

# SUPPLEMENTARY ENVIRONMENTAL INVESTIGATION AND POST-REMEDIAL MONITORING

# K19 Trutch Former Townsite, Alaska Highway, Northern BC

#### Submitted to:

Public Works and Government Services Canada Environmental Services, Pacific Region Suite 401 - 1230 Government Street Victoria, BC V8W 3X4

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# **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 57°43.908 north and longitude 122°56.564 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 (m³)	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 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**

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 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

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 57°43.908 north and longitude 122°56.564 west. The Site is located approximately 247 kilometres (km) north of Fort St. John (Figures 1 and 2).

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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.

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.

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 (m³)	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.





#### 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<sub>R</sub>). For the purposes of remediation, WL<sub>R</sub> 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  $\alpha$  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

ADEC/AEC	Borehole, Monitoring Well, Vapour Probes and Test Pit Locations					
APEC/AEC	Proposed Locations	Rationale				
	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)				
AEC 1B	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 m³). 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** 

				0	Groundwater Monitoring Well				Depth of
Location	Surveyed easting and northing		Surveyed elevation of ground surface Surveyed elevation of top of well casing		Depth of sand pack interval, measured at time of installation		Depth of well screen interval, measured at time of installation		end-of- borehole, measured at time of drilling
	(m; NAD83 UTM Z10N)		(m asl)		(m l	ogs)	(m bgs)		
	Easting	Easting Northing		(m asl)	Тор	Bottom	Тор	Bottom	(m bgs)
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** 

	Surveyed easting and northing		Surveyed	Surveyed	Soil Vapour Probe				
Location			elevation of ground surface	elevation of top of well	Depth of sand pack interval, measured at time of installation		Depth of well screen interval, measured at time of installation		
				casing	(m	bgs)	(m bgs)		
	(m; NAD83 UTM Z10N)		(m asl)	(m asl)	(				
	Easting	Northing	(III d3I)	(III asi)	Тор	Bottom	Тор	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 photoionisation 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-TF 18-03	2.6	Iron staining	No	0.0	0.5	-
K19-TF 18-04	2.6	No	No	0.1	0.5	-
K19-TP18-04	2.5	No	Slight	21.7	0.5	
K19-TI 10-05	2.6	Iron staining	No	1.3	2.6	-
K19-TP18-07	3.4	Iron staining	Yes	41.8	3.4	
K19-TF18-07	2.5	No	No	7.2	2.5	-
K19-TP18-09	2.5	No	No	1.2	2.5	-
K19-TP18-09	3.3			13.2	2.5	-
		No	Yes			
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 (°C)	рН	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.</li>
- 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).</p>

# 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<sub>R</sub>) 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<sub>R</sub> 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<sub>R</sub> 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<sub>R</sub> 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<sub>R</sub> 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<sub>R</sub> standards. Based on this data set, slightly less than 50% of samples analyzed were found to exceed CSR WL<sub>R</sub> 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 <sup>a</sup>	Min (mg/kg)	Mean (mg/kg)	90 <sup>th</sup> Percentile (mg/kg)	Max <sup>b</sup> (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 <sup>b</sup> )	11 (1)

#### Notes:

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

**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.



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.



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<sub>R</sub> 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<sub>R</sub>.

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<sub>R</sub> 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<sub>R</sub> 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<sub>R</sub> 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 guality.



### 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.** 

Alvaro Garrido, Ldo., Eurogeologist Environmental Scientist Ahmadreza Mehjoo, MSc, PEng, PMP Principal, Technical Director

AGH/AB/ARM/syd/lmk

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

								Alaska i	Highway, BC											
Location Sample Control Number Sample Date Depth of Sample (m bgs) Laboratory Report QA/QC	BC CSR Standards for WLR (< 3m)	BC CSR Standards for IL (> 3m)	K19-MW18-01 04301-07 2018-01-17 0.3-0.5 18N303338	K19-MW18-01 04301-09 2018-01-17 5.5-5.8 18N303338	K19-MW18-02 04302-01 2018-01-17 0.3-0.5 m 18V304890	K19-MW18-02 04302-03 2018-01-17 4.8-5.1 m 18V304890	K19-SV18-03 04302-10 2018-01-17 5.8-6.1 m 18V304890	K19-SV18-04 04302-12 2018-01-17 3.8-4.1 18V304890	K19-MW18-06 04303-04 2018-01-18 0.3-0.5 m 18V304890	K19-MW18-08 04304-09 2018-01-19 0.3-0.5 m 18N304491	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-SP18-02 D1 04313-06 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-02 D2 04313-07 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-02 D3 04313-08 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-02 D4 04313-09 2018-01-15 0.1-0.1 m 18N303359	K19-SP18-02 D5 04313-10 2018-01-15 0.1-0.1 m 18N303359
Field Parameters PID (ppm) Physical Tests			-	-	-	-	-	-	0.9	0.6	-	-	-	-	-	-	-	-	-	-
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 Antimony	20 HH	250000 DW 40 T	-	-	-	-	-	-	8800 0.3	9800 0.6	4890 0.8	5200 0.5	5200 0.5	5210 0.5	4760 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	<b>500</b> P4	500 P4	-	-	-	-	-	-	185	168	177	131	148	176	144	-	-	-	-	-
Beryllium	<b>1-500</b> AWF	1-500 AWF	-	-	-	-	-	-	0.4	0.5	0.4	0.3	0.4	0.3	0.3	-	-	-	-	-
Bismuth	1 - 50 AWF	4 50 000	-	-	-	-	-	-	< 0.5 0.11	< 0.5 0.34	< 0.5 0.90	< 0.5 0.48	< 0.5 0.46	< 0.5 0.46	< 0.5 0.61	-	-	-	-	-
Cadmium Calcium	<b>1 - 50</b> AWF	1 - 50 AWF		-	-	-	-	-	2030	9540	75300	76000	82300	85000	80000	_	-	-	_	
Chromium	<b>60</b> 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	<b>100-7500</b> 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	<b>120</b> INT	150-8500 DW	-	-	-	-	-	-	12.4	25.7	8.8	5.2	6.7	5.7	5.9	-	-	-	-	-
Lithium	<b>65</b> 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 25 INT	2000 T 75 INT	-	-	-	-	-	-	83	171	463 0.06	335	557	445	437 0.03	-	-	-	-	-
Mercury Molybdenum	15 DW	75 INT		-	-	-	-	-	0.02 1.2	0.04 1.8	2.6	0.03 2.0	0.02 2.7	0.03 2.4	3.2	_	-	-	_	_
Nickel	70-300 DW	70-300 DW	_	-	-	-	-	<u>-</u>	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	<b>4</b> P4	4 P4	-	-	-	-	-	-	0.2	0.6	8.0	0.7	0.5	0.6	0.7	-	-	-	-	-
Silver	<b>20</b> EH	40 EH	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-
Sodium	<b>200</b> TOX	1000 TOX	-	-	-	-	-	-	60	54	115	80	79	89	77	-	-	-	-	-
Strontium	<b>20000</b> 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	<b>50</b> EH	300 EH	-	-	-	-	-	-	0.4	0.8	0.3	0.3	0.3	0.3	0.3	-	-	-	-	-
Titanium	30 DW	30 DW		-	-	-	-	-	63 0.5	35 1.0	136 1.6	166 1.1	145 1.2	189 1.2	202 1.5	-	-	-	-	-
Uranium Vanadium	100 DW	100 DW		-	-	-	-	-	0.5 37	37	30	1.1	20	22	1.5 10	-	-	-	_	
Zinc	150-3000 AWF	150-3000 AWF		-	-	-	-	-	41	58	83	64	72	65	84	-	-	-	-	-
Zirconium	7441	100 0000 AWI	_	-	-	_	_	_	0.6	0.4	5.1	3.0	3.2	3.8	3.3	_	-	_	_	_
			I								٥									

#### 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.

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

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

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

		•				AI	aska nigilway,	ьс										
Location Sample Control Number Sample Date Depth of Sample (m bgs) Laboratory Report QA/QC	BC CSR Standards for WLR (< 3m)	BC CSR Standards for IL (> 3m)	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 Acenaphthylene Anthracene Benzo(a)anthracene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Benzo(k)fluoranthene Benzo(k)fluoranthene Benzo(k)fluoranthene Chrysene Dibenzo(a,h)anthracene Fluoranthene	2000 HH  2.5 TOX 1 EH 10 INT  1 EH 400 HH 1 EH 50 TOX	15000 HH  30 TO) 10 EH 50 INT  10 EH 4500 HH 10 EH 200 TO)	< 0.03 < 0.03 0.04 0.18 < 0.02 < 0.02 0.10 0.006	< 0.05 < 0.05 < 0.004 < 0.03 < 0.03 0.10 < 0.02 < 0.02 0.05 < 0.005 0.02	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.01	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.01	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.02 < 0.05 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.01	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.02 < 0.05 < 0.005 < 0.005 < 0.005	< 0.05 < 0.05 < 0.004 < 0.03 < 0.03 0.04 0.15 < 0.02 < 0.02 0.08 0.005 0.003	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.002 < 0.05 < 0.002 < 0.05 < 0.01	< 0.005 < 0.005 < 0.004 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 < 0.02 < 0.05 < 0.02 < 0.05 < 0.02 < 0.05 < 0.005 < 0.005	< 0.005 < 0.005 < 0.004 < 0.03 < 0.03 0.06 0.10 < 0.02 < 0.02 < 0.09 < 0.005 0.02
Benzo(a)pyrene Total Potency Equivalence (TPE)	<b>50</b> 10X	200 107	< 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 Fluorene Indeno(1,2,3-c,d)pyrene Index of Additive Cancer Risk (IACR) Naphthalene Phenanthrene Pyrene Quinoline 1-methylnaphthalene 2-methylnaphthalene EPH (C10-C19) EPH (C19-C32) VPHs	1	10 EH 9500 HH 10 EH 20 TO) 50 EH 100 HH 1000 HH 950 HH	< 0.02 < 0.6	< 0.05 0.12 < 0.02 < 0.6 0.74 0.30 0.04 < 0.5 0.77 1.08 67 65 37	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 0.005	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 0.005	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 20.005 < 20 < 20 -	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 0.005 - 0.005 < 0.005 - 0.00	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 20 < 20	< 0.05 0.19 < 0.02 < 0.6 1.18 0.50 0.06 < 0.5 1.51 2.18 130 104 70	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 0.03 < 0.01 < 0.05 0.009 0.009 33 51 < 10	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 1.005 < 0.005 < 1.005 < 1.005 < 1.005 < 1.005 < 1.005 < 1.005 < 1.005 < 1.005	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 0.005 < 1.005 < 20 < 20 < 10	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.002 < 0.01 < 0.005 < 0.005 < 0.005 < 0.005 < 1.005 < 0.005 < 1.005 < 1.005 < 1.005	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 0.005 < 1.005 < 0.005 < 1.005 < 1.005 < 1.005	< 0.05 < 0.02 < 0.02 < 0.6 0.005 0.03 < 0.01 < 0.05 0.007 0.008 38 51 < 10	< 0.05 < 0.02 < 0.02 < 0.6 < 0.005 < 0.02 < 0.01 < 0.05 < 0.005 < 0.005 < 1.005 < 0.009 33 228 < 10	0.06 < 0.02 < 0.02 0.6 < 0.005 0.12 0.03 < 0.05 0.032 0.022 54 86 < 10
BTEX Benzene Toluene Ethylbenzene o-Xylene m,p-Xylenes Xylenes, Total Styrene Methyl tert-Butyl Ether (MTBE)	0.035 DW AWF DW 5 EH 8000 EH	0.035 DW 0.5 AWI 15 DW 6.5 DW 50 EH 20000 HH	0.36 0.49 0.68 1.37 2.1 < 0.05	< 0.02 0.41 0.40 0.55 1.09 1.6 < 0.05 < 0.1	- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	< 0.02 0.16 0.51 0.69 1.51 2.2 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.01 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.01 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 0.1	< 0.02 < 0.05 < 0.05 < 0.05 < 0.05 < 0.1 < 0.05 < 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.

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

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

#### 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	НН			< 0.5
Bromodichloromethane (BDCM)	200	HH	550	НН	< 0.05
Bromomethane (Methyl bromide)	45	HH	300	HH	< 0.05
Bromoform (Tribromomethane)	650	HH	4000	HH	< 0.05
2-Butanone	20000	HH	4000		< 0.5
Carbon Tetrachloride	5	EH	50	EH	< 0.02
Chlorobenzene	1	EH	10	EH	< 0.05
Chloroethane		LII	10	LII	< 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	НН			< 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	НН			< 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), fresh 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.

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#### Results of January 2018 Supplementary Investigation **Groundwater Analyses - Dissolved Metals Anions** K19 - Trutch Former Townsite

Alaska Highway, BC

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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)	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			0.0	76900	110000	60600	59500	51600	31500	30600	124000	332000	62900	57800	92600	82800	47900
	FO		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
Chromium	50				_						i		=				
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	1	75 H	4	5	4	3	5	6	< 2	8	14	< 2	< 2	< 2	5	2
Zirconium	3000		7.5	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:				0.2	- 0.1	- 0.1	- U. I	- 0.1	- U. I	- 0.1	0.1	- 0.1	- 0.1	- 0.1	· U. I	- 0.1	- 0.1

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

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.

Exceeds CSR DW standard Exceeds CSR AW-F standard

#### Results of January 2018 Supplementary Investigation **Groundwater Analyses - Dissolved Metals Anions** K19 - Trutch Former Townsite

Alaska Highway, BC

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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					0.75	4.5	4.5	4.50	4.40	0.70		4.05	0.00		0.04	0.04	0.04	5.70
Dissolved Oxygen Conductivity (μS/cm)					0.75 574.4	1.5 838.1	1.5 838.1	1.56 856.9	1.19 870.4	2.73 731.2	1004	4.95 989	0.89 630.5	-	3.31 698.0	3.31 698.0	6.01 768.3	5.72 720.6
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	8.0	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	Н	< 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	Н	< 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	ļ				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	Н	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	Н	< 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 	0500	_	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		4000		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	00	_	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		75	L	< 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	Н	< 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

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

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.

Exceeds CSR DW standard Exceeds CSR AW-F standard

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

					7.43												
Location Sample Control Number Laboratory ID Date Sampled QA/QC	BC CSR Standards for Drinking Water	BC CSR Standards for Aquatic Life (Fresh Water)	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	K19-MW17-32 04310-01 18N303317 14-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	< 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	000	120	< 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
	00	200	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
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	7	` 1	` 1	` 1	`	` 1	` 1	`	` 1	` 1	` 1	` 1	` 1	<b>^</b> I	` 1

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

- Tickle Opiniotic Variables, i P = Tickle Opiniotic
 - Less than the laboratory method detection limit; (-) = Parameter not analyzed Italics - indicates that the detection limit exceeds one or more criteria.

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

Exceeds CSR DW standar Exceeds CSR AW-F standard

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

							giiway, 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)	K19-MW17-35D 04310-04 8 18N303317 2 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	<u>  L</u>	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	<u>  L</u>	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	- 30	<b>└</b>	:=-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	< 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	_   <b> </b> -	34000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
inically to reducy Land (INTDL)	30		34000	•	•	•	•	•	•	•	•	•	•	•	•	•	

#### 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

FDA = Field Duplicate Available; FD = Field Duplicate

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

!talics - 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

Exceede CSP DW standar.

Exceeds CSR DW standar Exceeds CSR AW-F standard

#### 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-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-MW17-06 04309-03 18N303317 13-Jan-18	K19-MW17-10 04309-04 18N303317 14-Jan-18	K19-MW17-29D 04310-03 18N303317 16-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
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:					I									

#### 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

#### 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 Wate	r) 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			<del></del>	< 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.

Exceeds CSR DW standard 2.5 Exceeds CSR AW-F standard

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

Alaska Highliay, 50										
Location		K19-MW18-02		K19-SV18-03		K19-SV18-03		K19-SV18-04		
Sample Control Number	CSR <sup>1</sup>	04316-02		04316-03		04316-04		04316-01		
•		Summa canister			canister		canister	Summa	canister	
Sampling Method										
Sample Depth (m bgs)		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 (%)			5.3		.5		.5	14.6		
Oxygen (%)			.1	14.8		14.8		0.15		
Helium breakthrough (%)		0	.7		-	-			-	
		Outdoor Air	Daw Jahawatam	Outdoor Air	Raw laboratory	Outdoor Air	Raw laboratory	Outdoor Air	Raw laboratory	
		Result *	Raw laboratory data**	Outdoor Air Result *	data**	Outdoor Air Result *	data**	Result *	data**	
Attenuation Factor Applied (α)		6.1E-07	Gutu	6.1E-07	uutu	6.1E-07	Guta	9.2E-07	uutu	
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				5.52 55	0.00			2.02.00		
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	400	4.0E-06	6.6	2.3E-06	3.7	2.4E-06	4.0	7.5E-06	8.1	
Xylenes, Total  Volatile Organic Compounds (VOCs)	100	4.9E-06	< 8.0	3.7E-06	6.1	3.4E-06	5.6	7.5E-06	8.1	
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) 1,2-dichlorobenzene	0.5 200	3.7E-06 6.1E-06	< 6.0 < 10.0	9.2E-07 1.5E-06	<1.5 <2.5	9.2E-07 1.5E-06	<1.5 <2.5	5.5E-06 9.2E-06	< 6.0 < 10.0	
1,3-dichlorobenzene	60	6.1E-06	< 10.0	1.5E-06	<2.5 <2.5	1.5E-06	<2.5 <2.5	9.2E-06 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 1,3-dichloropropene (Cis)		4.9E-06 2.4E-06	< 8.0 < 4.0	1.2E-06 6.1E-07	<2.0 <1.0	1.2E-06 6.1E-07	<2.0 <1.0	7.4E-06 3.7E-06	< 8.0 < 4.0	
1,3-dichloropropene (Cis) 1,3-dichloropropene (Trans)		2.4E-06 2.4E-06	< 4.0 < 4.0	6.1E-07 6.1E-07	<1.0 <1.0	6.1E-07 6.1E-07	<1.0 <1.0	3.7E-06 3.7E-06	< 4.0 < 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 3000	3.1E-05	50	1.7E-06	2.8	1.0E-06	1.7	4.3E-06	4.7	
4-Methyl-2-pentanone Tetrachloroethylene (PCE/PERC)	40	4.9E-06 1.2E-05	< 8.0 20	1.2E-06 1.3E-06	<2.0 2.1	1.2E-06 6.7E-06	<2.0 11	7.4E-06 1.6E-05	< 8.0 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 9.2E-07	<1.5	9.2E-07 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	

**Golder Associates** 

### Notes

All values are in  $\mu g/m^3$  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.

Applied attenuation factors ( $\alpha$ ) 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

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

Alaska Highway, BC										
Location	K19-MW18-07			K19-M	W18-10	K19-S	V18-05	K19-MW18-01		
Sample Control Number	CSR <sup>1</sup>				16-07	043	16-06	043	20-03	
Sampling Method		0			Summa canister		canister	Summa canister		
Sample Depth (m bgs)		2.7	-2.85	2.5-	-2.65	1.1	5-1.3	3.5	-3.65	
Date Sampled	RL		an-18		an-18		an-18	22-Jan-18		
QA/QC	KL	RL 21-Jan-10			21 04.1 10		21-3411-10		22 0411 10	
Field Screening Organic Vapour (ppm)		1	1.6	1	.8	F	5.2		).1	
Methane (%)	0				0	0.6		0.1		
Carbon Dioxide (%)			19	18	8.9	2.8		19.5		
Oxygen (%)			0.6		.3	3.8		0		
Helium breakthrough (%)		13.9		15.7		5.5			0	
		Outdoor Air Raw laboratory								
Attenuation Factor Applied (α)		<b>Result *</b> 9.2E-07	data**	<b>Result *</b> 9.2E-07	data**	<b>Result *</b> 1.5E-06	data**	<b>Result *</b> 6.1E-07	data**	
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	400	1.4E-05	< 15.0	1.4E-05	< 15.0	5.3E-05	35	9.2E-07	< 1.5	
Xylenes, Total Volatile Organic Compounds (VOCs)	100	1.8E-05	< 20.0	1.8E-05	< 20.0	6.2E-05	41	1.2E-06	< 2.0	
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 Chloroethane	10000	9.2E-06 9.2E-06	< 10.0 < 10.0	9.2E-06 9.2E-06	< 10.0 < 10.0	1.5E-05 1.5E-05	< 10.0 < 10.0	6.1E-07 6.1E-07	< 1.0 < 1.0	
Chloroform	100	9.2E-06 9.2E-06	< 10.0	9.2E-06 9.2E-06	< 10.0 < 10.0	1.5E-05 1.5E-05	< 10.0	6.1E-07 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 1,3-dichlorobenzene	200 60	2.3E-05 2.3E-05	< 25.0 < 25.0	2.3E-05 2.3E-05	< 25.0 < 25.0	3.8E-05 3.8E-05	< 25.0 < 25.0	1.5E-06 1.5E-06	< 2.5 < 2.5	
1,4-dichlorobenzene	800	2.3E-05	< 25.0	2.3E-05	< 25.0 < 25.0	3.8E-05	< 25.0 < 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 60	7.4E-06	< 8.00 < 8.00	7.4E-06	< 8.00 < 8.00	1.2E-05	< 8.00 < 8.00	4.9E-07	< 0.80 < 0.80	
1,2-dichloroethylene (Trans) (1,2-dichloroethene) 1,2-dichloropropane (Propylene Dichloride)	4	7.4E-06 1.8E-05	< 8.00 < 20.0	7.4E-06 1.8E-05	< 8.00 < 20.0	1.2E-05 3.0E-05	< 8.00 < 20.0	4.9E-07 1.2E-06	< 0.80	
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	40	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 30000	1.4E-05	< 15.0	1.4E-05	< 15.0	2.3E-05	< 15.0	9.2E-07	< 1.5	
Freon 113 2-Hexanone	30000	1.4E-05 1.8E-05	< 15.0 < 20.0	1.4E-05 1.8E-05	< 15.0 < 20.0	2.3E-05 3.0E-05	< 15.0 < 20.0	9.2E-07 1.2E-06	< 1.5 < 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 700	1.5E-04	160	1.9E-04	210	2.0E-05	< 13.0	7.9E-07	< 1.3	
n-Hexane 4-Methyl-2-pentanone	3000	1.0E-04 1.8E-05	110 < 20.0	2.9E-04 1.8E-05	310 < 20.0	3.2E-05 3.0E-05	21 < 20.0	2.8E-06 1.2E-06	4.6 < 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)	700	9.2E-06	< 10.0 < 23.0	9.2E-06	< 10.0 < 23.0	1.5E-05	< 10.0 < 23.0	6.1E-07	< 1.0 < 2.3	
Trichlorofluoromethane (Freon 11) Vinyl Bromide	1	2.1E-05 7.4E-06	< 23.0 < 8.00	2.1E-05 7.4E-06	< 23.0 < 8.00	3.5E-05 1.2E-05	< 23.0 < 8.00	1.4E-06 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	
		J 00		5 2 00		0.02 00		22 07	30	

### Notes

All values are in µg/m³ 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 ( $\alpha$ ) obtained from Table 1 of BC Ministry of Environment Protocol #22 - Application of Vapour Attenuation Factors to Characterize Vapour Contamination (Effective 1 November 2017).

ppm - parts per million

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

AVailable; FD = Field Duplicate

VPHv = Volatile petroleum hydrocarbons, carbon range 6-13

<sup>\*</sup> Compared to vapour standards.

 $<sup>^{\</sup>star\star}$  Raw laboratory data (without attenuation) are shown for reference only and are not compared to the vapour standards.

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

			Aid	iska Highway, Bo	•					
Location	K19MW18-08		K19-M	W18-09		K19-SV18-14	K19-SV18-17			
Sample Control Number	CSR <sup>1</sup> 04320-01		0433	04320-02		04320-04		04323-01		
Sampling Method	Standards	0011		Summa canister			Summa canister	r	Summa	a canister
Sample Depth (m bgs)	for 2.2-2.35		2.6-2.85			1.2-1.35		3.2	2-3.35	
Date Sampled	RL				an-18		24-Jan-18			Jan-18
QA/QC										
Field Screening										
Organic Vapour (ppm)		1	1.1	C	0.2		0.3			0.1
Methane (%)			0	0.1		0			0	
Carbon Dioxide (%) Oxygen (%)	20.8 0.8		19.9 0		21 0.7			21.4 0.7		
Helium breakthrough (%)			).6	0.4		0.7			0	
						0.5				
Attenuation Factor Applied (α)		Outdoor Air Result * 9.2E-07	Raw laboratory data**	Outdoor Air Result * 9.2E-07	Raw laboratory data**	Indoor Air Result * 2.8E-03	Outdoor Air Result * 1.50E-06	Raw laboratory data**	Outdoor Air Result * 6.1E-07	Raw laboratory data**
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 55 02	0.0000	5.5	3.1E-07	< 0.50
Benzene Toluene	5000	2.9E-06 2.4E-06	2.6	7.5E-07 7.4E-07	< 0.82	1.5E-02 3.9E-02	0.0000	5.5 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 Xylenes, Total	100	1.7E-06 2.9E-06	1.9 3.1	1.4E-06 1.8E-06	< 1.5 < 2.0	2.8E-02 4.5E-02	0.0000 0.0000	10 16	9.2E-07 1.2E-06	< 1.5 < 2.0
Volatile Organic Compounds (VOCs)	100	2.52-00	0.1	1.02-00	12.0	4.0L-02	0.0000	10	1.22-00	12.0
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 Carbon Tetrachloride	1.5	9.2E-07 1.8E-06	< 1.0 < 2.0	9.2E-07 1.8E-06	< 1.0 < 2.0	2.8E-03 5.6E-03	0.0000 0.0000	< 1.0 < 2.0	6.1E-07 1.2E-06	< 1.0 < 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) Dibromochloromethane (DBCM)	600 40	9.2E-07 1.8E-06	< 1.0 < 2.0	9.2E-07 1.8E-06	< 1.0 < 2.0	3.1E-03 5.6E-03	0.0000 0.0000	1.1 < 2.0	6.1E-07 1.2E-06	< 1.0 < 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) 1,1-dichloroethane	100 500	2.7E-06 1.1E-06	2.9 < 1.2	2.7E-06 1.1E-06	2.9 < 1.2	1.1E-02 3.4E-03	0.0000 0.0000	4.0 < 1.2	1.9E-06 7.3E-07	3.1 < 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) 2,2-Dichloropropane	4	1.8E-06 1.8E-06	< 2.0 < 2.0	1.8E-06 1.8E-06	< 2.0 < 2.0	5.6E-03 5.6E-03	0.0000	< 2.0 < 2.0	1.2E-06 1.2E-06	< 2.0 < 2.0
1,3-dichloropropane (Cis)		9.2E-07	< 1.0	9.2E-07	< 1.0	2.8E-03	0.0000	< 1.0	1.2E-06 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 30000	1.4E-06	< 1.5	1.4E-06	< 1.5	4.2E-03	0.0000	< 1.5	9.2E-07	< 1.5
Freon 113 2-Hexanone	30000	1.4E-06 1.8E-06	< 1.5 < 2.0	1.4E-06 1.8E-06	< 1.5 < 2.0	4.2E-03 5.6E-03	0.0000 0.0000	< 1.5 < 2.0	9.2E-07 1.2E-06	< 1.5 < 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 700	2.9E-05 4.1E-05	32	1.4E-06 2.9E-06	1.5	9.5E-02	0.0001 0.0000	34	7.9E-07 3.1E-06	< 1.3
n-Hexane 4-Methyl-2-pentanone	3000	4.1E-05 1.8E-06	45 < 2.0	2.9E-06 1.8E-06	3.1 < 2.0	3.4E-02 5.6E-03	0.0000	12 < 2.0	3.1E-06 1.2E-06	5.1 < 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 0.5	1.5E-06 1.5E-06	< 1.6	1.5E-06 1.5E-06	< 1.6	4.5E-03 4.5E-03	0.0000 0.0000	< 1.6 < 1.6	9.8E-07 9.8E-07	< 1.6 < 1.6
1,1,2-trichloroethane Trichloroethylene (TCE)	2	9.2E-07	< 1.6 < 1.0	9.2E-07	< 1.6 < 1.0	4.5E-03 2.8E-03	0.0000	< 1.0	9.8E-07 6.1E-07	< 1.6
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

All values are in μg/m³ 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

Land Use abbreviations: RL (Agricultural, Urban Park, Residential) Applied attenuation factors ( $\alpha$ ) obtained from Table 1 of BC Ministry of Environment Protocol #22 - Application of Vapour Attenuation Factors to

ppm - parts per million

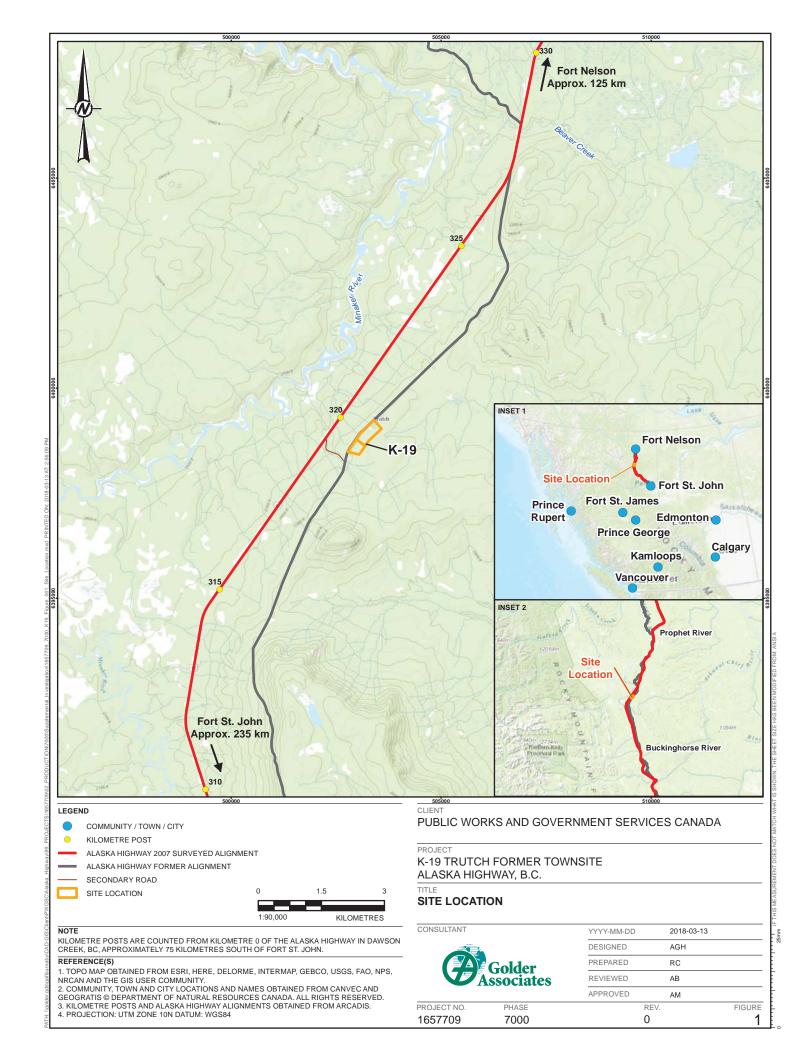
of 13 February 2018.

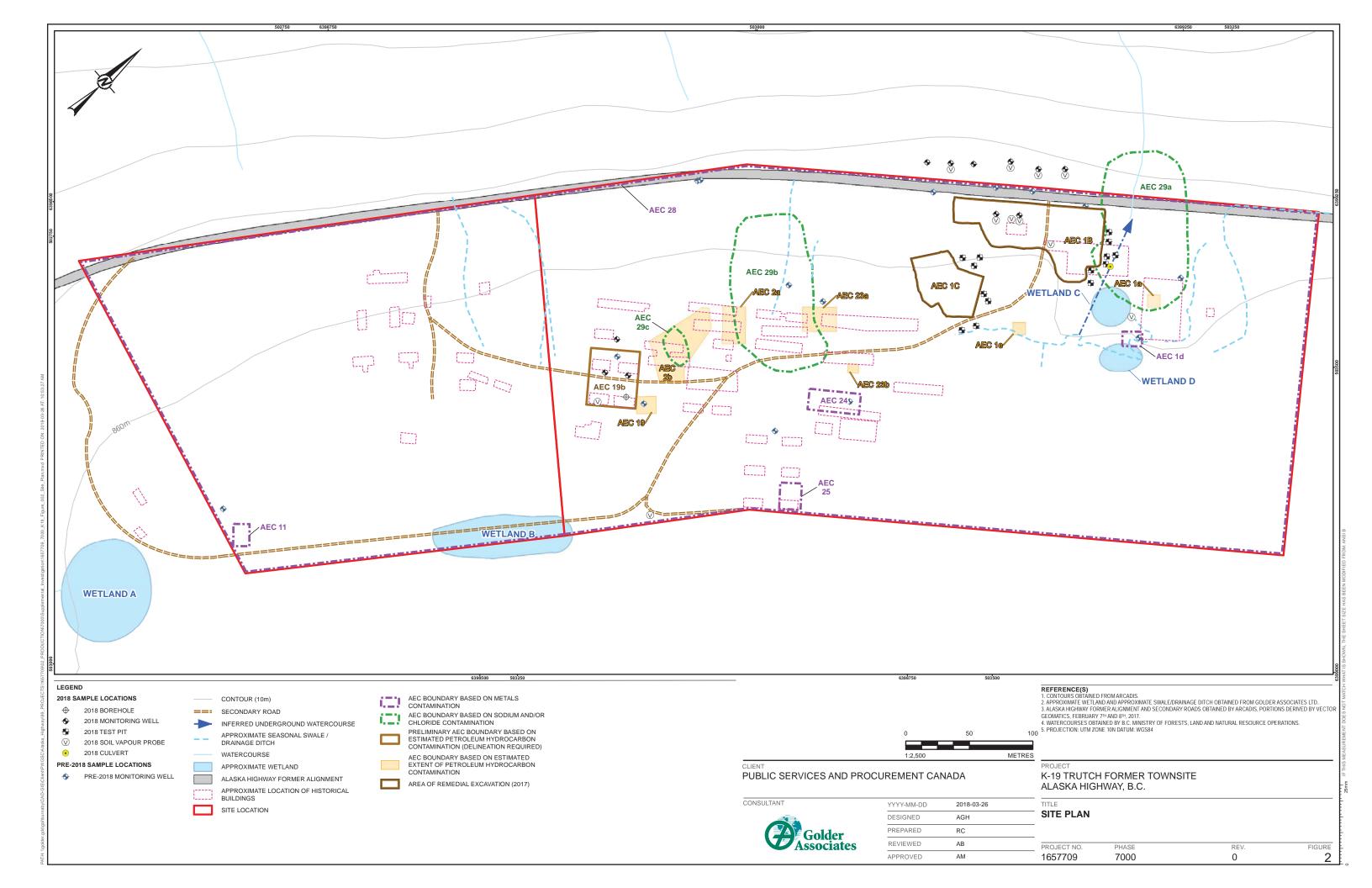
QA/QC = Quality Assurance / Quality Control; FDA = Field Duplicate Available; FD = Field Duplicate

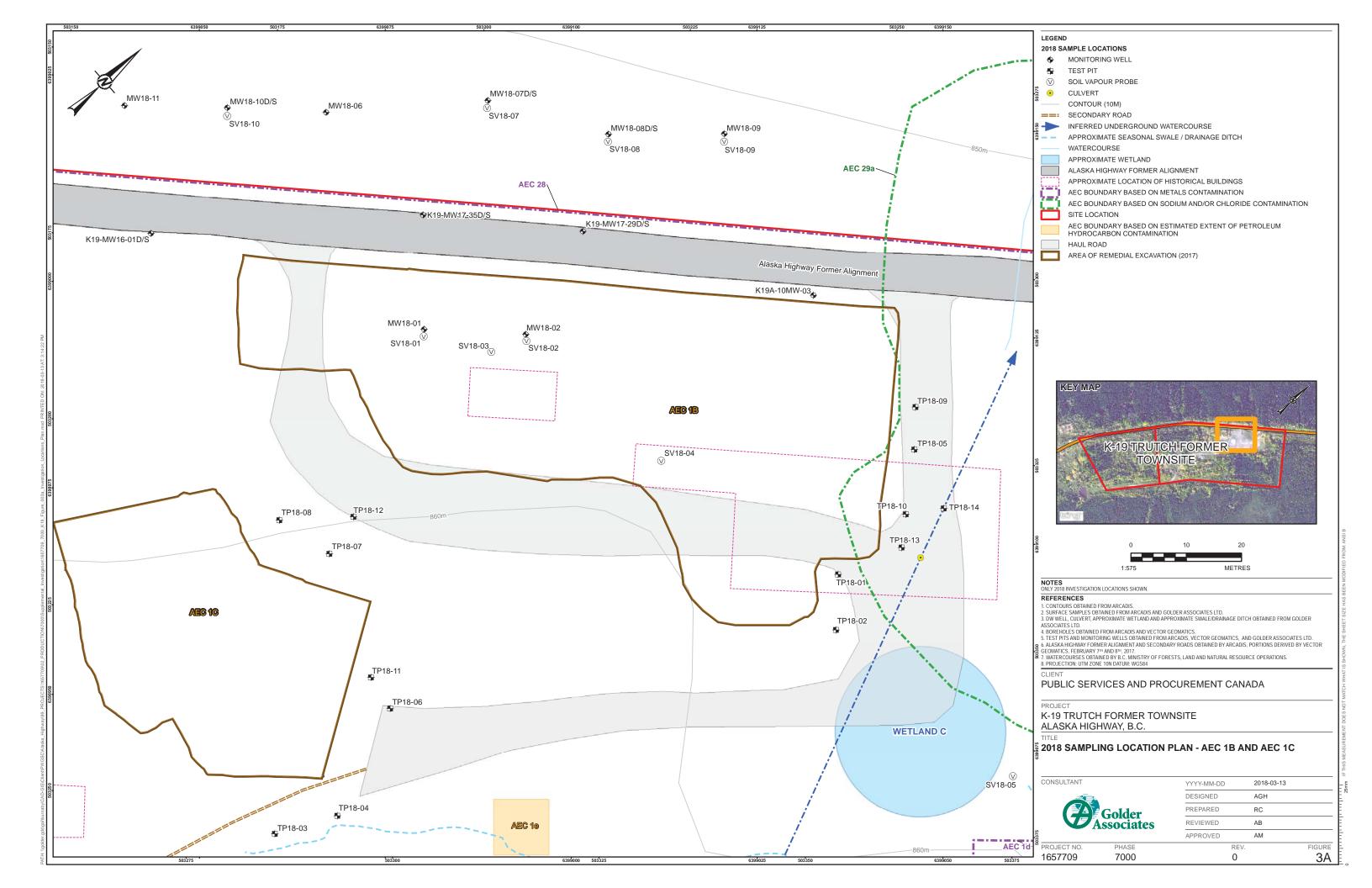
VPHv = Volatile petroleum hydrocarbons, carbon range 6-13

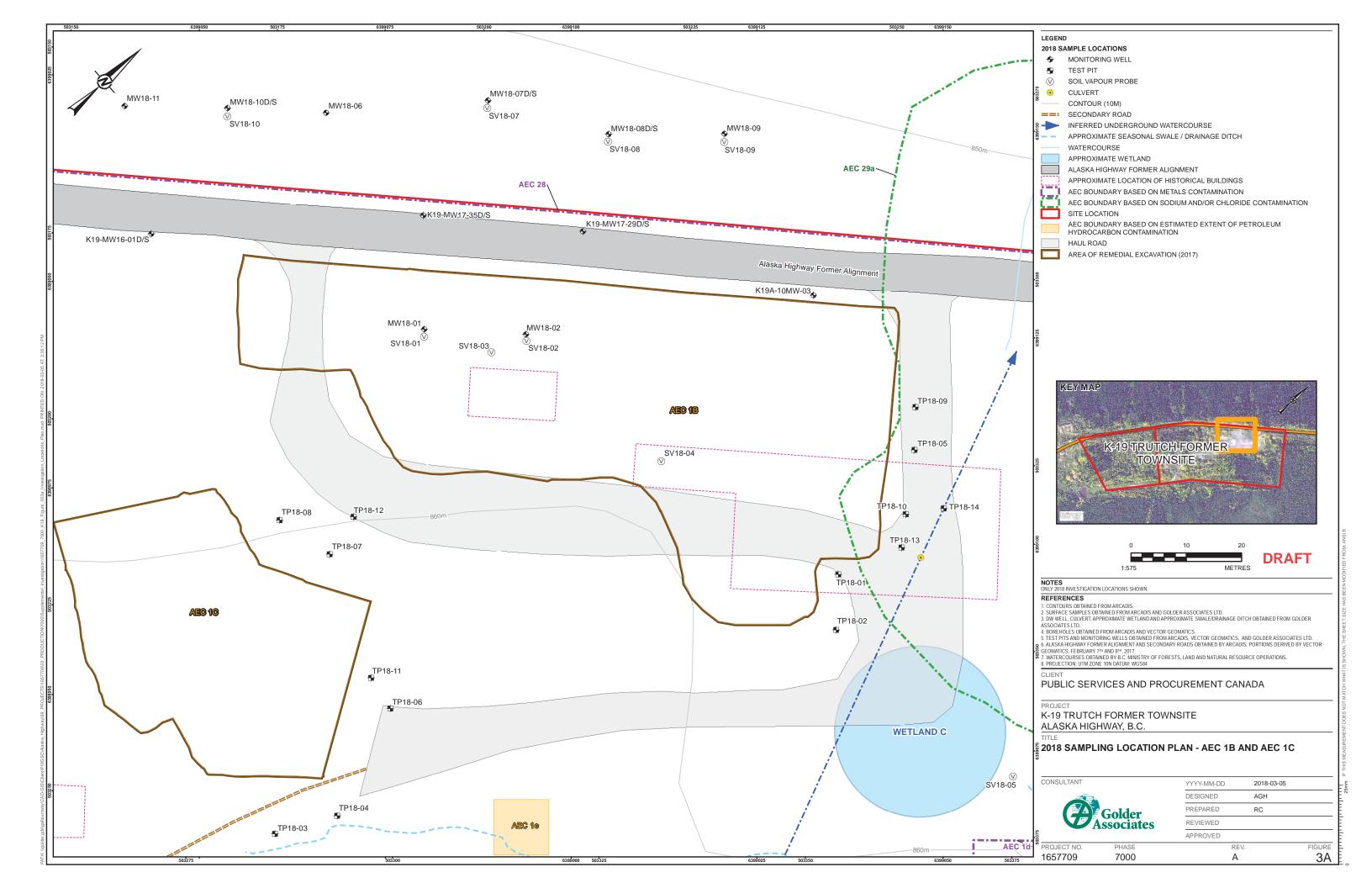
Characterize Vapour Contamination (Effective 1 November 2017).  $^{\star}$  Compared to vapour standards.

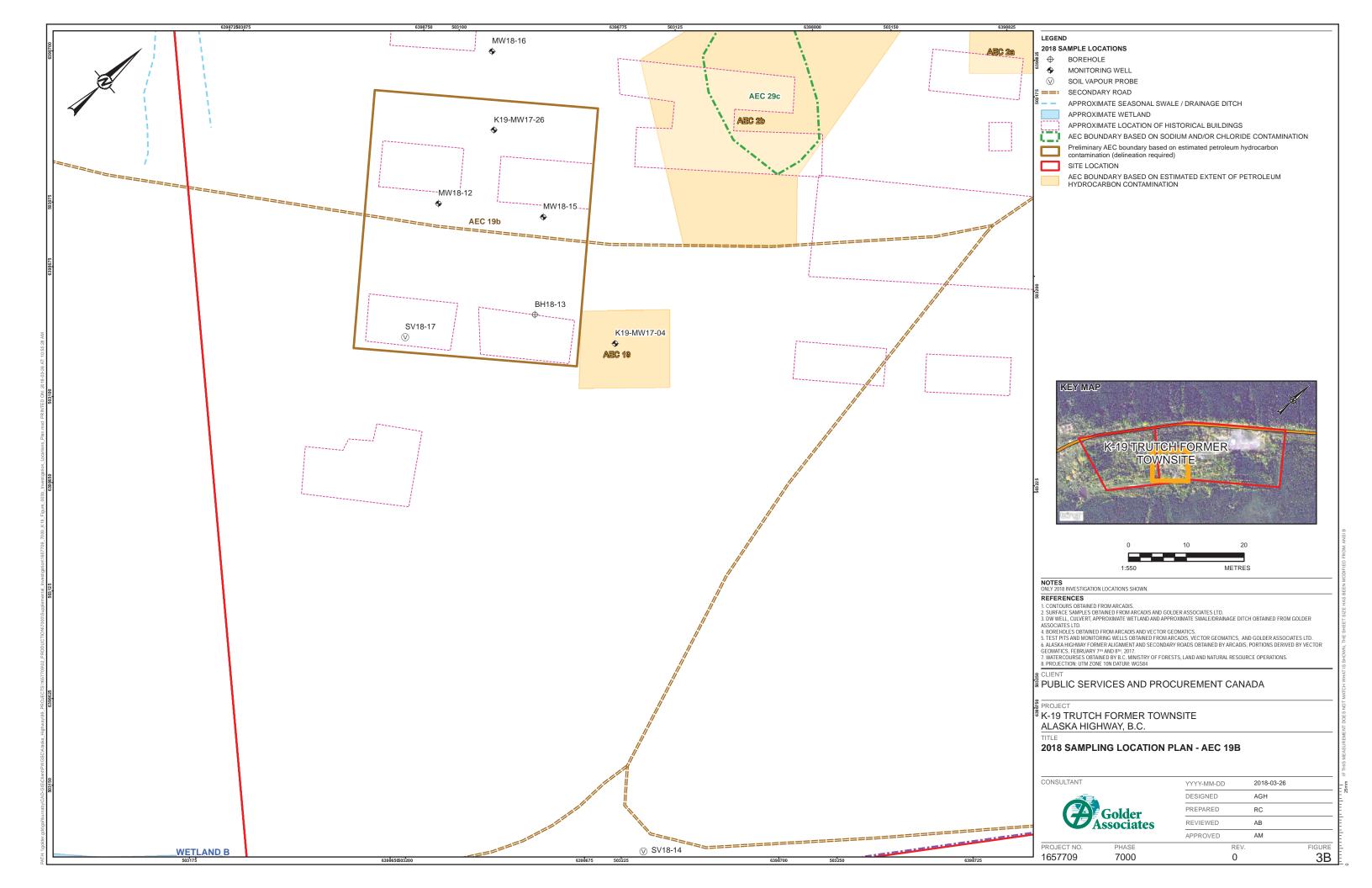
<sup>\*\*</sup> Raw laboratory data (without attenuation) are shown for reference only and are not compared to the vapour standards.

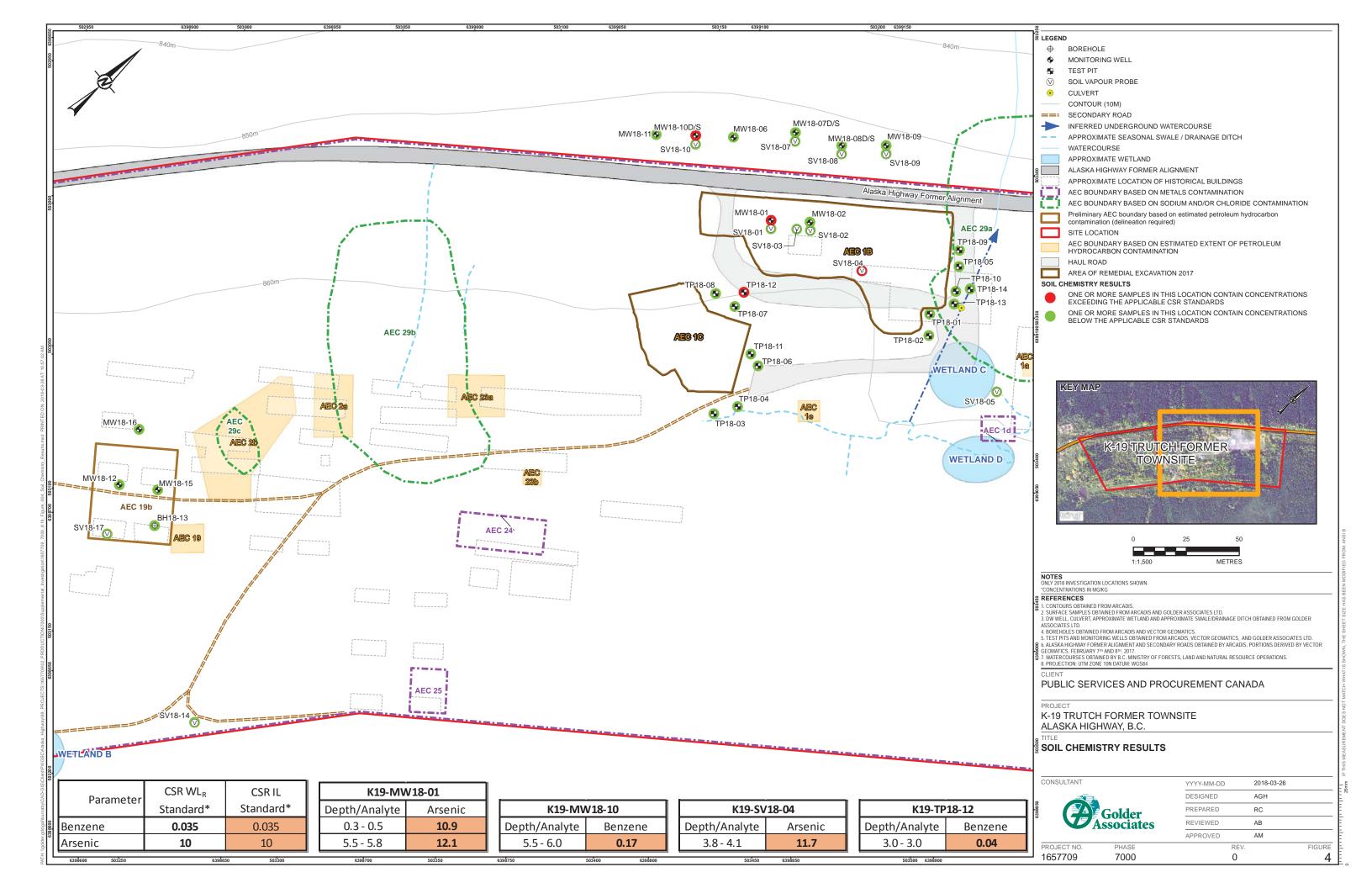


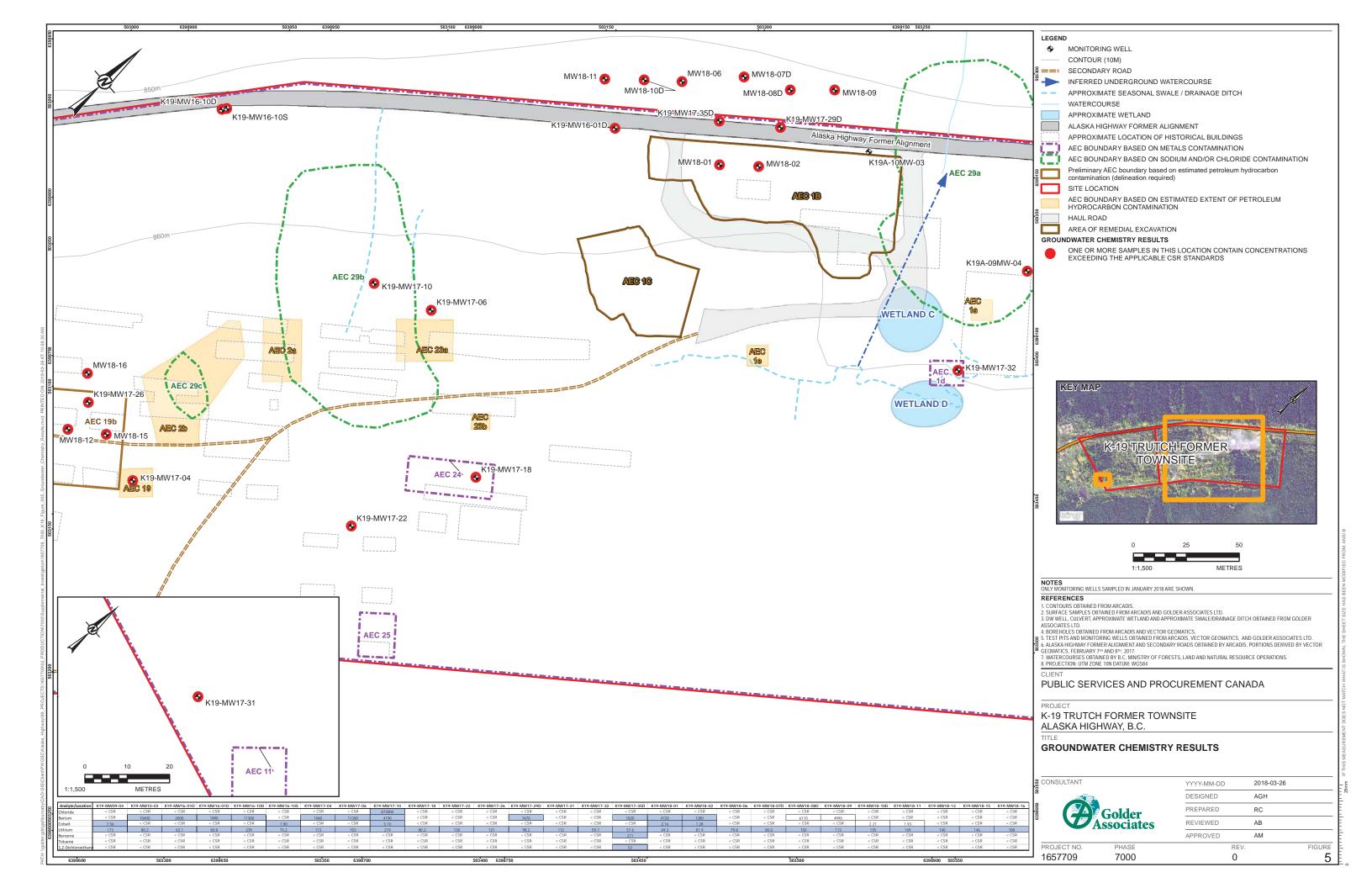


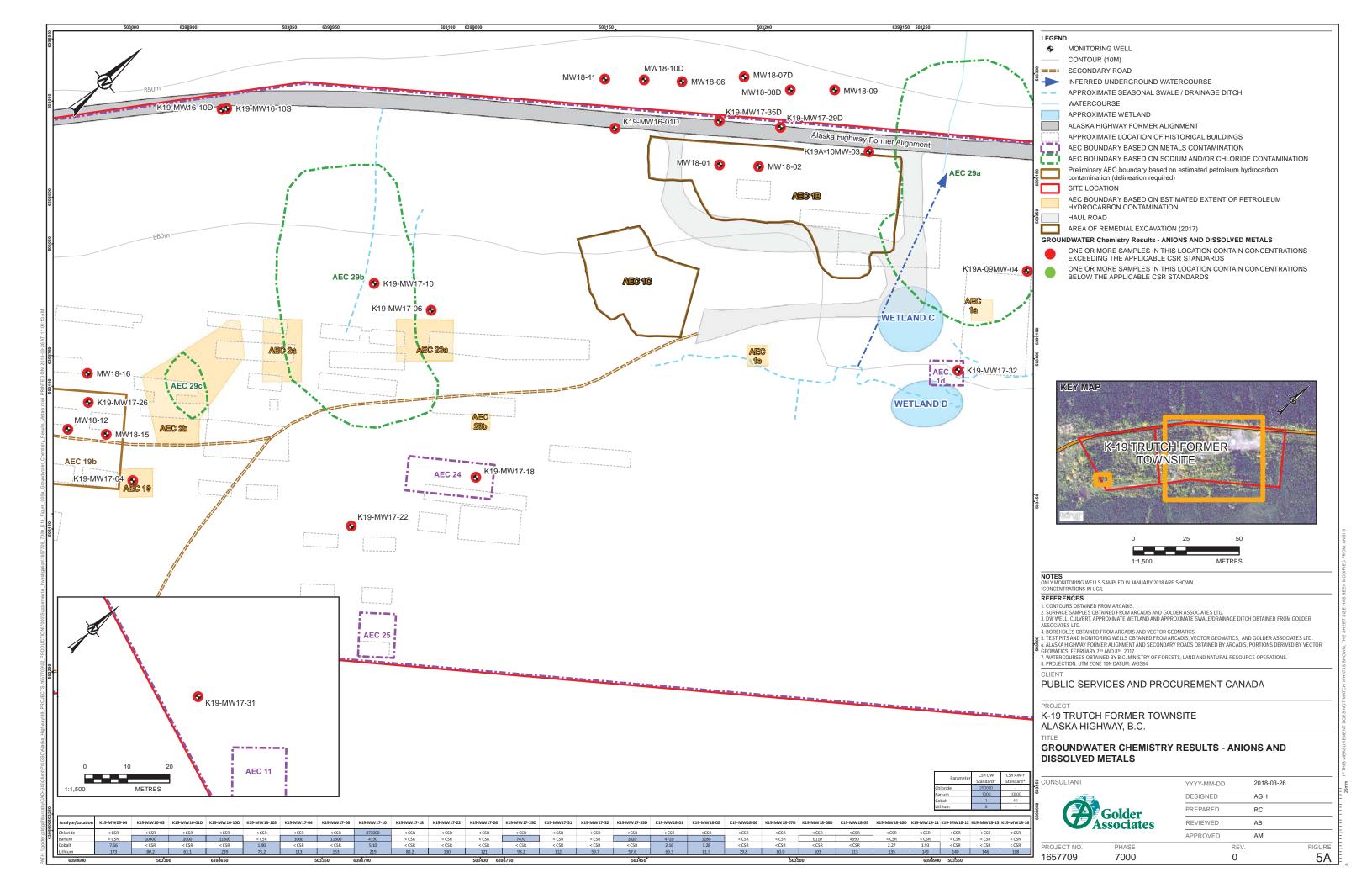


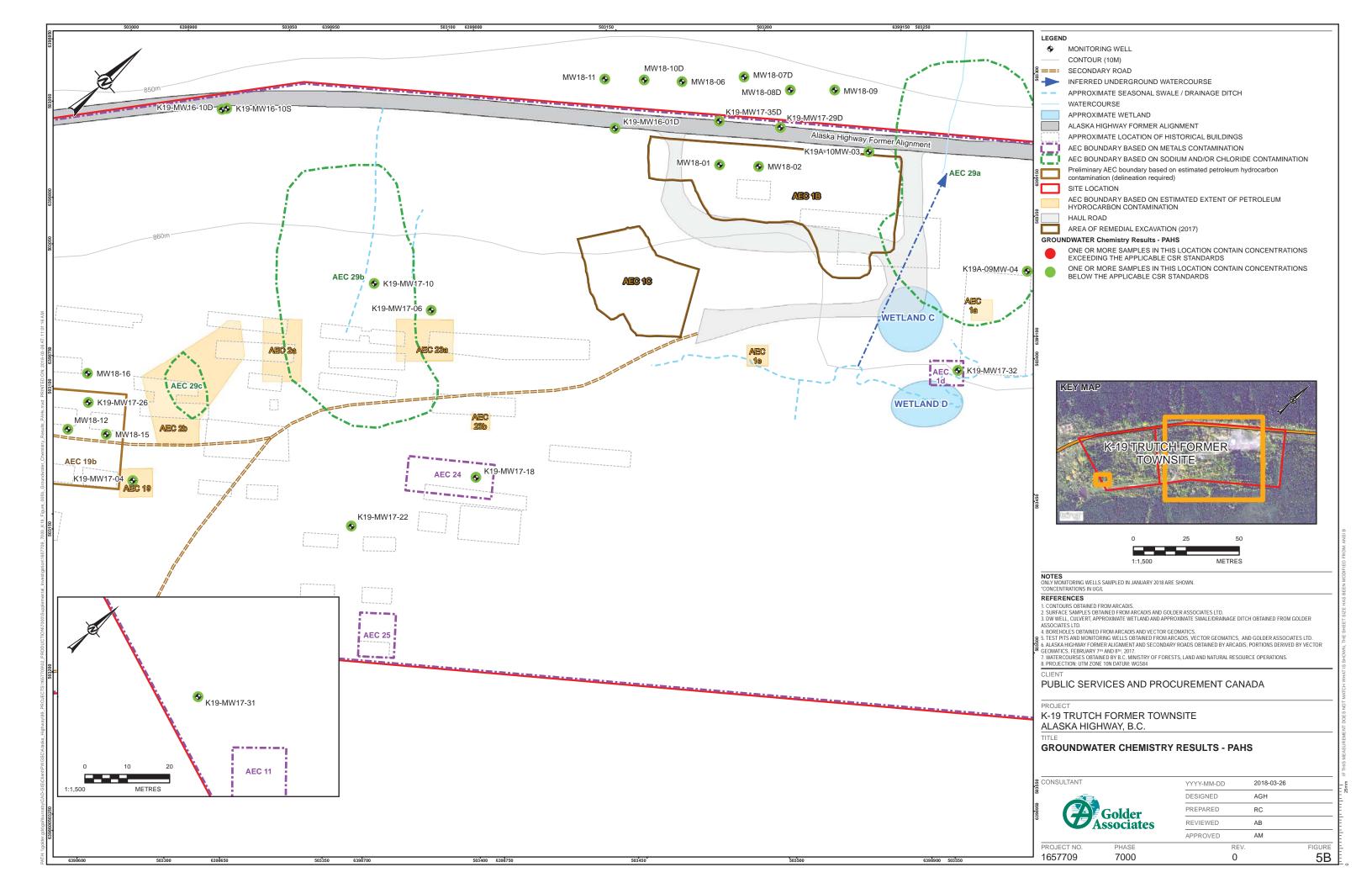


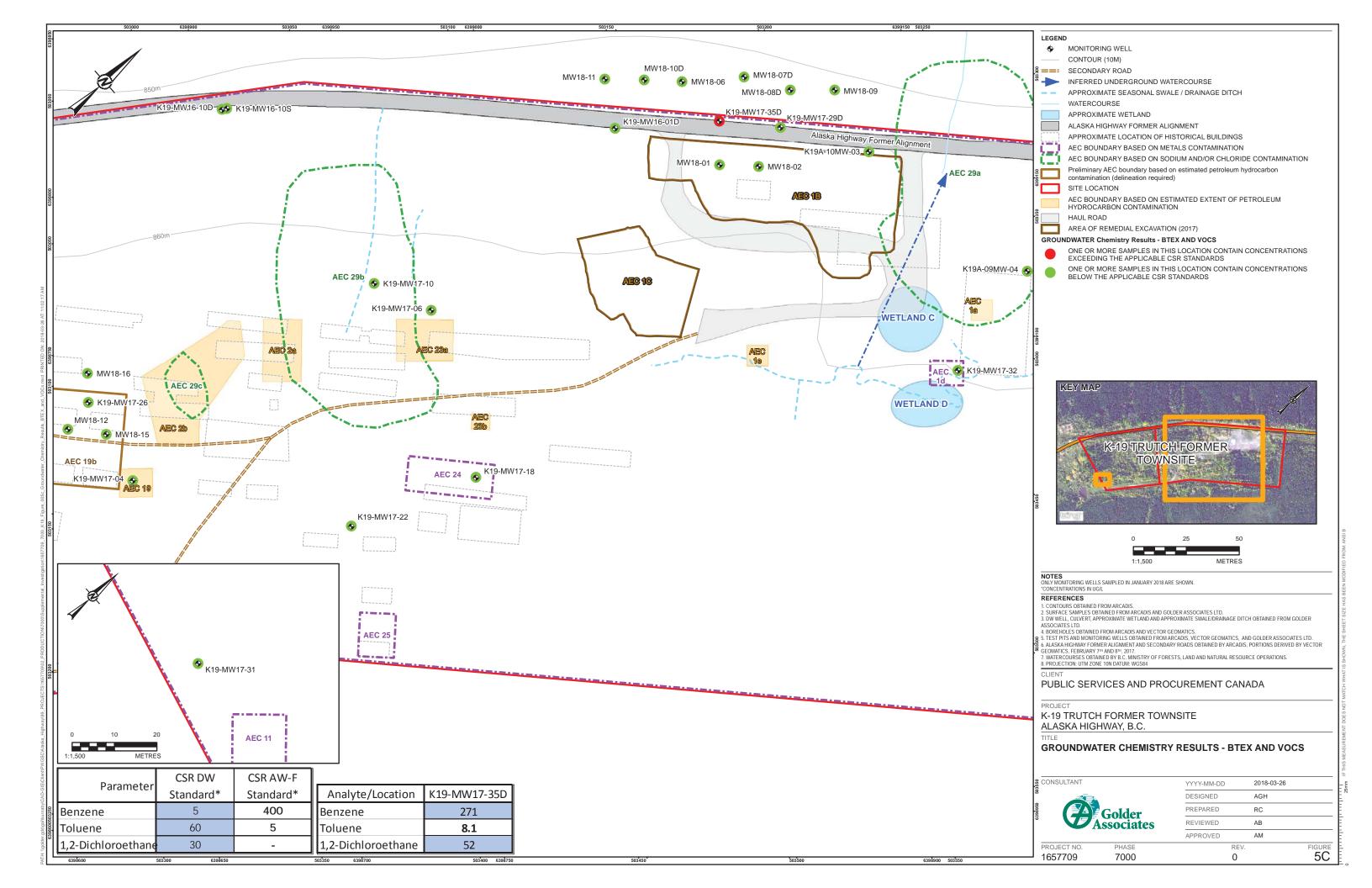


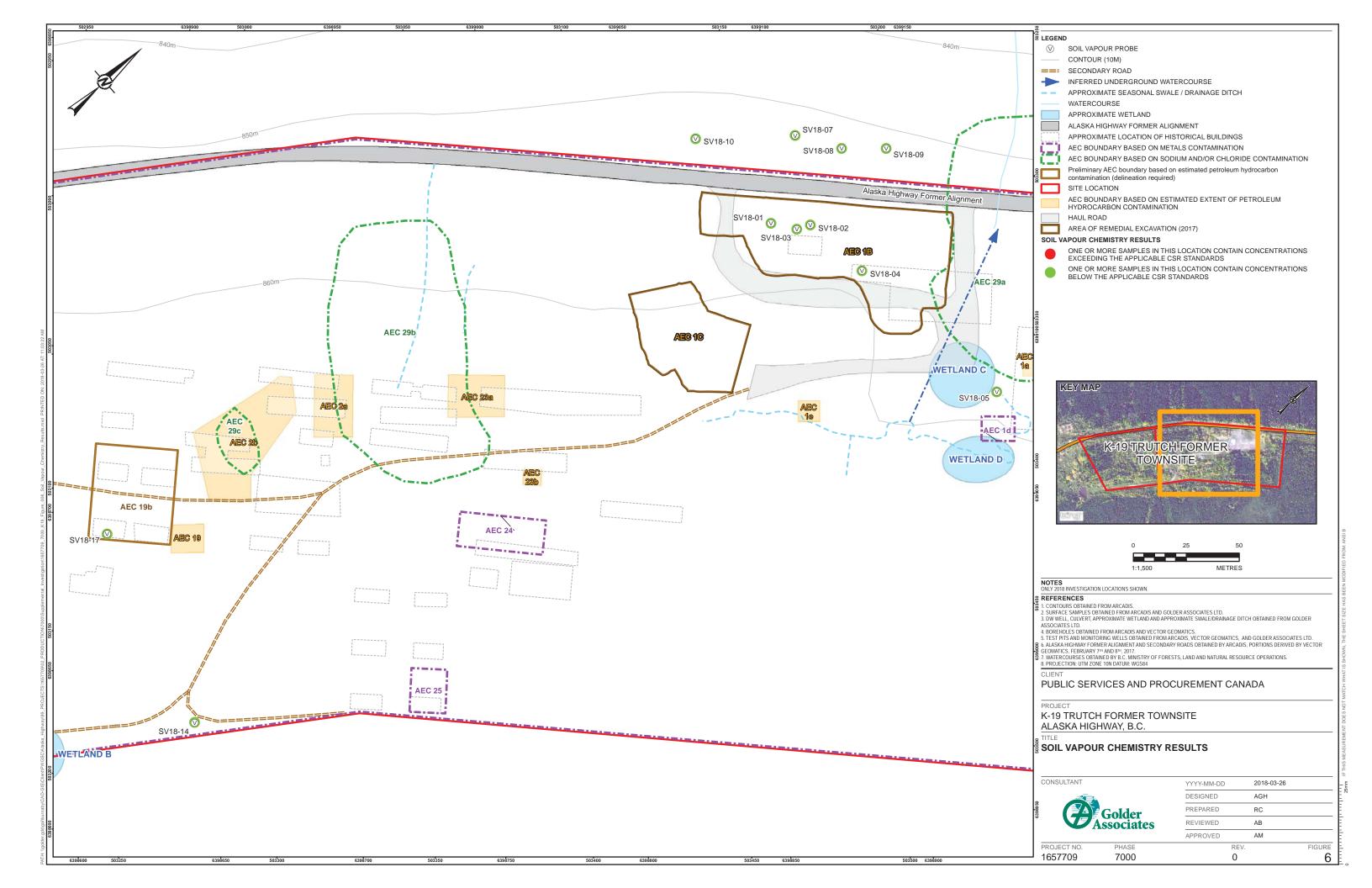














## **APPENDIX A**

**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.





## **K19 ENVIRONMENTAL INVESTIGATION**

# **APPENDIX B**

**Test Pit Logs** 



#### **RECORD OF TEST PIT: K19-TP18-01**

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399070.43 E: 503310.81

EXCAVATION DATE: January 12, 2018

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

6.5 m Length x 2.2 m Width

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd. INCLINATION: -90°

щ		z	SOIL PROFILE			GI S	EOTE AMPL	CH ES	PID ppm					<b>⊕</b>		CHEMISTRY ANALYSIS		٥٦	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE METRES		EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	20	40	60	80		NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
	0		Ground Surface (ML) SILT, trace to some gravel;		856.89 0.00														
-	1		(ML) SILT, trace to some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td><b>⊕</b></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>04308-01</td><td></td><td></td><td>- - - - - - - -</td></pl.<>						<b>⊕</b>						1	04308-01			- - - - - - - -
-	2	Deere 3250 Excavator Bucket	Highly to completely weathered (W4-W5), brown, no odour, no staining, very weak, SILTSTONE.		855.69 1.20				Φ						2	04308-02			-
-			Moderately weathered (W3), brown, no odour, no staining, weak, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	2.30 854.19				Ф						3	04308-03			-
-			End of Test Pit.Reached Target Depth		2.70														-
28/3/18	3																		- - - - - - - - - -

DEPTH SCALE

1 : 30

LOGGED: SS/KDB

#### **RECORD OF TEST PIT: K19-TP18-02**

INCLINATION: -90°

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19

N: 6399062.69 E: 503318.71

EXCAVATION DATE: January 12, 2018

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

6.2 m Length x 1.3 m Width

	_		T			G	FOTE	CH	PID										PIEZOMETER,
Щ		z	SOIL PROFILE			S.	EOTE AMPL		ppm					$\oplus$		CHEMISTRY ANALYSIS		그일	STANDPIPE, THERMISTOR
DEPTH SCALE METRES		EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	20	40	60	80		NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
			Ground Surface		857.26				_			Ť							
- 0 			(ML) SiLT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td>Ф</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>04308-04</td><td></td><td></td><td>-</td></pl.<>		0.00				Ф						1	04308-04			-
- - - - - - - - -		Deere 325D Excavator Bucket		× × × × × × × × × × × × × × × × × × ×	855.06 2.20				Φ						2	04308-05			-
-			Moderately weathered (W3), brown, no odour, no staining, weak, SILTSTONE.  End of Test Pit.Reached Target Depth	× > > > > > > > > > > > > > > > > > > >	2.20 854.66 2.60				-						—3—	-04308-06			
- 3 - 3 	3																		

DEPTH SCALE

1 : 30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-03**

INCLINATION: -90°

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19

N: 6398962.94 E: 503282.69

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

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

5.1 m Length x 1.4 m Width

	Τ		Т	SOIL PROFILE			G	EOTE AMPL	CH	PID					CHEMISTRY ANALYSIS			PIEZOMETER,
S	H	<u>Z</u> _	<u>.</u>	COLL TROT LE	F			AMPL		ppm			0				₽ NG P	STANDPIPE, THERMISTOR INSTALLATION
DEPTH SCALE METRES		METHOD		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	40	6	80	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	OR SEEPAGE OBSERVATION
_ 0	Ĺ			Ground Surface		858.84												
				(ML) CLAYEY SILT, some gravel, contains rootlets; brown to dark brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td>₽</td><td></td><td></td><td></td><td>1</td><td>04308-07/08</td><td></td><td></td><td></td></pl.<>		0.00				₽				1	04308-07/08			
_ 1		Deere 325D	Excavator Bucket	Completely weathered (W5), brown, no odour, no staining, extremely weak, SILTSTONE.	× > > > > > > > > > > > > > > > > > > >	857.64			€	€				2	04308-09			
- - -				Highly weathered (W4), dark brown-black, no odour, iron staining, very weak, SILTSTONE.	× > × > × > × >	856.54 2.30 856.24 2.60				₽				3	04308-10			
3 3	33			End of Test Mit.Reached Target Depth		2.00												

DEPTH SCALE

1 : 30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-04**

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19

N: 6398973.55 E: 503287.77

EXCAVATION DATE: January 13, 2018

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

INCLINATION: -90°

4.8 m Length x 1.3 m Width

	1	T			G	FOTE	СН	PID				1			г –	PIEZOMETER,
Ę	Z	SOIL PROFILE			S.	EOTE AMPL		ppm			$\oplus$		CHEMISTRY ANALYSIS		وٰدِ	STANDPIPE, THERMISTOR
DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	40	60	8	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		858.48												
- 0 		(ML) CLAYEY SILT, some gravel, contains rootlets; dark brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td>Ф</td><td></td><td></td><td></td><td>1</td><td>04308-11</td><td></td><td></td><td>- - - - - -</td></pl.<>		0.00				Ф				1	04308-11			- - - - - -
1	Deere 325D Excavator Bucket	Highly weathered (W4), brown, no odour, no staining, very weak,		857.48 1.00 2.30 856.18 2.30	<u> </u>			<b>⊕</b>				2	04308-12			- - - - - - - - - - - - - - - - - - -
3		SILTSTONE.  End of Test Pit.Reached Target Depth		× 855.98				•				3-	04399-01			-

Server: GINT

DEPTH SCALE
1:30

LOGGED: KDB CHECKED: AGH

#### **RECORD OF TEST PIT: K19-TP18-05**

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19

N: 6399095.48 E: 503308.44

EXCAVATION DATE: January 13, 2018

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

4.5 m Length x 1.6 m Width

INCLINATION: -90°

щ	z	SOIL PROFILE			GI S/	OTE(	SE	PID ppm				0		CHEMISTRY ANALYSIS		L G	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	I.	1	ı	B	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		855.01													
- 0 - - - - - - - - 1	Deers 325D E. Excavator Bucket	Ground Surface  (ML) SILT, some gravel, contains wood debris; brown, no odur, no staining; non-cohesive, dry.  - slight petroleum hydrocarbon-like odour from 0.4 to 1.1m depth  Highly to completely weathered (W4-W5), dark brown, no odour, no staining, extremely weak, SILTSTONE.	X X X X X X X X X X X X X X X X X X X		N .		REC.		D 4	0 6	0 8		2	04299-02	AN	4	
-																	-

GINT\_GAL\_NATIONALIM Unique Project ID: Output Form:BC\_TESTPIT WITH F

DEPTH SCALE

1:30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-06**

INCLINATION: -90°

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

N: 6398993.65 E: 503279.79

EXCAVATION DATE: January 13, 2018 EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd. DATUM: NAD 83

SHEET 1 OF 1

TEST PIT DIMENSIONS:

5.4 m Length x 1.2 m Width

Ī	щ	z		SOIL PROFILE			G S.	EOTE AMPL	CH ES	PID ppm			Φ		CHEMISTRY ANALYSIS			PIEZOMETER, STANDPIPE, THERMISTOR
	DEPTH SCALE METRES	EXCAVATION	METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %		<u> </u>	l	 8 🗆	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
ľ	- 0			Ground Surface		857.99				_								
				(ML) CLAYEY SILT, some gravel, contains wood debris; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td><b>⊕</b></td><td></td><td></td><td></td><td>1</td><td>04299-05</td><td></td><td></td><td>- - - - - -</td></pl.<>		0.00				<b>⊕</b>				1	04299-05			- - - - - -
	- 1 - 1 1	Deere 325D	Excavator Bucket	Highly to completely weathered (W4-W5), dark brown, no dour, no staining, extremely weak, SILTSTONE.	X 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	856.99 1.00				<b>⊕</b>				2	04299-06			- - - - - - - - - -
8	3			Highly weathered (W4), dark brown-black, no odour, iron staining, extremely weak, SILTSTONE.  End of Test Pit.Reached Target Depth	× × × × × × × × × × × × × × × × × × ×	855.89 2.10 855.39 2.60				•				3	-04299-07			- - - - - - - - - - - - - - - - - - -
8/3/18		_	_									1	 1					

LOGGED: KDB

CHECKED: AGH

DEPTH SCALE 1 : 30

#### **RECORD OF TEST PIT: K19-TP18-07**

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19

N: 6399004.18 E: 503251.63

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

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS: 4.6 m Length x 1.7 m Width

INCLINATION: -90°

	щ	z	SOIL PROFILE			GI S/	EOTE(	SE	PID ppm				<b>⊕</b>		CHEMISTRY ANALYSIS		L G	PIEZOMETER, STANDPIPE, THERMISTOR
	DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	ı	I	ı	B 	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
	- 0		Ground Surface	ļ.,,,	857.10													
	- 1	Deere 325D	(ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w~PL.  Highly to completely weathered (W4-W5), brown, no odour, no staining, extremely weak, SILTSTONE.	× 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	855.90 1.20 854.00 3.10 853.70 3.40				Ф	₽			Φ	3	04299-08 04299-09 04299-10			
01 /0/97																		

DEPTH SCALE

1 : 30

LOGGED: KDB

N: 6399001.54 E: 503241.05

#### **RECORD OF TEST PIT: K19-TP18-08**

EXCAVATION DATE: January 14, 2018

SHEET 1 OF 1 DATUM: NAD 83

PROJECT: Alaska Highway LOCATION: K19

CLIENT: Public Services and Procurement Canada

EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd.

TEST PIT DIMENSIONS: 5.1 m Length x 1.8 m Width

INCLINATION: -90°

щ	Τ.	z	SOIL PROFILE			GI S	EOTE AMPL	CH ES	PID ppm				<b>⊕</b>		CHEMISTRY ANALYSIS		0 د	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE METRES		METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	2 4	I	0 8		NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
			Ground Surface		856.93				-									
- - - - - - -	1		(ML) CLAYEY SILT; brown, no odour, no staining; cohesive, w~PL.		0.00				Ф					1	04300-01			- - - - - -
-		Excavator Bucket	Highly to compeltely weathered (W5-W4), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	855.73 1.20				Ф					2	04300-02			- - - - - - - - - -
-			Moderately weathered (W3), dark brown-black, no odour, no staining, weak, SILTSTONE.	× × × × × ×	2.20 854.43							Φ.		2	04200 02			- - -
	33		End of Test Pit. (Refusal)		2.50							Φ		1-3-	-04300-03			- - - - - - - - - - - - - - - - - - -

DEPTH SCALE

CHECKED: AGH 1 : 30

#### **RECORD OF TEST PIT: K19-TP18-09**

INCLINATION: -90°

ı

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.

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

3.9 m Length x 1.8 m Width

### PIEZOMETER, STANDPIPE, THERMISTOR GEOTECH SAMPLES PID SOIL PROFILE CHEMISTRY ANALYSIS ppm $\oplus$ ADDITIONAL LAB. TESTING EXCAVATION METHOD DEPTH SCALE METRES RECOVERY % INSTALLATION STRATA PLOT NUMBER OR SEEPAGE OBSERVATION TYPE ELEV. PID DESCRIPTION SCN DEPTH ppm (m) Ground Surface (ML) CLAYEY SILT; brown, no odour, no staining; cohesive, w<PL. 0.00 04300-04 Ф 853.38 1.20 Highly weathered (W4), brown, no odour, no staining, extremely weak, SILTSTONE. Ф 04300-05 -04300-06 End of Test Pit.

NT\_GAL\_NATIONALIM Unique Project ID: Output F

DEPTH SCALE

1:30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-10**

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399086.49 E: 503316.10

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

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

INCLINATION: -90°

4.6 m Length x 1.7 m Width GEOTECH SAMPLES PIEZOMETER, STANDPIPE, THERMISTOR INSTALLATION PID SOIL PROFILE CHEMISTRY ANALYSIS SCALE RES ATION HOD ppm  $\oplus$ -OT % **X** 

DEPTH SC METRE	EXCAVAT	DESCRIPTION	STRATA PLO	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY	PID ppm		ı	ı	NUMBER	SCN	ANALYSED	ADDITIOI LAB. TES	OR SEEPAGE OBSERVATION
		Ground Surface		855.82												
- 0		(ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td><b>⊕</b></td><td></td><td></td><td></td><td>1</td><td>04300-07</td><td></td><td></td><td>-</td></pl.<>		0.00				<b>⊕</b>				1	04300-07			-
- - - - - - - -	Deere 350D	Highly weathered (W4), dark brown, petroleum hydrocarbon-like odour, no staining, very weak, SILTSTONE.	× > × > × > × > × > × > × > × > × > × >	854.02 1.80					<b>⊕</b>			2	04300-08/09			-
- - - - - - - - 3			× > > > > > > > > > > > > > > > > > > >	852.82 3.00								3	04300-10			- - - - - - -
		brown-black, no dour, no staining, weak, SILTSTONE.	× > × > × > × >	852.52						Φ-		-4-	-04300-11			-
/3/18		End of Test Pit.Reached Target Depth		3.30												-

DEPTH SCALE

CHECKED: AGH 1 : 30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-11**

INCLINATION: -90°

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

N: 6398994.80 E: 503273.31

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

SHEET 1 OF 1 DATUM: NAD 83

TEST PIT DIMENSIONS:

4.2 m Length x 1.6 m Width

щ	z	SOIL PROFILE			G S.	EOTE AMPL		PID ppm			$\oplus$		CHEMISTRY ANALYSIS		_ <u>0</u>	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm		l	B	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface		857.67				Ì	, ,							
- 0 - - - -		(ML) CLAYEY SILT; brown, no odour, no staining; cohesive, w~PL.		0.00				0				1	04300-12			-
- 1	Deere 350D Excavator Bucket	Highly to completely weathered (W4-W5), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× > > > > > > > > > > > > > > > > > > >	856.77 0.90	-			<b>⊕</b>				2	04301-01			- - - - - - - - - - -
_ 2		Highly weathered (W4), dark brown-black, no odour, no staining, very weak, SILTSTONE.  End of Test Pit.	× > > > > > > > > > > > > > > > > > > >	855.57 2.10 855.17 2.50				Ф				—3—	-04301-02			- - - - - - - - - - - - - - - - - - -

DEPTH SCALE

1 : 30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-12**

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

EXCAVATION DATE: January 15, 2018 EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd. SHEET 1 OF 1

DATUM: NAD 83

TEST PIT DIMENSIONS:

INCLINATION: -90°

4.4 m Length x 1.8 m Width

	щ	z		SOIL PROFILE			G S.	EOTE AMPL	CH ES	PID ppm				Φ		CHEMISTRY ANALYSIS		رن	PIEZOMETER, STANDPIPE, THERMISTOR
	DEPTH SCALE METRES	EXCAVATION	METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	1	0 4	ı	6	8 🗆	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
				Ground Surface		856.78				_									
-	- 0			(ML) CLAYEY SILT; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td></td><td>1</td><td>04301-03</td><td></td><td></td><td>- - - - - - -</td></pl.<>		0.00				0					1	04301-03			- - - - - - -
- - - -		Deere 350D	Excavator Bucket	Highly weathered (W4), dark brown, no odour, no staining, extremely weak, SILTSTONE.	× > > > > > > > > > > > > > > > > > > >	855.68 1.10				<b>⊕</b>					2	04301-04			
-  -  -  -	- 2			- iron staining from 2.0 to 2.6m depth.	× > > > > > > > > > > > > > > > > > > >	× × × × × × × × × × × × × × × × × × ×													
-				- 2" metal pipe at 2.5m depth  Moderately weathered (W3), dark brown-black, no odour, no staining,	× > > × > × > × > × > × > × > × > × > ×	853.98 2.80					Φ				3	04301-05			- - - -
28/3/18	- 3			weak, SILTSTONE.  End of Test Pit. (Refusal)		\$ 853.78 3.00									4-	-04301-06			- - - - - - -

DEPTH SCALE

1 : 30

LOGGED: KDB

#### **RECORD OF TEST PIT: K19-TP18-13**

INCLINATION: -90°

CLIENT: Public Services and Procurement Canada PROJECT: Alaska Highway LOCATION: K19 EXCAVATION DATE: January 18, 2018 EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd. N: 6399081.91 E: 503320.06

SHEET 1 OF 1

DATUM: NAD 83

TEST PIT DIMENSIONS:

1.7 m Length x 5.9 m Width

1 4						S	OTE AMPL	ES	ppm			$\oplus$		CHEMISTRY ANALYSIS		ان ا	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE	MEIKES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	40	60	80	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
			Ground Surface		856.48					 Ī	T						
- - - - - - - - - - -	1	at	(ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td>Ф</td><td></td><td>1</td><td>04315-01</td><td></td><td></td><td>- - - - - - - - - -</td></pl.<>		0.00						Ф		1	04315-01			- - - - - - - - - -
-	2	Deere 350D Excavator Bucket	Highly weathered (W4), dark brown, no odour, no staining, very weak, SILTSTONE small pieces of wood debris present from 1.5 to 2.8m		854.98 1.50			€	<b>#</b>				2				- - - - - - - - - - - - - - - - - - -
28/3/18	3		- metal pipe at 2.8m depth  Moderately weathered (W3), dark brown.  End of Test Pit.Reached Target Depth	× > > > > > > > > > > > > > > > > > > >	853.48 3.00 853.28 3.20				)				4	04315-05			- - - - - - - - -

DEPTH SCALE

1 : 30

LOGGED: SS CHECKED: AGH

#### **RECORD OF TEST PIT: K19-TP18-14**

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

EXCAVATION DATE: January 18, 2018 EXCAVATION CONTRACTOR: Eh Cho Dene Enterprises GP Ltd. SHEET 1 OF 1

DATUM: NAD 83

TEST PIT DIMENSIONS:

2.8 m Length x 1.8 m Width INCLINATION: -90°

ш	7	SOIL PROFILE			G S.	EOTE AMPL	CH ES	PID ppm				Φ		CHEMISTRY ANALYSIS		ניי	PIEZOMETER, STANDPIPE, THERMISTOR
DEPTH SCALE METRES	EXCAVATION METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	PID ppm	4	I		0	NUMBER	SCN	ANALYSED	ADDITIONAL LAB. TESTING	INSTALLATION OR SEEPAGE OBSERVATION
		Ground Surface															
_ 0 0 1	Deere 350D Excavator Bucket	(ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td>× × × × × × × × × × × × × × × × × × ×</td><td>2.80</td><td></td><td></td><td>•</td><td>Φ</td><td></td><td>•</td><td>₽</td><td></td><td>2</td><td>04315-06  04315-07  04315-08  -04315-09</td><td></td><td></td><td></td></pl.<>	× × × × × × × × × × × × × × × × × × ×	2.80			•	Φ		•	₽		2	04315-06  04315-07  04315-08  -04315-09			

DEPTH SCALE

1 : 30

LOGGED: SS



## **K19 ENVIRONMENTAL INVESTIGATION**

# **APPENDIX C**

**Borehole Logs** 



#### **RECORD OF BOREHOLE: K19-BH18-13**

SHEET 1 OF 1 DATUM: NAD 83

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

N: 6398731.46 E: 503145.25

1 : 75

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

INCLINATION: -90°

	$\overline{}$								N: -9				Dir				_	יאעח	VIVIC	DEVI	TD	۸Τις	)NI		DIEZOMETED
0	보	SOIL PROFILE			GEO	OTEC	CH SA	MPL	ES	CHE	EMISTRY SAMP	PLES	PIE				$\oplus$	RES	ISTAN	ICE, E	BLO	WS/	0.3m	J.S	PIEZOMETER, STANDPIPE
DRILLING RIG	ME		STRATA PLOT		ĸ		.3m	<u>ا</u> <u>ە</u>	RECOVERY %	ا يم			2	2 4	4 6	8		2	20 4	40	60	8	<sub>0</sub> \	ADDITIONAL LAB. TESTING	OR THERMISTOR
	S N	DESCRIPTION	PΡ	ELEV.	NUMBER	TYPE	/S/0	CORE No.		ABE	SCN	LYSI	PIE						VATE			ENT	Γ%	OTTI 3. TE	INSTALLATION
. ISI			IRA.	DEPTH (m)	Ŋ	ŕ	BLOWS/0.3m	8 6	- E	2		ANALYSED	ppr	n					<b>—</b>				WI	AE	
1	4		S				В	_		_		_	2	0 4	0 60	08 (	)	1	0 :	20	30	4	0		
0	4	Ground Surface (ML) CLAYEY SILT, contains rootlets;	-	863.89 0.00				-	-												+				
		brown, no odour; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td>F</td><td>1</td><td>04317-06</td><td></td><td></td><td>⊕</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl.<>		0.00					F	1	04317-06			⊕											
									H	H	04011-00			Ψ											
1																									
11	ŀ	Completely weathered to recidual	$\frac{1}{1}$	862.69 1.20																					
		Completely weathered to residual soil (W5-W6), brown, no odour, no	× >	1.20																					
		staining, moist, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	}																					
2			× ×	861.64																					
	r	Highly weathered (W4), brown, no		2.25	1				ı		04317-07			⊕											
		odour, no staining, dry, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	}					L		04317-07			Ð											
3			( )	}																					
			lê ŝ	}																					
	H	Moderately weathered (W3),	×	860.39 3.50	1																				
		grey-brown, no odour, no staining, dry, SILTSTONE.	××	1																					
4		OIL TO TOINE.	× × × × × × ×	1						3	04317-08			Ф											
		moint from approximately 4.5 to	××	1					-	_															
		- moist from approximately 4.5 to 6.0m depth	× > × > × > × > × >	]																					
5			× >	1																					
			× >	1																					
			× ×	1						4	04317-09														
6	Ë.		××	1					F	_			_												
1	125		× ×	1																					
0.0	(Casing:152 mm;		××	1																					
1 == 1	- 1		××	}																					
, o	Stem Auger		××	3						5	04317-10			1											
	Stem		× × × ×	3					H	_															
	Solid		×××	3																					
8	"		× ×	3																					
			x x	3																					
			× × ×	3						6	04317-11			1											
9	L			854.79					H	$\dashv$															
		Moderately to slightly weathered (W3-W2), grey-brown, no odour, no	××	9.10																					
		stining, dry, SILTSTONE.	××	1																					
0		- wet from 9.1 to 10.0m depth	× × ×	1					L																
			× × × × ×	3						7	04317-12					•									
			X >	1					-	$\dashv$															
		- very hard layer from 10.7 to 10.8m	/× ;	853.09 10.80																					
1	- [\	depth (W1) Slightly weathered (W2), grey-brown,	/ × ;	1																					
		no odour, no staining, SILTSTONE.	× × × ×	1						_															
			× × × × ×	1						8	04318-01		[												
2			X >	1					-	$\dashv$															
			×××	1																					
			××	1																					
3		- soft layer from 12.8 to 13.0m depth	× >	1					-	_															
		(W4)	× × × × × × × × × × × × × × × × × × ×	]						9	04318-02														
		- very hard from 13.3 to 13.4m depth (W1)	×	850.19																					
4		End of Borehole.		13.70			$  \ \ ]$	T		T						T									
5																									
				i	1	I		- 1								- 1	- 1		1	1	- 1				
$\perp$				<u> </u>	<u> </u>															01			GACS		

#### **RECORD OF BOREHOLE: K19-BH18-17**

PROJECT: Alaska Highway LOCATION: K19 N: 6399050.23 E: 503195.63

CLIENT: Public Services and Procurement Canada

DRILLING DATE: March 10, 2018 DRILLING CONTRACTOR: Tundra Drilling SHEET 1 OF 1 DATUM: NAD 83

INCLINATION: -90°

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3r PIEZOMETER, PID DRILLING RIG DRILLING METHOD CHEMISTRY SAMPLES SOIL PROFILE GEOTECH SAMPLES ADDITIONAL LAB. TESTING Ф STANDPIPE ppm DEPTH SCALE METRES 40 60 80 STRATA PLOT 2 6 BLOWS/0.3m ANALYSED NUMBER THERMISTOR NUMBER CORE No. CORE RECOVERY ELEV. TYPE PID WATER CONTENT % INSTALLATION DESCRIPTION DEPTH ppm Wp <del>− ○</del>W ⊣ wi (m) 20 40 60 80 Ground Surface (ML) SILT, some fine to medium 0.00 sand, some fine gravel; light brown; no odour, no staining; non-cohesive, dry. 1 11144-01 Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE. (Bedrock inferred from drill reaction) 0.91 2 11144-02 3 11144-03 CME750 Auger 4 11144-04 4.42 Moderately weathered (W3), grey brown, no odour, no staining, dry, SILTSTONE. (Bedrock inferred from 5 11144-05/06 0 drill reaction) 6 11144-07 - slightly moist at 6.55m depth 11144-08 Ф 7.62 End of Borehole 10 11 12 13 15 SOIL CLASSIFICATION SYSTEM: GACS DEPTH SCALE

1:75

LOGGED: SS

CHECKED: ARM

1 : 75

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6398712.14 E: 503133.15

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

		ا۵	OOU PROFILE			l <sub>o</sub> -		CLIN			$\neg$		- NIOTOV 0 A NIO	1.50	PID	)				DYNA	MIC	PENE	TRA	TION	_	PIEZOMETER	
METRES	DRILLING RIG	맆	SOIL PROFILE	<u> </u>	I	GE	SIE	т -	1	_	+	_	EMISTRY SAME		ppn	n			0			ICE, B		TION /S/0.3n	ADDITIONAL LAB. TESTING	STANDPIPE OR	
ETRE	LLING	NG NG	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	W. E.	RECOVERY %	BER	SCN	ANALYSED	PID	)	. 0	8					_	NT %	DITIO	THERMISTOR INSTALLATION	
. ≥	DRI	SILLI	SECONIII NON	TRAT	DEPTH (m)	Š		3LOW	COR	0 5	RECO		33.1	ANAL	ppn							⊖ <sup>W</sup>		⊢ w	AD		
			Ground Surface	o	863.99						$\dagger$	+			20	) 4	0 60	80	)	10	) 2	20 ;	30	40	+	_	
0			(ML) CLAYEY SILT, contains rootlets; brown, no odour; cohesive, w~PL.		0.00						L															Sand	
			,,,									1 (	04321-09			Φ											
1											F	-															
			Highly to completely weathered		862.59 × 1.40																					Bentonite Chips	
			(W4-W5), brown, no odour, no staining, moist, SILTSTONE.	× ×	*																					Dentonite Chips	
2			Stanling, most, SIETSTSTE.	× :							t	2 (	04321-10					Œ									
				× : : : : : : : : : : : : : : : : : : :							F	+															
3				××	Š																					Granular Bentonite	S
				× ; × ; × ;	× × 860.49																					Vapour Probe with	
			Highly weathered (W4), brown-grey, no odour, no staining, dry,	X X X X X X X X X X X X X X X X X X X	3.50 ×																					Pointed Weight Granular	
4			SILTSTONE.	× :								3 (	04321-11						Ф							Bentonite	
				× ×							H	-															
5				× :																							
			- slightly moist at 5.3m depth	× ;																							
•		E	Moderately weathered (W3), grey-brown, no odour, no staining, dry,	X	858.29 5.70							4	04321-12														
6		(Casing:152 mm;	SILTSTONE.	× : × :	Š																						
	150	Casing		X   X	À																						
7	ш			× ;							F	_															
		Solid Stem Auger		X X							L	5 (	04322-01														
8		Solid		× × × ×																							
0				X X																							
		-	Slightly weathered (W2), grey-brown,	× ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	× 855.29 × 8.70						ŀ	6 (	04322-02			]										Bentonite Chips	
9			no odour, no staining, dry, SILTSTONE.	× : × :	3						ŀ	$\dashv$															
				××××																							
0				× :																							
				× ;								7	04322-03														
				× :	Š																						
1			- hard layer from 11.1 to 11.3m depth	×																							
				× : : : : : : : : : : : : : : : : : : :							F	-															
2				× :							L	8	04322-04														
				× :																							
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		$\rfloor$		×	× 850.29							9 (	04322-05														
4			End of Soil Vapour Probe.		13.70																						
5																											
J																											
	D		ONE	•	•	•	•	•		5	T	<u> </u>				S	OIL (	CLAS	SSIF	ICAT	ION	SYS	TEM	I: GAC	s	•	
=	PTH		CALE							7			Golder	<u> </u>		S	OIL (	CLAS	SSIF	FICAT	ION			  : GAC  :D: K[		<u> </u>	

DEPTH SCALE

1 : 75

#### **RECORD OF BOREHOLE: K19-BH18-18**

SHEET 1 OF 1

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

DRILLING DATE: March 10. 2018 DRILLING CONTRACTOR: Tundra Drilling DATUM: NAD 83

LOGGED: SS

CHECKED: ARM

	Π		SOIL PROFILE			GEO	JINC DETC		ATIC AMP			EMISTRY SAMF	PLES	PII					DYN	AMIC F	PENE	TRAT	ON 6/0.3m		PIEZOMETER,
DEPTH SCALE METRES	RIG	DRILLING METHOD		<u> </u>	1			_	_					pp									١,	ADDITIONAL LAB. TESTING	STANDPIPE OR
TRE	NG NG	G ME		STRATA PLOT	ELEV.	띪	ш	BLOWS/0.3m	CORE No.	CORE RECOVERY %	NUMBER		ANALYSED			4 6	8			0 4			80	EST	THERMISTOR
ME H	۱Ħ	Ĭ	DESCRIPTION	Ĭ	DEPTH	NUMBER	TYPE	WS/	뀚	SOR	₩	SCN	Ľ	PII						/ATEF		NTEN		B. T.	INSTALLATION
DE	12	룺		TRA	(m)	₹	-	200	8	, Ä	≥		₽							<b>—</b>			WI	⋖₹	
<u> </u>	$\vdash$			S.	+	1			$\vdash$	<u> </u>	$\vdash$		H	2	0 4	10 6	0 80	)	1	0 2	0 :	30	40	1	-
_ 0		$\dashv$	Ground Surface	1	0.00	<u> </u>			_		_						Щ					-		1	
E			(ML) SILT, some fine to medium sand, some fine gravel; brown, no		0.00																				
-			odour, no staining; non-cohesive, dry.			1					1	11144-09		Þ											=
E			- hard up to 0.45m depth																						-
_ 1		F	Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	X	× 0.91																				
- 1 -			odour, no staining, dry, SILTSTONE.	× × × × × × × ×	×																				
E				×	×																				
F				×	X						_	4444440	Ι,												=
_ 2				×	Â						2	11144-10		₱											_
Ė				×	×																				
F			Moderately weathered (W3), brown,		2.44																				=
Ē		Ë	no odour, no staining, dry, SILTSTONE.	×	3																				
_ 3		22 m	OILTOTONE.	×	×																				_
E		1:gc		×	×																				-
Ė	.20	Casi	- soft layer from 3.5m to 3.8m depth	×	k																	1			
Ė.	CME750	<u>_</u>		×	Ŕ						3	11144-11		Ф										1	
_ 4	0	Auge	- very hard layer from 4.0m to 4.6m	×	×						_													1	]
Ė		tem	depth	×	K																			1	=
F		Solid Stem Auger (Casing:152 mm; )		××××××××××××××××××××××××××××××××××××××	K						4	11144-12		Ф								1			]
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F				×	Ä																				=
E				×	×																				
Ē				×	×						5	11145-01		₽											
6					<u>}</u>																				-
F			Slightly weathered (W2), grey, no odour, no staining, dry, SILTSTONE.	×	8 6.10																				-
Ē			odour, no staining, dry, SILTSTONE.	×	3																				
F				×	3																				=
7				×	Â						-	11145-02													-
E				× × × × × × ×	×						Ľ	11145-02													-
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N: 6399063.40 E: 503208.61

1 : 75

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

#### **RECORD OF BOREHOLE: K19-BH18-19**

CORD OF BOREHOLE. K19-BH10-19

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

DATUM: NAD 83

CHECKED: ARM

SHEET 1 OF 1

	_					_				ON:	$\overline{}$							1						_	
щ	ပ	딡	SOIL PROFILE			GEO	OTE	CH S	SAMI	PLES	C+	HEMISTRY SAME	PLES	PID	1		Э	RI	YNAN ESIS	TAN(	PENE CE, BI	LOW	ION S/0.3r	n _ c	PIEZOMETER, STANDPIPE
DEPTH SCALE METRES	GR	DRILLING METHOD		TO:		~		æ.		%	·   ~		ا ا	2		6	8				0 6		80 <b>\</b>	ADDITIONAL AB TESTING	OR
ETR.	Ž	9	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	2 2	NUMBER	SCN	ANALYSED	PID				+					NT %	1 E	THERMISTOR INSTALLATION
ÄΣ	띪		DESCRIPTION	XAT/	DEPTH	Σ	Ε	Š	ORE	88		SCN	\A	ppn				ן ן ו			W		–ı w	.   ₩₩	<u></u>
	[ ]	DRI		STR	(m)	2		BL	Ō	#	Z		¥	20	40	60	80				0 3			·   `-	<b>-</b>
		$\Box$	Ground Surface							T	T				Ï	Ť	Ť	$\top$	Ť	Ī		Ť	Ť		
_ 0		П	(ML) SILT, some fine to medium	Ш	0.00													T						+	-
			sand, contains rootlets; light brown; no								1	11145-03	(	•											
-			odour, no staining; non-cohesive, dry.																						
- ,																									
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											2	11145-04	(	▶											
_ 2			Highly weathered (W4), brown, no	× >	1.83																				
			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	×××	1																				
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-	CME750	(Ca		l x x	}						1	11145-06			L	,									
: - 4	CME	ger	- harder rock from 3.9 to 4.6m depth	× ×	7						<del> </del>	- 11-3-00			T	<b>'</b>									
	Ĭ	n Au	- narder rook from 3.9 to 4.0m depth	× ×	1						1														
	1	Ster		× > > > > > > > > > > > > > > > > > > >																					:
-	Ĭ	Solid Stem Auger (Casing:152 mm;			7						5	11145-07						<b>ф</b> 11							
- - 5	1	"	Moderately weathered (W3), grey	XX	4.88																				=
			brown, no odour, no staining, dry, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	1																				
			OLE TO TOTAL.	× >	1						6	11145-08/09				Φ									
-				××	1						L	11145-06/09				Ψ									
- 6				× >	1																				-
			Slightly weathered (W2), grey brown, no odour, no staining, moist,	× >	6.10																				
			SILTSTONE.	×××	1																				
			<ul> <li>moist from 6.1 to 7.6m depth</li> <li>water in borehole from 6.4 to 7.6m</li> </ul>	××	1							1													
- 7			depth	× >	1						7	11145-10		⊕											-
-				× × × × × × × × × × × × × × × × × × ×	1																				
-		Щ		××	7.62						-							+						-	
- - 8			End of Borehole.		7.02																				
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#### **RECORD OF BOREHOLE: K19-BH18-20**

SHEET 1 OF 1 DATUM: NAD 83

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

N: 6399018.06 E: 503254.94

1 : 75

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

INCLINATION: -90°

щ	ري دي	SOIL PROFILE			GEC		CH S				EMISTRY SAME	LES	PID				Φ	DYN/ RESI	AMIC I STAN	PENE	TRATI	ON 5/0.3m	ıσ	PIEZOMETER, STANDPIPE
DEPTH SCALE METRES	DRILLING RIG		LOT		2		.3m	0.	% \	œ		ED	2	4	6						60 E	•	ADDITIONAL LAB. TESTING	OR THERMISTOR
PTH	SILLIN	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	JMBE	SCN	ANALYSED	PID								NTEN		DDIT	INSTALLATION
DE			STR/	(m)	Ŋ		BLO	8	REG	ž		ΑN			60					⊃W !0 3		-  WI 40	⋖⊴	
_ 0		Ground Surface											Ī	Ť	Ĭ	Ť								
E		(ML) CLAYEY SILT; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td>Ļ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>=</td></pl.<>		0.00						Ļ														=
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E	9	Highly weathered (W4), dark brown,		1.52						2	11145-12		Ф											3
_ 2		no odour, no staining, extremely weak, SILTSTONE.	Îx x							_	11143-12		Ψ											4
=	CME750		× × × × × ×																					=
Ē	CME750			0.74																				3
3	Ġ	Moderately weathered (W3), dark brown black, hydrocarbon-like odour, possible dark staining, SILTSTONE.	× ×	2.74						3	11146-01						4	) 19.5						4
Ē		possible dark staining, SILTSTONE.	× ×							Ť	11140-01							19.5						4
E		- Abrupt colour transition to lighter grey-brown at 3.4m depth	× ×																					3
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CHECKED: ARM

PROJECT: Alaska Highway LOCATION: K19

N: 6399041.10 E: 503198.02

1 : 75

CLIENT: Public Services and Procurement Canada

#### **RECORD OF BOREHOLE: K19-BH18-21**

DRILLING DATE: March 11, 2018

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: ARM

INCLINATION: -90°

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

#### **RECORD OF BOREHOLE: K19-BH18-22**

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

N: 6399018.57 E: 503247.86

1 : 75

DRILLING DATE: March 11, 2018 DRILLING CONTRACTOR: Tundra Drilling SHEET 1 OF 1 DATUM: NAD 83

CHECKED: ARM

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DEPTH SCALE METRES	INGR	DRILLING METHOD		STRATA PLOT	ELEV.	ER	ш	BLOWS/0.3m	ON		NUMBER		SED	$\overline{}$		6	8			20 4				1	ADDITIONAL LAB. TESTING	OR THERMISTOR
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			cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>11147-01</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></pl.<>								1	11147-01		1												1
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		2 mm	(SM) SII TV SAND: dark grey strong		1.52																					
_		ing:15	(SM) SILTY SAND; dark grey, strong hydrocarbon-like odour, slight black																							=
_ 2	CME750	(Cas	staining; non-cohesive, dry.		ł																					]
	SM	nger									2	11147-02				•	⊕									
		tem A																								1
_ 3		Solid Stem Auger (Casing:152 mm;	Highly weathered (W4), grey, strong hydrocarbon-like odour, dry,	X	3.05						3	11147-03						[	308.9							3
		Š	hydrocarbon-like odour, dry, SILTSTONE.	×																						=
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#### **RECORD OF BOREHOLE: K19-BH18-23**

DRILLING DATE: March 11, 2018

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

1 : 75

DRILLING CONTRACTOR: Tundra Drilling

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: ARM

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DEPTH SCALE METRES	JG R	DRILLING METHOD		STRATA PLOT		ĸ		.3m	ا ا	%	NUMBER			2	4	6	8		20	4(	0 6	0	80 L	ADDITIONAL LAB. TESTING	OR THERMISTOR
ĔĒ		S N	DESCRIPTION	ΑP	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	F E	Æ	SCN	ANALYSED	PID				,	WAT			NTE	NT %	7 E.H.	INSTALLATION
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				ST	(111)			В		<u> </u>	_		٩	20	) 40	60	80	_	10	20	0 3	30	40		-
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_			(ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td>L</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>]</td></pl.<>		0.00						L														]
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	ō	Auge		××	1																				]
		stem	Highly weathered (MA) gray strong	XX	3.66																				
- - 4		Solid Stem Auger (Casing:152 mm;	Highly weathered (W4), grey, strong hydrocarbon-like odour, no staining,	××	3 3.30																				]
		S	dry, SILTSTONE.	×							4	11147-09													
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DEPTH SCALE

1 : 75

#### **RECORD OF BOREHOLE: K19-BH18-24**

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

DRILLING DATE: March 11, 2018 DRILLING CONTRACTOR: Tundra Drilling SHEET 1 OF 1 DATUM: NAD 83

LOGGED: SS

CHECKED: ARM

	<u>0</u>	밁	SOIL PROFILE	_		GEO			AMP	_	_	EMISTRY SAME	LES	PII	D m		(	⊕ E	DYNA RESIS	MIC F	PENET CE, BL	OWS	ON 5/0.3m	-Ş	PIEZOMETER, STANDPIPE
MEIKES	DRILLING RIG	DRILLING MET	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	NUMBER	SCN	ANALYSED	PII	m				W <sub>P</sub>	ATEF	R CON			ADDITIONAL LAB. TESTING	OR THERMISTOR INSTALLATION
0			Ground Surface (ML) CLAYEY SILT, some gravel; brown, no odour, no staining; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>11147-11</td><td></td><td>€</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl.<>		0.00						1	11147-11		€											
1		152 mm; )	- small rootlets and organics at 1.1m depth - iron staining from 1.52 to 1.82m																						
2	₩.	Auger (Casing:152	depth  Completely weathered to residual soil (W5-W6), grey, no odour, no staining, dry, SILTSTONE.  Highly weathered (W4), grey, no odour, no staining, dry, SILTSTONE.	X : X : X : X : X : X : X : X : X : X :	× 1.98 × × 2.44						2	11147-12			•	•									
3		Solid Stem Auger	odour, no staining, dry, SILTSTONE.	× : × : × : × : × :	× × × ×						3	11148-01			E	<b>⊕</b>									
4				× : × : × : × :	× × × × 4.57						4	11148-02			<b>⊕</b>										
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#### **RECORD OF BOREHOLE: K19-BH18-25**

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

1 : 75

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: ARM

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DEPTH SCALE METRES	<u>ত</u>	DRILLING METHOD	SOIL PROFILE			GE	OTE	CH S	SAM	PLES	S CF	HEMISTRY SAME	PLES	PID	י ר		0	RE	'NAMIC SISTA	NCE,	BLOW	/S/0.3	m _	<u>0</u>	PIEZOMETER, STANDPIPE
SCAL	G R	Æ		OT.		~		E E		76	٠ _		٥	2		6	8		20	40	60	80	ADDITIONAL	Ĭ.	OR
H.S.	Ιž	9		STRATA PLOT	ELEV.	NUMBER	М	BLOWS/0.3m	CORE No.	W A	NUMBER		ANALYSED	PID		<u> </u>	i_		WAT				.⊢≌	邑	THERMISTOR INSTALLATION
FE	물	=	DESCRIPTION	ΑTA	DEPTH	J.	TYPE	NS NS	I S	8		SCN	AL,	ppm					wan Vp <b>⊢</b>					9	INSTALLATION
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	┢	Ӵ		o				╀	+	+	+			20	) 4(	60	80	+	10	20	30	40	+		
— o		$\vdash$	Ground Surface	1	0.00				-		-					_		-	-		-		_	_	
E			(ML) CLAYEY SILT, some fine to medium sand, fine gravel, wood debris and trace organics; cohesive, w <pl.< td=""><td></td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></pl.<>		0.00																				3
			and trace organics; cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>11148-03</td><td>(</td><td>₽  </td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>=======================================</td></pl.<>								1	11148-03	(	₽											=======================================
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_		(Casing:152 mm; )	Completely weathered to residual	× > × > × > × >	1.52						12	11148-04	_ ا												‡
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_ 2	750	(Ca	otaning, ary to moist, oil to total.	× >	1																				=
=	CME750	je	IF II	× >	2.44																				=
_	ľ	Solid Stem Auger	Highly weathered (W4), grey, no odour, no staining, dry, SILTSTONE slightly moist at 2.4m to end of hole	× >	2.44																				=
_ 3		sterr	- slightly moist at 2.4m to end of hole	× ×	1																				3
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#### **RECORD OF BOREHOLE: K19-BH18-26**

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

N: 6399018.82 E: 503238.58

DRILLING DATE: March 12, 2018 DRILLING CONTRACTOR: Tundra Drilling SHEET 1 OF 1 DATUM: NAD 83

INCLINATION: -90°

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빌.	<u>8</u>	뵘	SOIL PROFILE			GE	OTE	_	SAME	_	+	EMISTRY SAME	PLES	ppr	n			Ф	RES	SISTAN	NCE, B	BLOW	1ON S/0.3m	g L	STANDPIPE
DEPTH SCALE METRES	NGF	DRILLING METHOD		STRATA PLOT		E.		BLOWS/0.3m	9	% ≻	NUMBER		Э	2	2 4	6	8				40		80	ADDITIONAL LAB. TESTING	OR THERMISTOR
ET.		<u>8</u>	DESCRIPTION	TAF	ELEV. DEPTH	NUMBER	TYPE	NS/C	CORE No.	SORE	MBE	SCN	ANALYSED	PIE							R CO			DOT B. TE	INSTALLATION
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				S					┝		$\vdash$			2	0 4	0 60	0 80	)	_	10	20 :	30 	40	+	
_ 0		П	Ground Surface (ML) CLAYEY SILT, some fine to	Ш	0.00																				
			(ML) CLAYEY SILT, some fine to medium sand, some fine gravel, trace wood debris; cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>11148-07</td><td>١,</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></pl.<>								1	11148-07	١,												
_			wood debris; cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Ī</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>]</td></pl.<>											Ī											]
- - - 1																									
- '																									]
				Ш																					]
-			Highly weathered (W4), grey, very slight hydrocarbon odour, no staining,	× × × ×	× 1.52						2	11148-08						⊕							]
_ 2		<u>:</u>	slightly moist, SILTSTONE.	×	×						F	11140-00						Ŷ							=
		2 mr		×	×																				
		ng:15		× × × × × × × ×	×																				
- 3	220	(Casi		×	×																				=
_ 3	CME750	Jer	- strong hydrocarbon odour from 3.04 to 4.57m depth	×							3	11148-09/10						[	126						=
	ľ	n Aug	to 4.57m depth	×																					
		Solid Stem Auger (Casing:152 mm; )	Moderately weathered (W3), grey, no odour, no staining, dry, SILTSTONE.		3.66																				
- 4		Solid	odour, no staining, dry, SILTSTONE.	×	Ä						1														-
				×	Ä						1														=
				× × × × × × × × × × × × × × × × × × ×	X						4	11148-11/12			۲										
_ 5				×	X	1					<del> </del>	11140-11/12			9										]
				×	×																				=
				×	×																				=
				×	×						5	11149-01			_										=
- 6		Ц		×	6.10					╙				Ш			_				╙	_	_		=
			End of Borehole.		0.10																				]
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- 7																									
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15				1																					] =
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	-			•	•				_	Ī					S	OIL	CLAS	SSIF	FICA	TION	SYS	TEM	GAC	s	
DE	PT	H S	CALE					1		/ <u>A</u>		Golder											ED: S		

1 : 75

LOGGED: SS CHECKED: ARM

#### RECORD OF BOREHOLE: K19-BH18-27

• •

CLIENT: Public Services and Procurement Canada PROJECT: Alaska Highway

PROJECT: Alaska Highway LOCATION: K19 N: 6399013.72 E: 503236.50 DRILLING DATE: March 12, 2018
DRILLING CONTRACTOR: Tundra Drilling

SHEET 1 OF 1 DATUM: NAD 83

INCLINATION: -90°

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3r PIEZOMETER, PID DRILLING RIG DRILLING METHOD CHEMISTRY SAMPLES SOIL PROFILE GEOTECH SAMPLES Ф STANDPIPE ppm ADDITIONAL LAB. TESTING DEPTH SCALE METRES STRATA PLOT 2 6 40 60 80 BLOWS/0.3m ANALYSED CORE No. CORE RECOVERY NUMBER THERMISTOR NUMBER ELEV. TYPE PID WATER CONTENT % INSTALLATION DESCRIPTION SCN DEPTH ppm Wp <del>− ○</del>W ⊣ wi (m) 20 40 60 80 Ground Surface (ML) CLAYEY SILT, some fine gravel, trace wood debris; cohesive, w<PL. 0.00 11149-02 1.52 Highly weathered (W4), grey, slight hydrocarbon odour from 1.52m to 3.04m depth, no staining, dry, SILTSTONE. 2 11149-03 Ф<sub>13.7</sub> CME750 3 3 11149-04 Moderately weathered (W3), grey, slight hydrocarbon odour from 3.04m to 4.57m depth, no staining, dry, SILTSTONE. 3.66 4 11149-05 6.10 End of Borehole. 10 11 12 13 15 SOIL CLASSIFICATION SYSTEM: GACS DEPTH SCALE

Golder

LOGGED: SS CHECKED: ARM

1:75

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399044.10 E: 503232.92

1 : 60

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

		_					INC	CLIN	ATIC	N: ·	-90°							_									
ц	DRILLING RIG	릵	SOIL PROFILE			GEO	OTEC	CH S.	AMP	LES	СНІ	EMISTRY SAME	PLES	PIE	D m		(	∌	DYNAM RESIS	MIC I	PENE CE, B	TRAT LOW	TION /S/0.3	3m	פֿר	PIEZOMETE STANDPIP	
METRES	GRI	Ę.		LOT		œ		3m	ö	%	<u>ر</u>		ΞD	2	2 4	1 6	8		20	4	0 6	30	80	۱	LAB. TESTING	OR	
ET,		2	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	IBEF	SCN	ANALYSED	PIE	)			Ť	WA	ATE	R CO	NTE	NT %	<u>ا</u>	ĔË.	THERMISTO INSTALLATION	
7 7 5	DRII	∄	DESCRIPTION	RAT	DEPTH	Š	≥	NO.	SOR	200	N	0011	NAL	ppr	m		[		Wp	<u> </u>	<sub>W</sub> ∈		— v	NI S	LAB LAB		
	č	힉		ST	(m)			BI	_	<u>~</u>			٨	2	0 4	0 60	80	4			0 3		40	_			$\neg \neg$
0		1	Ground Surface		855.05																						
			<b>(SM/GM)</b> SILTY SAND and GRAVEL, medium to coarse sand, fine gravel;	0.0	0.00																						
			brown; non-cohesive, dry.								1	04301-07			0												
					1																						
				) 0																							
1				1	,																						
					1																						
					]																					Bentonite	
					1																						
2				. 0							2	04301-08			⊕												
					1						Ĥ	0.100.1.00															
					9																						
			- moist at 2.7m depth	3																							
3					1																					Granular	\$ 8
																										Bentonite	9233
					1																					Vapour Probe with	
		Ë.		0	9																					Pointed Weight	
4		152 1	- moist to wet at 4.0m depth	',0																						Granular Bentonite	
		(Casing:152 mm;	moiot to wet at 4.0m depart		1																					Demonite	
	ш			, ,																							
	ō .	Stem Auger			,																						
5		Je m		0	9																						
	1	Solid		3																							
		"			1																					Bentonite	
			- wet at 5.6m depth								3	04301-09		Ф													
6					1																						
		$\perp$	Moderately to slightly weathered		848.85 6.20																						
			(W3-W2), grey, no odour, no staining, SILTSTONE.	× ×	1																						
			- moist to wet at 6.6m depth	× × × × × × × × × × × × × × × × × × ×	1						4	04301-10				<b>•</b>											
7				× ×	1																						l II.
			- wet at 7.1m depth	××	1																					Sand	
				××	3																						
			- wet from 7.5m to end of hole	× × × × ×	3																					Screen	
8				× >	3																						H
				lŝ 3	3						5	04301-11		Φ													H
				l x x	3																						
				× × × × × × × × × × × × × × × × × × ×																						Slough	
9		4		××	846.05																						<b>A</b>
			End of Monitoring Well.		9.00																						
10																											
						1																					
11																											
12																											
				1	-	<u> —</u>			<u>ــــ</u>	_	<u></u>		I		 S.		CLAS	SIF	ICATION	ON	SYS	LΕΜ	]: GA	ACS			
DE	PTH	SC	CALE					1		7 <u>A</u>	7	Golder			J	\			-,				i. O. D: K				
								1	4	/	<u>"</u> (	Joiger											۰۰. ۱۱				

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

DATUM: NAD 83

SHEET 1 OF 1

CHECKED: AGH

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

N: 6399057.18 E: 503245.87

1 : 70

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

	Τ.										-90°							_	51010		DE1 15		7101			5,530,1575
ا ب	9	읽	SOIL PROFILE			GE	OTE	CH S	AMP	LES	СН	EMISTRY SAME	PLES	PII	D m		(	₽	DYNA RESIS	MIC	PENE ICE, E	ETR/ BLO	ATION NS/0	.3m	일	PIEZOMETER, STANDPIPE
METRES	DRILLING RIG	ING ME	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	NUMBER	SCN	ANALYSED	PII	)	4 6		_	W	ATE	40 R CC	NT			ADDITIONAL LAB. TESTING	OR THERMISTOR INSTALLATION
				STRA	(m)	N	-	BLO	8	RECO	₽		₽NA			n 60	80				⊖W 20			WI	₹₹	
		†	Ground Surface		855.03													Ť		<u>, , , , , , , , , , , , , , , , , , , </u>		Ť	Ť			Т
1			(SM/GM) SILTY SAND and GRAVEL, medium to coarse sand, fine gravel; no odour, no staining; non-cohesive, dry.	000000000	0.00						1	04302-01			⊕											
3			- moist from 2.3 to 5.0m depth								2	04302-02		Φ												Granular Bentonite Vapour Probe with Pointed Weight
5	CME750	(Casing:152 mm; )	- moist to wet at 5.0m depth		848.93						3	04302-03		<b>⊕</b>												Granular Bentonite
7	CMI	Solid Stem Auger	Moderately weathered (W3), grey, no odour, no staining, SILTSTONE slightly moist at 6.2m depth	× > × > × > × > × > × > × > × >	6.10						4	04302-04				Φ										Bentonite
8			- slightly moist at approximately 7.3m depth	× ×																						
9			- slightly moist at 8.8m depth	× × × × × × × × × × × × × × × × × × ×							5	04302-05				•										8=
10			- wet from 9.7 to 10.5m depth	× > > × > × > × > × > × > × > × > × > ×							6	04302-06		0												Sand Screen
11				× × × × × × × × × × × × × × × × × × ×	843.03						7	04302-07		<b>⊕</b>												Slough
13			End of Monitoring Well.		12.00																					
14 DEF	PTH	ıso	CALE							Ā		Golder			S	SOIL (	CLAS	SIF	ICAT	ION				ACS KDE		

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399057.18 E: 503191.88

1 : 60

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

	П,	<u>. T</u>							IATI		$\neg$				PIE				_	DVNAMIC	DEN	IETD	ΑΤΙΛ	ON.		PIEZOMETER,
S ALE	RIG	릴	SOIL PROFILE	Τ⊢	1	GE	OTE		1	_	+	_	EMISTRY SAME	PLES	ppr	n			∌	DYNAMIC RESISTAL				١.	ING ING	STANDPIPE OR
DEPTH SCALE METRES	DRILLING RIG	NG ME	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	W .	RECOVERY %	BEK	SCN	ANALYSED	PIE		6		-	20 WATE					ADDITIONAL LAB. TESTING	THERMISTOR INSTALLATION
	DRI		DESCRIPTION	TRAT	DEPTH (m)	NON	≱	3LOW	SOR	8	RECO!	200	3014	ANAL	ppr					Wp 📙	ON	/		- WI	ABI	
	- 1	7	Ground Surface	S	851.42			Ш.			+	$\dashv$		-	20	) 4	0 60	08 (	+	10	20	30	) 4	10		Т
0		T	(ML) SILT, some fine to coarse sand, some fine gravel, contains rootlets;		0.00						T															
			light brown, no odour, no staining; non-cohesive, dry.								İ	1	04303-04		Ф											
			non-concave, dry.																							
- 1																										-
					849.92																					Bentonite Chip
		l	Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× :	1.50						r	2														
2			odour, no staining, dry, SILTOTONE.	×	Š						L	_	04303-05			Ф										
				×																						
				× : : : : : : : : : : : : : : : : : : :																						
				×																						Granular 🔅 🔅
3				× :								3	04303-06													Vapour
				×							L		04000 00				٦									Probe with Pointed Weight
				× × × × × × × × × × × × × × × × × × ×																						Granular Bentonite
4				×																						-
		_		× :																						
	Ш,	2 mm;			846.62																					
5		(Casing:152 mm; )	Moderately weathered (W3), grey-brown, no odour, no staining, dry,	×	¥ 4.80						L	_														
			SILTSTONE.	×							1	4	04303-07				•	,								
	δ	Solid Stem Auger		X : X : X : X : X : X : X : X : X : X :	Š						F	-														
6		d Sterr		×																						Bentonite Chips
Ü		Sol		× :	Š																					
		ŀ	Moderately to slightly weathered		844.92 6.50																					
			(W5-W2), grey-brown, no odour, no staining, dry, SILTSTONE.	× : × : × : × : × : × : × : × : × : × :	Š																					
7				×							r	_	24202.00		Œ											
				× :								5	04303-08		4											
				× :																						
8				×																						6 6
				× :	X																					Sand
			aliabelic assist force 0.7 to 0.0ss	×							ľ	6	04303-09			Ф										
9			- slightly moist from 8.7 to 8.9m depth	X	Š								0.000 00			Ψ										Screen
				×																						
				× :	Š																					
10				×																						
10				× : × : × : × : × : × : × : × : × : × :								7	04303-10		Φ											Slough
				× :	× 840.82								J-1000-10													Ciougii
			End of Monitoring Well.		10.60																					
11																										
12																										
					1				<u> </u>		Ţ							21.45	SIL.	ICATION	SV	QTF	- NA-	GACS	<u></u>	
DE	PTH	SC	CALE					1		7	7	<b>)</b>	Golder			3	OIL (	JLMO	OII"	IOATION				GAC:		
										<i>.</i>	- 1		LULUEL													

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

DRILLING DATE: January 18, 2018

SHEET 1 OF 1

DATUM: NAD 83

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

Щ.	IG HOD		SOIL PROFILE			GEC	OTEC	CH S	AMP	LES	СН	EMISTRY SAME	LES	PID				0	DY RE	NAMIC SISTA	PEN NCE,	ETF BLC	RATIO	ON /0.3m	٦.D	PIEZOMETER STANDPIPE	
DEPTH SCALE METRES	DRILLING RIG			STRATA PLOT	ELEV.	ER	ш	/0.3m	o N	CORE RECOVERY %	ER		SED	2		6	8	3		20				30	ADDITIONAL LAB. TESTING	OR THERMISTOI	
DEPTI	DRILL		DESCRIPTION	RATA	DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	ECONE	NUMB	SCN	ANALYSED	PID						WATI Vp <b>I</b> —				ı ‰ -l Wi	ADDI LAB.	INSTALLATIO	Ν
	عا	+		ST				<u>B</u>		~			⋖	20	) 40	0 60	8 (	0	<u> </u>	10			4	10		ſ	П
- 0		gı nı	ound Surface ML) SILT, some fine sand, some fine ravel, contains rootlets; light brown, o odour, no staining; non-cohesive, ry.		851.02 0.00						1	04303-11		•	,											Sand -	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
2		H OI	lighly weathered (W4), brown, no dour, no staining, dry, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	849.02 × 2.00 × × × ×						2	04303-12		ę	∌											Granular Bentonite Vapour Probe with Pointed Weight	
4	í.	re	softer rock inferred from drill eaction between 3.3 and 4.0m depth	× × × × × × × × × × × × × × × × × × ×	× × × × × × × × × × × × × × × × × × ×						3	04304-01/02			Φ											Granular Bentonite Bentonite Chips	
5 - 5	CME750		Moderately weathered (W5), rey-brown, slight petroleum ydrocarbon-like odour, no staining,	× × × × ×	846.02 5.00							04304-07/08														Sand Screen	
6	CMI Solid Stem Auger		ry, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	× × × × × × × × × × × × × × × × × × ×						6	04304-04			Φ											Bentonite Chips	
8		-	moist at 8.3m depth moist at 8.6m depth hard layer from 9.0 to 9.05m (based	× × × × × × × × × × × × × × × × × × ×	× × × × × × × × × × × × × × × × × × ×						7	04304-05			0	,										Sand Screen	
- 10		N (V st	India layer floir 9.0 to 9.03m (based of midll reaction)  Moderately to slightly weathered M3-W2), grey-brown, no odour, no taining, dry, SILTSTONE.  wet from 9.0 to 10.3m depth Moderately to slightly weathered M3-W2), grey-brown, no odour, no taining, dry, SILTSTONE.	× × × × × × × × × × × × × × × × × × ×	9.05 × × × 840.72						8	04304-06		•	,											Slough	
- 11 - 12			taining, dry, SILTSTONE.		10.30																					,	- H A
															S	OIL (	CLA	SSI	FICA	ATION	I SY	STE	M:	GAC:	 S		
DE	PTH	SCAL	E					1		7 <u>A</u>		Golder ssociate			_	- '								: KDI			
1:	60							'	V		Ά	ssociate	25								СН	EC	KED	: AGI	H		

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399092.54 E: 503228.98

1 : 60

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

G	HOD HOD	SOIL PROFILE			GEO				LES		EMISTRY SAME	PLES	PII	) n			<b>•</b>	DYN/ RESI	AMIC STAN	PENE CE, B	TRA	ATION NS/0	N .3m	٥٦	PIEZOMETER, STANDPIPE
METRES DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	BER	SCN	YSED	PII		6					10 R CO	_			ADDITIONAL LAB. TESTING	OR THERMISTOR INSTALLATION
M DRII	DRILLII	DESCRIPTION	STRAT	DEPTH (m)	NON	≱	BLOW	COR	CO RECOV	NOM	SCN	ANALYSED	ppi		0 60			Wp	<u> </u>	⊖ <mark>W</mark> 20 :		—1	WI	ADE	
0		Ground Surface	,,,	851.60										J 40	J 60	-80			0 2		30	40			
1		(ML) SILT, some fine sand, some fine gravel, contains rootlets; brown, no odour, no staining; non-cohesive, dry.		0.00						1	04304-09		Φ												Sand :
2		Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× : : : : : : : : : : : : : : : : : : :	849.90 × 1.70 × × × ×	-					2	04304-10			Ф											Granular Bentonite Vapour Probeith Pointed Weight Granular Bentonite
4			X	× × × × × × × × × × × × × × × × × × ×						3	04304-11			Φ											Bentonite Chips
O CME750	Solid Stem Auger (Casing:152 mm;	Moderately weathered (W3), grey-brown, no odour, no staining, dry, SILTSTONE.	× ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	846.10 5.50	-					4	04304-12			Φ											Sand Screen
7		- very hard layer from 7.0 to 7.1m depth (inferred from drill reaction) Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE.	× : : : : : : : : : : : : : : : : : : :	× × × × × × × × × × × × × × × × × × ×						5	04305-01					4	€								Bentonite Chips
9		- softer layer from 8.6 to 8.8m depth	× : : : : : : : : : : : : : : : : : : :	× × × × × × × × × × × × × × × × × × ×						6	04305-02				Φ										Sand Screen
10		- medium hard layer from 9.5 to 9.8m depth - moist from 9.8 to 10.0m depth	X : : : : : : : : : : : : : : : : : : :	× × × × × × × × × × × × × × × × × × ×						7	04305-03			•	Ð										
11		End of Monitoring Well.	× ;	× × × 840.50 11.10																					Slough S
12		CALE							Š		Golder			S	OIL C	CLAS	SIF	ICAT	ION	SYS	TEI	И: G	ACS	3	

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399108.16 E: 503242.97

1 : 60

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

	2					N: -90		DI FO	PI	D.		DYN	IAMIC	PENE	TRAT	ION	1	PIEZOMETER,
THOLE	SOIL PROFILE	T <sub>F</sub> T	GEOT	ECH S	_	_	HEMISTRY SAM	PLES	pp		0					TON 'S/0.3m	AR NG	STANDPIPE
DRILLING RIG	S S	STRATA PLOT	ER I	BLOWS/0.3m	Š.	RECOVERY %		SED	PI	2 4 6	8			10 6		80 NT %	ADDITIONAL LAB. TESTING	OR THERMISTOR INSTALLATION
	Z DESCRIPTION	DEPTH	-1 22 1 5	ows	CORE No.	CORE RECOVERY % NUMBER	SCN	ANALYSED	pp					OW.		MI ⅓   WI	ADD.	INSTALLATION
H	<u> </u>			B		2 2		<	2	0 40 6	0 80			20 3		40		- Τ
0	Ground Surface (ML) SILT, some fine to medium	851.5																Sand
1	sand, some fine gravel; brown, no odour, no staining; non-cohesive, dry.					1	04305-04			Φ								- Sund
2	Highly weathered (W4), grey-brown, no odour, no staining, dry, SILTSTONE.	849.5 × × 2.0 × × × × × × × ×				2	04305-05			<b>⊕</b>								Bentonite Chips  Granular Bentonite
3 1	- 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			Ф								Vapour Probewith Pointed Weight Granular Bentonite
OME750 Solid Stem Auger (Casing:152 mm; )	Moderately weathered (W3), no odour, no staining, grey-brown, dry, SILTSTONE.  - very hard from 5.5 to 5.55m depth  - hard layer at 6.0m depth - softer layer from 6.1 to 6.8m depth	X X X X X X X X X X X X X X X X X X X				4	04305-07			€	Đ							Bentonite Chips
7	(inferred from drill reaction)  - hard layer at 6.8m depth  Moderately to slightly weathered (W3-W2), grey-brown, no odour, no	X X X X X X X X X X X X X X X X X X X				5	04305-08			<b>⊕</b>								
8	staining, dry, SILTSTONE.  - hard layer at 7.1m depth  - wet from 9.0 to 10.0m depth  - potential fractures from 9.0 to	× × × × × × × × × × × × × × × × × × ×				6	04305-09			<b>⊕</b>								Sand
0	10.2m depth  - very hard layer from 10.2 to 10.5m	× × × × × × × × × × × × × × × × × × ×				7	04305-10			Φ								Screen
1	depth  End of Monitoring Well.	× × 841.0 10.5																Slough
12										SOIL	CLASS	IFICA	TION	SYS	ГЕМ	: GAC	s	
EPTH S	SCALE			(	(青		Golder							LO	GGE	D: KD	В	

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

SHEET 1 OF 1 DATUM: NAD 83

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

E.	ص ق	Q P	SOIL PROFILE			GEO		CH S				EMISTRY SAMP	LES	PIE				Ф	DYN RES	AMIC ISTAN	PENE	TR BLO	ATIC	N 0.3m		PIEZOMETER STANDPIPE	
DEPTH SCALE METRES	DRILLING RIG	DRILLING MET	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	NUMBER	SCN	ANALYSED	PIE ppr	2 4 ) n				V	VATE	R CO		ENT	Γ% IWI	ADDITIONAL LAB. TESTING	OR THERMISTOI INSTALLATIO	R
0   			Ground Surface (ML) SILT, some fine to medium sand, some fine gravel; brown, no dour, no staining; non-cohesive, dry.		851.43 0.00						1	04306-01			Ф											Sand	
_ 1 _ 1			Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× : × : × : × : × :	850.43 1.00																					Bentonite Chips	
2 			- hard layer from 1.7 to 1.75m depth - softer layer from 1.75 to 2.6m depth	× : : : : : : : : : : : : : : : : : : :	× × × × × 848.83						2	04306-02			Φ											Granular Bentonite Vapour	
- - - 3			Moderately weathered (W3), brown, no odour, no staining, dry, SILTSTONE.	× : : : : : : : : : : : : : : : : : : :	2.60 × × × ×																					Probe with Pointed Weight Granular Bentonite	
- - - - - - - - - - - - - - - - - - -			- very hard from 3.7 to 4.3m depth	× : : : : : : : : : : : : : : : : : : :							3	04306-03					Φ									Bentonite Chips	
5		(Casing: 152 mm; )	- strong petroleum hydrocarbon-like odour from 4.5 to 6.0m depth Moderately to slightly weathered (W3-W2), grey-brown, no odour, no staining, dry, SILTSTONE.	× ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	× 846.63 × 4.80																					Sand	
6	CME750	Solid Stem Auger	Slightly weathered (W2), grey, no odour, no staining, dry, SILTSTONE.	X	845.43 6.00						4	04306-08/09 & 04:	306-04					С	<sup>□</sup> 206.€	5						Carcaii	
7			- very hard layer from 7.1 to 7.15m depth - very hard layer from 7.5 to 7.8m depth - softer layer from 7.8 to 8.3m depth	× : : : : : : : : : : : : : : : : : : :	× × × × × × × × × × × × × × × × × × ×						5	04306-05						€	)							Bentonite Chips	- -
9 10			- slightly moist at 8.7m depth	× : : : : : : : : : : : : : : : : : : :	X X X X X						6	04306-06				Ф										Sand	
- - - - - - - - - 10			- potential fractures from 9.1 to 10.0m depth - wet from 9.1 to 10.6m depth	× : : : : : : : : : : : : : : : : : : :	X X X X																					Screen	
- - - - - - - 11			End of Monitoring Well.	× ;	840.83 10.60						7	04306-07				Φ										Slough	
- 11 																											
DE 1 :		ıso	CALE								A	Golder ssociate	<u></u>		S	OIL (	CLAS	SSII	FICA		SYS'	GG	ED	: KDE	3		

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6399030.89 E: 503166.57

1 : 60

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

	ניו	Q Q	SOIL PROFILE			GEC		CH S			$\overline{}$	EMISTRY SAMI	PLES	PII				Φ	DYN	IAMIC ISTAN	PENE	ETR BLC	RATIO	ON 5/0.3m	.(2)	PIEZOMETER, STANDPIPE
METRES	DRILLING RIG			LOT		œ		.3m	ö	%	~		n.	1		4	6	8		20		60		<sub>80</sub> \	ADDITIONAL LAB. TESTING	OR THERMISTOR
METE	ILLIN	S N	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	MBE	SCN	ANALYSED	PII						VATE			ΓΕΝ	IT %	] [ ] [ ]	INSTALLATION
_	DR	訓		IRA	DEPTH (m)	N	F	lov	9	ZECO.	Ž		AN A	pp	m				W	p <b>—</b>	⊖W			-I WI	A B	
		믜		S				В		ш.			<u> </u>	2	20 4	10 E	0 8	30		10	20	30	4	40 T	₩	-
0		+	Ground Surface (ML) SILT, some fine sand, some fine	+	851.00 0.00																	+				
			gravel; brown, no odour, no staining;		0.00																					Sand
			non-cohesive, dry.								1	04307-01			⊕											
		-																								
1					850.00																					
		Γ	Highly weathered (W4), brown, no odour, no staining, dry, SILTSTONE.	× × ×	X 1.00																					Bentonite Chips
			odour, no staining, dry, SIETS TONE.	×	X																					
				× ×	X																					
				×	3																					Granular 💸
2				×	3																					Bentonite 🖁
				×	3						2	04307-02			0											Vapour Probe with
				×	3						-															Pointed Weight
				×	3																					Granular Rentanita
3				×	Ä																					Bentonite
				×	×																					
				×	×																					
		-	Moderately to highly weathered	×	× 847.30 × 3.70																					
4			(W3-W4), brown, no odour, no	×××	3.70																					
٦		ļ	staining, dry, SILTSTONE.	×	846.80						,	04307-03														
			Moderately weathered (W3), grey-brown, no odour, no staining, dry,	×	× 4.20						ľ	04307-03				#										
		E,	SILTSTONE.	×	×																					
		(Casing: 152		×	×																					
5	0	asing	- hard from 5.0 to 5.05m depth	×	×																					Bentonite Chips
	ш	- 1	<ul> <li>potential fractures from 5.05 to</li> <li>7.2m depth</li> </ul>	× × ×	×																					
	Ö	Auge	<u></u>	×	×																					
		Solid Stem Auger		×	×						4	04307-04					Ф									
6		팅		×	×						⊢															
		Ň		×	×																					
				×	×																					
				×	×																					
7				×	×						_															
			- very slight moisture from 7.2 to	×	×						5	04307-05			Φ											
			7.3m depth	× ×	×																					
			- potential fractures from 7.6 to 9.1m	×	×																					Bentonite Pellets
8			depth	×	X																					
°۱				×	3																					
				×	3																					
			- wet from 8.6 to 8.8m depth	××	3																					Sand
			not nom old to close dopa.	×	3						6	04307-06			'	₽										Gund
9		-	Moderately to slightly weathered	×	841.90 × 9.10							1														
			(W3-W2), grey-brown, no odour, wet,	×	x 3.10																				1	Screen
			SILTSTONE potential fractures from 9.1 to	×	×																				1	
			10.0m depth	×	×																				1	
0		$\vdash$	Slightly weathered (W2), grey-brown, no odour, wet, SILTSTONE.	×	3 841.00 X 10.00							-													1	Slough
			no odour, wet, SILTSTONE.	×	Ê						7	04307-07				₱										Sand
		$\perp$		×	× 840.40	Ш																1				Gallu
			End of Monitoring Well.		10.60																					
1																									1	
																									1	
																									1	
2																										
					•					\$						SOIL	CLA	SSI	FICA	TION	SYS	STE	M:	GAC	s	•
El	PTH	I SC	CALE						Ê	Æ	E	Golder									LC	GG	3EC	): KDI	В	
										-		~ ~~~														

1 : 75

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

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

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

	Т	۵							IATIO		${}^{-}$			PID				DYNA	MIC	PENET	TRAT	TION	1	PIEZOMETE	-R
DEPTH SCALE METRES	RIG	DRILLING METHOD	SOIL PROFILE	<u> </u>	1	GE	OIE	_	Π	Ι.	+	HEMISTRY SAM	T	ppm		•	•	RESI	STAN	ICE, BI	LOW	'S/0.3m	ADDITIONAL LAB. TESTING	STANDPIP OR	
ETRE	LING	NG ME	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	RE %	NUMBER	SCN	ANALYSED	PID	4	6	8			F COI	_		TEST	THERMISTO	
DEP.	DRIL	RILLI	DESCRIPTION	IRAT,	DEPTH (m)	NOM	₽	LOW	CORI	CORE	N N	SCIN	NAL,	ppm						OW.		⊣ wı	ADE LAB.		
	╀	□		S				m m	-	"	+		+	20	40	60	80	1	0 2	20 3	30 	40			$\Box$
- o			Ground Surface (ML) CLAYEY SILT, contains rootlets	+	863.01 0.00										+										
			and wood debris; brown, no odour; cohesive, w~PL.								1	04307-08		€	,										
- 1			Completely weathered to residual	$\prod_{x}$	861.81 × 1.20																				
			soil (W5-W6), dark brown, no odour, moist, SILTSTONE.	×	1.20																				
_ 2			most, dietotone.	× × × × × ×	Š																				
					860.51						2	04307-09		■ ■	•										
			Highly weathered (W4), brown, no odour, dry, SILTSTONE.	××	2.50																				
_ 3			ododi, dry, Sill 13 TONE.	×	Š																				
				× × × × ×																					
				×	2 050.04																				
- 4 :			Moderately weathered (W3), grey brown, no odour, no staining, dry,	×	× 859.01 × 4.00						3	04307-10				•									
			SILTSTONE.	× × ×	X .						Ľ	-				Ĭ									
- 5			- very hard layer from 4.6 to 4.7m depth (W1)	×																					
			- softer from 4.7 to 5.0m depth (W4)	×	Š																			Bentonite Chips	
:		_	- pieces of sandstone from 5.5 to 6.0m depth	× × × × × × × ×							4	04307-11					- ⊕								
- 6		(Casing:152 mm;	- very hard from 6.0 to 6.05m depth	×	Š																				
		ing:15	(W1) - very hard from 6.15 to 6.2m depth		856.56 856.45																			PVC Pipe	
	CME750	(Cas	\(\((W1)\)\ Slightly weathered (W2), grey-brown,	× × × ×	0.43																				
- 7 :	S	Stem Auger	no odour, no staining, dry, SILTSTONE.	×							5	04307-12													
		Stem		× × ×							Ŀ	-													
. 8		Solid	- potential fracture from 7.6 to 13.2m depth	× × × × ×	Š																				
				×																					
				× ×							6	04317-01													
- 9				×	X						H	-		lΤ											
				× ×	Š																				
				×																					
- 10				× × ×	Š						7	04317-02													
				×							Ŀ	-		ΙŢ											
_ 11				× × ×	Š																			Bentonite Pellets	` .
				×																				1 0010	
				× × ×	3						8	04317-03												0	
: - 12				×							Ŀ	-			٦									Sand	
			- wet from 12.2 to 13.7m depth	×	Š																			Screen	
				×																					
- 13 -				× × × × × × × ×																					
				××	849.31						9	04317-04												Slough	
- 14			End of Monitoring Well.	ľ	13.70																				<u></u> .
_ 15																									-
					1				<u>L</u>		L				90		ASS	FICAT	ION	SYST	EM	: GAC	<u></u>		
DE	EPT	ΗS	CALE					1		7	Ÿ.	Golder	ı		30	.L UL	, 100	. 10/1	IOIN			D: KDI			
								- 1	. 7	-	<b>-</b> -	AAMA													

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

DRILLING DATE: January 24, 2018

SHEET 1 OF 1

DATUM: NAD 83

CHECKED: AGH

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

N: 6398743.82 E: 503133.67

1:70

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

Coronal Suffect			9	SOIL PROFILE			GE		CLIN CH S				EMISTRY SAME	PLES	PIE				Φ	DYN	AMIC	PENE	ETR/	ATIOI	N N		PIEZOMETE	
Completely awardened to module collesies, wife.   College   Coll	METRES	3 RIG	ĒT.		Ь				Ę	Ι.	%						. 6	6 8							١.	NAL TING	OR	
Completely awardened to module collesies, wife.   College   Coll	ETR	Ĭ	NGN	DESCRIPTION	A PL	ELEV.	BER	PE	S/0.3	E No	ERY ERY	BER	SCN	YSE							Ĺ	Ĺ				ESE.		
Completely awardened to module collesies, wife.   College   Coll	≥	DRII	SILLI	BEGORII HON	RAT		N	≿	NON	COR	ECO	N N	JOIN	MAL	ppr	n				W	· I—	OW.			WI	ABG		
Completely weathered for pasticle   Sand	_		ä		ST	(111)			B	Ĺ	~			4	2	0 40	0 6	0 8	0					40	)		-	П
bower, no odour, contested, weefful.    Total acts acts   Total acts	0		$\perp$		+																		-	4			Sand	
Completely weathered to reactual and control of the						0.00						1	04318 05			_											Sanu	٤.
Connotes weathwest to residual and INVENTION of the State of Monitoring Chips  Sentonite Chips  Sentonite Chips  Bentonite Chips  1												H	04310-03			Ψ												
Connotes weathwest to residual and INVENTION of the State of Monitoring Chips  Sentonite Chips  Sentonite Chips  Bentonite Chips  1																												
Stanting, moist, SILTSTONE  ##phy weathered (W4), per-town ro colour, dry, SILTSTONE  - Intrider conditions from 3.0 to 3.3m depth (senter to W3)  - Potential fractures from 4.2 to 4.5m depth (senter to W3)  - Potential fractures from 4.2 to 4.5m depth (senter to W3)  - Potential fractures from 4.2 to 4.5m depth (senter to W3)  - Signify weathered (W3), per-town ro colour, dry, senter to warm of the senter to W1)  - Intrider conditions from 5.5 to 5.7m depth (senter to W1)  - Intrider conditions from 5.5 to 5.7m depth (senter to W1)  - Intrider conditions from 5.5 to 5.5m depth (senter to W1)  - Intrider conditions from 5.5m depth (senter to W1)  - Intrider conditions from 5.5 to 5.5m depth (senter to W1)  - Intrider conditions from 5.5 to 5.5m depth (senter to W1)  - Intrider conditions from 5.5 to 5.5m depth (senter to W1)  - Intrider conditions from 5.5 to 5.5m depth (sen	1		ŀ	Completely weathered to residual																								
Highty weathered (W4), grey-known, codour, dry, SLIESTONE.  - harder conditions from 3.0 to 3.3 m depth (similar to W3)  - potential fractures from 4.2 to 4.5 m depth (similar to W3)  - potential fractures from 4.2 to 4.5 m depth (similar to W3)  - potential fractures from 4.2 to 4.5 m depth (similar to W3)  - slightly weathered (W3), grey-known, codour, dry, slightly weathered (W3), grey-known, codour, dry, slightly weathered (W3), grey-known, codour, dry, slightly weathered (W2), grey-known, codour from 10.3 to 12.2 m depth (similar to W1)  - slightly weathered (W2), grey-known, codour from 10.3 to 12.2 m depth (similar to W1)  - slightly weathered (W2), grey-known, codour from 10.3 to 12.2 m depth (similar to W1)  - slightly retrieved (W2), grey-known, codour from 10.3 to 12.2 m depth (similar to W1)  - slightly petroleum hydrocation like codour from 10.3 to 12.2 m depth (similar to W1)  - slightly retrieved (W2), grey-known, codour from 10.3 to 10.45 m depth (similar to W1)  - slightly retrieved (W2), grey-known, codour from 10.3 to 10.45 m depth (similar to W1)  - slightly retrieved (W3), slightly weathered (W3), slightly w				soil (W5-W6), brown, no odour, no staining, moist, SILTSTONE.	×	3																					Bentonite Chips	
Tighty weathered (V/2), grey-brown, no colour, day, Sill, CSTONE   2.50    - harder conditions from 3.0 to 3.3m    - depth (similar in V/3)   2.50    - harder conditions from 4.0 to 4.5m   2.50    - harder conditions from 4.0 to 4.5m   2.50    - harder conditions from 4.0 to 4.5m   2.50    - A.50    - Moderately weathered (W/3), grey-brown, no colour, day, and see from 5.5 to 5.7m				-	×	X																						
Fighty weathered (W2), grey-brown, object (similar to W1)   Signific (sim	2				× :	×						Ļ	04240.00															
Doctoring (Str. STONE)   Section (Str. Str. Stone)   Section (Str. Str. Str. Str. Str. Str. Str. Str.					× :							Ľ	04316-00			9												
Bentonite  Apport  App				Highly weathered (W4), grey-brown, no odour, dry, SILTSTONE.	×	2.50																					Granular	**
Control of the cont	3			- harder conditions from 3.0 to 3.3m	× :	$\frac{2}{3}$																					Bentonite	Ž
				depth (similar to W3)	× :	×																					Probe with	1
- noterinal fractures from 4.2 to 4.5m depth Moderately weathered (W3), grey-brown, no odour, dry, SLTSTOME.  - well have from 4.5 to 5.7m depth Sightly weathered (W2), grey-brown, no odour, dry, SLTSTOME.  - slightly weathered (W2), grey-brown, no odour, dry, SLTSTOME.  - slightly weathered (W2), grey-brown, no odour, dry, SLTSTOME.  - well have from 6.5 to 8.56m depth (similar to W1)  - slightly petroleum hydrocarbon-like odour from 10.3 to 12.2m depth - well have from 10.3 to 12.2m de					× :	×																					Pointed Weight	š
	4				× :	Š																						
Moderately weathered (W3),   X				- potential fractures from 4.2 to 4.5m	× :	X 252 24						3	04318-07					Ф										
grey-brown, no odour, dry, St. TSTONE:  - work hard flayer from 5.6 to 5.7m  - very hard from 8.5 to 8.55m depth  - slightly weathered (W2), grey-brown, no odour, dry, St. TSTONE:  - very hard from 8.5 to 8.55m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.0 to 1.2 m depth  - slightly project from 1.0 to 1.0 to 1.2 m depth  - slightly project from 1.0 to 1				Moderately weathered (W3),	/ × :		1																					
Section   Continue	5				× :	×																						
A   O4318-08			mm;	- moist to wet from 4.9 to 5.1m depth	× :	ž																						
Slightly weathered (W2), grey-brown, no doour, dry, SlLTSTONE.			g:152	veny hard layer from 5.6 to 5.7m	- X :	3																						
Slightly weathered (W2), grey-brown, no doour, dry, SlLTSTONE.	6	.20	Casin	depth (similar to W1)	× :	X						4	04318-08		Ш													
Slightly weathered (W2), grey-brown, no doour, dry, SlLTSTONE.		CME7	ger (		× :	×																					Bentonite Chins	
Slightly weathered (W2), grey-brown, no doour, dry, SlLTSTONE.			m Au	- slightly moist at 6.4m depth	× :	Š																						
Silightly weathered (W2), grey-brown, no odour, dry, SiLTSTONE:			lid Ste		× :	3																						
Silightly weathered (W2), grey-brown, no odour, dry, Sil.TSTONE.	7		So		×	×						5	04318-09															
Silightly weathered (W2), grey-brown, no odour, dry, SILTSTONE.					× :	×																						
Slightly weathered (W2), grey-brown, no odour, dry, SILTSTONE:  - very hard from 8.5 to 8.55m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth - very hard from 10.35 to 10.45m depth (similar to W1)  End of Monitoring Well.  Silightly weathered (W2), grey-brown, no odour, dry, SILTSTONE:  - very hard from 8.5 to 8.55m depth - very hard from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (simila					× :	X X 855 31																						
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(similar to W1)    Sand   Sand					- X :	×																						
- slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth				(similar to W1)	× :	Ž						6	04318-10															
- slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth   - very hard from 10.3 to 13.5 to 10.45m depth (similar to W1)  End of Monitoring Well.	9				× :	3																						
- slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth					×	×																						E
- slight petroleum hydrocarbon-like odour from 10.3 to 12.2m depth - very hard from 10.35 to 10.45m depth (similar to W1)  End of Monitoring Well.  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slight petroleum hydrocarbon-like odour from 10.35 to 10.45m depth (similar to W1)  - slig					× :	×																					Sand	E
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depth (similar to W1)				- slight petroleum hydrocarbon-like	- X :	3						7	04318-11															Œ
depth (similar to W1)					×	×																					Screen	l
	11			depth (similar to W1)	× :	X																						lle
					×	3																						E
End of Monitoring Well.  Slough					× :	×						8	04318-12 & 04321	1-01			1											lE
End of Monitoring Well.	12				× :	X X 054.44																					Slough	
	ł			End of Monitoring Well.																							Glough	پی
	13																											
	14																											
SOIL CLASSIFICATION SYSTEM: GACS EPTH SCALE  Golder  LOGGED: KDB																												
EPTH SCALE LOGGED: KDB						1			-		Ī		I			S	OIL	CLA	SSI	FICA	TION	SYS	TEN	M: G	SACS	3	l .	
	DEI	PTŀ	H SC	CALE					(		Æ		Golder									LO	GG	ED:	KDE	3		

### **RECORD OF MONITORING WELL: K19-MW18-16**

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

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

N: 6398756.43 E: 503106.44

1 : 60

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

		8	SOIL PROFILE			GEO		CLIN. CH S			$\overline{}$	EMISTRY SAM	PLES	PID				Τ	DYNAMIC RESISTAN	PENE	ETRAT	ION S/0.3m		PIEZOMETE	
DEPTH SCALE METRES	DRILLING RIG	발		TO.		~		3m		%	~		۵	ppn 2		6			20			80	ADDITIONAL LAB. TESTING	STANDPIPI OR	
AETR	ILLIN	S	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	ABEF	SCN	ANALYSED	PID				_	WATE			NT %	JEE.	THERMISTO INSTALLATIO	OR ON
DEF	DRI			TRAT	DEPTH (m)	Š	F	LOW	SOR	ZECO S	ž		ANA	ppn				1	Wp <b>I</b> ─			- WI	88		
	H	4		.v				ш					+	20	) 40	60	80	+	10	20 	30	40	1	-	$\Box$
_ 0	Н	+	Ground Surface (ML) CLAYEY SILT, contains rootlets;	Ш	861.29 0.00											+		+						Sand	
F			brown, no odour; cohesive, w <pl.< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td>0.4004.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Gund</td><td></td></pl.<>								_	0.4004.00												Gund	
Ē											1	04321-02			Φ										
-																									
_ 1																									
_		ŀ	Highly to completely weathered	×	860.09 × 1.20																				
-			(W4-W5), brown, no odour, dry, SILTSTONE.	×	X																				
E			SILTOTONE.	×	8																				
_ 2				×	3																				
_				×	3						2	04321-03			⊕										
-				×	3						_														
E				× × ×	3																				
- 3		-	Highly weathered (W4), brown, no	X	858.29 3.00																				
_			odour, no staing, dry, SILTSTONE.	× ×	3.50																				
Ė			- hard layer from 3.5 to 3.55m depth	× × × × × × × × × × × × × × × × × × ×	×																				
=			(similar to W2)	×	X																				
_ 4			- very slightly moist at 3.8m depth	×	×																				
_				×	×						3	04321-04					•							Bentonite Chips	
-		<u>:</u>	<ul> <li>hard layer from 4.3 to 4.4m depth (similar to W2)</li> </ul>	×	×																			Bentonite onipo	
		52 mr	,	×	×																				
_ 5		(Casing:152 mm;	Moderately weathered (M2)	×	856.29 5.00																				
E			Moderately weathered (W3), grey-brown, no odour, no staining, dry,	× × × × ×	3.00																				
_	CM	Solid Stem Auger	SILTSTONE.	×																					
		tem A			×						4	04321-05													
<del>-</del> 6		Spig		×	X						<u> </u>														
E		ŏ		× ×	X																				
_				×	×																				
				×	X																				
- 7				×	3																				
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_				×																					
_ 8				×	×																				
_		ŀ	Slightly weathered (W2), grey-brown,	×	853.09 8.20																				
			no odour, dry, SILTSTONE.		3						_														8 8
_				× × ×							6	04321-07												Sand	
9				×	×																				
			<ul> <li>very hard layer from 9.1 to 9.3m depth (similar to W1)</li> </ul>	×	×																				
E			- moist to wet from 9.3 to 10.0m depth	×	X																			Screen	
Ė			P. W. 1	× × × × × × × × × ×	X																				
10 				×	Š																				
9 10			- very hard layer from 10.3 to 10.4m	×	Š						7	04321-08			_										
-	Ш	$\downarrow$	depth (similar to W1)	×	850.69 10.60									Ш		4	$\perp$	4			1	-		Slough	المتحر
L			End of Monitoring Well.		10.60																				
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12																									-
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n DF	=PT+	1.50	CALE					4		7		Golder			S	JIL (	LAS	SIF	ICATION						
	11		<del></del>						4		E	Golder								LO	GGE	D: KD	R		

### **RECORD OF SOIL VAPOUR PROBE: K19-SV18-03**

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

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

N: 6399050.38 E: 503244.09

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

	_					INC	CLIN	ATIC	ON:	<u>-90°</u>														T
	2 2	SOIL PROFILE			GEO	OTE	CH S	AMP	PLES	СН	EMISTRY SAME	PLES	PIE	) n		0	DYI RES	VAMIC SISTAN	PENE ICE, E	ETRA BLOV	NS/0	N 0.3m		PIEZOMETER, STANDPIPE
METRES	DRILLING RIG		TO.		~		3m	<u>.</u>	%	~		Ω	2		l 6			20				١.	ADDITIONAL LAB. TESTING	OR
H H	ِعَ الْحَ	BEGGEIPTION	l P	ELEV.	BER	Щ	3/0.3	Š	泄쏪	HH	0011	/SE	PIE					WATE					ĘË	THERMISTOR INSTALLATION
∑	텕	DESCRIPTION	YAT/	DEPTH	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	Ĭ	SCN	ANALYSED	ppr					'p <b>⊢</b>				WI	APC AB.	iiioi/iabaiiioii
l'			STRATA PLOT	(m)	z		BL	0	2	Z		¥	2	0 4	0 60	80	**	10	20	30			`_	
T		Ground Surface		855.27									٦			Ť		1	Ĭ	Ť	Ť			
0		(SM/GM) SILTY SAND and GRAVEL, fine to medium sand, fine gravel;		0.00																				
		fine to medium sand, fine gravel;	٥٠٥																					
		brown, no odour, no staining; non-cohesive, dry.		,																				
		non conceive, dry.		1																				
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	, m	- moist at 2.4m depth		1																				
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3	CME/50	-		1																				Bentonite 88
ŀ	בַּן כַּ		11,6					1																I 888
	CME/50 Solid Stem Auger (Casing:152 mm:			,																				Vapour Probewith
	7.			1																				Pointed Weight
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6		- wet at 5.8m depth	),0							2	04302-10		Ф											
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		(Bedrock inferred from drill reaction)																						
		End of Soil Vapour Probe.																						
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### **RECORD OF SOIL VAPOUR PROBE: K19-SV18-04**

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

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

N: 6399060.05 E: 503279.33

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

Description			٥	SOIL PROFILE			GEO				ON:		EMISTRY SAM	PI ES	PIC	)				DYNA	MIC	PENE	TR/	ATIO	N		PIEZOMETER,
Sand	METRES	RIG	띩	SOLFINOLIE	<del> </del>	1	OL	JILO		1			LIVIIOTICI OAW	Т	ppn	n			- 1						١.	₽NG	
Sand	TRE	NG.	3		PLO	FLEV	띪	ш	0.3n	Š	"%	监		SED	-		6	8					$\perp$			EST	THERMISTOR
Sand	M	RIL	Ĭ.	DESCRIPTION	ATA		JMB	₹	WS,	)RE	SOR	₽ B B	SCN	ALY												. J.	INSTALLATION
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Bestonite Chips    1	0		$\dashv$	(SM/GM) SILTY SAND and GRAVEL,	. 0																		t				Sand
Bentonite Chips  Granular Bentonite Chips  G				fine to medium sand, fine gravel;	1),0																						715
Gendrock inferred from drill reaction)  End of Soil Vapour Probe.				non-cohesive, dry.		4																					
Gendrock inferred from drill reaction)  End of Soil Vapour Probe.					0	9																					
Gendrock inferred from drill reaction)  End of Soil Vapour Probe.	1				11,0																						Rentonite Chins
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Bentonite Chips Granular Bentonite  (Bedrock inferred from drill reaction) End of Soil Vapour Probe.			:152			1																					
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### **RECORD OF SOIL VAPOUR PROBE: K19-SV18-05**

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

DRILLING DATE: January 18, 2018 DRILLING CONTRACTOR: Tundra Drilling N: 6399069.17 E: 503364.31

SHEET 1 OF 1 DATUM: NAD 83

CHECKED: AGH

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H.	9	兒	SOIL PROFILE			GE	OTE	CH S	SAMF	PLES	C+	IEMISTRY SAME	PLES	PID	1		Э	) RE	NAMIC SISTA	NCE.	BLC	RATIC DWS/	0.3m	٦̈Б	PIEZOMETER, STANDPIPE
DEPTH SCALE METRES	IG R	DRILLING METHOD		STRATA PLOT		ıκ		.3m	<u>o</u>	%	i r			2	4	6	8		20	40	60	8	<sub>10</sub> \	ADDITIONAL LAB. TESTING	OR THERMISTOR
PTH		NG.	DESCRIPTION	TAP	ELEV.	NUMBER	TYPE	BLOWS/0.3m	CORE No.	SR.	NUMBER	SCN	ANALYSED	PID					WAT			ΓEN	Γ%	3. H	INSTALLATION
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_ 0		$\dashv$	Ground Surface (ML/GP) CLAYEY SILT and GRAVEL;		857.03 0.00						-						_								Sand
_			dark brown, no odour, no staining;																						Sand
_		Ë.	cohesive, w~PL.								1	04303-01		Φ											Bentonite Chips
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_	S	nger									2	04303-02		Φ											Pointed Weight
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DE	PT	H S	CALE					1		7	F.	Golder			30	J1∟ (		) ii iU/	TIOI				: KDE		
									4	J.		Tolaer										راار		,	

### **RECORD OF SOIL VAPOUR PROBE: K19-SV18-14**

SHEET 1 OF 1 DATUM: NAD 83

LOGGED: KDB

CHECKED: AGH

CLIENT: Public Services and Procurement Canada

PROJECT: Alaska Highway LOCATION: K19 N: 6398712.14 E: 503226.90

DEPTH SCALE

1 : 60

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

		0						ION:	$\neg$		D. E.	PIE	<u> </u>			DYI	JAMIC.	PENE.	TRATIO	ON	1	PIEZOMET	FR
빌.	92	SOIL PROFILE		ı	GEO	TECH	1 SAN	_	+	HEMISTRY SAM	PLES	ppr	'n		А	RES	NAMIC SISTAN	ICE, B	LOWS	5/0.3m	무일	STANDPII	PE PE
DEPTH SCALE METRES	DRILLING RIG	ME.	STRATA PLOT		2		BLOWS/0.3m	<u>.</u>   §	NUMBER		ED	2	2 4	6	8		20 4	10 6	30 8	<sub>30</sub> \	ADDITIONAL LAB. TESTING	OR THERMIST	OR
ΞĒ		DESCRIPTION	Α	ELEV.	NUMBER	TYPE	LOWS/0.3r		취유	SCN	ANALYSED	PIE					NATE		NTEN	T %	1 <u>5</u> "	INSTALLAT	ION
H N	DRI:		₹	DEPTH		}  ∶	8 8		[] ∫	55.1	I₹	ppn	n			] w	р 📙	OW.		- WI	AB		
		NO.	STI	(m)	_	_ li	18 L		¥		<	2	0 4	0 60	80		10 2			40			
		Ground Surface		867.27																			
_ 0	1.	(ML) CLAYEY SILT, some fine grav	el;	0.00																		Sand	
-		dark brown, no odour, no staining; cohesive, w~PL.							H				Φ.										
_		Coriesive, wart.							1	04318-03		li	⊕									Granular	
-																						Bentonite	888
-	750	(Cas																					
— 1 -																						Vapour	****
-	<u>ا</u> آ	Aug							L													Probe with	
-		tem							2	04318-04		•	,									Pointed Weight	12.12.12
-		Solid Stem Auger																					
-		[8]		865.27																		Granular	
_ 2 -		End of Soil Vapour Probe.		2.00																		Bentonite	WENERE .
-																							
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		LLCONE						4	マラ				0	J.L. (	,	10/		2.0	· v · ·	٠,٠٠٠	-		



### **K19 ENVIRONMENTAL INVESTIGATION**

## **APPENDIX D**

**Groundwater Development and Sampling Forms** 



Project Name	: K19 Tr	utch			-	Project	t No.:	1657709	0.196	
ocation:	710	~~		IA		Date:	Town 1	14/01/	20(0)	
Veather: SPS Coordin		al	Ten	nperature:\A			eted By: red By:	BM		
700 30 700 320	ING WELL	NEORMA	ATION			review	eu by.			
Time of Meas		IIAL OLVIAIN	ATION			Tidall	u Influence	U D Van	rof No.	
Depth to Proc			m	Product Thickness:	_ m		y innuenced urized:	l: □Yes	21	
Depth to Wat				□ TOP				□ Yes		
	om of Well (B):			□ TOP			Headspace: Vell Volume	1	ppm	
Diameter of S			mm	LI TOP					for a particular	(0.0 : - 1.)
Vell Condition			<b>3011</b>				1.1 =			(2.0 inch) diameter w (1.5 inch) diameter w
QUIPME	NTLIST									
	aterra		Multim	eter I	Model:			Rental Equip	ment:	
ΠН	ydrolift		pH/Ter		Model:			=qa.p		
□В	ailer (Type:			ctivity Meter I	Model:		_ D	Field Bump		
□P	eristaltic				Model:					□ pH7
□ S	ubmersible				Model:					
□В	adder				Model:			□ 1413 us/cr		
ump Details:	TA			. Ampoule	-					
ump Details.	9		🗀 0.0	Ampoule	.,,		U	Field Calibrat	ion	
vg. Flow Rat	Volume Removed	Temp.	рН	□ Cond. □ Specific	700000000000000000000000000000000000000	Sample Redox	Diss. O <sub>2</sub> *		vel	(Ass/A)
line	(L)	(°C)	(Units)	μS/cm or mS/c (circle one)	m	(mV)	(mg/L)	(m)		Remarks
- 7					Carrier and I	We supply	No. of Concession, Name of Street, Name of Str			
				The second secon						
			- AMERICAN	FOX						
				M						
À										
* Record D	O in Mg/L, not po	ercentage					Ļ	4		
omments:										
Odour:	☐ Yes ☐	No If yes								
Sheen:	□ Yes □	No If yes	□ Нус	drocarbon-like OR E	Metallic-li	ke				
Turbidity:	Clear I I	111111		111111111111			Silty			
. J. Didity.				Conta	iner Size					
						41	0.1	44	Filtered	Preservatives
Analysi	s T	ype	40 mL	120 mL   250 ml	500 ml	1 1 1	21	4 1		1100011011100
	s T	ype □ Glass	40 mL	120 mL 250 mL	500 mL	1L	2 L	4L DY	s DNo	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
			40 mL	120 mL 250 mL	500 mL		ZL	□Ye		, , , , , , , , , , , , , , , , , , , ,
	☐ Plastic	☐ Glass	40 mL	120 mL 250 mL	500 mL		ZL	□ Ye	s 🗆 No	7,7000,700,700
	☐ Plastic	☐ Glass	40 mL	120 mL 250 mL	500 mL		21	□Ye	s □ No	

O:\Final\2013\1412\FORM UPDATE PROJECT 2013\Word Files - April\GW Development and Sampling Data.docx

Consumables: 

Waterra Tubing

☐ Silicon Tubing

☐ Glass

☐ Glass

☐ Plastic

☐ Plastic



☐ Groundwater Filter

☐ Footvalve

☐ Yes

☐ Yes

☐ HDPE/Teflon Tubing

☐ D.O. Ampoules

□ No

□ No

SCN No.

Field Dup.

☐ Development ☐ Purging/Sampling

Well No .: MW16-10	2
--------------------	---

cation:	K19-T	rutch					Project	No.:	1657709		
eather: 'S Coordina	ites:		Ten	nperature:	_		100 0 100	eted By:	-		
			. 2027				Review	ea By:			
	ING WELL										
ime of Measu		15:19	-				Tidally	y Influenced	1		
epth to Prod				Product This	ckness: _	m		urized:		No	
epth to Wate				⊠ TOP				leadspace:		ppm	
	m of Well (B):	L.		TOP				Vell Volume			
iameter of St			mm	119011				2.0 =	A STATE OF THE SALE		(2.0 inch) diameter
ell Condition		NoTPlu	011	nen			(B-A)*	1.1 = /	Litres - fo	r a 38 mm	(1.5 inch) diameter
QUIPME	NT LIST										
ump □ Wa	aterra		Multim	eter	100	Model:		п	Rental Equipme	ent:	
□ Hy	drolift			np Meter		Model:			teritar Equiprin	3110	
12000	iler (Type:			ctivity Meter		Model:			ield Bump		
	ristaltic			ed Oxygen		Model:					□ pH7
/	bmersible			Redex) Mete	r	Model:			□ pH10		
□ Bla	adder			c Vapour Me	ter	Model:		_ '	☐ 1413 us/cm		
ıma Dotoila:										-	
unip Details.			🗆 0.0.	Ampoule				U )	ield Calibration	۱ <u> </u>	
ırge Volume:	Well. Vol. )	×		=	litres		Start: Sample	intake depti	Finish:	-	
Time	Volume Removed	Temp.	pH		□ Specific		Redox	Diss. O <sub>2</sub> *		1	Remarks
	(L)	(°C)	(Units)		circle one)		(mV)	(mg/L)	(m)		
					1						
			4	AX							
			-	K	1						
			17	1							
				,							
								1			
										+	
* Record D	O in Mg/L, not p	ercentage									
	O in Mg/L, not p	ercentage									
mments:											
mments: Odour:	□ Yes □	No If yes		drocarbon lik	o OP 1	7 Motallia II	ilko.				
omments: Odour: Sheen:	□ Yes □	No If yes	□ Нус	drocarbon-lik				Silty			
mments: Odour:	□ Yes □	No If yes	□ Нус				ike Very	Silty			
mments: Odour: Sheen: Turbidity:	☐ Yes ☐ ☐ Yes ☐ Clear ☐ ☐	No If yes	□ Нус			1111		Silty			
mments: Odour: Sheen:	☐ Yes ☐ ☐ Yes ☐ Clear ☐ ☐	No If yes	IIIIII		Conta	IIII ainer Size	Very		41 Fil	lered	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐ ☐ Yes ☐ Clear ☐ ☐	No If yes No If yes IIIIII	□ Нус			1111		Silty 2 L	4 L		Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐ ☐ Yes ☐ Clear ☐ ☐ Plastic	No If yes No If yes IIIIIII	IIIIII		Conta	IIII ainer Size	Very		4 L PYes	□No	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐☐ Yes ☐☐ Clear ☐☐ Plastic	No If yes No If yes I I I I I I I  Type  Glass Glass	IIIIII		Conta	IIII ainer Size	Very		4 L ☐ Yes ☐ Yes	□ No	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐☐ Yes ☐☐ Clear ☐☐ Plastic	No If yes No If yes I I I I I I I  Type  Glass Glass Glass	IIIIII		Conta	IIII ainer Size	Very		4 L □ Yes □ Yes □ Yes	□ No □ No	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐☐ Yes ☐☐ Clear ☐☐ Plastic☐☐	No If yes No If yes I I I I I I I  Type Glass Glass Glass Glass	IIIIII		Conta	IIII ainer Size	Very		4 L □ Yes □ Yes □ Yes □ Yes	□ No □ No □ No □ No	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐☐ Yes ☐☐ Clear ☐☐ Plastic☐☐	No If yes No If yes I I I I I I I	IIIIII		Conta	IIII ainer Size	Very		4 L □ Yes □ Yes □ Yes □ Yes □ Yes □ Yes	□ No □ No □ No □ No □ No	Preservatives
mments: Odour: Sheen: Turbidity:	☐ Yes ☐☐ Yes ☐☐ Clear ☐☐ Plastic☐☐	No If yes No If yes I I I I I I I  Type Glass Glass Glass Glass Glass	IIIIII		Conta	IIII ainer Size	Very		4 L □ Yes □ Yes □ Yes □ Yes	□ No □ No □ No □ No	Preservatives



☐ Development ☐ Purging/Sampling

Well No.: K19-MW17-03

oject Name:	K19 Trui	ch					Project	No.:	16577	1		
cation:		-					Date:				2018	
eather:			Tem	perature:			Comple	ted By:		BM		
PS Coordinates:							Review	ed By:				
MONITORING	WELLI		- william									
ime of Measureme	int:	12:0	3_		1	/	Tidally	Influenced	d: 🗆 Y	es □N	0	
Depth to Product:		-		Product Thickne	ess:	m	Pressu			es □ N		
Depth to Water (A):				□ ТОР				eadspace:			ppm	
Depth to Bottom of				□ TOP		*		/ell Volume				
Diameter of Standpi	pe:	n	nm									2.0 inch) diameter
Vell Condition:	-						(B-A)*	1.1=		itres - for	a 38 mm (	1.5 inch) diameter
EQUIPMENT L	IST			-10								
Pump □ Waterra			Multime	eter	Mo	odel:		0	Rental	Equipmen	it:	
☐ Hydrolif	t		pH/Tem	np Meter	Mo	odel:						
☐ Bailer	(Type:		) Conduc	ctivity Meter	Mo	odel:		🛛	Field B	ump		
☐ Peristall	ic		Dissolv	ed Oxygen Met	er Mo	odel:						□ pH7
☐ Submer	sible		ORP (F	Redex) Meter	Mo	odel:	20		□ pH10	0		
☐ Bladder			Organio	Vapour Meter	Mo	odel:			□ 1413	3 us/cm		
oump Details:			D.O.	Ampoule					Field C	alibration	-	
VELL DEVELO	DAREALT	/DIIDCII	AIC.				-19/4				135	
	Well. Vol. X	FUNGII	40	_	litres		Start:			Einich:		
vg. Flow Rate:	ven. voi. X	L/m	in	-	intes			intake dept	th:	FILIISH.	-	
rg. Flow Hate.							Sample	ппаке <del>сер</del> п	-		ī	
The state of the s	olume moved	Temp.	рН	□ Cond. □ S			Redox	Diss. O2	* Wa	ter Level	1	Domarka
Time Re	(L)	(°C)	(Units)	μS/cm (	e ane)		(mV)	(mg/L)		(m)		Remarks
15:48 3	6	7.5	7,57	733	10		1006	2.65	15	781	Veru	Soltu
15:59 6	0	4.4	7.29	40	4,5	4	13.1	2-6	3 5	-845	66	u O
16:12 ~	10	34	6.88	75	30,9		34 1	7.64	- 6	015	te	u
6:23 1	20	3.8	6.90	39	320	8	49.0	721	16	,212	u	t-
	35	3.4	7.97	7	310	4	20.4	2.61	15	.323	11	82
b .		9	/ /							A LONG		
3.		July 0		Well Filter				little 1				
						ide						
* Record DO in N	/lg/L, not pe	rcentage			· ·				- min			A
omments:				THE NEW	- 12	26.	201	97-11				
Odour:	Yes D	lo If yes	4 4 4 4	De la Company	100	No. 1	100			12-1	ATES	
	Yes B		V 100000 000000	Irocarbon-like					75			
Turbidity: Cl	ear II	IIIIII	IIIIII	1111111	IIII	I,I)I	Very	Silty		- 1	10	1
			1		Contain							
Analysis	Ty	<i>у</i> ре	40 mL	120 mL 2	Contair 50 mL	500 mL	1L	2L	4 L	Filte	red	Preservatives
	☐ Plastic	☐ Glass	40 IIIL	120 IIIL 2	30 IIIL	500 ML	AL.	ZL	4 L	ПУол	EI No.	V N SIF
1 41	□ Plastic	☐ Glass		ANTA E		5			-	☐ Yes	□ No	
	Plastic	☐ Glass			- 3-1 (6		-			☐ Yes	□ No	**************************************
	□ Plastic	☐ Glass								□ Yes	□ No	
	□ Plastic	☐ Glass	1 1 1 1				1	-		□Yes	□ No	
	□ Plastic	Glass	1							□ Yes		
	□ Plastic	□ Glass	The same							□ Yes	□ No	
		4										



roject Name: ocation:	K19 Trute	ch					Project Date:	No.:	165770	9			
eather:			Ten	nperature:				ted By:	BI	1			
PS Coordinates:							Review	ed By:					
MONITORING W	ELL IN	FORM	ATION										
Time of Measurement:	_						Tidally	Influenced	:	es 🗆 N	No		
epth to Product:	_		m	Product Thic	kness:	m		urized:		es 🗆 N			
epth to Water (A):	4	1.675	m below	□ TOP			Well H	leadspace:			ppm		
epth to Bottom of We	ell (B): 💋	4.87	m below	□ TOP			One V	Vell Volume	:				
Diameter of Standpipe	:		mm										diameter w
Vell Condition:	_						(B-A)*	1.1 =	Li	tres - for	a 38 mm	(1.5 inch)	diameter w
QUIPMENT LIS	ST												
ump   Waterra			Multim	eter		Model:			Rental I	Equipme	nt:		
☐ Hydrolift			pH/Ter	mp Meter									
☐ Bailer (T	ype:		) Condu	ctivity Meter					Field Bu	ımp			
☐ Peristaltic				ved Oxygen N	Meter	Model: _			□ pH4			□ pH7	
☐ Submersib	le			Redex) Meter		Model: _	•		□ pH10				
☐ Bladder			Organi	c Vapour Met	er	Model:			□ 1413	us/cm			
ump Details:			D.O	. Ampoule					Field Ca	alibration	_		
ELL DEVELOR	MENT	PURG	NG										
	II. Vol. X	· Oito		=	litres		Start:			Finish:			
/g. Flow Rate:		L/r	nin.	-				intake dept		i iiisii.	-		
				□ Cond. Ì	O/Considia	Cond		T T T T T T T T T T T T T T T T T T T	_		T	-	
Volu Time Remo		Temp.	pH				Redox	Diss. O2*		er Level		Remar	ks
(L		(°C)	(Units)		or mS/o		(mV)	(mg/L)		(m)			.,•
12:15 <	3	3.4	7.22	9	92		25.9	1.30	4.	85	Pun	ped	dry
						-						1	0
		_	- 1	01/									
			D			-					-		
			41	7		-							-
				1									
* Record DO in Mg/	L, not per	centage		*-									
mments:								-	-				
Odour:	s 🗆 N	o If ye	s	-									
Sheen: ☐ Ye	s 🗆 N	o If ye	s 🗆 Hyd	drocarbon-like	OR E	Metallic-	-like						
Turbidity: Clear	111		111111	111111	IIIII	IIII	Very	Silty					
			T		0	. 0:							**
Analysis	Тур	oe	40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filte	ered	Prese	ervatives
	Plastic	☐ Glass	40 IIIL	120 1112	250 IIIL	300 IIIL	1	2 L	46	□ Yes	□No		
	Plastic	☐ Glass		1.4						□ Yes	□ No		
	Plastic	☐ Glass								□ Yes	□ No		
	Plastic	☐ Glass								□ Yes	□No		
	] Plastic	☐ Glass							-1	□ Yes	□No		
	Plastic	☐ Glass								□ Yes	□No		
				1						□ Yes	□No		



Development

Development

Development

Well No. 19-01

Location: Weather: GPS Coordinates			Ten	nperature: _			Date: Comple Review		18/	01/2	1018	- 19/6
Time of Measurem Depth to Product: Depth to Water (A) Depth to Bottom of Diameter of Stands Well Condition:	rent:	,757 n	n below )	Product Thickr TOP TOP	ness:	_ m	Well H One W (B-A)*	leadspace /ell Volume	П - 2 э: <u>О</u> L	es on	No ppm a 51 mm	(2.0 inch) diamet (1.5 inch) diamet
Pump	a (Type: litic ersible		Dissolv ORP (F	eter np Meter ctivity Meter red Oxygen Me Redex) Meter c Vapour Mete Ampoule	Mod Mod eter Mod Mod	del: del: del: del:		_	Field B   pH4   pH1   141:	ump 0	_	□ pH7
WELL DEVEL	ODMENIT	/DUDGI		Ampoule					i leid C	alibration	_	
Purge Volume:	Well. Vol. X			-	Litres			intake dep		Finish:	-	
Avg. Flow Rate: _												
	/olume emoved (L)	Temp. (°C)	pH (Units)	Geire Ge	or mS/cm cle one)		Redox (mV)	Diss. O <sub>2</sub> (mg/L)		(m)		Remarks
Time R	Volume emoved (L)	(°C)	(Units)	µS/cm (circ	or mS/cm cle one)		(mV)	1		(m)		Remarks
Time R	Volume emoved (L)	(°C) (°C) (°C) (°C) (°C)	(Units)	µS/cm (circ	or mS/cm cle one)		(mV)	1		(m)		Remarks
* Record DO in  Comments: Odour: Sheen:	Mg/L, not per	rcentage	(Units)	µS/cm (circ	or mS/cm cle one)	etallic-lik	(mV)	(mg/L)		(m)		Remarks
* Record DO in  Comments: Odour: Sheen:	Mg/L, not per	rcentage	(Units)	drocarbon-like	OR □ M	letallic-lik	(mV)	(mg/L)		(m) -312 -263		Remarks
* Record DO in  Comments: Odour: Sheen: Turbidity: C	Mg/L, not per  Tyes	rcentage  lo If yes I I I I I I  pe Glass Glass	(Units)	drocarbon-like	OR □ M	etallic-lik	(mV)	(mg/L)	8	(m)	ered No	
* Record DO in  Comments: Odour: Sheen: Turbidity: C	Mg/L, not per  I Yes	rcentage	Units)  Hyo  I I I I I I  40 mL	drocarbon-like	OR □ M	etallic-lik	(mV)	(mg/L)	8	(m) 5-312 -21-2	ered 🗆 No	



Development

Development

Purging/Sampling

Well No.: 1819-14W18-02

oject Name:	K19 Trut	ch				Project	No.:	165770	09		
cation:						Date:		18	101/	2019	5
eather:	ove	rcast	Tem	perature:	-7	Comple	eted By:	BO	1		
S Coordinates:						Review					
ONITORING	WELLIN	FORMA	TION								***
ime of Measureme	nt: _					Tidall	y Influence	ed: 🗆 Y	es di	No	
epth to Product:	4	m	n F	Product Thic	kness:	m Press	urized:	DY	es 🔟	No	
epth to Water (A):	6			TOP		Well H	Headspac	e: <		_ ppm	
epth to Bottom of V	Vell (B):	11.910 m	below E	TOP			Vell Volun	-			
ameter of Standpip	oe: _	51 m	nm (		. 1	(B-A)*	2.0 = 1€	3.3L	itres - for	a 51 mm (	2.0 inch) diameter well
ell Condition:		Good	new	insta	u	(B-A)*	1.1 =	L	itres - for	a 38 mm (	1.5 inch) diameter well
QUIPMENT L	IST					14	r				
ımp DWaterra			Multime	ter	Mode	251 Prof	100 p	Rental	Equipme	nt:	
☐ Hydrolift			pH/Tem	p Meter	Mode	:					
☐ Bailer	Type:		Conduc	tivity Meter	Mode	:		Field B	ump		
☐ Peristalti	С		Dissolve	ed Oxygen I	Meter Mode	:		□ pH4			□ pH7
☐ Submers	sible		ORP (R	edex) Mete	r Mode	4		□ pH10			
☐ Bladder			Organic	Vapour Me	ter Mode			□ 1413	us/cm		
mp Details:			_ D.O.	Ampoule			×	Field Ca	alibration	Dee	BM fold "
ELL DEVELO	PMENT	PURGIN	lG.								
	/ell. Vol. X	n oncon			litres	Start:	10:01	60	Finish:		
g. Flow Rate:		L/mi	n	-			intake de		i illisti.	-	
			- 15		<u> </u>		Trace de	pui		1	
	lume noved	Temp.	рН		Specific Con	d. Redox	Diss. C	) <sub>2</sub> * Wa	ter Level	1	Bridge.
F 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(L)	(°C)	(Units)	US/CI	m on mS/cm trcle one)	(mV)	(mg/L	.)	(m)		Remarks
10:00	- 5	2.2	5064	105		68.0	5.72	6.	749	Fxtr.	emely sulti
10:20 3	7 2	1.6	6,42	93		49.8	3.5	36.	758	4	u ()
11:00 61	0 5	2.4	6.53	100		53.2	14.6	7 6	-710	n	4
14.49 100	) 2	8.5	7.00	95	7	25.9	4	TY L	272	2 6	CE
, , ,							1 "	1			
		-									
* Record DO in M	lg/L, not per	centage					1				
mments:											
Odour:	res AN	lo If yes	-								
Sheen:					e OR □ Met						
Turbidity: Cle	ar II	IIIIII	IIIIII	IIIIII	11111111	I Ven	Silty				
							0				
Analysis	Ту	ре	40 mL	120 mL	Container 250 mL 500		2 L	4 L	Filt	ered	Preservatives
-	☐ Plastic	☐ Glass			3002			100	☐ Yes	□ No	
	☐ Plastic	☐ Glass							☐ Yes	□No	
	□ Plastic	☐ Glass		-			a male man		□ Yes	□No	
	□ Plastic	☐ Glass	1			NO ACCOUNT OF THE PARTY OF THE		- 1	□ Yes	□ No	
	□ Plastic	☐ Glass					A CANADA SANCE CONTRACTOR OF THE PARTY OF TH		□ Yes	□ No	
	□ Plastic	☐ Glass						-310	☐ Yes	□No	
	□ Plastic	☐ Glass							□ Yes	□ No	The same of the sa



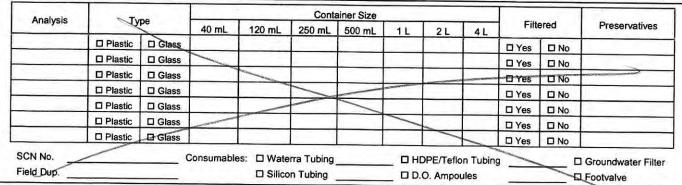
Development
Purging/Sampling

Well No. 9 MW 18-07)

Project Name: .ocation: Veather: SPS Coordinates:		Kig -	Tem		-10	_	Project Date: Comple Review	eted By:	19 B1	577	69 34	
MONITORING Time of Measurem Depth to Product: Depth to Water (A): Depth to Bottom of Diameter of Standp Well Condition:	ent: : <i>E</i> Well (B): [	0.952 n	n below )	Product Thic TOP TOP TOP		_ m	Pressu Well H One W	leadspac Vell Volur 2.0 = 7	e: ne:	Yes Di	No ppm a 51 mm (	(2.0 inch) diameter well (1.5 inch) diameter well
Pump Waterra  Hydrolii Bailer Peristal Submee	a ft (Type: ttic rsible	,	Dissolv ORP (F	eter np Meter ctivity Meter red Oxygen Redex) Mete c Vapour Me Ampoule	Mod Mod Meter Mod r Mod	del: del: del: del:	I Par	 	Field E  pH4  pH1	Bump		□ pH7
WELL DEVELOPurge Volume:	OPMENT Well. Vol. X			-	litres		Start:	13:	pth:	Finish:		
90-00 by 10-00-00-00-00-00-00-00-00-00-00-00-00-0	olume emoved (L)	Temp. (°C)	pH (Units)	µS/c	Specific Com or mS/cm circle one)	ond.	Redox (mV)	Diss. C	) <sub>2</sub> * W	ater Level (m)		Remarks
13 39 13:44 14:48 15:23	14 22 36 48	2.5	7-97	896	1.2		19.6	8,01	5/1	031 Drug 0:0/5/	Dry	0 48L CIE
* Record DO in I	77				1/1.0		52,0	70)			DAY	W 73L
omments: Odour:	Yes You	No If yes	□ Hyd		e OR 🗆 M		ke Very	Silty				
Analysis	Ту	/ре	40 mL	120 mL	Containe	or Size	1 L_	2 L	4 L	Filte	ered	Preservatives
	☐ Plastic ☐ Plastic ☐ Plastic	☐ Glass ☐ Glass ☐ Glass								☐ Yes	□ No	
	☐ Plastic ☐ Plastic ☐ Plastic	☐ Glass ☐ Glass ☐ Glass ☐ Glass								☐ Yes ☐ Yes ☐ Yes ☐ Yes	□ No □ No □ No	
SCN No.	☐ Plastic	☐ Glass	Consumable	es: 🗆 Wate	rra Tubing		_ D HD	PE/Teflo	n Tubin	□Yes	□ No □	Groundwater Filter



Date:     Date:   Da					WATER			ENT	1	evelop urging/	ment Sampli	ing W	ell No.: <u>K19</u>
Tidally Influenced:	roject Name: ocation: eather: PS Coordinate			Te	mperature:	-12	<u> </u>	Date: Compl	leted By:	20/	8/2		
Waterra	Fime of Measure Depth to Produc Depth to Water Depth to Bottom	ement: et: (A): of Well (B):	DRY 7,792	m m below m below	TOP	ckness: ,	m	Tidali Press Well One V	ly Influenc surized: Headspac Well Volur *2.0 =	e: ne: L	es A	No ppm ra 51 mm	
Sample intake depth:    ump	erra rolift er (Type: staltic mersible der		pH/Te	mp Meter uctivity Meter ved Oxygen (Redex) Mete ic Vapour Me	Meter er	Model: Model: Model:		= =	Field B  pH4  pH11  1413	Sump 0 3 us/cm		□ pH7	
Time   Removed (L)   PS/cm or mS/cm (mV)   Redox (mV)   Remarks	urge Volume:	Well. Vol. >	·		-				100000000000000000000000000000000000000	-	Finish:		
Odour:	Time	Removed			μS/c	m or mS/						y to make the state of the last	Remarks
Odour:						)(	2						
Sheen:	omments:												
Plastic	Sheen:	□ Yes □	No If yes	□ну					y Silty				
□ Plastic □ Glass □ Yes □ No	Analysis	_	1	40 mL	120 mL	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1L	2 L	4L		ered	Preservatives
Dies Divo												7 T T T T T T	
I Disability of the second of		☐ Plastic		The same of the sa	No.						☐ Yes	□ No	





Development

Purging/Sampling

Well No .: K19-Mill8-08D

ather: S Coordinates:		THE .	Tem	perature:	-12		Date: Comple Review		20/01/ BM	2019			
ONITORING me of Measureme epth to Product: epth to Water (A): epth to Bottom of ameter of Standp ell Condition:	ent: Well (B):		m m below	Product Thick TOP TOP TOP		m	Well H One W (B-A)*	Influenced: urized: leadspace: /ell Volume: 2.0 = 7	☐ Yes 🖟	No ppm a 51 mm	(2.0 inch) diameter v (1.5 inch) diameter v		
QUIPMENT I mp Waterra     Hydrolif     Bailer     Peristal     Submer     Bladder	it (Type: tic rsible		pH/Ten	pH/Temp Meter Model: _ Conductivity Meter Model: _ Dissolved Oxygen Meter Model: _ ORP (Redex) Meter Model: _ Organic Vapour Meter Model: _ D.O. Ampoule					tental Equipme ield Bump I pH4 I pH10 I 1413 us/cm ield Calibration	uipment:  p			
ELL DEVELO	OPMENT			76	litres	10	Start:		N				
g. Flow Rate:			nin.					ntake depth		_			
and the second s	olume emoved (L)	Temp. (°C)	pH (Units)	μS/ci	Specific m or mS/cr		Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Leve		Remarks		
10:07		2.1	7.87	105			-148.9	3.67	8.585	0	٠٠١٠		
10:17 2	28	-		-					9.341	u	u		
10 17	2:	2,0	7.49	54	1.6		-49.3	5.54	9.842	Cle	eanna		
			7.18	10	0		-27.8	5.52	9.275	13	40		
6:20 4	20 :	200					1010	4		A.			
6:20 4		2.0	7.13	90	10	<	-124.5	6.38	9.122	61	CC		
6:20 4	70 :	-		90	10		-124.3	6.38	9.122	i ce			
6:20 4	70 :	. 8		90	10		-124.5	6.38	10				
* Record DO in I	Yes X	ercentage No If yes	7.13					6.38	10				
* Record DO in Mannents: Odour:	Ves V	ercentage  No If yes	7.13	rocarbon-lik	e OR 🗆				10				
* Record DO in It	Mg/L, not pe	ercentage  No If yes  I I I I I I	7.13	rocarbon-lik	e OR 🗆		like Very		9 - 23	, ce			
* Record DO in Mannents: Odour:	Mg/L, not pe	ercentage  No If yes	7.13	rocarbon-lik	e OR 🗆	A - 8"	like Very	Silty	9 - 23				
* Record DO in It	Ves 1 1 1 Ty	ercentage  No If yes  I I I I I I	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	9 - 23	, ce			
* Record DO in Imments: Odour: Sheen: Turbidity: Ck	Mg/L, not pe  Yes Plastic Plastic	ercentage  No If yes  I I I I I I	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	9 - 23 4L Filt	ered			
* Record DO in International Control of the Control	Ves 1 1 1 Ty	No If yes No If yes I I I I I I ype Glass Glass	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	9 23 4L Filt	ered D No			
* Record DO in International Control of the Control	Mg/L, not pe  Yes Plastic Plastic	Procentage  No If yes  No If yes  I I I I I I  ype  Glass	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	Filt	ered No			
* Record DO in International Control of the Control	Yes Yes I I  Plastic Plastic Plastic Plastic Plastic	No If yes No If yes I I I I I I ype Glass Glass	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	4L Filt	ered No No			
* Record DO in International Control of the Control	Mg/L, not pe  Yes Yes ear II  Plastic Plastic Plastic Plastic	Procentage  No If yes  No If yes  I I I I I I  ype  Glass Glass Glass	7.13 s	lrocarbon-lik	e OR 🗆	PIII A sa iner Size	like Very	Silty	4L Filt 4L Yes Yes Yes	ered No No	Preservatives		



Ď Development☐ Purging/Sampling

Well No .: K19 - MW18 - 09

	K19	Trutch			Project	No.:	1657709		
ocation:	-				Date:			018	
eather:	-	ear	Ten	nperature:12_	Comple	eted By:	BM		
PS Coordin					Review	ed By:			
MONITOR	ING WELL								
Time of Meas	urement:	13:	55		Tidally	/ Influenced	Yes	No	
Depth to Proc				Product Thickness:	m Press	urized:	□ Yes 🗡	No	
Depth to Wate				□ TOP	Well F	leadspace:		_ ppm	
Deptn to Botte Diameter of S	om of Well (B):	51	III DOIOW	□ TOP		Vell Volume	Com		
Well Condition		Caoo	mm neu	o mospall		2.0 = 6 * 1.1 = /			m (2.0 inch) diameter w
					(B-A)	1.1 =	Litres - for	a 38 mr	m (1.5 inch) diameter w
EQUIPME					0	01 -			
1	aterra		Multim	eter Me	odel: 151 Pro	4050 F	Rental Equipme	nt:	
	ydrolift 				odel:				
	ailer (Type:				odel:		Field Bump		
	eristaltic ubmersible				odel:				□ pH7
	omersible adder				odel:		□ pH10	_	
					odel:		☐ 1413 us/cm	_	
Pump Details:			D.O.	Ampoule		₽ F	ield Calibration	Sec	BM feld ne
ourge Volume		_	min.		Sample	13-55 intake depth		_	
	Volume	Temp.	рН	☐ Cond. 🗹 Specific C	Redox	Diss O.*	Water Level		
Time	Removed (L)	(°C)	(Units)	uS/cm or mS/cm	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Level (m)		Remarks
Time	Removed (L)	(°C)	(Units) 7-95	us/cm or ms/cm (alrcle one)	Redox (mV)	(mg/L)	(m)	9	Remarks
Time 13:59 14:05	Removed (L)	(°C)	(Units) 7-95 8-05	us/em or ms/cm (alrcle one) 1062	Redox (mV) -90.1		(m) 8-315		2 Huz
Time	Removed (L) 14 28 42	(°c) 1.0 1.5 1.3	(Units) 7-95 8-05 7-90	1052 1053 440	Redox (mV) -90.1 -43.8	(mg/L)	(m) 8-315 8-29 8	t	it is
Time 13:59 14:05 A:6	Removed (L)	(°C) 1.0 1.5 1.5	(Units) 7.95 8.05 7.70 7.48	1053 440	Redox (mV) -90.\ -43.8 -60.2 -4.8	(mg/L)	(m) 8-315 8-29 k 2. 893	CI	2 Huz
Time 13:59 14:05 14:24	Removed (L) 14 2-8 42 70	(°c) 1.0 1.5 1.3	(Units) 7-95 8-05 7-90	1052 1053 440	Redox (mV) -90.1 -43.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 8	CI	alter earing
Time 13:59 14:05 14:24	Removed (L) 14 2-8 42 70	(°C) 1.0 1.5 1.5	(Units) 7.95 8.05 7.70 7.48	1053 440	Redox (mV) -90.\ -43.8 -60.2 -4.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time 13:59 14:05 14:24 14:34	Removed (L) 14 2-8 4-2 70 100	(°C) 1.0 1.5 1.5 1.5 2.4	(Units) 7.95 8.05 7.70 7.48	1053 440	Redox (mV) -90.\ -43.8 -60.2 -4.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time 13:59 14:05 14:24 14:34	Removed (L) 14 2-8 42 70	(°C) 1.0 1.5 1.5 1.5 2.4	(Units) 7.95 8.05 7.70 7.48	1053 440	Redox (mV) -90.\ -43.8 -60.2 -4.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time 13:59 14:05 14:24 14:34	Removed (L) 14 2-8 4-2 70 100	(°C) 1.0 1.5 1.5 1.5 2.4	(Units) 7.95 8.05 7.70 7.48	1053 440	Redox (mV) -90.\ -43.8 -60.2 -4.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time 13:59 14:05 14:24 14:34  * Record D  omments: Odour:	Removed (L) 14 2-8 4-2 70 100 0 in Mg/L, not	(°C) 1.0 1.5 1.5 2.4  Decreentage	(Units) 7.95 8.05 7.70 7.48 7.63	— ps/em or ms/cm (drc/e one)  1062- 1053- 940- 1015	Redox (mV) -90.\ -43.8 -60.2 -4.8 -6.8	(mg/L) 6.61 7-25 5.74 4.36	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not	(°C) 1.0 1.5 1.5 2.4  Decreentage  (No If year)	(Units) 7.95 8.05 7.30 7.48 7.63	ps/em or ms/cm (alrcle one) 1062 1053 940 1015 975	Redox (mV) -90.\ -43.8 -60.2 -4.8 -6.8	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time 13:59 14:05 14:24 14:34  * Record D  omments: Odour:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not	(°C) 1.0 1.5 1.5 2.4  Decreentage  (No If year)	(Units) 7.95 8.05 7.30 7.48 7.63	— ps/em or ms/cm (drc/e one)  1062- 1053 940 1015	Redox (mV) -90.\ -43.8 -60.2 -4.8 -6.8	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  If Yes If Yes Clear If In	(°C) 1.0 1.5 1.5 2.4  Decreentage  (No If year)	(Units) 7.95 8.05 7.30 7.48 7.63	ps/em or ms/cm (drcle one) 1062 1053 940 1015 975	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m) 8-315 8-29 k 2. 893	CI	alter earing
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  If Yes If Yes Clear If In	(°C) 1.0 1.5 1.5 2.4  Decreentage  (No If year)	(Units) 7.95 8.05 7.30 7.48 7.63	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 8 8-813 8-962	Cle	alter earing
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  If Yes If Yes Clear If In	(°C) 1.0 1.5 1.5 2.4  Dercentage  (No If year) 1   1   1   1   1   1   1   1   1   1	(Units) 7.95 8.05 7.90 7.48 7.63 7.63	rocarbon-like OR IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-395 6-29 8 8-893 8-962	Cle	a ture a
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  If Yes Clear I	(°C) 1.0 1.5 1.5 2.4  Dercentage  (No If year) I I I I I I  Type  C	(Units) 7-95 8-05 7-90 7-48 7-63	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 & 8-313 3-962	C\c	a ture a
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  I Yes I Yes Clear I	(°C) 1.0 1.5 1.5 2.4  Decreentage  (No If yet IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	(Units) 7-95 8-05 7-90 7-48 7-63	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 & 8-313 3-962	C\c	a ture a
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  I Yes I Yes Clear I Plasti I Plasti	(°C)  1.0  1.5  1.5  2.4  Decreentage  (No If year in the second of the	(Units) 7.95 8.05 7.30 7.48 7.63	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 & 8-313 3-962	C\c\c\c\c\c\c\c\c\c\c\c\c\c\c\c\c\c\c\c	a ture a
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  Yes Yes Clear I Plasti Plasti	(°C)  1.5  1.5  2.4  Decreentage  (No If yether in the image)  (No If yether in the image)  Glass  Glass  Glass  Glass  Glass	(Units) 7.95 8.05 7.30 7.48 7.63	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 8 8-813 3-962  4L Filte  Yes  Yes	C\c	a ture a
Time  13:59  14:05  14:24  14:34  * Record D  omments: Odour: Sheen: Turbidity:	Removed (L) 14 2-8 4-2 70 100  O in Mg/L, not  Yes Yes Clear Plasti Plasti Plasti	(°C)  1.5  1.5  2.4  Dercentage  (No If ye in the interpretage in Glass in	(Units) 7.95 8.05 7.30 7.48 7.63  8.5 Hyd 1111111  40 mL	rocarbon-like OR Contain	Redox (mV)  -90.\ -43.8  -60.2  -4.8  -6.8  Wetallic-like  I I I Very  er Size	(mg/L) 6.61 7-25 5.74 4.36 5.44	(m)  8-315 6-29 6 8-813 3-962  4L Filte  Yes  Yes  Yes  Yes	C No No No	a ture a



Development

Development

Purging/Sampling

K19-HW18-10D Well No.:

roject Name: ocation: /eather:	Cvec		<u>୩୦</u> Ѡ Tem	perature:	-12		Project Date: Comple		16577		2018	
PS Coordinates:							Review	ed By:				
MONITORING Time of Measuremer Depth to Product: Depth to Water (A): Depth to Bottom of W Diameter of Standpip Well Condition:	vell (B): (A	12 -c -637 m	n lelow	Product Thic TOP TOP	kness: <u>~</u>	<u></u>	Pressu Well H One W (B-A)*:	urized: leadspace /ell Volum 2.0 = 10	e: _2 2.5	itres - for	lo _ ppm a 51 mm	(2.0 inch) diameter we (1.5 inch) diameter we
EQUIPMENT L Pump	Type: c ible	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 ☐ pH7 ☐ pH10 ☐ pH 10				
WELL DEVELO Purge Volume: W Avg. Flow Rate:	/ell. Vol. X				litres			12 : c	2100	Finish:	4	
Time Rer 12:03 12:06 12:19 12:30 12:30 12:30	(L)	L/min.  Temp. (°C)					Redox (mV)	Diss. O. (mg/L) 2,7( 2,7( 2,7) 4.8			Ven	Remarks  Siff U  G  G  G  G  G  G  G  G  G  G  G  G  G
* Record DO in M  comments: Odour: Sheen: Turbidity: Cle	Yes QN	lo If yes		rocarbon-lik			ke Very	Silty				
Analysis	Ту	ре	40 mL	120 mL	Conta	ainer Size	1 L	2L	4 L	Filte	ered	Preservatives
	☐ Plastic	☐ Glass	TO THE	TEV IIIE	200 IIIE	JUJ IIIE				☐ Yes	₽ No	
	□ Plastic	☐ Glass							The state of the s	Yes	□ No	
	□ Plastic	☐ Glass					>			☐ Yes	□ No	
	□ Plastic	☐ Glass				STATE OF THE STATE			-	☐ Yes	□ No	
	☐ Plastic	☐ Glass ☐ Glass			-	-			-	☐ Yes	-BNo	
	LIPIASTIC	LUGIASS	1							☐ Yes	□ No	The state of the s



roject Name: ocation: Veather: SPS Coordinate		wine		erature: _			Project I Date: Complet Reviewe	ed By:		577 BM	201	ठे
MONITORIN Time of Measure Depth to Product Depth to Water ( Depth to Bottom Diameter of Stan Well Condition:	ment: : A): of Well (B): 14	m 5.235 m	below below below	roduct Thickr TOP TOP	ness: _	_ m	Pressu Well He One W	eadspace: ell Volume .0 =	7 Lif	tres - for a	ppm 51 mm (2	.0 inch) diameter we .5 inch) diameter we
☐ Peris	oria  colift  r (Type:  taltic  nersible		Dissolve ORP (Re	p Meter ivity Meter d Oxygen Medex) Meter Vapour Mete	N N eter N	Model: // // // // // // // // // // // // //			Field Bu □ pH4 □ pH10 □ 1413	us/cm		3m Geld
<b>WELL DEVE</b> Purge Volume: Avg. Flow Rate:	Well. Vol. X	/PURGIN	-	-	_ litres			ntake dept		Finish:		
Time	Volume Removed (L)	Temp. (°C)	pH Nits)		Specific or mS/cr rcle one)	Description III	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Wa	ter Level (m)		Remarks
11-11 14-07 9:31 10-30 11-67 11:59 13-06 15:00	72	7.3	7-93	61:	55.9	+ -	6.0	10.77	D B a	RY RY RY RY RY RY RY RY RY RY RY RY RY R	DR DR DR DR	(2) 14 L 1 (2) 23 L 1 (2) 59 L 1 (2) 59 L 2 (2) 60 L 2 (2) 60 L
Comments: Odour: Sheen: Turbidity:	□ Yes □ Yes	No If yes	□ Hyd	rocarbon-like			ke Very	Silty				
Analysis	T,	/pe	7.	22200	1 - 5 - 5 - 5	iner Size				Filte	ered	Preservatives
			40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	□ Vaa	□ No_	
	☐ Plastic	☐ Glass ☐ Glass								☐ Yes	□ No	
	☐ Plastic	☐ Glass								☐ Yes	□ No	
	☐ Plastic	☐ Glass								□ Yes	□ No	
		☐ Glass				$\sim$				□Yes	□No	
	☐ Plastic									☐Yes	□ No	
	☐ Plastic	☐ Glass							\	☐ Yes	□ No	
	□ Plastic	☐ Glass							TOLER			
				TI VALUE	na Tubina		C1 130	DETToffer	Tubing		\ T	Groundwater Filter
SCN No.			Consumable	es: Li vvater	ra rubing			OPE/Teflor	Lupling			Footvalve

Golder Associates

11				LING DA		IAITTIAI		relopment ging/Samplin	g Well	1-MW18-
oject Name:	币	KI	7			Proie	ct No.:	165770	۴(	
ocation:		. / .	1			Date:		25/61/2	018	
eather:	Satur	one	Tomr	perature:	-190	and the same of th	leted By:	BNI		
			rem	Jerature.	11		wed By:	Disc		
PS Coordinat	Charles Charles Ave.	CASSAGE V	0.200			Kevie	wed by.			
	NG WELL IN	1				200				
ime of Measur	_	7:40						d: □Yes □N		
Depth to Produ	· Person	m		roduct Thickne	ess:	<b>→</b> 100 (1007)	ssurized:	☐ Yes ☐ N		
Depth to Water	(A):	912 mi	1	TOP TOP			Headspace: Well Volume		ppm	
Depth to Botton Diameter of Sta		mn	1	TOP					a 51 mm (2	.0 inch) diameter well
Nell Condition:	100			install			)*1.1 =			.5 inch) diameter well
ven Condition.		That!	new	monay		(5,			2.75.2100.4	**************************************
QUIPMEN	IT LIST					V. 0	01 .			
Pump Wa	terra		Multime	ter	Mode	10/16/18	1000	Rental Equipmen	nt:	
ES Hyd	Irolift		pH/Tem	p Meter		el:				
☐ Bai	ler (Type:			tivity Meter		el:		Field Bump		S
	istaltic			ed Oxygen Me	ter Mod	el: 7				□ pH7
	omersible			edex) Meter		-1		□ pH10		
□ Bla	dder		Organic	Vapour Meter	Mod	el:	_	☐ 1413 us/cm		
ump Details:			_ □ D.O.	Ampoule				Field Calibration		
Time  10 20  10 41  11 30  12-15  13-25  14 30	Removed (L)	(°C) 2 .9 4.0 7	7.83 7.57 2.76		or mS/cm le one)	-21 2-6 17-1	(mg/L)	(m)  2	Dry Dry Dry Dry	Remarks  24 ( 36 ( 36 ( 60 48 1  60 60 4 ( 60 74 ( 60 60 4 ( 60 60
* Record D	O in Mg/L, not per	centage								-4
Odour: Sheen: Turbidity:	☐ Yes	o If yes		Irocarbon-like			ery Silty			
Analysi	s Ty	ре	40 mL	120 mL	Containe 250 mL 5	r Size	2 L	4 L Fil	tered	Preservatives
	☐ Plastic	☐ Glass		-529				☐ Yes	□ No	
	☐ Plastic	☐ Glass						□ Yes	□ No	
	☐ Plastic	☐ Glass				><		□ Yes	□No	
	☐ Plastic	☐ Glass						□Yes	□No	
-	☐ Plastic	☐ Glass					-	□Yes		
	☐ Plastic	☐ Glass						☐ Yes	□No	
-	□ Plastic	☐ Glass						□Yes	□No	



me of Measurement: epth to Product: epth to Water (A): epth to Bottom of Wel ameter of Standpipe: fell Condition:	7.3	ORMAT	ION				Complet Reviewe			101/3 BP (		
	_5	mm	pelow D	roduct Thicki TOP LTOP	ness: _	m	Pressur Well He	eadspace ell Volum .0 = 6	= Ye e:	tres - for a	ppm s 51 mm (2	2.0 inch) diameter v .5 inch) diameter v
QUIPMENT LIS  ump A Waterra Hydrolift Bailer (Ty Peristaltic Submersibl Bladder  ump Details:	/pe:	)	Dissolve ORP (Re	p Meter tivity Meter ed Oxygen Me edex) Meter Vapour Mete	M M eter M M	Model: /5  Model: Model: Model: Model:	1		Field Bi D pH4 D pH10 D 1413	)		□ pH7
VELL DEVELOP urge Volume: Wel vg. Flow Rate:	PMENT/P	L/min	=		litres		Start:	ntake dep	oth:	Finish:		
Time Remo (L)	oved 16		pH (Units)		Specific Por mS/cr rcle one)	m	Redox (mV)	Diss. O: (mg/L)		ter Level (m)	Do Do Do	Remarks  14 (2) 14  14 (2) 50  14 (3) 60  14 (6) 60
* Record DO in Mg/	/L, not perce	entage										
Odour: ☐ Ye Sheen: ☐ Ye Turbidity: Clear	s A No	If yes		rocarbon-like			ke Very	Silty				
Analysis	Туре	,	40 mL	120 mL	Conta	500 mL	1 L	2 L	4 L	Filte	ered	Preservatives
1	□ Plastic I	☐ Glass	40 IIIE	120 1111	200 IIIL	OOD THE				☐ Yes ☐ Yes ☐ Yes	□ No	
1	□ Plastic □	☐ Glass ☐ Glass ☐ Glass ☐ Glass								☐ Yes ☐ Yes ☐ Yes ☐ Yes	□ No □ No □ No	

☐ Development ☐ Purging/Sampling

Well No .: MWO9-04

oject Name:	K19 Tru	itch					Project	t No.:	1657	709		
eation: eather:	01	reconst	Ten	nperature:	11	°C	Date: Comple	eted By:		13	Tan	18
S Coordinates:								red By:				
ONITORING	WELL	NFORM	ATION						-			
ime of Measurem			50				Tidally	v Influenc	ed: 🗖	Yes 🗷	No	
epth to Product:		/	m	Product Thic	kness:	/ m		urized:		Yes 🗖		
epth to Water (A)	: ),	2.87/	m below .	TOP				Headspac		11	ppm	
epth to Bottom of	Well (B):	1.519	m below	<b>I</b> TOP				Vell Volur	-	~		
iameter of Standp	oipe:	51	mm				(B-A)*	2.0 = 7	7.7	Litres - fo	r a 51 mm	(2.0 inch) diameter
fell Condition:		600	001					1.1 = 7				(1.5 inch) diameter
QUIPMENT	LIST											
ump   Waterra	a		Multim	eter		Model: /	siprof	1/25 0	Renta	l Equipme	ent:	550 7 4
☐ Hydroli	ft		pH/Ter	mp Meter		Model:	1				Sec	lotes.
☐ Bailer	(Type:		_) Condu	ctivity Meter		Model:	1		Field !	Bump	-	lotes.
	tic		Dissolv	ved Oxygen I	Meter	Model:	1		□рН			□ pH7
☐ Subme	rsible		ORP (F	Redex) Meter	ė.	Model:	1			10		
☐ Bladder			Organi	c Vapour Me	ter	Model:	U		□ 141	13 us/cm		
ump Details:			□ D.O.	Ampoule						Calibration		
									. 1014			
ELL DEVEL		/PURGI	NG									
	Well. Vol. X	-		=	litres		Start:			Finish:	_	
g. Flow Rate: _		L/m	nin.				Sample	intake de	pth:			
and the second s	olume	Temp.	nLI	□ Cond. I	Specific	Cond.	Б. /	2,472				
Time Re	moved	(°C)	pH (Units)	#S/cr	or mS/	cm	Redox (mV)	Diss. O (mg/L		ater Level (m)		Remarks
1565	(L)	3.4			ircle one)		102	(mg/L				
18 12	100	3.3	7.24		7-0		1/6-5	0.4	5	4.30	-	lear.
1317	7	3.2	1-67	58		7	220,4	10.6	5 4	1.46	/	11
1520	6	^	6.9%		3.2		78-4	0:4	0 6	1-43	,	le
15 26	7.5	5.0	6.46	59	3.1		233.2		1 1	1.400		11
15 20	Anso	10 0	6.10	181	20/		241.7	0.4	6. 7	1.376	5	4
- 0	myp	ie a	1 10	Tall	_	-	_			-	4-	17)
									+		1	
* Record DO in I	Mg/L, not pe	rcentage									4	
nments: Odour:	Van Ma	1- 1/										
	Yes ☑↑ Yes ☑↑			e a la company								
		_		lrocarbon-like IIIIIII				0.111				
Turblatty. Cit	cai II	LATELL	11111	111111	1 1 1 1 1	1 1 1 1	Very	Silty				
Santa a V					Cont	ainer Size			-			
Analysis	Ту	pe	40 mL	120 mL	250 mL	500 mL	1 L	2 L	4 L	Filt	ered	Preservatives
> Metuls	□ Plastic	Glass	1	1	200 1112	000 1112	1		7.2	Yes	□No	Guo-/Hel
ENEX /UPH	☐ Plastic	D Glass	3							□ Yes	E No	//
14/PAU	□ Plastic	D Glass			2					□ Yes	ĺQ/No	Jod BI
Plaborde.	Plastic	☐ Glass								□ Yes	D No	- 46
	□ Plastic	☐ Glass								□ Yes	□ No	-
	☐ Plastic	☐ Glass							-	□ Yes		
	☐ Plastic	☐ Glass								☐ Yes	□ No	
	LI Flastic	L Glass					1			I I Voc	□ No	



 Well No .: MW10-63

roject Name:	K19 Trutch				Projec	t No.:	1657709		
eather: PS Coordinates:	Clea	Ter	mperature: _ =	12 =		eted By: /ed By:	-14	Jun Z	2018
MONITORING Fime of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of V Diameter of Standpin Well Condition:	vell (B): 11.15	m m below	Product Thickness: ☑ TOP ☑ TOP		Press Well I One V (B-A)*	urized: Headspace Vell Volum	). 6 Litres - fo	No ppm pr a 51 mm	(2.0 inch) diameter w
EQUIPMENT L  rump	Туре:	) Condu Dissolv ORP (I	eter mp Meter ctivity Meter ved Oxygen Meter Redex) Meter c Vapour Meter	Model: Mo	SIPM		□ pH10 □ 1413 us/cm		Motes
/ELL DEVELO	DASENT/DUE		. Ampoule				Field Calibration	n	
	ell. Vol. X	2.44.37.27.27	= litr	es	Start: Sample	 intake dept	Finish:		
Time Rem	tume noved Temp. (°C)	(Units)	Cond. Spec uS/cm or m (circle on	S/cm	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Leve	4	Remarks
1553	2 3.8 3 3 4 3.4 8 3.0	6.70 6.63 6.48 6.48	\$78 \$83 \$85 \$85 \$86	1	123.1 26.9 31.9 36.9 14.6	7.75 7-79 6.08 6.18 7.05	5.78	0 0	Cleur.
* Record DO in Mo	g/L, not percentag	e							
mments: Odour: □ Y Sheen: □ Y Turbidity: Clea	es 🗷 No If	yes ☐ Hyd	lrocarbon-like OR	☐ Metallic-l	ike Very	Silty			
Analysis	Туре	40 mL	120 mL 250 m	ontainer Size	111	2 L	4 L Filt	tered	Preservatives
BTEX /VOC)	□ Plastic □ Gla	Plastic			. 1L		D Yes □ Yes	□ No	Hu/Huo
Philloide.	□ Plastic □ Gla □ Plastic □ Gla □ Plastic □ Gla	SS	2				☐ Yes ☐ Yes ☐ Yes	D No D No	
	☐ Plastic ☐ Glass ☐ Plastic ☐ Plastic ☐ Glass ☐ Plastic ☐ Plastic ☐ Glass ☐ Plastic						☐ Yes	□ No	
SCN NoO	1309-0	Consumable	s:   Waterra Tubin  Silicon Tubin			PE/Teflon D. Ampoule			Groundwater Filter Footvalve



☐ Development
☑ Purging/Sampling

Well No .: 1519-MW16-015

roject Name:	K19 Trutch				Project	t No.:	1657	709				
ocation:	-0.1				Date:		14	101/2	25185			
eather:	Cleas	Ten	nperature:	-14	Comple	eted By:	R	m				
PS Coordinates:				1	Review	red By:						
MONITORING V	WELL INFO	RMATION										
ime of Measuremen	t:	3:25			Tidall	y Influence	ed: 🗆 '	Yes &	No		- 1	
epth to Product:	-		Product Thickne	ss: /		urized:		Yes X			- 1	
epth to Water (A):	The second second		E TOP		Well H	Headspace	e: _•		_ ppm			
epth to Bottom of W		m below	□ TOP			Vell Volum	-				-	
iameter of Standpip	e:5	Good .				2.0 = 3				1 (2.0 inch) diamete		
ell Condition:			(B-A)*	1.1 =		_itres - fo	r a 38 mm	n (1.5 inch) diamete	r well			
QUIPMENT LI	ST											
ump		Multim	eter	Model:	/51 Pro 1	9050	Renta	Equipme	ent:			
☐ Hydrolift		pH/Ter	np Meter	Model: _	1							
☐ Bailer (1			ctivity Meter	Model: _		□	Field E	Bump				
Peristaltic			ed Oxygen Mete		4					□ pH7		
☐ Submersit	DIE		Redex) Meter	Model: _	A			0				
☐ Bladder			c Vapour Meter	Model: _			/	3 us/cm				
ımp Details:		D.O.	Ampoule		Field Calibration							
Time   Volume   Rem (IL   13:30   C   13:51   3   14:55   5:58	/L, not percenta	p. pH (Units) 2 6.52 5 6.50 7 6.49 6.74 6.49 6.54 6.52 6.50 7 6.49 6.49 6.49 6.49	Cond. S S PS/cm of Circle 511 . 532 . 517 . 513	mS/cm one) 3 3 3 OR	Redox (mV) -63. 7 -60.9 -58.3 -57.6	Diss. O (mg/L)  I o o o o o	* War	212- 215- 217- 220- 218	ie Ci	e te	San	
Turbidity: Clear	11111	IIIIIIII	111111111	1111111	Very	Silty						
Analysis	Туре			Container Size					a was w	Ashan alland		
		40 mL		0 mL 500 mL	. 1L	2 L	4 L	400 112	ered	Preservatives		
		Blass	2			-		X Yes	□ No	HNU3		
Trend de		Blass 2		è				Yes	□ No	HCI	1	
alama dalli	17.4	Glass A	1	-				□ Yes	)© No	Isdivin Bits	pure	
		Blass 6			2			□ Yes	No No	uu		
	Control of the contro	lass	1 = 1					□ Yes	DrNo		-	
	7. 2-1 6 F7   Inc	ilass						□ Yes	□ No			
SCN No. 0430	9-11				V 1			□ Yes	□ No		_	
	309-12	Consumable	s: □ Waterra T			OPE/Teflor O. Ampou	2. 12.20			Groundwater Filte	er	



☐ Development ☐ Purging/Sampling Well No. 9-4W16-105

ocation:		kut	Ten	nperature:	-12 4		eted By:	14 59	Jon	2018
SPS Coordinate						Review	red By:			
MONITORIN	NG WELL	INFORM	ATION							
Time of Measure	ement:	14E	00			Tidall	y Influenced	d: □ Yes Ø	No	
Depth to Produc		-04	la .	Product Thickne	ess:	n Press	urized:	□ Yes Æ	No	
Depth to Water (		1	Action of the second second	<b>E</b> TOP		Well I	Headspace:	_/	ppm	
Depth to Bottom		6.35	m below	E TOP			Vell Volume			
Diameter of Star	ndpipe:		mm od-			(B-A)*	2.0 = 3			n (2.0 inch) diameter we
Well Condition:		00				(B-A)*	1.1=	Litres - f	or a 38 mm	n (1.5 inch) diameter we
EQUIPMEN"	TLIST									
Pump □ Wate	erra		Multim	eter	Model:	\$1 pm	0 0	Rental Fourier	ent Se	e3M Tion
□ Hydr	olift		pH/Ter	np Meter	Model	1		Torner Equipit	one O	LOH
☐ Baile	er (Type:		) Condu	ctivity Meter	Model:			Field Bump		
Peris	staltic		Dissolv	ed Oxygen Met	ter Model:			□ pH4		□ pH7
☐ Subn	mersible		ORP (F	Redex) Meter	Model:			□ pH10		
☐ Blade	der		Organi	c Vapour Meter	Model:	11/		□ 1413 us/cm		
Pump Details:			□ D.O.	Ampoule			п.	Field Calibration		
								Tota Galibratic		
WELL DEVE	LOPMEN	T/PURGI	NG							
Purge Volume:	Well. Vol. 3	C. Contract	0.5	=	litres	Start:		Finish		
Avg. Flow Rate:		L/m	nin.			Sample	intake dept	h: _6 \	M	
				DO 150	- The Total Co.					
	Volume	Tomo	~11	Li Cond. Like	Specific Cond.		100 mil	III and a second		
Time	Removed	Temp. (°C)	pH (Units)	µS/cm	or mS/cm	Redox (mV)	Diss. O <sub>2</sub> *	A 100 TO	el	Remarks
	Removed (L)	(°C)	(Units)	uS/cm (circl	or mS/cm le one)	(mV)	(mg/L)	(m)	el	Remarks
Time 1422	Removed (L)			uS/cm (circl	or mS/cm	(mV)	(mg/L)	(m) 5.16	Ve	of ston ru
1422	Removed (L)	(°C) Z-8 Z-7	(Units) 6-62 6-59	US/cm (circl	or mS/cm le one) 3. 7	(mV) -97.0	(mg/L)	(m) 5.(6 5.4)	5. 7	-1//
1422	Removed (L)	(°C)	(Units) 6-67 6-57	US/cm (circl 426 441.	or mS/cm le one) 3. 7	(mV) -97.0 -94.8 -96.0	(mg/L)	(m) 5.66 5.96 5.86	5. 7	of ston ru
1422	Removed (L)	2.8 2.7 2.7	(Units) 6-62 6-59	426 441 441	or mS/cm le one)	(mV) -97.0 -94.8 -96.0 -96.7	(mg/L)	(m) 5.(6 5.9) 5.80	5. 7	of ston ou fumple for
1422 1424 1426 1427 1430	Removed (L)	(°C) Z.8 Z.7 Z.8 Z.9	(Units) 6-62 6-59 6-51	15/cm (circl) 426 426 441. 449. 449.	or mS/cm le one)	(mV) -97.0 -94.8 -96.0 -96.1 103.6	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	y slow our of for my le for
1422 1424 1426 1427 1430	Removed (L)	(°C) Z.8 Z.7 Z.8 Z.9 Z.9 Z.9	(Units) 6-67 6-59 6-59 6-50 6-50	15/6m (circl) 456 496 491. 495	or mS/cm le one) 3. 7 9 9	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	5. 7	Jeston Fur Jumple for
1422 1424 1426 1427 1430	Removed (L)	(°C) 2.8 2.7 2.8 2.9 3.3	(Units) 6-62 6-51 6-51 6-50 6-50 0-50	15/cm (circl) 426 426 441. 449. 4495	or mS/cm le one)	(mV) -97.0 -94.8 -96.0 -96.1 103.6	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	y slow our of for my le for
1422 1424 1426 1427 1430	Removed (L)  1  Z  3  4  Slow Note	(°C)  2.8  2.7  2.8  2.9  3.3  2.00	(Units) 6-62 6-51 6-51 6-50 6-50 0-50	15/6m (circl) 456 496 491. 495	or mS/cm le one) 3. 7 9 9	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
1422 1424 1425 1427 1430 * Record DO i	Removed (L)  1  Z  3  4  Slow Note	(°C)  2.8  2.7  2.8  2.9  3.3  2.00	(Units) 6-62 6-51 6-51 6-50 6-50 0-50	15/cm (circl) 426 426 441. 449. 4495	or mS/cm le one) 3. 7 9 9	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
1422 1424 1426 1427 1430 * Record DO i	Removed (L)  1  2  3  4  5  6  1  1  1  1  1  1  1  1  1  1  1  1	(°C)  Z. 8  Z. 7  Z. 8  Z. 9  Z. 9  Z. 00000000000000000000000000000000000	(Units) 6-67 6-51 6-51 6-50 6-50 0-50 0-50 0-50	15/cm (circl) 426 426 441. 449. 4495	or mS/cm le one) 3. 7 9 9	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
1422 1424 1426 1427 1430 * Record DO i	Removed (L)  1  2  3  4  5  Flow Flow Flow Flow Flow Flow Flow Flo	(°C)  Z.8  Z.7  Z.8  Z.9  Z.9  Z.0  Z.0  Z.0  Z.0  Z.0  Z.0	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-50 0-50	15/6m (circle 45) (circle 45) (426) (491) (495)	or mS/cm le one)	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 1.77 1.36 1.33 0.71	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
1427 1424 1425 1427 1430 * Record DO i	Removed (L)  1  2  3  4  5  Flow Point Mg/L, not p	(°C)  Z.8  Z.7  Z.8  Z.9  Z.9  Z.00  ACOUNT OF YES	(Units) 6-62 6-51 6-51 6-50 0-50 0-50 0-50 0-50 0-50 0-50 0-50	US/cm (circle 45 426 441 441 441 441 441 441 441 441 441 44	or mS/cm le one)  3. 7	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 0.72 1.77 1.36 1.33 0.71 Ple	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
1427 1424 1425 1427 1430 * Record DO i	Removed (L)  1  2  3  4  5  Flow Point Mg/L, not p	(°C)  Z.8  Z.7  Z.8  Z.9  Z.9  Z.00  ACOUNT OF YES	(Units) 6-62 6-51 6-51 6-50 0-50 0-50 0-50 0-50 0-50 0-50 0-50	15/6m (circle 45) (circle 45) (426) (491) (495)	or mS/cm le one)  3. 7	(mV) -97.0 -94.8 -96.0 -96.1 103.6 1 San	(mg/L) 0.72 1.77 1.36 1.33 0.71 Ple	(m) 5.(6 5.76 5.86 6.26	yc 5. 7 . D	Jeston Fur Jumple for
# Record DO i	Removed (L)  I  Z  3  4  Flow Fig. 19  II Yes B  II Yes D  Clear II	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 0-50 0-50 0-50 0-50 0-50 0-50 0-50	US/cm (circle 45 426 441 441 441 441 441 441 441 441 441 44	or mS/cm le one)  3. 7	(mV) -97.0 -94.8 -96.0 -96.7 103.6 1 San	(mg/L) 0.72 1.77 1.36 1.33 0.71 Ple	(m) 5.(6) 5.90 6.26 	7 P	Jeson Fur Jeson for Jeson for St.
* Record DO i	Removed (L)  1  2  3  4  5  FOR PORT OF PORT O	(°C)  Z-8  Z-7  Z-8  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 0-50 0-50 0-50 0-50 0-50 0-50 0-50	15/6m (circle 45 ) 426 441 (445 )	or mS/cm le one)  3. 7  3. 7  3. 7  4. 7  5. 7  5. 7  6. 7  7. 7	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) 0.72 1.77 1.36 1.33 0.71 Ple	(m) 5.(6) 5.90 6.26 	yc 5. 7 . D	Jeston Fur Jumple for
# Record DO i	Removed (L)  1  2  3  4  5  For Particular Section 1  1  1  1  1  1  1  1  1  1  1  1  1	(°C)  Z-8  Z-7  Z-8  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	11111111	OR Metallic	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.16 5.97 5.80 6.26 4.54	Document of the second of the	Preservatives
* Record DO i	Removed (L)  I  Z  3  4  Flow points and the second	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	120 mL 25	OR Metallic I I I I I I I  Container Size 50 mL 500 mL	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.(6) 5.90 6.26 4.54 7.54	ltered	Jeson Fur Jeson for Jeson for St.
*Record DO i	Removed (L)  I  Z  3  4  Flow Plastic Plastic Plastic Plastic Plastic	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	120 mL 25	OR Metallic	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.(6) 5.90 6.26 6.26 4.54	Itered No	Preservatives  Hellthos
* Record DO i	Removed (L)  I  Z  3  4  Flow Plastic Plastic Plastic Plastic Plastic	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9  Z-9	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	120 mL 25	OR Metallic I I I I I I I  Container Size 50 mL 500 mL	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.(6) 5.90 6.26	Itered In No	Preservatives  Hellthos  Sod Bi
*Record DO i	Removed (L)  I  Z  3  4  Flow Plastic Plastic Plastic Plastic Plastic	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-9  Z-1  Z-1	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	120 mL 25	OR Metallic I I I I I I I  Container Size 50 mL 500 mL	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.(6) 5.90 6.26 6.26 6.26 6.26 6.26 6.26 6.26 6.2	Itered  I No INO INO	Preservatives  Hellthos  Sod Bi
*Record DO i	Removed (L)  I  Z  3  4  Wot  For Rel  in Mg/L, not p  O Yes  O Yes  O Plastic  Plastic  Plastic  Plastic  Plastic  Plastic  Plastic  Plastic	(°C)  Z-8  Z-7  Z-9  Z-9  Z-9  Z-9  Z-00-23  Porton of yes  No If yes  No If yes  Type  Glass  Glass  Glass  Glass	(Units) 6-62 6-51 6-51 6-50 6-50 0-50 0-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	120 mL 25	OR Metallic I I I I I I I  Container Size 50 mL 500 mL	(mV) -97.0 -94.8 -96.0 -96.7 103.6 / San	(mg/L) . 0.72 1.77 1.36. 1.33 0.71 ple	(m) 5.(6) 5.97 6.26 6.26 6.26 6.26 6.26 Final Properties of the pr	Itered  I No  No  No	Preservatives  Hellthos  Sod Bi



	GR AN	OUNDWA D SAMPLI	TER DEVELO	PMENT	☐ Deve	lopment ng/Samplir	well No .: Mul
Project Name: Location: Weather: GPS Coordinates:	K19 Trutch	Tempera	ature:(Z C		t No.: 16	657709 14 1	lun 18
MONITORING N Time of Measuremen Depth to Product: Depth to Water (A): Depth to Bottom of W Diameter of Standpipe Well Condition:	123 4.662 ell (B): 12.820	m Produm below		Tidall m Press Well I One V	y Influenced: surized: Headspace: Well Volume:	Yes N	lo
Pump	ype:	Multimeter pH/Temp Me Conductivity Dissolved O ORP (Redex Organic Vap	Meter Mod  xygen Meter Mod  d) Meter Mod  our Meter Mod	el: el: el:	D Fie	ld Bump	t: See BM Fiel Notes phr
WELL DEVELOR Purge Volume: We Avg. Flow Rate:	PMENT/PURGII	= _	litres	Start:	intake depth:	Finish:	
Time Remarks (L. 12:07 4 12:13 6 13:24 8 13:30 14	oved (°C)	pH (Units) (1) (Units) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	Cond. Specific Corps/cm or mS/cm or mS/cm (circle one)  \$8 \ 3  \$76 \ 3  \$69.6  \$59.7	Redox (mV) -83.3 -93.8 -105.2 -126.6 -136.1	Diss. O <sub>2</sub> * (mg/L)  0.63  0.35  0.37  0.42	Water Level (m) 4.903 4.951 4.975 5.005	Remarks  Olean
* Record DO in Mg/	L, not percentage						
Odour:	s DiNo If yes		bon-like OR □Mer IIIIIIIII		Silty		
Analysis	Туре	40 mL 120	Container	Size	2L 4L	Filter	ed Preservatives
BTX/VPH I	Plastic Glass Plastic Glass Plastic Glass Plastic Glass Plastic Glass Plastic Glass	3	7_			☐ Yes☐ Yes☐ Yes☐ Yes☐ Yes☐ Yes☐ Yes☐ Yes	ONO HOLLHWOSE  DANO SONO BI  DANO ONO ONO ONO ONO ONO ONO ONO ONO ONO
	Plastic ☐ Glass Plastic ☐ Glass					□ Yes	□ No

Consumables: 

Waterra Tubing 

HDPE/Teflon Tubing

☐ D.O. Ampoules

☐ Silicon Tubing

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☐ Groundwater Filter

☐ Footvalve

SCN No.

Field Dup.

☐ Development ☐ Purging/Sampling

Well No .: MW/7-04

Project Name:	- 4						ct No.:	165	7709				
ocation:	-	0.27				Date:			1370	in 1	8		
Weather:	-	reces	Ten	nperature:	-110	Com	oleted By	/:	4	>			
GPS Coordinat	es:					Revie	wed By:						
MONITORII	NG WELL	INFORM	MATION										
Time of Measur	ement:	14	15			Tida	Illy Influer	ced:	Yes 🗖	No			
Depth to Produc				Product Thic	kness:	and the second	ssurized:		Yes 🔟				
Depth to Water				TOP		Wel	Headspa	ice:		ppm			
Depth to Bottom		7-988.	m below	<b>☑</b> TOP			Well Vol						
Diameter of Star	C. A. S.	31	, mm				()*2.0 = ( ()*1.1 =	4.6	Litres - for	r a 51 mn	n (2.0 inch) diameter		
Well Condition:		- looned						/	Litres - for	a 38 mn	n (1.5 inch) diameter		
EQUIPMEN	T LIST												
Pump □ Wat	erra		Multim	eter	Mode	1: 451 Pm	S Profus Rental Equipment:						
☐ Hydi	rolift		pH/Ter	np Meter	Mode	1 1	Field Burns						
	er (Type:			ctivity Meter	Mode	el;		Field	Bump (		10		
Ď Peri:				ed Oxygen I		el:		□pH	14		□ pH7		
	mersible		- 1	Redex) Meter		/	□ pH10						
☐ Blad	ider		Organi	Vapour Me	ter Mode	l:							
Pump Details:			D.O.	Ampoule		☐ Field Calibration							
WELL DEVE	ELOPME	NT/PURG	ING										
Purge Volume:	Well. Vol.			_	litres	Start:			Finish:				
Avg. Flow Rate:		-	min.	-	"""		e intake d	enth:	_ Finish:				
	Volume			□ Cond i	T Casalla Cas		I make a	срии.		7			
Time	Volume Removed	Temp.	pH	1000	Specific Con	d. Redox	Diss.		ater Level		Demonto		
	(L)	(°C)	(Units)		ircle one)	(mV)	(mg/	L)	(m)		Remarks		
14 23	1.5	4.0	6.60	6	74.2	- 58.6	0.	74 6	2.28.	1	clark		
1433	2.5	3.8	6.39	65	0.9	13.5	0.8	9 1	5.50		les		
1437	4	36	6.51	67	9.4	-85-		6.	6.74				
1449	5.5	2,7	6,00	017	- 4	-76-3	2-3	8- 6	6.890				
1452	1.	7.1	6.37	00	5 - 9	10.	1.5	4 7	7.066				
1456	8.5	21	6.27	244	-	170 0	11.5	6.	1.14	4			
	Race	le air	4 8	5077	- (	-120.8	1.2	0.	7-195	-			
* Record DO	in Mg/L, not		0.5	20		-1	1						
Comments:													
Odour:	□ Yes □	No If ye											
Sheen:		⊠No Ifye ⊒No Ifye		rocarbon like	OR   Met	allia lika	_	-					
			The second secon				y Silty						
						1 10	y Only						
Analysis		Туре			Container	Size							
- 1			40 mL	120 mL	250 mL 500	mL 1L	2L	4 L	Filte	ered	Preservatives		
D Metal				1		1 - 1			DYes	□ No	two 1 He		
316/1/1			3						□ Yes	₽ No	Spd Bi		
21 HIPPA	- 1	1			2				☐ Yes	D No	SOU BI		
	☐ Plasti								☐ Yes	□ No			
	☐ Plasti								☐ Yes	□ No			
	☐ Plasti	THE STREET							☐ Yes	□ No			
1201010	Plasti		1					_	☐ Yes	□ No			
SCN No.	0430	1-0	Consumable		The second second	ロト	DPE/Tefl	on Tubin	9		☐ Groundwater Filter		
Field Dup				☐ Silicor	Tubing		O. Ampo	ules			☐ Footvalve		



	19 Trutch		Project No	_	657709	10-
Ocation:  Veather:  GPS Coordinates:	year	Temperature:2\	Date: Complete Reviewed	d By:	13/61/22 BM	518
Time of Measurement: Depth to Product: Depth to Water (A): Depth to Bottom of Well Diameter of Standpipe: Well Condition:	11:30 m m	Product Thickness:	m Pressuriz Well Hea One Well (B-A)*2.0	ed: dspace:		ppm 51 mm (2.0 inch) diameter well 38 mm (1.5 inch) diameter well
EQUIPMENT LIST Pump	9:	pH/Temp Meter M Conductivity Meter M Dissolved Oxygen Meter M ORP (Redex) Meter M Organic Vapour Meter M D.O. Ampoule	Model: YOL Pro Pl Model:	_	eld Bump pH4 pH10 1413 us/cm	D pH7
Purge Volume: Well.  Avg. Flow Rate:		= 14.4 litres	Start: \_\	-50 ake depth:	Finish:	12:20
	d Temp.	pH (Units) Cond. Specific (Specific (Circle one)	m Redox D	iss. O <sub>2</sub> * (mg/L)	Water Level (m)	Remarks
Time Volume Remove (L)		77 6890	7.4 5	,84	10.265	Silfy
Time Remove (L)  11:55 3  12:40 6	3.5 7	012 1431	-31.5 2 -22.7 3	2.75	10.275	Clearing
Time Remove (L)  11:50 1  11:55 3  12:40 6	3.5 7	·12 1431 ·14 1267	-31.5 2 -22.7 5 -22.3 5	2.75		

	nalysis	Tve	pe			Conta	ainer Size				-0.		11275.5
			pe	40 mL	120 mL	250 mL	500 mL	1 L	2L	4 L	Fift	ered	Preservatives
105.	metals	☑ Plastic	☐ Glass		V						☐ Yes	□No	MNON
BTE	X/VPH	☐ Plastic	☑ Glass	V3							□Yes	□ No	Detembre
HA	EPH/HEPH	☐ Plastic	☑ Glass	A		2					□Yes	□No	Sedum blas
Ch	londe.	D Plastic	☐ Glass		~		-				☐ Yes	D'No	
V	DC5	☐ Plastic	<b>☑</b> Glass	V3							□Yes	Ĭ No	Dodinin Er
1)145	s. Heron	☐ Plastic	☑ Glass	1.							□ Yes	□ No	HC1
		☐ Plastic	☐ Glass								□Yes	□No	



				WATER DEVELOPM PLING DATA	AIEN I		elopment ging/Samplir	ng Well No.: MV	V/7
roject Name:	K19 Tr	utch			Project	t No :	1657709		
ocation:					Date:		13 - 7	an 7018	
eather:	Cl	ear	Tem	perature: /Z c		eted By:	20	21.4. 20010	
PS Coordinates						ed By:	-0>		
MONITORIN Time of Measurer Depth to Product: Depth to Water (A Depth to Bottom of Diameter of Stand Well Condition:	ement: :: A): of Well (B):	7.04	m gm below gm below gmm	Product Thickness: r	m Press Well F One V (B-A)*	y Influenced: ourized: Headspace: Vell Volume:	☐ Yes ☐ N	lo _ ppm a 51 mm (2.0 inch) diam	
EQUIPMENT		- 600	α.		(B-A)*	1.1 =	Litres - for	a 38 mm (1.5 inch) diam	eter we
□ Hydro □ Bailer □ Perista □ Subma	Type:	se GL	) Conduction Dissolve	pp Meter Model: _ ctivity Meter Model: _ ed Oxygen Meter Model: _			pH4	nt: Dee Field Mof DpH7	) (
Delade Pump Details:  VELL DEVEL Purge Volume:	ler B		Organio	Vapour Meter Model: _ Ampoule	Start	□	I pH10		
Details:	LOPMEN	T/PURG	Organio	: Vapour Meter Model: _	Start:	□	1 1413 us/cm ield Calibration Finish:		
□ Bladde Pump Details:  VELL DEVEL Purge Volume: Purge Volume: Purge Flow Rate:  Time R	LOPMEN	T/PURG	Organio	Ampoule    litres     Cond	Start:	D	1 1413 us/cm ield Calibration Finish:	Remarks	
□ Bladde  Pump Details:  VELL DEVEL  urge Volume:  vg. Flow Rate:	Volume Removed	Temp. (°C)	Organic D.O. IING min.  pH (Units)	Ampoule	Start: Sample	intake depth:	1413 us/cm ield Calibration  Finish:  Water Level	Remarks 600 Mmf	ha
□ Bladde tump Details:  VELL DEVEL urge Volume: vg. Flow Rate:  Time R	Volume Removed	Temp. (°C)	Organic D.O. ING min.  pH (Units)  5-96	Ampoule    Litres   Litres	Start: Sample	intake depth:	Finish:  Water Level (m)  7.70		ha
□ Bladde ump Details:  VELL DEVEL urge Volume: vg. Flow Rate:  Time R	Volume Removed (L)	Temp. (°C)	Organic D.O. ING min.  pH (Units) 5-96	Ampoule    Litres   Litres	Start: Sample  Redox (mV)  160.2	intake depth: Diss. O <sub>2</sub> * (mg/L)	Finish:  Water Level (m)  7.70 8.25	beofund ditiully	ha
□ Bladde ump Details:  /ELL DEVEL urge Volume: /g. Flow Rate:  Time R  0 1 4 5  6 5 7  10 1 9 4	Volume Removed (L)	Temp. (°C)  7. 7  2. 9  2. 4  2. 7	Organic  D.O.  ING  min.  pH (Units)  5.96  5.96  6.03	Ampoule    Litres   Litres	Start: Sample  Redox (mV)  160.2	intake depth:  Diss. O <sub>2</sub> * (mg/L)  /. / O  /. 0 K  2. 40	Finish:  Water Level (m)  7.70	beo frul ditully	ha octli Bo
□ Bladde tump Details:  VELL DEVEL urge Volume: vg. Flow Rate:  Time  F  0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Volume Removed (L)	Temp. (°C)	Organic  D.O.  ING  min.  pH (Units)  5.96  6.03	Wapour Meter Model:  Ampoule  Iitres  Cond_B Specific Cond.  S/cm or mS/cm (circle one)  3/3/3/3/4 4/4/4	Start: Sample  Redox (mV)  /60.2    52.1  //6.9	Diss. O <sub>2</sub> * (mg/L)	Finish:  Water Level (m)  7.70 8.25	beofund ditiully	ha octi
□ Bladde Pump Details:  VELL DEVEL urge Volume: vg. Flow Rate:  Time R  09 45  64 57  10 19	Volume Removed (L)	Temp. (°C)  7. 7  2. 9  2. 4  2. 7	Organic  D.O.  ING  min.  pH (Units)  5.96  5.96  6.03	Ampoule    Litres   Litres	Start: Sample  Redox (mV)  160.2  176.9  138.1  134.1	intake depth:  Diss. O <sub>2</sub> * (mg/L)  /. / O  /. 0 K  2. 40	Finish:  Water Level (m)  7.70 8.25	Swith to	ha Bo
Delader  Pump Details:  VELL DEVEL  Turge Volume:  vg. Flow Rate:  Time  Fig. 45  64:57  10:44  10:19  10:47	Volume Removed (L)	Temp. (°C) 7-7 2-9 2-9 3-5 5-1	Organic  D.O.  ING  min.  pH (Units)  5.96  5.83  6.03	Wapour Meter Model:  Ampoule  Iitres  Cond_B Specific Cond.  S/cm or mS/cm (circle one)  3/3/3/3/4 4/4/4	Start: Sample  Redox (mV)  /60.2    52.1  //6.9	Diss. O <sub>2</sub> * (mg/L)  1. 10 8  2. 40  1. 09  1. 40  2. 90	Finish:  Water Level (m)  7.70 8.25	beofund ditiully	ha Bo the
□ Bladde Pump Details:  VELL DEVEL Turge Volume:  vg. Flow Rate:  Time  Fig. 45  65:57  10:04  10:19	Volume Removed (L)	Temp. (°C) 7-7 2-9 2-9 3-5 5-1	Organic  D.O.  ING  min.  pH (Units)  5.96  5.83  6.03	Wapour Meter Model:  Ampoule  Iitres  Cond_B Specific Cond.  S/cm or mS/cm (circle one)  3/3/3/3/4 4/4/4	Start: Sample  Redox (mV)  160.2  176.9  138.1  134.1	Diss. O <sub>2</sub> * (mg/L)  1. 10 8  2. 40  1. 09  1. 40  2. 90	Finish:  Water Level (m)  7.70 8.25	Swith to	ha Bo
DBladde tump Details:  VELL DEVEL urge Volume:  vg. Flow Rate:  Time  Fig. 19  10:19  10:19  10:47  11:01  Record DO in	Volume Removed (L) 7-5	Temp. (°C) 7-7 2-9 2-9 3-5 5-1	Organic  D.O.  ING  min.  pH (Units)  5.96  5.83  6.03	Wapour Meter Model:  Ampoule  Iitres  Cond_B Specific Cond.  S/cm or mS/cm (circle one)  3/3/3/3/4 4/4/4	Start: Sample  Redox (mV)  160.2  152.1  176.9  134.1  127.9	Diss. 0 <sub>2</sub> * (mg/L)  1.10  1.08  2.40  1.09  1.40  2.60  1.91	Water Level (m)	Swith to	ha Bolling the
DBladde Pump Details:  VELL DEVEL urge Volume: vg. Flow Rate:  Time R  O 1 19 10 19 10 19 10 19 10 32 10 19	Volume Removed (L)	Temp. (°C)  7.7  2.9  2.7  3.5  5.1  6.7  creentage	Organic  D.O.  ING  Min.  PH (Units)  5.96. 5.83 6.08 6.09 7.44 8.20 8.20	Wapour Meter Model:  Ampoule  Iitres  Cond_B Specific Cond.  S/cm or mS/cm (circle one)  3/3/3/3/4 4/4/4	Start: Sample  Redox (mV)  160.2  152.1  176.9  134.1  122.9	Diss. O <sub>2</sub> * (mg/L)  1. 10 8  2. 40  1. 09  1. 40  2. 90	Water Level (m)	Swith to	ha Bo

1	Analysis	TV	pe			Conta	ainer Size				410		1.7
L	7 illalyolo	1,9	pe	40 mL	120 mL	250 mL	500 mL	1 L	2 L	4L	Filt	ered	Preservatives
ŀ	DMelals	☐ Plastic	D Glass	1	1					200	Yes	□No	4N03/401
1	BIEX/YPH	☐ Plastic	Glass	3							☐ Yes	₽ No	Soul Bi
L	C/H/PAH	☐ Plastic	Glass	V		7					□ Yes	□ No	Sod Bi
k	Monde.	☐ Plastic	☐ Glass		1						□Yes	□No	
L		☐ Plastic	☐ Glass								□ Yes	□No	
-		☐ Plastic	☐ Glass								□ Yes	□No	
L		☐ Plastic	☐ Glass							77	□Yes	□No	

SCN No. ON 309 - 04 Consumables: ON Waterra Tubing ON Ampoules ON Ampoules ON Ampoules ON Ampoules ON Footvalve



		GROUNDV AND SAM	WATER DEVELOF PLING DATA	MENT	_ /	elopment ging/Samplin	g Well No.: K19-Mu
Project Name: Location: Weather: GPS Coordinates:	K19 Trutch	Sunny Tem	nperature: 2_			1657709 -14/01/	2018
MONITORING V Time of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of We Diameter of Standpipe Well Condition:	: 13: 4.6 ell (B): 7.9		Product Thickness:	Tidall m Press Well I One V (B-A)	ly Influenced: surized: Headspace: Well Volume:	Yes William	o .
Pump	ype:	) Conduct Dissolve ORP (R Organic	np Meter Model: stivity Meter Model: ed Oxygen Meter Model: dedex) Meter Model:			tental Equipment ield Bump I pH4 I pH10 I 1413 us/cm	□ pH7
WELL DEVELOF Purge Volume: We Avg. Flow Rate:	PMENT/PU II. Vol. X	RGING 3 =	itres		13 7 o o		
Time Volument Remond (L) 13:00 C 13:11 2 13:21 4 13:21 4 14:59	ved (°C)	(Units)  2 7.02  1 6.73  1 6.71  recharac  + day	Cond Specific Cond.  (S/cm) or mS/cm (circle one)  322.3  459.4  456.6	Redox (mV) -15.4 -8.6 -14.1 -17.8	Diss. 02* (mg/L) 1.34 5.41 7.94 9.40	Water Level (m)  4: 365 5:020 5: 536 4: 115	Remarks  Class a a u u torning Sample
* Record DO in Mg/l  Comments: Odour:	S No	If yesHydre	ocarbon-like OR □ Metall	c-like Very	Citte		

Analysis	Tv	/pe			Conta	ainer Size						
	/ ',	pc	40 mL	120 mL	250 mL	500 mL	1 L	2L	4 L	Filte	ered	Preservatives
Diss. Hetal	Plastic	☐ Glass		V						Yes	□ No	11103
0135. HG	☐ Plastic	TO Glass	V							12 Yes	□ No	HCI
TEX/VPH	☐ Plastic	☐ Glass	3							□Yes	□No	Bedion Boo
AH/LEAH/HEA	☐ Plastic	M Glass			2					□Yes	D No	u it
	☐ Plastic	☐ Glass					- 1			□ Yes	□ No	
	☐ Plastic	☐ Glass								□Yes	□ No	
	☐ Plastic	☐ Glass		9						□Yes	□No	
SCN No	1309-1	0 0	onsumable	es: 🗆 Wate	erra Tubing on Tubing			OPE/Teflo			Q	Groundwater Filte



∟ocation: Veather:	K19 Trutch	Tem	perature: > 1 6	Project Date:	No.:	1857709	an 2018 / 14
GPS Coordinates:				Review		02	
MONITORING Time of Measurem Depth to Product: Depth to Water (A): Depth to Bottom of Diameter of Standp Well Condition:	ent: 12:4 4-643 Well (B): 9-788	m F	Product Thickness: m TOP >4.830	Pressi Well H One W		Yes A No	
EQUIPMENT I	.IST						oo min (n.e men) diameter we
□ Hydrolif □ Bailer □ Peristal □ Submer □ Bladder	(Type:ic	Dissolve ORP (R Organic	pp Meter Model:	1		ield Bump  pH4  pH10  1413 us/cm eld Calibration	(se Freld Note)
VELL DEVELO	PMENT/PURC	SING				5.00 (3.000) (30) (30)	
	Vell. Vol. X	= /min.	itres	Start: Sample i	ntake depth:	Finish;	
urge Volume: \			☐ Cond. È Specific Cond.	Redox	Diss. O <sub>2</sub> *	Water Level	Remarks
urge Volume: Now Rate:	olume moved (L) Temp. (°C)	pH (Units)	uS/cm or mS/cm (circle one)	(mV)	(mg/L)	(m)	
urge Volume: \ vg. Flow Rate:	moved lemp.		uS/cm or mS/cm			(m) 5.93 6.66. 7.70	Cher to no
rige Volume: No. 10 Property of the Property o	moved (°C)	(Units) 7-04 6-51 6-95 6-71	#S/cm or mS/cm (circle one) 6 3 2 - 4	(mV)	(mg/L)		Cher to no Wittle recorded DEYER SIL

Tv	ne.			Conta	ainer Size				11035		
.,,	pc 1	40 mL	120 mL	250 mL	500 mL	1 L	2L	4L	Filte	ered	Preservatives
☐ Plastic	☐ Glass								≥ Yes	□No	HWO, 14
□ Plastic	☐ Glass	3							□Yes	□No	111
☐ Plastic	Glass			2					☐ Yes	□No	
□ Plastic	☐ Glass								□ Yes	□ No	
☐ Plastic	☐ Glass								☐ Yes	□No	
☐ Plastic	☐ Glass								□ Yes	□No	
☐ Plastic	☐ Glass								□Yes	ПМо	7
	☐ Plastic	☐ Plastic ☐ Glass	□ Plastic □ Glass	□ Plastic □ Glass	Plastic	Q   Plastic   Q   Glass   Q   Q   Q   Q   Q   Q   Q   Q   Q	120 mL   250 mL   500 mL   1 L     Plastic	Plastic	120 mL   120 mL   500 mL   1 L   2 L   4 L	Plastic	Plastic



# GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development
Purging/Sampling

Well No .: KI9-HW17-26

ocation:	Wia I	TO COLO					Projec	t No.:	165770		7	
	-						_ Date:		- 1	101	/20	196
Veather:	Temperature:  Coordinates:  DNITORING WELL INFORMATION of Measurement: th to Product: th to Water (A): th to Bottom of Well (B): the to Bottom of Well (B):		·		Comp	leted By:	101	1				
COLUMN TO SERVICE	ion:  Iner: Temperatur  Coordinates:  NITORING WELL INFORMATION  of Measurement:					Review	ved By:					
Time of Measur Depth to Produc Depth to Water Depth to Botton	rement: ct: (A): n of Well (B):	7.412 H.588	m m below m below mm	□ TOP	nickness:	_	m Press Well One ( (B-A)	ly Influenced surized: Headspace: Well Volume *2.0 = 8	: e: Lit	res - fo	No ppm ra51 mm	ı (2.0 inch) diamel
	- 1.000		DU.				(B-A)	(1.1)=	Lit	res - to	r a 38 mm	(1.5 inch) diamet
Pump 🗆 Wat  □ Hyd  ☑ Baile □ Peri □ Sub □ Blad	erra rolift er (Type: staltic mersible der		pH/Te	emp Meter uctivity Mete ved Oxygen Redex) Met ic Vapour M	Meter er	Model: _ Model: _ Model: _ Model:	1		Field Bui □ pH4 □ pH10 □ 1413 t	mp 		pH7
Pump Details: _	Temperature:    Temperature:							Field Cal	ibration	1		
14:40	Removed (L)	(°C) 3.17 3.13	(Units) 7 = 14 6 = 94	us/c	om or mS circle one	6/cm ) )	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	7.4	702	C	Remarks
omments:	□ Yes 🔯	No If yes	☐ Hyd	drocarbon-lik	ke OR	□ Metallic-	-like Very	Silty				
					NO		very	Jilly				
Analysis	T	0.			Con	tainer Size						
7 797			40 mL	120 mL	250 mL			2 L	4 L	Filte	ered	Preservatives
			,	V			-		L	Yes	□No	4N03
	Contract Con								E	Yes	□ No	HCI
	0		5							1 Yes	□ No	
MINITERY /HE	Temperature:    Temperature:   Temperature:   Temperature:   Torking Well (B)   Torking Measurement:   Torking Mea		2					] Yes	□ No			
										1 Yes	□ No	
	☐ Plastic	☐ Glass								) Yes	□ No	
	☐ Plastic	☐ Glass								C. 1		
	439-0	A						V	E	Yes	□ No	



# GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development D Purging/Sampling

Well No .:	K19-HW17-	291
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Project Name:	K19 T	rutch					Projec	t No.:	1657	709			
ocation:							Date:		16	101/	248		
Veather:		ar	Ter	nperature:	-8		Compl	eted By:		BIL	1		
SPS Coordinates	:						Reviev	ved By:		0			
MONITORING Time of Measurer Depth to Product: Depth to Water (A Depth to Bottom of Diameter of Stand Well Condition:	nent: ): of Well (B):	5.908	m below m below mm	TOP	ickness: ,		Mell I One V (B-A)	y Influence surized: Headspace Well Volum *2.0 = 6	: _ ne: . 2	Yes D	No ppm	m (2.0 inch) diameter we m (1.5 inch) diameter we	
EQUIPMENT	LIST												=
Pump   Water	ra		Multim	eter		Model: 2	51 Pro	9000	Renta	l Equipme	ent		
☐ Hydrol						Model:				- 1-re-in			
						Model: _		□	Field I	Bump		Đ	
					Meter	Model: _	4		□ pH₄	1		_ □ pH7	
				Section 18 Con					□ pH1	10			
	Temperature:			Model: _				3 us/cm					
Pump Details:			D.O	Ampoule				Ø	Field (	Calibration	See	55 field n	2
13 50 13 54 14 00 14 10 14 20 14 30 14 40 14 50 * Record DO in	(L)  1  2  4  10  12  Mg/L, not p  Yes Yes	(°C)  4.0  3.7  3.6  4.1  4.2  4.3  4.3  4.2  ercentage	(Units) 6.88 6.61 6.56 6.52 6.50 6.47 6.47	7 (8)	e OR [	Metallic		0.70	6 6 6 6 6 6 6 6 6	122 1263 1306 1585 1672 1673 1713		Remarks  Clear  a a  a a  a a  a a  a a  a a  a a	2
Talibidity.	1		111111	111111			Very	Silty					4
Analysis	Т	уре	10 ==1	100 = 1	1.5.7.	ainer Size	1	2. 1		Filt	ered	Preservatives	
Diss. Metal	DE Plastic	□ Glase	40 ML	120 mL	250 mL	500 mL	1 L	2 L	4L				
D100. Ha	17		1	1						Yes Yes	□ No	HN03	
C/BTEX/VOH			3							☐ Yes	□ No	HC1	1
PH/HEAN/PAH	-				2		- 1			□ Yes	X No	Sodiom Bisi	7
Chloride	Plastic	Glass					J- 21			☐ Yes	₩ No		
	Plastic	☐ Glass								□ Yes	□ No		
	☐ Plastic	☐ Glass								□ Yes	□No		
SCN No. 6	+310-	03	Consumable	s: □ Wate			X(HD	PE/Teflon	Tubing			Groundwater Filter	1



roject Name: ocation: /eather: :PS Coordinates:	K19 Trutch	5 Ter	mperature:	-12-	Date:	ct No.: eleted By: wed By:	1657709	0/2013 M	5	
MONITORING National Time of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of Water of Standpiper Well Condition:	t:	m below mm	Product This TOP  TOP	ckness:	Tida m Pres Well One (B-A		e:	No ppm s - for a 51 m	m (2.0 inch) diameter v m (1.5 inch) diameter v	
EQUIPMENT LI  Pump	ype:	Dissol ORP (	neter mp Meter ictivity Meter ved Oxygen I Redex) Mete ic Vapour Me . Ampoule	Model Model Meter Model r Model	4		Field Bum	/cm		
VELL DEVELOI Purge Volume: We	ell. Vol. X	GING 3 L/min.	= 29	litres		15 : 4 intake dep		nish:		
Time Volu Remo	oved lemp.	pH (Units)	ŲS/ci	Specific Cond or mS/cm ircle one)	Redox (mV)	Diss. O <sub>2</sub> (mg/L)	(m	)	Remarks	
15.56 2 16-18 6 Little to	1.8 2 1.5 no rechau	7.19	4: 4: broed	19.9	336 26.9 2006 13.4		3.3. 4.9.	55 C	lea(	
10:17 -	2.7	6.78	41	8.2	48.2			35 30	imple	
* Record DO in Mg/ omments: Odour:	s No If	yes ☐ Hyd	I drocarbon-liki I I I I I I I	e OR □ Meta	Ven	y Sifty				1
Analysis	Туре	40 mL	120 mL	Container S 250 mL 500 i		2 L	4 L	Filtered	Preservatives	
1 10	Plastic Glas	-	~					Yes □ No	HN03	
office.	Plastic Glas	55	-					Yes □ No	HCI	1.1
D135. Hg 1	1 Plactic   Polo	× 1 1		_				Yes M No	Sodion Bisi	10
DISS HO DIEX/VPH C	Plastic Glas									1
DISS HO I BTEX/VPH I PAH/LEAVHER I	Plastic Glas	ss .		2				res ⊠ No	uu	,
DISS. HO C BTEX/VPH C PAH/LEAN/HEAL C		es s		2				res □ No	χ	,



	A	IND ONI	IPLING				-				Vell No.: <u>K.A M</u>
Project Name: .ocation: Veather: GPS Coordinates:	K19 Trutch	Ter	mperature:	-14			t No.: eted By:	1	7709 H/0/ BM	/ 2×	8
MONITORING V	VELL INFOR	MATION						_		-	
Time of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of We Diameter of Standpipe Well Condition:	t: 15- 4.666 ell (B): 5-895	m m below m below mm Cacca	Product Thi	ickness: _	<u> </u>	Press Well I One V		e: ne:	Litres - fo		m (2.0 inch) diameter we m (1.5 inch) diameter we
EQUIPMENT LIS	ST										, , , , , , , , , , , , , , , , , , , ,
Pump		) Condu Dissolv ORP (I Organi	mp Meter ctivity Meter ved Oxygen Redex) Mete c Vapour Me . Ampoule	Meter I	Model: //c Model: Model: Model: Model: Model:	DI PIBY	 _	Field  p+  p+	Bump		_ □ pH7
WELL DEVELOP							20	rieiu	Calibration		
		0	11					A			
Purge Volume: Wel	me temp. (°C)	/min.  pH (Units)  7:15	US/ci	Specific or mS/c circle one)	m	Redox (mV)	intake de Diss. O (mg/L	2* W	/ater Level (m)	4 m	Remarks
Purge Volume: Wel Avg. Flow Rate:  Time Volum Remo (L)  15:47 P 15:52 I 16:00 2 16:05 3 16:13 1 16:18 P	me Temp. (°C)  3 -/ 2.5 2.6 2.6 2.6 2.6 2.6 2.6 2.6	/min,	US/ci	Specific or mS/ccircle one)	m -	Sample Redox	Diss. O (mg/L)  0.82  1.07  1.10  0.87  0.87	2* W	/ater Leve	4 1 Cfe	Remarks  ear  u  u  u
Purge Volume: Wel Avg. Flow Rate:  Time Volum Remo (L)  15:47 P 15:52   16:00 2 /6:05 3 /6:07 4 /6:13   /6:18 4 /6:22 5	me Temp. (°C)  3 / 2.5 2.6 2.6 2.6 2.6 2.6 3.7 2.6 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7	9 /min. pH (Units) 7.15 7.12 7.10 7.00 7.09 7.09 7.09	56 3 5 7 9 5 8 6 5 7 9 5 7 9 6 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Specific  From or mS/c  Circle one)  2.6  3.7  4.7  4.7  4.7  4.7  6.7  6.7  6.7  7.7  6.7  6	m	Redox (mV) -6.7 -20.4 -21.4 23.1 25.0 31.7 33.2 -33.0	Diss. O (mg/L)  0.83  1.00  0.80  0.70  0.70  0.70	2* W	5. /ater Level (m)  - 225 - 428 - 532 - 615 - 726 - 780	4 1 Cfe	Remarks  ear  u  u  u
Purge Volume: Well Avg. Flow Rate:  Time Volum Remo (L)  15:47  16:00  2  16:05  3  16:13  16:13  16:13  16:22  * Record DO in Mg/L  Comments: Odour: □ Yes Sheen: □ Yes Turbidity: Clear	me Temp. (°C)  3 / 2.5 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6	9 /min. pH (Units) 7.15 7.12 7.12 7.10 7.09 7.09 7.09	56 3 5 7 9 5 8 6 5 7 9 5 7 9 6 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Specific or mS/c circle one)  2.6  3.3  4.4  4.4  Compared to the second of the second	Metallic-li	Redox (mV)  -6.7 -20.4 -21.4 -23.7 -25.0 -3/.7 -33.2 -33.0	Diss. O (mg/L)  0.83  1.00  0.80  0.70  0.70  0.70	2* W	5. /ater Level (m)  - 225 - 428 - 532 - 615 - 726 - 780	4 1 Cfe	Remarks  ear  u  u  u
Purge Volume: Well Avg. Flow Rate:    Time	me Temp. (°C)  3 / 2 5 2 6 2 6 2 6 2 6 2 6 2 7 2 7 4 1, not percentage  S No If y I I FI I I	9 /min. pH (Units) 7.15 7.12 7.12 7.10 7.09 7.09 7.09	56 3 5 7 9 5 8 6 5 7 9 5 7 9 6 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Specific or mS/c circle one)  2.6  3.3  4.4  4.4  Compared to the second of the second	m	Redox (mV)	Diss. O (mg/L 0.82) 1.00 0.82 1.10 0.84 0.71 0.87	2* W	5. /ater Level (m)  223 4.428 4.532 7.728 7.728 7.728	4 1 Cfe	Remarks  ear  u  u  u
Purge Volume: Well Avg. Flow Rate:  Time Volum Remo (L)  15:47 P 15:52 I 16:00 2 16:05 3 16:13 I 16:18 P 16:13	me Temp. (°C)  3 -/ 2 - 5 2 - 6 2 - 6 2 - 6 2 - 6 2 - 6 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 3 -	9/min.  pH (Units)  7.5  7.12  7.10  7.09  7.09  7.09  1111111  40 mL  s	56.5 56.5 56.5 5.6.2 5.79 5.8.6 5.8.3 5.79 5.79	e OR Contail	Metallic-li	Redox (mV)  -6.7 -20.4 -21.4 -23.7 -25.0 -3/.7 -33.2 -33.0	Diss. O (mg/L)  0.83  1.00  0.80  0.70  0.70  0.70	2* W	5. /ater Level (m)  223 4.428 4.532 7.728 7.728 7.728	Cfe & cu	Preservatives  HNO3  HCI
Purge Volume: Well Avg. Flow Rate:  Time Volum Remo (L)  15:47 P15:52 1  16:00 2  16:05 3  16:13 1  16:13 P16:22 P16:13 P	me Temp. (°C)  3 -/ 2 - 5 2 - 6 2 - 6 2 - 6 2 - 6 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 3 -	9/min.  pH (Units)  7.15  7.12  7.12  7.10  7.09  7.09  40 mL  40 mL	56.5 56.5 56.5 5.6.2 5.79 5.8.6 5.8.3 5.79 5.79	e OR Contain	Metallic-li	Redox (mV)	Diss. O (mg/L 0.82) 1.00 0.82 1.10 0.84 0.71 0.87	2* W	/ater Level (m)  223 4.428 5.32 7.728 7.728 7.728 7.728 7.728 7.728 7.728	Cfe & cu & c	Preservatives  HNO3  HCI  Sodium Gisula
Purge Volume: Well Avg. Flow Rate:  Time Volum Remo (L)  15:47  16:52  16:05  3  16:13  16:18  * Record DO in Mg/L  omments: Odour: □ Yes Turbidity: Clear  Analysis  DISS. Meters  DH/HEPH/PAH □  DH/HEPH/PAH □	me Temp. (°C)  3 / 2 5 6 2 6 6 2 6 6 6 6 6 6 6 6 6 6 6 6 6	9/min.  pH (Units)  7.15  7.12  7.10  7.00  7.09  7.09  7.09  40 mL  8 6 3	56.5 56.5 56.5 5.6.2 5.79 5.8.6 5.8.3 5.79 5.79	e OR Contail	Metallic-li	Redox (mV)	Diss. O (mg/L 0.82) 1.00 0.82 1.10 0.84 0.71 0.87	2* W	/ater Level (m)  225 - 428 - 532 - 67 - 728 - 780 - 842 - 804  Filte  Yes  Yes  Yes	Gred INO	Preservatives  HNO3  HCI
Purge Volume: Wel Avg. Flow Rate:  Time Volum Remo (L)  15:47 P 16:52 1 16:05 3 16:07 4 16:13 P 16:13	me Temp. (°C)  3 -/ 2 - 5 2 - 6 2 - 6 2 - 6 2 - 6 2 - 7 2 - 7 2 - 7 2 - 7 2 - 7 3 -	9/min.  pH (Units)  7.15  7.12  7.10  7.00  7.00  7.00  7.00  11111111  40 mL	56.5 56.5 56.5 5.6.2 5.79 5.8.6 5.8.3 5.79 5.79	e OR Contain	Metallic-li	Redox (mV)	Diss. O (mg/L 0.82) 1.00 0.82 1.10 0.84 0.71 0.87	2* W	/ater Level (m)  223 4.428 5.32 7.728 7.728 7.728 7.728 7.728 7.728 7.728	Cfe & cu & c	Preservatives  HNO3  HCI  Sodium Gisula

Silicon Tubing

☐ D.O. Ampoules



☐ Footvalve

Field Dup.

Location:	K19 Trutch				_ Project		1657709	10		
Weather: GPS Coordinates:	Clear	Ter	mperature:	8		eted By:	BM	. 0		
MONITORING V	VELL INFORM	MOITAN								
Time of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of Wi Diameter of Standpipe Well Condition:	t: 10.5 5.986 ell (B): 7.707	m below mm	Product Thickness TOP	5:	m Pressi Well H One V	urized: leadspace: Vell Volume: 2.0 = 3.1	Litres - fo	No ppm ra51 mr	m (2.0 inch) diameter v m (1.5 inch) diameter v	
EQUIPMENT LIS	ST					+				
Pump		Dissolv ORP (I	eter mp Meter ctivity Meter ved Oxygen Meter Redex) Meter c Vapour Meter . Ampoule	Model: Model:	9		ental Equipme ield Bump I pH4 I pH10 I 1413 us/cm eld Calibration		_ 0 pH7 - ce 30 felo	60
WELL DEVELOR	PMENT/PURG	ING								
	II. Vol. X	3	= 10	tres	Start:	10:54	Finish:			
Avg. Flow Rate:	L/	min.				ntake depth:	-			-
Volu	me		□ Cond. ØSpe	oific Cand	T T	mane depin		1		- 1
Time Remo	oved (°C)	pH (Units)	US/cm or (circle o	mS/cm ne)	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Leve (m)		Remarks	
11:01 1		6.30	805.		-11567	4.32	6.020	0	Llear	
	3.7	6.37	862	)	-11901	1.90	6.023	11	k v	
	06	6.38	852		-128.6	1.43	6.032		u v	11
		6.39	83		-131.3		6.028	u	u u	
11:13 3	1 3 9	000			-136.4	1.50	6.025			- 1
	2 0	6.39	028				0 00/		u u	1 1
11:18 3	3.9	6.39	839	2.1	- 137.5	1030			a sala	1 1
11:18 3	2 0	6.39	839	5 . 1	- 137.)	1000			imple	11
11:18 3	3.8	6,39	8 3 9	5 • 1	- 137.)	1.30			mple	]
11:18 3 11:19 2 11:25 F	3.8	6,39	8 3 8	7 • 1	[~ 13f.)	1.30			mple	
11:18 3 11:19 2 11:25 F	L, not percentage	6,39	8 3 8		- (54.)	1.30			mple	
* Record DO in Mg/	L, not percentage	6,39 s				1.00			mple	]
* Record DO in Mg/	L, not percentage  S No If yes No If yes	6,39 s	rocarbon-like OF	R   Metalli	c-like				mple	
* Record DO in Mg/	L, not percentage  S No If yes No If yes	6,39 s		R   Metalli					mple	
* Record DO in Mg/	L, not percentage  s No If yes No If yes I I I I I I	6.39 s !!!!!!	rocarbon-like OF	R □ Metalli IIIII Container Siz	c-like Very S			000		
* Record DO in Mg/ Comments: Odour:	L, not percentage  S No If ye S No If ye I I I I I	6,39 s	rocarbon-like OF	R □ Metalli IIIII Container Siz	c-like Very S	Silty	L Filt		Preservatives	
* Record DO in Mg/ Comments: Odour:	L, not percentage  s Mo If ye s Mo If ye I I I I I  Type	\$	rocarbon-like OF	R □ Metalli IIIII Container Siz	c-like Very :	Silty	Eile	000		
* Record DO in Mg/ Comments: Odour:	L, not percentage  S No If yes No If yes I I I I I I I I I I I I I I I I I I I	6.39 s !!!!!!	rocarbon-like OF	R	c-like Very :	Silty	L Filt	ered No.	Preservatives  HNO 5	
* Record DO in Mg/ comments: Odour:	L, not percentage  S No If yes I I I I I I I I I I I I I I I I I I I	\$	rocarbon-like OF I I I I I I I I I I I I I I I I I I	R	c-like Very :	Silty	L Filt	ered No.	Preservatives HNO 2	- I
* Record DO in Mg/ comments: Odour:	L, not percentage  S No If yes I I I I I I I I I I I I I I I I I I I	6.39 s s □ Hyc 111111 40 mL	rocarbon-like OF	R	c-like Very :	Silty	L Filt	ered No.	Preservatives HNO 9 HCA Balana B130	
* Record DO in Mg/ Comments: Odour:	L, not percentage  S No If yes I I I I I I I I I I I I I I I I I I I	\$	rocarbon-like OF I I I I I I I I I I I I I I I I I I	R	c-like Very :	Silty	L Filte	ered No.	Preservatives  HNO 5	
* Record DO in Mg/ omments: Odour:	L, not percentage  S No If yes I I I I I I I I I I I I I I I I I I I	6.39 s s □ Hyc 111111 40 mL	rocarbon-like OF I I I I I I I I I I I I I I I I I I	R	c-like Very :	Silty	Filte Yes Yes Yes Yes	ered No.	Preservatives HNO 9 HCA Balana B130	



Veather: SPS Coordinat	Overc	ad,5	<u>Nau</u> Tem	perature:	-10	Da Co	oject No.: te: ompleted By viewed By:	:	709 /21/ BM	C5		
MONITORII Time of Measur Depth to Produc Depth to Water Depth to Bottom Diameter of Sta Well Condition:	rement: ct: (A): n of Well (B):	6.832n 7.35.7n	n lelow in below in	Product Thice TOP	kness: _	m	Fidally Influer Pressurized: Well Headspa Dne Well Vol B-A)*2.0 = B-A)*1.1 =	ace:	Yes DN	No _ ppm a 51 mm	(2.0 inch) diameter we (1.5 inch) diameter we	
Peri	terra Irolift er (Type: istaltic mersible		Dissolve ORP (R	eter  p Meter  tivity Meter  ed Oxygen Meter  tedex) Meter  Vapour Me  Ampoule	Mo Meter Mo Mo	odel:	4	☐ Field I ☐ pH <sup>2</sup> ☐ pH <sup>2</sup>	Bump		ophr_	£-1 4
VELL DEV urge Volume: vg. Flow Rate:	Volume			=	litres	St Sa	mple intake	-1	Finish:	7.0		
Time  16:03  16:65  16:13  16:23  16:23  16:33	3 6 6	(°C)	(Units) 6.58 6.55 6.55 6.50 6.49 6.49	90 88 87 86	n or mS/cm ircle one) 3-8 3-2 5-4 5-4 5-3	36 8 - 15	3.1 10	11) 136 136 136 136 1536 1586	94-8 94-8 94-4 17-3 91-5 17-6 97-5 17-6	Cle u u u	u u u	
* Record DC omments: Odour: Sheen: Turbidity:	in Mg/L, not pe	No If yes	□ Hyd		e OR □I	111	Very Silty		•		MALE	
	Ty	ype	40 mL	120 mL	Contain 250 mL		IL 2L	4 L	Filte	ered	Preservatives	
Analysis	Plastic	☐ Glass	7						Yes	□ No	11/15	

HDPE/Teflon Tubing

☐ D.O. Ampoules

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Consumables: 

Waterra Tubing

Silicon Tubing



Groundwater Filter

☐ Footvalve

SCN No.

Field Dup.

roject ocatio	t Name:	1	K19	Trut	ch		_ Project	No.:	20/0	-	, Q.m.	_
Veathe	2001		ear	Tem	perature:	-12	_ Date: _ Comple Review	eted By:	BM		10	_
17.5			INFORM	ATION			- IVE A IE AA	eu by				=
Time of Depth Depth Depth Diame	of Measurem to Product: to Water (A to Bottom o eter of Stand Condition:	nent: ): f Well (B):	6.947 11.865 51	m lelow m below mm	Product Thic TOP TOP		m Pressi Well H One W (B-A)*	urized: leadspace: /ell Volume <u>:</u>		No ppm a 51 mm	(2.0 inch) diameter we	
FOLI	HOMENIT	LICT									11000	=
Pump	JIPMENT			Multime	tor	Model	VSI Pro	Ploso -	ental Equipme			
, unip	☐ Hydrol				ner p Meter	Model:		· IV JU R	eritai Equipme	nit.		
		(Type:			tivity Meter	Model:		ПЕ	eld Bump			
	Perista				ed Oxygen I	90,340,40					□ pH7	
	□ Subme				edex) Meter		144		pH10		p	$\dashv$
	☐ Bladde			100,000	Vapour Me				1413 us/cm			
D						illo don				6- 1	BM feld no	Loca
rump	Details:			🗆 0.0.	Ampoule			₹ Fi	eid Calibration	ae !	OF THE THE	1/
WEL	L DEVEL	OPMEN	T/PURG	ING								
	Volume:	Well. Vol.		10	-	litres	Start:	12:24	Finish:			
(-115)	low Rate:		L	min.				intake depth			٨	
		4.1			E Cond	Specific Cond.						
1	man and a second	Volume Removed	Temp.	pН		m or mS/cm	Redox	Diss. O <sub>2</sub> *	Water Leve		Remarks	*
		(L)	(°C)	(Units)		circle one)	(mV)	(mg/L)	(m)		Temano	
12:	24	0	1.2	7.3		0.6	-37.0	0.71	7.002	- C	lear	
12:	:32	1.5	1.2	7.25		76.2	-29.2	0.82	6.987	· a	и	
12:	:42	3.0	1.4	7.74	87	10.6	-27.2	1.19	6.998	и	u	
12.	:50	5.0	1.8	8.90	8	69.7	-71.3	1.18	7.014	и	u	
12.	:55	6	801	8.72		69.0	-60.8	1.20	7.013	ц	C	
	5:03	8	1.9	8.67	8	69.2	- 57.1	1020	7.012	) 11	u	
13	: 11	10	108	8-25	8.	70.4	-56.5	1019	7.014	e.	rt.	
				9						SAN	YPLE	
13		Mg/L, not p	percentage	Rec	ampli	e dir	10	broke	n Sam	Molo	wals	
13	Record DO in					-				1	VI-501 )	=
13												
* R	nents:	] Yes 💆	(No If w	es								
* Ro	nents: dour:		ÉNo Ify		rocarbon-lik	e OR 🗆 Metali	ic-like					
* Ro Comme Od Sh	nents: dour: [ heen: [	Yes V	No If y	es 🗆 Hyd		e OR 🗆 Metal		Silty				
* Ro Comme Od Sh	nents: dour: [ heen: [	Yes V	No If y	es 🗆 Hyd		e OR □ Metali IIIIIIII		Silty				
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (	Yes Clear I	No If y	es 🗆 Hyd			Very	Silty				
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (	Yes Clear I	No If y	es 🗆 Hyd		111111111	Very	r. 1	4 L Fil	tered	Preservatives	
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (	Yes Clear I	No If y	es Hyd IIIIII 40 mL	111111	Container Si	Very	r. 1	4 L Fil	tered	Preservatives HN03	
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (  Analysis	Yes Clear I	No If y	es □ Hyc I I I I I I I 40 mL	111111	Container Si	Very	r. 1	4 L		HNO3	
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (  Analysis	Yes Clear I	No If y I I I I Type  C Glas C Glas C Glas	40 mL	111111	Container Si 250 mL 500 n	Very	r. 1	4 L Yes	□ No	HNO3 HC1 Sodiom Bisol	bha-
* Ro Comme Od Sh Tu	nents: dour: [ heen: [ urbidity: (  Analysis	Plasti	Type  C Glass C ZGlass	40 mL	111111	Container Si	Very	r. 1	4 L Yes	□ No	HNO3	dha:
* Ro Comme Od Sh Tu	Analysis	Plasti	Type  C Glass  C GGlass  C GGlass	40 mL	111111	Container Si 250 mL 500 n	Very	r. 1	4 L A Yes A Yes □ Yes	□ No □ No □ No	HNO3 HC1 Sodiom Bisol	pha-
* Ri Comme Od Sh Tu	Analysis	Plasti	Type  G Glass G GGlass	40 mL	111111	Container Si 250 mL 500 n	Very	r. 1	Yes Yes	□ No □ No □ No □ No	HNO3 HC1 Sodiom Bisol	pha-



# GROUNDWATER DEVELOPMENT AND SAMPLING DATA

☐ Development ☐ Purging/Sampling

Well No.: fesano

oject Name:	K19 Trutch				Proje	ect No.:	1657	709			
cation:	Overtag	-	now		Date		2	1/9/	2018		
eather:		Ter	nperature:	-12	Com	pleted By:		8	M		100
PS Coordinates:	-				Revi	ewed By:	-				
MONITORING Time of Measurement Depth to Product: Depth to Water (A): Depth to Bottom of V Diameter of Standping Vell Condition:	nt: 13	m below m below mm	Product Thick 可TOP TOP W M分		m Pre We One (B-		e: _ ne:	Yes D	ppm a 51 mm	ı (2.0 inch) diameter w ı (1.5 inch) diameter w	
QUIPMENT L	IST		*		. 0	01		-			
Pump   Waterra		Multim	eter	Mod	del XSI Pre	Plus	Renta	l Equipme	nt:		
☐ Hydrolift		pH/Te	mp Meter		del:						
☐ Bailer (	Type:	) Condu	ctivity Meter	Mod	del:		Field I	Bump			
Peristalti	С	Dissol	ved Oxygen M	leter Mod	del:		□ pH₄	4		□ pH7	
☐ Submers	ible	ORP (	Redex) Meter	Mod	iel:		□ pH′	10			
☐ Bladder		Organi	c Vapour Met	er Mod	lel:		□ 141	3 us/cm			
ump Details:		D.O	. Ampoule			>6	Field (	Calibration	Sec	field no	oto
Vg. Flow Rate:	lume noved (°C)  L)  S  J-0  S  g/L, not percentage	(Únits) 6,48 6,44 6,44 6,45	□ Cond. □ µS/cm	Specific Co or mS/cm cle one)		Diss. C (mg/L	pth:  22* W  3 6  5 6	Finish:    ater Level (m)   995   979   987   988   98	11.3	Remarks	
Odour: DY	es No II	yes									
Sheen: DY	es No II	yes 🗆 Hyd	drocarbon-like					5			
Turbidity: Clea	ar IIIII	JIIIIIII	111111	111111	II Ve	ery Silty					
				Cantalan	- 0:						
Analysis	Type	40 mL	120 mL	Containe 250 mL 50	00 mL 1 L	2 L	4L	Filt	ered	Preservatives	
Dus Metalo	Plastic G		120 1112	200 1112   00	JO MIL TE		46	Yes	□No	HN03	1
Diss Haz	□ Plastic □ Gla	1						Yes	□ No	HCL	1
BIEX, WAL. A	□ Plastic Gla							□ Yes	□ No	Sodium Bysu	Ipl
HE PH. PAH	□ Plastic □ Gla			2				□Yes	□ No	au	-
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	□ Plastic □ Gla							□Yes	□ No		
	□ Plastic □ Gla							□Yes	□ No		
								1	1	+	-1
	☐ Plastic ☐ Gla	ass						☐ Yes	□ No		



MONITORING WELL INFORMATION   Time of Measurement:	Project Name:	K19 Trutch				Project		1657709	1	w
MONITORING WELL INFORMATION   Time of Measurement:	Weather:	Clear	Tem	perature:	2	Comple	eted By:	20/c/	12010	5
Pump Details:	MONITORING Time of Measureme Depth to Product: Depth to Water (A): Depth to Bottom of N Diameter of Standpi Well Condition:  EQUIPMENT L Pump	Nell (B): 15 - 6 - 3 - 9 4 pe: 51 - 61 - 61 - 61 - 61 - 61 - 61 - 61 -	m below im below ) mm  Multime pH/Ten  Dissolv ORP (F	eter  pp Meter  ctivity Meter  ed Oxygen Meter  Redex) Meter	Model: Mo	Tidally Press Well H One V (B-A)*	Influenced urized: leadspace: Vell Volume 2.0 =	Yes Litres Litres Rental Equi	Po No ppm - for a 51 m - for a 38 m	m (2.0 inch) diameter w m (1.5 inch) diameter w
Purge Volume   Well Vol. X					Model:		1.			BM field n
Analysis Type 40 mL 120 mL 250 mL 500 mL 1 L 2 L 4 L Filtered Preservatives    Display   Display	Avg. Flow Rate:	Diume moved (°C)  20 3.7  20 2.5  20 2	pH (Units)  6.77  6.70  7.00  6.60  8.00  8.00	Cond. Species Species (pS/cm or ms (circle one 73\$ . 3 . 3 . 3 . 3 . 3 . 3 . 4 . 3 . 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5	fic Cond. S/cm  )  Metallic	Sample  Redox (mV)  31.1  31.4  30.1  -30.0  UC.1  -35.1  -40.6	Diss. 0 <sub>2</sub> * (mg/L)  0.30  0.45  0.10  0.93	h: Vater L (m) 5 41 5 42 5 42 5 42 5 4	evel	
40 mL   120 mL   500 mL   11	Analysis	Туре							Filtered	Preservatives
□ Plastic □ Glass □ Yes □ No	DISS METAL DISS LLS LEPHALEPHARA	☐ Plastic ☐ Glass ☐ Plastic ☐ Glass ☐ Plastic ☐ Glass	1	1	L   500 mL	1 L	2 L	N N	Yes □ No Yes □ No Yes □ No	HNO3 HU Sodium Bis
□ Plastic □ Glass □ □ Yes □ No	Chloride	□ Plastic □ Glass		1					Yes □ No	

Consumables: 

Waterra Tubing

Silicon Tubing



Groundwater Filter

☐ Footvalve

HDPE/Teflon Tubing

☐ D.O. Ampoules

SCN No.

Field Dup.

20/2

				WATER DEVELOPLING DATA	OPMENT		elopment ing/Samplir	Well No.:	N 18
roject Name:	: K19	Trutch			Project	No.:	1657709		
ocation:					Date:		21/01/	194	
Veather:	-		Terr	perature:		eted By:	RIL	10	
SPS Coordina	ates:		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.porature.	Review		DIE		
MONITOR Time of Measu Depth to Produ Depth to Wate Depth to Botto Diameter of St Well Condition	urement: uct: er (A): em of Well (B): tandpipe:	5.4	m below m below mm	Product Thickness:	m Press Well I One V (B-A)*	y Influenced: urized: Headspace: Vell Volume: 12.0 = 11.1	☐ Yes TXN		
EQUIPMEN	MTIICT	-542			(2.1)			a 30 mm (1.3 man) diame	ter wer
Pump	Magnetic a		Multime	eter Ma	odel 181 Pro	Pluso R	ental Equipmer	4.	
No. of the last of	drolift				odel:	, )L K	ental Equipmen	H.	
	iler (Type:				odel:	ПЕ	ield Bump		
and the second	ristaltic				odel:			DH7	
	bmersible				odel:		pH10		
□ Bla					idel:		1 1413 us/cm		
Pump Details:					dei.				
Pump Details.			⊔ 0.0.	Ampoule		Ų F	ield Calibration		
Time	Volume Removed (L)	Temp. (°C)	pH (Units) 6,52 4,53	Cond. Specific Cons. Specific Cons. (circle one)	ond. Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Level (m) 5. 4.19 5. 2.41	Remarks	
	4	2.6	6053	710 .1	-41,7	0.93	5,242	Revamp e	
10:03									
10:03								11 000,000	
10:03								11000010	
10:03								11 000,000	
10:03									
	O in Ma/L not	percentage							
	O in Mg/L, not	percentage							
		percentage  ☐ No If ye	98						
* Record DO	□ Yes □	□ No If ye	es 🗆 Hyd	rocarbon-like OR □ M		Silty			
* Record DO Comments: Odour: Sheen:	□ Yes □	□ No If ye	es 🗆 Hyd		I I Very	Silty			
* Record DO Comments: Odour: Sheen:	☐ Yes ☐ Yes ☐ Clear ☐	□ No If ye	es Hyd	Containe	III Very				
* Record DC Comments: Odour: Sheen: Turbidity:	☐ Yes ☐ Yes ☐ Clear I	□ No If ye □ No If ye IIIIII Type	es □ Hyd	Containe	I I Very		4 L Filte	red Preservative	8
* Record DO Comments: Odour: Sheen: Turbidity:  Analysis	☐ Yes ☐ Yes ☐ Clear ☐	□ No If ye □ No If ye I I I I I I  Type ic □ Glass	es □ Hyd	Containe	III Very		Filte	red Preservative □ No HNO3	s
* Record DC Comments: Odour: Sheen: Turbidity:	☐ Yes ☐ Yes ☐ Clear ☐ ☐ Plast	□ No If ye □ No If ye I I I I I I  Type ic □ Glass ic Ⅵ Glass	40 mL	Containe 120 mL 250 mL 5	III Very		4 L Filte	red Preservative	
* Record DC Comments: Odour: Sheen: Turbidity:  Analysis Disp. Mr	☐ Yes ☐ Yes ☐ Clear ☐ I	□ No If ye □ No If ye I I I I I I  Type ic □ Glass ic □ Glass ic □ Glass	40 mL	Containe	III Very		Filte	red Preservative  No HNC3  No HCL  No Station F	
* Record DC Comments: Odour: Sheen: Turbidity:  Analysis Disport	☐ Yes ☐ Yes ☐ Clear ☐ I	□ No If ye □ No If ye I I I I I I  Type ic □ Glass ic □ Glass ic □ Glass	40 mL	Containe 120 mL 250 mL 5	III Very		Filte  L Yes  L Yes	red Preservative	

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Consumables: 

Waterra Tubing

Silicon Tubing

☐ Glass

☐ Glass

☐ Plastic

☐ Plastic



Groundwater Filter

☐ Footvalve

□ Yes

☐ Yes

HDPE/Teflon Tubing

□ D.O. Ampoules

□ No

□ No

SCN No.

Field Dup.

L

Lo W	roject Name: ocation: eather: PS Coordinate	es:	cast, s		nperature:	-Lò		Project Date: Comple	ted By:		709 1/01/ BM	18		
1 1 1	MONITORING INTERPRETATION OF THE PROPERTY OF T	ement: t: (A): of Well (B):	6.112 10.814 51	m below	Product Thick XTOP XTOP	ness: Z		m Pressu Well H One W (B-A)*:		e: _ me:		No ppm	n (2.0 inch) diameter w n (1.5 inch) diameter w	
F	EQUIPMEN	TUST												
F	Pump □ Wate □ Hydr □ Baile X Peris	erra olift er (Type: staltic nersible		Dissolv ORP (F	eter mp Meter ctivity Meter ved Oxygen M Redex) Meter c Vapour Mete . Ampoule	eter I	Model: \( \sum_{\text{Model:}} \) Model: _ Model: _ Model: _ Model: _ Model: _	4		Field I	3 us/cm		BM field	n
=	VELL DEVE									1 /0/4	Santration		OF TEIG	10
P	urge Volume: vg. Flow Rate:	Well. Vol. X	·		= □ Cond.)≾	litres	Cond.	Start: Sample i	102 ntake de	pth:		3	11-12	- 7
	Time	Removed (L)	(°C)	(Units)	pS/cm (cir	or mS/c	m	(mV)	(mg/L		ater Leve (m)		Remarks	
	10 37	1	20	6.73	709,9	5		-26.0	2,6	76	479	(	Jear	1
	10 42	2	2,2	6.72	728.6	5		-24.3	2.6		564		iere	
	10-47	3	2,5	6.70	708,	8		-21,2	2-7	8 6	,674		در دو	1
	N.52	4	2.3	6,70	711.	5		-17.1	2.8	5) 6	748	5	u ci	1
	10:57	5	2.3	6,70	713.5			-99	3:	296	791		u a	
Ш	的池	6		6.71	731.			-7,3	3 .	196	782		4 01	1
	11:07	7		6.71	730:			-7.5	2.5	18 6.	830		a Cl	
	11-12			6.72	7310	2		-8.0	2-7	5 6	-884		le il	
_	Necola DO	n Mg/L, not pe	ercentage									3	AMBLE	
Co	Sheen:	□Yes ⊠ □Yes ⊠ Clear II	No If yes	□ Hyd	Irocarbon-like	OR [	l Metallic	-like Very :	Silty					
	Analysis	T	ype			Conta	iner Size				1		Agrana Agran	
			T	40 mL	120 mL	250 mL	500 mL	1 L	2 L	4L	Filt	ered	Preservatives	
	D190. Me		☐ Glass						4.7		Yes	□ No	HN03	
ņ	D195 Hg		☐ Glass	ı							Yes	□No	44	
D	TEX, VPH,		Glass	3	1					1 7 9	□Yes	¹ <b>X</b> No	Sodium Bis	01
1	-IEPH, PAH, 1		☐ Glass			2					□Yes	DE No	u c	
		☐ Plastic	☐ Glass								☐ Yes	□ No		
		☐ Plastic	☐ Glass								☐ Yes	□ No		
		☐ Plastic	☐ Glass											



	oject Name:		10	19					Project	No.	16	57-	200	4	
	cation:	-	-1						Date:	NO.:	22	101	10	1 Cr	
	eather:	1	muer	casi	Ten	perature:	-12	5	Comple	ted Dur	2-2	201	120	210	
	S Coordina				10.1	iperature.			Reviewe						
_	ONITORI	_	=1 1 10	IEODRA	ATION			-	TO VIEW	eu by.					
	ime of Measu		LLL II	12	STON				Tidally	Influenced	П.V	V.			
100	epth to Produ		-		m .	Product Thic	kness	m	Pressu			DN			
100	epth to Water		=	7-998	m below	₩ TOP				eadspace:					
D	epth to Botto	m of Well				TOP TOP				/ell Volume			- PP		
D	iameter of Sta	andpipe:	v	51	mm		1		(B-A)*2	2.0 = 7.	6 Litre	es - for	a 51 mm	(2.0 inch) dian	neter well
V	Vell Condition		_	Crow	1 new	1115	tall		_ (B-A)**					n (1.5 inch) dian	
E	QUIPMEN	NT LIS	Г												
130	ump □ Wa				Multim	eter	N	Model: VE	of Part	1650 F	Rental Fo	uipmer	nt:		
	□ Ну		-	· .		np Meter		Model:					- 41		
	1	iler (Typ	e: 10	ton		ctivity Meter		Model:		D F	ield Bun	np			
		ristaltic				ed Oxygen M		Model:			□ pH4			□ pH7	
	100	bmersible				Redex) Meter		Model:	4		□ pH10 _				
	☐ Bla	idder			Organi	c Vapour Me	ter N	Model:			∃ 1413 u		-		
P	ump Details:				D.O.	Ampoule				₹ F	ield Cali	bration	re.	BM te	id no
W	VELL DEV	ELOP	WENT	/PURGI	NG										
	urge Volume:		Vol. X			_	Eterry		Ctort			Transacture.			- /
P		A A CIII	VOI. 7			-	iltres		Start.			-inisn:			
	vg. Flow Rate		VOI, X	L/n	nin.	=	litres		Start: Sample i	intake depti		inish:			-
					nin.			Cond.		intake depti		-inisn:			
		Volum Remov	ne	Temp.	nin. pH	□ Cond. (	Specific		Sample i	Diss. O <sub>2</sub> *	Water	r Level		Remarks	
	vg. Flow Rate	Volum	ne	Temp. (°C)	pH (Units)	□ Cond. (	Specific n or mS/c ircle one)	m	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water			*	
	vg. Flow Rate	Volum Remov	ne	Temp.	pH (Units)	□ Cond. (Cond. (Cond.)	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	0	Remarks	
	Time	Volum Remov	ne ed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
	vg. Flow Rate	Volum Remov	ne ed	Temp. (°C)	pH (Units)	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	*	
	Time	Volum Remov	ne ed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
	Time	Volum Remov	ne ed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
	Time	Volum Remov	ne ed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
	Time  Time	Volum Remov (L)	ne eed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
A	Time	Volum Remov (L)	ne eed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
A	Time  Time  * Record Domments:	Volum Remov (L)	ne ed	Temp. (°C)	pH (Units) B 72 7-93	Cond. 4	Specific n or mS/c ircle one)	m ~	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
A	* Record Domments:	VolumRemov (L)	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	Cond. (G	Specific n or mS/c ircle one)	m	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water (r	r Level	C	lear	
A	Time  Time  * Record Domments:	Volum Remov (L)  22  D in Mg/L  Yes	ne ed	Temp. (°C) 3. ( 3. ( 3. ( 3. ( 3. ( 3. ( 3. ( 3. (	pH (Units) B 72 7.93 7.22	Cond. (G.)	Specific n or mS/c ircle one)	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	r Level	C	lear	
A	* Record Domments: Odour: Sheen:	VolumRemov (L)	ne ed	Temp. (°C) 3. ( 3. ( 3. ( 3. ( 3. ( 3. ( 3. ( 3. (	pH (Units) B 72 7.93 7.22	Cond. (G	Specific n or mS/c ircle one)	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	r Level	C	lear	
A	* Record Domments: Odour: Sheen: Turbidity:	Volum Remov (L)  22  D in Mg/L  Yes  Clear	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	drocarbon-lik	Specific one of the second of	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	r Level	Si	AMPLE	lives
A	* Record Domments: Odour: Sheen: Turbidity:	Volum Remov (L)  22  D in Mg/L  Yes  Clear	ne ed	Temp. (°C) 3.1 3.2 3.3 3.3 3.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1	pH (Units) B 72 7.93 7.22	Cond. (G.)	Specific one of the second of	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	r Level m)	Si	AMP LES	
Co	* Record Domments: Odour: Sheen: Turbidity:	Volum Remov (L)  22  D in Mg/L  Yes  Clear	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	drocarbon-lik	e OR	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	Filte	Solution in the second	Preservat	3
Co	* Record Domments: Odour: Sheen: Turbidity:  Analysis	Volum Remov (L)  27  D in Mg/L  Yes Clear	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	drocarbon-lik	e OR IIIII	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (r	Filte Yes Yes	ered No	Preservat	
Co	* Record Domments: Odour: Sheen: Turbidity:  Analysis	Volum Remov (L)  22  D in Mg/L  Yes  Clear	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	drocarbon-lik	e OR	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (n	Filte Yes Yes	ered No	Preservat HNO3 HCA Sodium	B180
Co	* Record Domments: Odour: Sheen: Turbidity:  Analysis  Des Me	Volum Remov (L)  22  D in Mg/L  Yes Clear	ne ed	Temp. (°C)  3 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	pH (Units) B 72 7-93 7-22	drocarbon-lik	e OR IIIII	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (n	Filte Yes Yes	ered No	Preservat	B180
Co	* Record Domments: Odour: Sheen: Turbidity:  Analysis	Volum Remov (L)  O in Mg/L  Yes  Clear	ne ed	Temp. (°C)	pH (Units) B 72 7-93 7-22	drocarbon-lik	e OR IIIII	Metallic-I	Redox (mV)	Diss. O <sub>2</sub> * (mg/L) 3.93 2-33	Water (n	Filte Yes Yes	ered No	Preservat HNO3 HCA Sodium	B180



54%		D SAM		DEVEI DATA	_OPIVI	ENI		velop rging/	ment Samplir	ng W	ell No.:	3 0
Project Name:	KIA		***************************************	- Constant		Project	No.:	145	770	1		
ocation:	1.1					Date:		2	2/01	1201	9¢	
Neather: Ove	ercast	Terr	perature:	-14			eted By:	_	0	1	0	
GPS Coordinates:			porataro	- 17		Review		-		احار		
	LINEODIA	TION				1101101	eu by.		_			
MONITORING WEL Time of Measurement:	LINFORIVIA 11 -C	4 2 1 2 2 2				-200	2700-2-70-2	7 /502	V	,		
Depth to Product:			D	edition 3	/	200	/ Influence		1			
Depth to Water (A):	7.833		Product Thi	ckness:	m		urized:		res Di	-		
Depth to Bottom of Well (B)			TOP				leadspace			ppm		
Diameter of Standpipe:	~ 1	nm	A TOP				Vell Volum 2.0 =	2	Hann for		/0.0 (==b) d(===+b	
Well Condition:	Good		> in=	tal		(B-A)*					(2.0 inch) diamete	1000
The Designation of the Control of th	Direc	1 1100	- (4)	31000	1	- (p-V)	1.1-	_ 1	illes - lor	a so min	(1.5 inch) diamete	er well
<b>EQUIPMENT LIST</b>					1		01					
Pump   Waterra		Multime	eter		/lodel: Y	SI fro	YIUS	Rental	Equipme	nt:		
Hydrolift		pH/Ten	np Meter		/lodel:	1						
Bailer (Type:			ctivity Meter		/lodel:			Field E	Bump			
Peristaltic		Dissolv	ed Oxygen	Meter N	Model:			□ pH4			□ pH7	
☐ Submersible		ORP (F	Redex) Mete		Model:	4			0			
☐ Bladder		Organio	Vapour Me	eter N	/lodel:			□ 141	3 us/cm			
Pump Details:		□ D.O.	Ampoule				O	Field C	Calibration	Q.	By fiel	direct
Time Removed (L)  4 42  4 52  6  14 57  8  15 61  10  15 05  12  15 10  * Record DO in Mg/L, no  Comments: Odour: □ Yes Sheen: □ Yes	Temp. (°C)  3.3  3.4  3.5  3.7  3.7  3.7  3.7  3.7  3.7  3.7		( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	36	m	Redox (mV)  3.3  2.6 9  3.1 3  2.7  2.7  2.7  2.7  2.7  2.7  2.7  2.	Diss. 0. (mg/L) 6-39 5-4 5-8 4-9 4-5		ater Level (m)  -912 -952 -963 -963	5	Remarks  nearly early early (c	<b>&gt;</b>
	11111111					Very	Silty					
6000	12-5			Conta	iner Size							
Analysis	Туре	40 mL	120 mL	250 mL	500 mL	1 L	2L	4 L	Filte	ered	Preservatives	3
Diss. Metal XiPla	stic	L CT	1			V III	77-1		XYes	□No	HN03	
D 195. Hg   Pla	stic Glass	1							Yes	□No	HCA	
HEPH/PAH [Pla	stic <b>D</b> Glass			2					□Yes	MNo	Sodium 1	اهای وا ک
C/BTEK/VPH   Pla		3				1			□Yes	No	uu	7
141 1 1	stic Glass		- 1			l'and	). The state of th		□Yes	DONO		
Chloride XPIa	The second second			1-				-	□Yes			
Chonde APla	stic Glass						- 1		LI 162	□ No		
									□Yes	□ No		



Project Name:	K19		Project No.:	16	5770	9	
ocation:			Date:	22	101/2	018	
Veather:	vercast Tem	perature: - 14	Completed E	By:	BIL		
GPS Coordinates:			Reviewed By	<i>f</i> :			
MONITORING WEL	INFORMATION						7
Time of Measurement:	11:24		Tidally Influe	enced:   Yes	No No		
Depth to Product:	m	Product Thickness:	m Pressurized	: 🗆 Yes	6		
Depth to Water (A):	5.64 m below	TOP	Well Heads	pace:	ppm		
Depth to Bottom of Well (B)	13.38 2 below >	TOP	One Well Vo	olume:			
Diameter of Standpipe:	51 mm	V 11	(B-A)*2.0 =	D D Litre	s - for a 51 mm	(2.0 inch) diameter well	
Well Condition:	Good, new	install	(B-A)*1.1 =	Litre	s - for a 38 mm	(1.5 inch) diameter well	
EQUIPMENT LIST			- 10 TO W				
Pump ☐ Waterra	Multime	eter Mo	odel: YSi Pre Plus	Rental Fo	uipment:		
☐ Hydrolift			odel:	,Ly	a.pmont.		
□ Bailer (Type:_	10/0 200 1810		odel:	☐ Field Burn	p		
Peristaltic	Dissolv		odel:			□ pH7	
☐ Submersible	ORP (F	edex) Meter Mo	odel:	□ pH10 _			
☐ Bladder	Organic	Vapour Meter Mo	odel:	☐ 1413 us	s/cm		
Pump Details:	□ D.O.	Ampoule		Field Calib	oration Sec	BM fired	nu
WELL DEVELOPME	NT/DUDCING						=
WELL DEVELOPME				2 -			
Purge Volume: Well. Vo		itres			inish:		
Avg. Flow Rate:	L/min.		Sample intake	depth: 1	004	m	
Volume	Temp. pH	☐ Cond. ☐ Specific C	ond. Redox Dis	s. O <sub>2</sub> * Water	Level		
Time Removed (L)	(°C) (Units)	(circle one)	2 C C C C C C C C C C C C C C C C C C C	ng/L) (n		Remarks	
11:36	2.7 6.88	1.98 4	-22.2 10	27 5-6	89 CI	0.40	
11:42 2	2.4 6.79	644 1	-1-1-1	07 5.6	93 4	ed C	
11:48 3	2 .7 6 .83	646.4	-1241	0663	12 0	16	
11:53 4	2.0 6.83	649.9	120	016.7	10 4	a	
11:58 5	200 6084	653 . 4	-17-20	9267	13 "	عا	
12:03 6	2.3 6.85	664,3	9601 80	299 6,7	13 4	4	1
	204 6.76	640,8	100-8 00	93 6.7	24 4	Ci	
12:13 8	2,5 6,73	630,5	99,400	89 600	726 00	4	1
12:13 8					PAIT	resample	24
12-13 8 12-23 16 * Record DO in Mg/L, no	r percentage						11
* Record DO in Mg/L, no Comments:	<i>A</i>						
* Record DO in Mg/L, no Comments: Odour:   Yes	No If yes						
* Record DO in Mg/L, no  Comments: Odour: □ Yes Sheen: □ Yes	O No If yes ☐ Hyd	rocarbon-like OR 🗆 N					
* Record DO in Mg/L, no  Comments: Odour: □ Yes Sheen: □ Yes	No If yes						
* Record DO in Mg/L, no  Comments: Odour: □ Yes Sheen: □ Yes	O No If yes ☐ Hyd		I I I Very Silty				
* Record DO in Mg/L, no  Comments: Odour: □ Yes Sheen: □ Yes	No If yes ☐ Hyd	Contain	I I I Very Silty er Size	41	Filtered	Preservatives	
* Record DO in Mg/L, no Comments: Odour:	No If yes Hyd	Contain	I I I Very Silty			Preservatives	
* Record DO in Mg/L, no Comments: Odour:	No If yes Hyd  IIII T IIIIII  Type 40 mL	Contain	I I I Very Silty er Size	P	¶Yes □ No	Preservatives	
* Record DO in Mg/L, no Comments: Odour:	Type  40 mL  Stic Glass  GNO If yes Hydrogram  Hydrogram  40 mL	Contain	I I I Very Silty er Size	Þ	¶Yes □ No ¶Yes □ No	Preservatives HN03	sløh
* Record DO in Mg/L, no Comments: Odour:	Type  40 mL  Stic Glass  Ty Glass  Ty Glass  Ty Glass	Contain 120 mL 250 mL 9	I I I Very Silty er Size	) )	Yes No Yes No	Preservatives	sięh
* Record DO in Mg/L, no Comments: Odour:	Type  40 mL  Stic Glass	Contain 120 mL 250 mL 9	I I I Very Silty er Size	) ) (	Yes □ No Yes □ No Yes ★No Yes ★No	Preservatives HNO3 HCI Sodium Bis	sigh
* Record DO in Mg/L, no Comments: Odour:	Type  40 mL  Stic Glass   Contain 120 mL 250 mL 9	I I I Very Silty er Size		Yes No Yes No Yes No	Preservatives HNO3 HCI Sodium Bis	sięh	



				VATER DEV		TENT	Devel Purgi	lopment ng/Samplin	g We	- MW[8-11 11 No.:
roject Name: ocation: /eather: :PS Coordina		rutch	Tem	perature:	6	Project I Date: Complet Reviewe		857709 24/01/2	ui8	
MONITORI Time of Measu Depth to Produ Depth to Water Depth to Bottor Diameter of Sta Well Condition:	rement: ct: (A): m of Well (B): andpipe:	5,708	m F	Product Thickness XTOP XTOP MSTAUL		Well He One W (B-A)*2			ppm a 51 mm (	2.0 inch) diameter we 1.5 inch) diameter we
⊅ Per	iterra drolift ler (Type: ristaltic omersible		Conduc Dissolve ORP (R Organic	eter  p Meter  tivity Meter  ed Oxygen Meter  edex) Meter  Vapour Meter  Ampoule	Model: _ Model: _ Model: _ Model: _ Model: _			pH10 1413 us/cm		Ophr_
WELL DEV	ELOPMEN	NT/PURGI								
Purge Volume: Avg. Flow Rate		7.77	nin,	: li	tres		2-05	Finish:	in	
Time	Volume Removed (L)	Temp.	pH (Units)	□ Cond. □ Spe µS/cm or (circle o	mS/cm	Redox (mV)	Diss. O <sub>2</sub> * (mg/L)	Water Level (m)		Remarks
12-00	3	2.4	6.77 6.70 6.67 6.70	579. 581. 566. 574.	50	-1220 -1804 -2201 -1807 -17-3	0.51	5.805 5.823 5.832 5.849 5.872		ar slightly
12:18 12:28 12:38 12:49 12:58	279	2-6	6.67	563 555 551	00	= 1806 = 20.4	0,74	5.886	Cla	te u
12:28 12:38 12:40 12:58	q	2.6	6.67	555 551	0 1	-1806	V 6 1	5.886	Cla	
12: 28 12: 38 12: 40 12: 58 * Record DO	☐ Yes }	percentage  No If ye	s	SES 555 551	R □ Metalli	- 1826 -20.4	6.72	5.886	Cla	
12: 28 12:38 12:40 12:59 * Record Do omments: Odour: Sheen:	☐ Yes ☐ Yes ☐ Clear ☐	percentage  No If ye	sHyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886 5-895	Cla	
* Record Domments: Odour: Sheen: Turbidity:	☐ Yes ☐ Yes ☐ Clear ☐	percentage  No If ye  No If ye  I I I I I I	s	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886		e av
* Record Domments: Odour: Sheen: Turbidity:	D in Mg/L, not  Yes Clear  I	percentage  No if ye No if ye I I I I I I Type  iic Glass iic Glass	s Hyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886 5-895	ered	e av
* Record DO  * Rec	O in Mg/L, not  Yes Yes Clear Plast Plast	percentage  No If ye No If ye I I I I I I Type  iic Glass iic Glass	sHyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886 5-895	ered	e av
* Record DO  * Rec	O in Mg/L, not  Yes Yes Clear Plast Plast Plast	percentage  No If ye No If ye Glass Company  Type  Company  Glass	sHyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886 5-875 4L Pilte UYes UYes UYes	ered No	e av
* Record DO  * Record DO  mments: Odour: Sheen: Turbidity:  Analysis  DOS-1-19	O in Mg/L, not  Yes Yes Clear I Plast Plast Plast	percentage  No If ye No If ye Glass Company  Type  Company  Compan	sHyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	1 Filte	ered No No No No	e av
* Record DO comments: Odour: Sheen: Turbidity:  Analysis	O in Mg/L, not  Yes Yes Clear Plast Plast Plast	percentage  No If ye No If ye I I I I I I  Type  II Glass	sHyd	rocarbon-like Ol	R	c-like Very	6 72 Silty	5.886 5-875 4L Pilte UYes UYes UYes	ered No No No	e av



roject Name	:	1519				р	roject	No.:	165	77	09		
ocation:	_					-	Date:		76	2 7	-	5	
leather:	C	now	Tem	perature:	-21			ted By:	2-6/	RIL	2010	5	
PS Coordin		7.10.00		poruturo			Review		_	0	-		
MONITOR	ING WEI	L INFORM	IATION					cu by.					
Time of Meas			M D				Tidally	Influence	. n.	(an 5/s	io		
Depth to Proc		19	_	Product This	kness.	m	Pressi			res Din			
Depth to Wate		8.062		TOP		- "		eadspace:		es di	ppm		
Depth to Botte	om of Well (B	0	1	TOP				lell Volume	-		_ bbiii		
Diameter of S	tandpipe:	51	mm	/	1 80.25					itres - for	a 51 mm	(2.0 inch) diame	ter well
Well Condition	1:	Gnoc	1, 120	O INS	stall							(1.5 inch) diame	
EQUIPME	NTLIST												
	aterra		Multime	ator	NA - 4	1/51	Crol	1050	Dectri	E			
Anna Sala	ydrolift			np Meter	Mode		1	. / -	Rental	⊏quipme	nt		
	ailer (Type:	Testion		tivity Meter					Field B	lumn			
4	eristaltic	107		ed Oxygen			1					□ pH7	
□ S	ubmersible			tedex) Mete		9-9	4		□ pH1				
□В	adder			Vapour Me						3 us/cm		·	
oump Details			□ D.O.	Ampoule				M.	Field C	'alibration	Sou	BM Gel	1 000
	Land Street	10. Table 10. Sec. 10.										UI T	140
		NT/PURG							2				
Purge Volume					litres	S	Start:	1:0:	)	Finish:			
vg. Flow Rat	e:	L/i	min.			S	Sample	ntake dep	th:	*			
	Volume	Temp.	рН		Specific Cor	d. p	edox	Dies O	IN	ator Lovel			
Time	Removed (L)	(°C)	(Units)		m or mS/cm		mV)	Diss. O <sub>2</sub> (mg/L)	VVe	ater Level (m)		Remarks	
11:19	4	2.6	7.78	120	rifcle one)	39	7	4.24	a	457	1	11-26	
11:40	7	2.6	7.55	375	3905	1	0.4	2.80	10	241		uil	
11:44	10	2.7	7.68	73	10-7	44		4-66	10	552		uu	
11 51	13	2,8	7.75	72	5.3	15	16	4-2	111	192		uu	
11 79	20	2.7	totil	for the same of th	1800	7	Ct	3-3	16	m	0	n @ 201	
												2.	
* Paged F	O in Mail	ot percentage											
Record L	O in Nig/L, no	ot percentage											
omments:													
Odour:	☐ Yes	No If ye											
Sheen:	□ Yes	No If ye			ke OR □ Me		9						
Turbidity:	Clear	THE	TIIIIII	IIIIII	11111111	I	Very	Silty					1
					Container	Cizo				T	A Company	1	====
Analys	is	Туре	40 mL	120 mL		) mL	1 L	2 L	4 L	Filte	ered	Preservative	es
D 155 M	ctals A Pla	stic		1	200 IIIL 00	1111		21	76	X Yes	□No	HNOZ	-
Dra F	□ Pla									XYes	□ No	HU	
Chiar	.0	100		1						□Yes	™ No	1	
Chust					2					□Yes	'DA No	Sodion	Brough
7		stic Glass	3							□Yes	"No	ич	217
HEPH/	VIII LITE					T				□Yes	□No		
HEPHI	□ Pla	stic Glass	3							LI 1 C3	LINO		

G

pject Name:  cation:  cather:  S Coordinates:  CONITORING WELL INFORMATION  me of Measurement:  epth to Product:  epth to Product:  m Product Thickness:  epth to Water (A):  epth to Bottom of Well (B): 12.525 m below	Tidal m Pres: Well One (B-A) (B-A)	ved By:  ly Influence surized: Headspace Well Volun *2.0 =* *1.1 =*	26 	es itres - for	lo lo ppm a 51 mm	n (2.0 inch) diameter v
Temperature:iq _ C S Coordinates:  NONITORING WELL INFORMATION Ime of Measurement:iq _ i, i, i, i epth to Product: m Product Thickness: epth to Water (A): m belowi TOP epth to Bottom of Well (B): _i 2 .525 m belowi TOP iameter of Standpipe: mm //ell Condition: Multimeter Model	Tidal m Press Well One (B-A) (B-A)	ly Influence surized: Headspace Well Volun *2.0 = *1.1 =	e: ne: 	es on other desires - for	lo lo ppm a 51 mm	
S Coordinates:  NONITORING WELL INFORMATION  me of Measurement: epth to Product: epth to Water (A): epth to Bottom of Well (B): 12.525 m below	Tidal m Pres: Well One (B-A) (B-A)	ly Influence surized: Headspace Well Volun *2.0 = *1.1 =	e: ne: 	es itres - for	lo ppm a 51 mm	n (2.0 inch) diameter v
me of Measurement: epth to Product: epth to Water (A): epth to Bottom of Well (B): 12-525 m below	Tidal m Pres: Well One (B-A) (B-A)	ly Influence surized: Headspace Well Volun *2.0 = *1.1 =	e: ne: 	es itres - for	lo ppm a 51 mm	n (2.0 inch) diameter v
me of Measurement:  epth to Product:  m	m Presi Well One (B-A) (B-A)	surized: Headspace Well Volun *2.0 = *1.1 =	e: ne: 	es itres - for	lo ppm a 51 mm	n (2.0 inch) diameter v
epth to Product:  m Product Thickness:  epth to Water (A):  m below TOP  epth to Bottom of Well (B): 12.525 m below TOP  iameter of Standpipe:  m Product Thickness:  TOP  mm  full Condition:  GUIPMENT LIST  ump Waterra  Multimeter  Model	m Presi Well One (B-A) (B-A)	surized: Headspace Well Volun *2.0 = *1.1 =	e: ne: 	es itres - for	lo ppm a 51 mm	ı (2.0 inch) diameter v
epth to Water (A):  epth to Bottom of Well (B): 12.525 m below TOP  iameter of Standpipe:  mm  Mell Condition:  GUIPMENT LIST  ump Waterra  Multimeter Model	Well One (B-A) (B-A)	Headspace Well Volun *2.0 = *1.1 =	e: ne: <b>9</b> L	Litres - for	_ ppm a 51 mm	n (2.0 inch) diameter v
epth to Bottom of Well (B): 12.525 m below TOP iameter of Standpipe: 51 mm //ell Condition: Gaca new Waterna Multimeter Model	One (B-A) (B-A)	Well Volun *2.0 = *1.1 =	ne:		a 51 mm	n (2.0 inch) diameter v
Standpipe:   Sta	(B-A) (B-A)	*2.0 = _ *1.1 = _	9 1			n (2.0 inch) diameter v
QUIPMENT LIST  UMP Waterra  Multimeter Model	Y51 fo	*1.1 = _				1 (2.0 inch) diameter v
QUIPMENT LIST ump	Y51 for			lities - for		
ump □ Waterra Multimeter Model	:	ور دا ا			a 30 IIII	n (1.5 inch) diameter v
en a company and	:	TCO Y				
☐ Hydrolift pH/Temp Meter Model		011000	Rental	Equipme	nt:	
C T Ci						
Bailer (Type: Terlan ) Conductivity Meter Model		□	Field B			
☐ Peristaltic Dissolved Oxygen Meter Model ☐ Submersible ORP (Redex) Meter Model	-		□ pH4			_ □ pH7
□ Submersible ORP (Redex) Meter Model □ Bladder Organic Vapour Meter Model		_	□ pH1			9
and the second s		16.		3 us/cm	_	0 0 . 1
ump Details:   D.O. Ampoule		×	Field C	alibration	See	But field v
/ELL DEVELOPMENT/PURGING			· h			
urge Volume: Well. Vol. X = litres	Start:	14-1	4	Finish:		
/g. Flow Rate: L/min.	Sample	intake de	pth:			
Volume Tomp DL Cond. Specific Cond	d	Tear of	520	11 1 1 1 Au		
Time Removed (°C) (Units) (Sircle one)	Redox (mV)	Diss. O (mg/L	- 1	ater Level (m)		Remarks
(L) (G) (Grade one) (Circle one) (4:19 3 2.6 7.58 755.3	10 -9	5.2			-	
14:21 6 3.3 7.52 746.6	6.4	5.6	7 0	ail	1-	
1424 9 3.3 7.43 749.8	500	5	510	100	3	
14:26 12 3017,35 750.8	5.7	5.	56/0	761		27.4
14:32 18 31 756 7664	-3.2	3 5.3	7/1	42	-AR	VIO DRY
16:36 79 3.2 7.48 768.3	7.8	600	1 8	.701	.54	MPLE
* Popperd DO in Me/II and acceptance						
* Record DO in Mg/L, not percentage						
omments:						
Odour:    Yes No If yes						
Sheen: Yes No If yes Hydrocarbon-like OR Meta						
Turbidity: Clear IIII(IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	( Vei	y Silty				
Container S	Size			1 - 0 5		
Analysis Type 40 mL 120 mL 250 mL 500		7 2 L	4 L	Filte	ered	Preservatives
55 METAL DAPlastic Glass				Yes	□No	HN03
155 Hy Plastic D Glass				Yes	□No	HIL
Chende A Plastic Glass				□Yes	No No	1
1/HERH PATH   Plastic D'Glass   2				□Yes	D No	Sodom B
CASTEXVIII D Plastic Gass 3			1	□Yes	E No	u u
☐ Plastic ☐ Glass	- 10			□Yes	□No	
☐ Plastic ☐ Glass				□Yes	□ No	



ect No.:    26/01/2018
dally Influenced:
dally Influenced:
dally Influenced:
dally Influenced:   Yes No essurized:  Yes No ell Headspace:  ppm  Ne Well Volume:  A)*2.0 =  Litres - for a 51 mm (2.0 inch) diameter well  Litres - for a 38 mm (1.5 inch) diameter well
essurized:     Yes   ANo
essurized:     Yes   ANo
ppm  ie Well Volume:  -A)*2.0 = Litres - for a 51 mm (2.0 inch) diameter well  Litres - for a 38 mm (1.5 inch) diameter well
Litres - for a 51 mm (2.0 inch) diameter well  Litres - for a 38 mm (1.5 inch) diameter well
-A)*2.0 =
A)*1.1 = Litres - for a 38 mm (1.5 inch) diameter well
Rental Equipment:
Rental Equipment:
☐ Field Bump
□ pH4 □ pH7
D 1440
1413 us/cm
XI Field Calibration See Br field no
pple intake depth:  Diss. O <sub>2</sub> * Water Level Remarks
) (mg/L) (m)
Solfford Gear
6 6.54 7.40S 4 0 451
0 4 02 8 000
2 2 32 8 38 3744
94,68 1001
ring 9
5,326 601 Sample
3-7 04-1
Very Silty
L 2 L 4 L Filtered Preservatives
XYes   No HNS 3
MYes □No HC
☐ Yes 🔼 No
Yes No Sound Si
□ Yes D\(\(\mathbb{O}\)\(\mat
☐ Yes ☐ No
(



#### **K19 ENVIRONMENTAL INVESTIGATION**

### **APPENDIX E**

**Soil Vapour Sampling Forms** 



	SOIL VAPOUR SAMPLING DATA	□ Probe Installation  © Purging/Sampling Sample ID: KI9 - SVIB -  □ Field Blank □ Equipment Blank	
Project Name: Location: GPS Coordinates: Weather & Temperature: Wind Direction:	K19 Trutch <sub>1</sub> BC -14°C Speed:	Project No.: 1657709 6000  Date: 22 - Jan - 2018  Completed By: Clargey  Reviewed By:	
Mean Humidity	Est. Precipitation (w/ 48 hrs):	Barometric Pressure: Trend:	
SOIL GAS PROBE INFO Condition of sample locatio Land use of adjacent site?: Probe type (steel drive poin Probe location (indoor? sub Slab depth: Building use within 30 m? Depth to water in nearby we (* volume is calculated using the sc http://golderporte/Technical/GroupB	t, PVC):  slab? subsurface?):  m bgs  Basement present?:  well ID:  ili purge volume calculator spreadsheet at:  cRegionalRemediation_1/Field%20Procedures/Forms/Proce 3/4%2D37%20Sil%20Pologoun%20Air%20Samplingt	Probe diameter:  Borehole diameter:  Length of sandpack:  Length of probe:  Diameter of tubing:   Diameter of tubing:  M  Diameter of tubing:  M  Diameter of tubing:  M  Diameter of tubing:  Diamete	
FIELD SCREENING EQ Fixed Gas Meter: Organic Vapour Meter: Other: Pump:  None	Model: Mini Rue 3000  Model: MGD 2002	Gases Detected: CH4, CO2, D2 Lamp eV: Gases Detected: Delium	_
LEAK TRACER TEST Completed: Type of leak tracer used: Volume Purged: A. [He] below shroud, start: B. [He] below shroud, finish C. [He] in tedlar bag: $D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10.000}\right)100$ D must be < 2% to pass. If fail,	2. 20.3 % 3. 175 ppm (0.0)	1	-
PURGING / FIELD SCRI Purge Volume: Probe Vo Sample Container: Equilibration Time After Purg	EENING  I. X = litres Ca  I. A L Support	alibrated Flow Rate: 201.6 Actual Flow Rate: 201.6 Act	<u>-</u>
Time Volume Purged (L) 14:34 1.4 14:41 3.6 14:50 5.4	CH <sub>4</sub> CO <sub>2</sub> O <sub>2</sub> H <sub>2</sub> S (ppm) O.1 O.1 I9.4 — O.1 O.1 I9.5 —	Vacuum ("H2O)         Flow Rate (mL/min)         PID (ppm)         Remarks (moisture, restricted flow, etc.)           0.0         203.1         0.0           0.1         195.7         0.0           0.0         201.8         0.0	
SAMPLE COLLECTION	RECORD		
Sample ID: Lab ID/Serial No.: Sample Media Type: Sample Time Required (i	KIM-5VIB-01 04320-03 SV min): 10:00	Sample Elevation:  Canister Vacuum Pressure: Pre Sampling:  Canister Vacuum Pressure: Post Sampling:  Flow Regulator Serial No.:  Laboratory:  AGA	
Sample End Time: Sample Total Elapsed Til Sample Volume:	15:13:30	Sample Pump Type and ID: Sample Pump Calibrated Flow Rate (lab cal'd): Sample Pump Actual Flow Rate (at probe):	



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rur	'n.		- 10		211000	11	

3-02

	OIL VAPOUR MPLING DATA	⊠ Purging/Sampling ☐ Field Blank ☐ Equipment Blank	Sample ID: KIG-NW/SVI8 18
Project Name:  Location:  GPS Coordinates:  Weather & Temperature:  Wind Direction:  Mean Humidity  Est. Pre	Julishsation  Tulu 182  C., Clear.  Speed:  cipitation (w/ 48 hrs):	Project No.:  Date:  Completed By:  Reviewed By:  Barometric Pressure:	1657709 19 Jan 2018 88
SOIL GAS PROBE INFORMATIO Condition of sample location? Land use Land use of adjacent site?: Probe type (steel drive point, PVC): Probe location (indoor? subslab? subsite Slab depth: Building use within 30 m? Depth to water in nearby well: (* volume is calculated using the soil purge volume thto://golderportal/Technical/GroupBcRegionalRements)	N  2?: Feducal  urface?): Subsum  m bgs  Basement present?: Well ID: e calculator spreadsheet at: diation 1/Field%20Procedures/Forms/P	Probe diameter:  Borehole diameter:  Length of sandpack:  Length of probe:  Diameter of tubing:  Length of tubing:  Probe and 30% sandpace:	Trend:
FIELD SCREENING EQUIPMENT Fixed Gas Meter: Model: Organic Vapour Meter: Model: Other: Model: Pump:  None SKC	LIST  Londer Gene Z  Mini Rac 800  MOD 2002  eristaltic Other:		10.6 ar Hum.
LEAK TRACER TEST  Completed:  Type of leak tracer used:  Volume Purged:  A. [He] below shroud, start:  B. [He] below shroud, finish:  C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{A+B}{2}\right)10,000}\right)100$ D must be < 2% to pass. If fail, improve seal	1. 55°6 2. 52°6 3. 0	1	1
Equilibration Time After Purging:  Time Volume Purged (L) (%)  1317-1327	edlar	Vacuum	Total Purge Time:
SAMPLE COLLECTION RECORD  Sample ID: Lab ID/Serial No.: Sample Media Type: Sample Time Required (min): Sample Start Time:	04316-07 131 frama 10 min 15:02	Sample Elevation: Canister Vacuum Pressure: Pre Canister Vacuum Pressure: Po Flow Regulator Serial No.: Laboratory:	e Sampling: -Z5, 5
Sample End Time: Sample Total Elapsed Time (min):	15:12 10 min	Sample Pump Type and ID: Sample Pump Calibrated Flow	Rate (lab cal'd):

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Sample Volume:

Sample Pump Actual Flow Rate (at probe):



### SOIL VAPOUR

☐ Probe Installation Purging/Sampling

Sample ID: 1/19-5018-03

77	S	AMPLI	NG DA	TA		d Blank		пріс ів. ұ		10 2	
	1/			. (		ipment Blanl			1.		
Project Name:		19 +	west	ganon		ct No.:	165	7700			
Location:	-	TNY	un ist		Date:		19	Jan	2018	<u> </u>	
GPS Coordinates:					·	oleted By:		. 0			
Weather & Temperature:	-1	0.6	and the second second		Revie	wed By:				0.00	
Wind Direction:			Speed:	. (1)							
Mean Humidity	_ Est. Pr	ecipitatio	n (w/ 48 h	rs): <u> </u>	Baron	metric Pressur	e:		Trend:		
SOIL GAS PROBE INFO	ORMATIC	NC									
Condition of sample location	n? Land us	se?:	Fed	vul	Prob	e diameter:		0.0	177 m		
Land use of adjacent site?:					Bore	hole diameter:		0.1	55 m		
Probe type (steel drive poin	t, PVC):	200-	Ste.	el Zoin	✓ Leng	th of sandpack	:	0.	45 m		
Probe location (indoor? sub	slab? subs	surface?):	Si	beron	e Leng	th of probe:		0.13	55 m		
Slab depth:		m	bgs	,	Diam	eter of tubing:		0.0	006 (1/	4 in. = 0.006 m)	
Building use within 30 m?	2	о В	asement pr	esent?:	Leng	th of tubing:		L	m	The second secon	
Depth to water in nearby we	ell:	W	ell ID:		Prob	e and 30% sand	dpack volun	ne: 7	- 97 litr	es *	
(* volume is calculated using the so http://golderportal/Technical/GroupB ures%2FProcedures%2FPROC%2D 7-9575-4318-95D3-20C60AB87A1BJ	cRegionalRen 34%2D37%20	nediation 1/F	ield%20Procei	dures/Forms/Proce	edures.aspx?RootF 1%20Procedures&F	Folder=%2FTechnica FolderCTID=0x01200	nl%2FGroupBcF 00839DDA92DA	RegionalRemed 17D04A8FC92	iation%5F1%2FF 8D7E521E61F&	Field%20Proced View={0562CD8	
FIELD SCREENING EQ		7,5		/	AC AC TOM TO ASSE	200	9-00-00-00-0		4		
- OULD POLICE AND CONTRACT AND ADDRESS OF THE PROPERTY OF THE	Model:			6un Z	Gase	es Detected: _	Uty	,021	Oz		
TOTAL CONTROL AND	Model:			GOOS IN	Lamp		10	. 6			
123773 (26486) 60520	Model:			7007	Gase	es Detected: _	Hu	him.			
Pump: ☐ None 反Sk	(C	Peristaltic	□ Oth	er:							
LEAK TRACER TEST			Velici						800		
Completed:	Ø₹0	day 🗆	Other								
Type of leak tracer used:			lium-								
Volume Purged:	-	1/ -	7	(L)	_		(L)			/1.\	
A. [He] below shroud, start:		1	213		1		(12)			(L)	
B. [He] below shroud, finish		2		0/0	2.			2			
C. [He] in tedlar bag:	•	3.	0		2.—			3.—			
		·—		**************************************	U			٥	-/-		
$D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10,000}\right)100$		D=	0	%(P)/F	D=	/ % F	P/F	D=		% P/F	
D must be < 2% to pass. If fail,	improve sea	al and repe			500 1			-	-1		
PURGING / FIELD SCRI	ENING										
Purge Volume: Probe Vo			8	litua a		D-4	7 - 2				
Sample Container:		edler			alibrated Flow I art: <i>1</i> らるい		11-	Actual Flo	CAS TATOMATANASA		
Equilibration Time After Purg			min			-	6/2	Total Purg	e IIme:	<del></del>	
Lquilibration Time After Fully	girig	2		_ = = = = = = = = = = = = = = = = = = =	ullibration Tim	e Between Con	seculive Sa	imples: _			
Time Volume	CH <sub>4</sub>	C0 <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	Vacuum	Flow Rate	PID		Remarks		
1524 - 1524 1731 - 1536	(%)	(%)	(%)	(ppm)	("H2O)	(mL/min)	(ppm)	(moisture	, restricted fl	ow, etc.)	
	0	0.5	14.6		0.05	203.01	0.6	-			
1536-1541 U	0	0.5	14.7		0.05	205.23	0.5				
1546-1553	0	0.5	14-6		0.05	207.71	0.8				
1600-1605	O	0.5	14-8	/	0.05	206.66	0-8				
SAMPLE COLLECTION	RECORE								- 1,200 N		
	. LOUIL		SA	FO					,		
Sample ID:				04316-0	71				-11		
Lab ID/Serial No.:		13	1,0	155		acuum Pressure			75	25	
Sample Media Type:			nma	huma		acuum Pressure		pling:	5.5	3.2	
Sample Time Required (r	nin):	1/2		10		lator Serial No.		ia	3101	3144	
Sample Start Time:		163		1637	Laboratory		1000		A6F	YT.	
Sample End Time:		164	8	1648	200 200	mp Type and II					
Sample Total Elapsed Tir	me (min):	1.//	, -		2000 7000	mp Calibrated	C		_		
Sample Volume:		1.0	1	1-4		mp Actual Flow	/ Rate (at pr	obe):			
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Aprovioure Sample - 10 min Regulators on coun fines Golder Associates
L> 10 min total For Z x 1.4 L Carmsters.



Aur-in fist: Passion 24.2" -> 16.0 in 5 min. ☐ Probe Installation SOIL VAPOUR Sample ID: K19 - SU18 - 04 ☑ Purging/Sampling SAMPLING DATA ☐ Field Blank ☐ Equipment Blank **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:** 0 Trend: SOIL GAS PROBE INFORMATION Condition of sample location? Land use?: Probe diameter: 0.0127 Land use of adjacent site?: 0.155 Borehole diameter: Probe type (steel drive point, PVC): Length of sandpack: 0.45 Probe location (indoor? subslab? subsurface?): Length of probe: m bgs Diameter of tubing: 0.00% (1/4 in. = 0.006 m) Building use within 30 m? No Basement present?: Length of tubing: m Depth to water in nearby well: Well ID: Probe and 30% sandpack volume: (\* volume is calculated using the soil purge volume calculator spreadsheet at: http://golderportal/Technicai/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={0562CD8} 7-9575-4318-95D3-20C60AB87A1B} FIELD SCREENING EQUIPMENT LIST Fixed Gas Meter: Model: Gases Detected: miniRac 3000 Organic Vapour Meter: Model: Lamp eV: Other: Model: MOD 2002 Gases Detected: Pump: □ None **III**SKC ☐ Peristaltic ☐ Other: LEAK TRACER TEST Completed: **□**Today ☐ Other Type of leak tracer used: Volume Purged: A. [He] below shroud, start: 112 060 B. [He] below shroud, finish: C. [He] in tedlar bag: %(P)F % P/F % P/F D must be < 2% to pass. If fail, improve seal and repeat. **PURGING / FIELD SCREENING** Actual Flow Rate: ~ こ1 ロ Purge Volume: Probe Vol. X litres Calibrated Flow Rate: 11:57 Sample Container: Start: 11:04 Finish: Total Purge Time: Equilibration Time After Purging: Equilibration Time Between Consecutive Samples: Volume CH₄ C02 00 H<sub>2</sub>S Vacuum Flow Rate PID Remarks Time Purged (L) (%)(%)(%)(ppm) ("H2O) (mL/min) (moisture, restricted flow, etc.) (ppm) 1104-1109 240/400 0.1 17-7 0.15 0 1116 1111 -11164121 11 018.4 0.1 0 0-15 200/410 0.1 1130-1135 6 0 0.3 limited Sumple - NO 14.9 Aloreachin 0.15 147-1152 X 0 0.15 14.6 001400

possible

SAMPLE COLLECTION RECORD
--------------------------

Sample ID:	04316-01	Sample Elevation:	
Lab ID/Serial No.:	芳185	Canister Vacuum Pressure: Pre Sampling:	-24
Sample Media Type:	A NX	Canister Vacuum Pressure: Post Sampling:	- 4
Sample Time Required (min):	10 min	Flow Regulator Serial No.:	12)089
Sample Start Time:	12:31	Laboratory:	ALAT
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:	1-41	Sample Pump Actual Flow Rate (at probe):	

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August 8, 2013

\* Forging @ Zw milmin increased to 400 milmin For Sampling For 5 min - due to limited volume in tedlor Golder **Associates** 

	SOIL VAPOUI SAMPLING D		© Purg □ Field	oe Installati ging/Sampli d Blank ipment Blar	ng Sam	nple ID: _	K19.518-05
Project Name: Location:  GPS Coordinates: Weather & Temperature: Wind Direction:	7 (Trulch) rlch / BC  2°C , Snow Speed:		Date:	ot No.:	165770 21 Jan - Chareja j	9 2017	
Mean Humidity E	st. Precipitation (w/ 48	hrs):	Baror	netric Pressu	ıre:		Trend:
SOIL GAS PROBE INFORM Condition of sample location? La Land use of adjacent site?: Probe type (steel drive point, PV Probe location (indoor? subslab' Slab depth: Building use within 30 m? Depth to water in nearby well: (*volume is calculated using the soil pur http://golderportal/Technical/GroupBcRegio	AATION and use?: 9000  (C): 9155  (S) subsurface?): 9000  m bgs  Basement  Well ID:	present?: N	Bore Leng Leng Diam Leng Prob	e diameter: hole diameter th of sandpac th of probe: leter of tubing th of tubing: e and 30% sa	k: : ndpack volum		.025 m 0.15 m m m (1/4 in. = 0.006 in m litres *
ures%2FProcedures%2FPROC%2D34%2L7-9575-4318-95D3-20C60AB87A1B)  FIELD SCREENING EQUIPI Fixed Gas Meter: Mod Organic Vapour Meter: Mod Other: Mod Pump: □ None SKC	WENT LIST el: Gem 2000 el: Mini Rue	%20Air%20Samplin	g%20Procedures&F	es Detected:	000839DDA92DA	17D04A8FC9;	28D7E521E61F&View={0562CL
LEAK TRACER TEST Completed: Type of leak tracer used: Volume Purged: A. [He] below shroud, start: B. [He] below shroud, finish: C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{c+B}{2}\right)10,000}\right)100$ D must be < 2% to pass. If fail, impro	1. 31.2.7 2. 24.5 3. Opposition of the oppositio	500 (L) //. _% P/F	1 2; 3 D=_(	11.7% 31.9% 2000 pp	0 (L)	1 2 3 D=	15 (L) 43.7 26.3 Oppon 0 % P/F
PURGING / FIELD SCREEN Purge Volume: Probe Vol. X Sample Container: 1.4 Equilibration Time After Purging:	= 2.58 L Summa	St	alibrated Flow tart: 10°.56	Finish: [[]	.59	Total Purg	ow Rate: 1140 mL ge Time: 1:0'3
Purged (L) (1) 11:04 1:12 0.	7 4.0 4.9 .6 3.6 3.7	H <sub>2</sub> S (ppm)	Vacuum ("H2O) - 8.15 - 7.0 - 7.0	Flow Rate (mL/min) 1.40 1.35 1.35	PID (ppm) 0,9 5.0 2.6 4.9	(moisture	Remarks e, restricted flow, etc.)
Lab ID/Serial No.: Sample Media Type:	19-5415-05 04316-0	<b>S</b>	Canister V	acuum Pressu acuum Pressu	ıre: Post Sam		920 masl -26 " Ha -4 " Ma
Sample Time Required (min): Sample Start Time: Sample End Time: Sample Total Elapsed Time (r Sample Volume:	12:30		Laboratory Sample Pu Sample Pu	lator Serial Note: Imp Type and Imp Calibrate Imp Actual Flo I3.docx	ID: d Flow Rate (I		AGAT AGAT

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Y, P				APOUR NG DA	TA	□ Pur □ Fiel	be Installatio ging/Samplii d Blank tipment Blan	ng Sar	mple ID: ]	<u> </u>	8-05
Project Name: Location: GPS Coordina Weather & Ter Wind Direction	tes:			Speed:		Date:	ect No.: : pleted By: ewed By:				
Mean Humidit	y	Est. P	recipitatio	n (w/ 48 hr	s):	Baro	metric Pressu	re:		Trend:	
SOIL GAS F Condition of s Land use of a Probe type (si Probe location Slab depth: Building use v Depth to wate (* volume is calcu- http://golderporatures%2FProcedun	PROBE INF ample locatio djacent site?: teel drive poir n (indoor? sub vithin 30 m? r in nearby w lated using the si Technical/Groups sex%2FPROC%2E	ORMATI on? Land L ont, PVC): oslab? sub ell: oil purge volu coRegionalRe o34%2D37963	osurface?):  m B W ume calculation	bgs asement pro /ell ID: r spreadshed:	esent?:	Prob Bore Leng Leng Dian Leng Prob	pe diameter: whole diameter: gth of sandpack gth of probe: neter of tubing: gth of tubing: pe and 30% san Folder=%2FTechnic FolderCTID=0x0120	:: dpack volur	ne:	m m m (	1 1 1/4 in. = 0.006 m res *
FIELD SCRI Fixed Gas Me Organic Vapo Other: Pump:   N	EENING EQ	Model: Model: Model:			ər:	Lam	es Detected: _p eV: _ es Detected: _				
Type of leak to Volume Purget A. [He] below B. [He] below C. [He] in tedlo D = $\left(\frac{c}{\left(\frac{A+B}{2}\right)10,000}\right)$ D must be < 2%	ed: shroud, start: shroud, finish ar bag: )100	n:	2 3 D=	9	20 THE 10	2 3	%।	100	2 3		
PURGING / I Purge Volume Sample Conta Equilibration T	: Probe Vo	ol. X	=		s	alibrated Flow tart: quilibration Tim	Rate: Finish:	-	Total Purg	e Time: _	
Time	Volume Purged (L)	CH <sub>4</sub> (%)	CO <sub>2</sub> 5-1 (%)	0 <sub>2</sub> (%) 2.8	H <sub>2</sub> S (ppm)	Vacuum ("H2O) 3.8	Flow Rate (mL/min)	PID (ppm) 5.3	(moisture	Remarks , restricted	flow, etc.)
11:5A	8.49	J.6	52	28	-	3.8	174.2	5.5			
SAMPLE CO Sample ID: Lab ID/Seri Sample Me Sample Tin Sample Sta	al No.: dia Type: ne Required ( int Time:		D			Canister V Flow Regu Laboratory	acuum Pressur acuum Pressur ulator Serial No r:	e: Post San			
Sample Tot Sample Vol	al Elapsed Ti ume:					Sample Pu	ump Type and I ump Calibrated ump Actual Flov	Flow Rate (			

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<b>***</b>		IL VAPOUF MPLING DA		<b>b</b> i Pur □ Fiel	be Installatior ging/Samplìn d Blank iipment Blank	g Sam	ple ID:	49 - SV	18-07
Project Name: Location: GPS Coordinates: Weather & Temperature:	irutch	Snow		Date Com	43	65770 1-Jan Loves	9/60	00	
Wind Direction: Mean Humidity	Est. Pre	Speed: cipitation (w/ 48 I	nrs):	Baro	metric Pressure			Trond:	
SOIL GAS PROBE IN Condition of sample local Land use of adjacent site Probe type (steel drive po Probe location (indoor? s Slab depth: Building use within 30 m? Depth to water in nearby (* volume is calculated using the http://golderportal/Technical/Grou, ures%25/Procedures%25/PROC% 7-9575-4318-95D3-20C60AB87A	FORMATIO ion? Land use ?: vint, PVC): ubslab? subst  well: soil purge volum pBcRegionalReme 2D34%2237%205	in in its section of the section of	present?:	Prot Bore Leng Diar Leng Prot	pe diameter: whole diameter: gth of sandpack: gth of probe: neter of tubing: gth of tubing: ge and 30% sand	pack volum	(le:	m litr	/4 in. = 0.006 m; es * Field%20Proced View=(0562CD8
FIELD SCREENING E Fixed Gas Meter: Organic Vapour Meter: Other: Pump:  None	Model: Model: Model:	LIST Gen 2000 Min I Rice eristaltic   0 0t	her:	Lam	es Detected: p eV: es Detected:	CH4,C	02,0	)2	
Completed: Type of leak tracer used: Volume Purged: A. [He] below shroud, sta B. [He] below shroud, fini C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{A + B}{2}\right)10,000}\right) 100$ D must be < 2% to pass. If face	rt: sh:	1. 21.8 2. 25.1 3. Oppor	1.4 (L) /. % P/F	1 2 3 D=_	% P/		2 3		
PURGING / FIELD SC Purge Volume: Probe V Sample Container: Equilibration Time After Po	1.4L S	= Jmin	s	calibrated Flow start: 15.09		.50		ow Rate: 1	88 5 min
Time Volume Purged (L. 15:24) 1.4 15:34 3:85 15:43 4.25	0.0	C0 <sub>2</sub> (%) (%) j.2 (9.2) lb (8.7) lb (8.7)	H <sub>2</sub> S (ppm)	Vacuum ("H2O) - O.6 - O.6	1.88	PID (ppm) 0.6 9.3	(moisture	Remarks e, restricted t	low, etc.)
15:50 5.65	0.0	16 19.0		-0.6	183.3	13.9			
SAMPLE COLLECTIO  Sample ID:  Lab ID/Serial No.:  Sample Media Type:  Sample Time Required  Sample Start Time:  Sample End Time:		149-5/18-09 0436-09 5/ 10:00 16:07		Canister V Flow Regu Laborator	acuum Pressure acuum Pressure ulator Serial No.:	: Post Samp		905 E13142 AGAT	mis/ -20 "Ha
Sample Total Elapsed Sample Volume:		1.46		Sample P	ump Calibrated F ump Actual Flow	low Rate (la			

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	DIL VAPOUR MPLING DATA	☐ Probe Installation  ✓ Purging/Sampling Sample ID  ☐ Field Blank  ☐ Equipment Blank	:K19-5V18-08
Project Name: Location: GPS Coordinates: Weather & Temperature: Wind Direction: Mean Humidity  Est. Pre	Speed:speed:	Project No.: Date: Completed By: Reviewed By: Barometric Pressure:	Trend:
SOIL GAS PROBE INFORMATIO Condition of sample location? Land us Land use of adjacent site?: Probe type (steel drive point, PVC): Probe location (indoor? subslab? subs Slab depth: Building use within 30 m? Depth to water in nearby well:	we?: good  urface?): gutartace  m bgs  Basement present?: well ID: Kin-Mw 18-0  the calculator spreadsheet at:  adiation 1/Field%20Procedures/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms/Forms	Probe diameter:  Borehole diameter:  Length of sandpack:  Length of probe:  Diameter of tubing:  Length of tubing:	m m (1/4 in. = 0.006 m) m litres *
FIELD SCREENING EQUIPMENT Fixed Gas Meter: Model: Organic Vapour Meter: Model: Other: Model: Pump:  None Model:	CLIST  Sem 2000  Mini Rae 3000  MGD 2002  Peristaltic	Gases Detected: CH4, CO2, Lamp eV: Gases Detected: Delium	02
LEAK TRACER TEST  Completed: Type of leak tracer used: Volume Purged: A. [He] below shroud, start: B. [He] below shroud, finish: C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{c}{2} - \frac{c}{2}\right)10,000}\right) 100$ D must be < 2% to pass. If fail, improve sea	1.44 4 1/. 2.23.5 /. 3. Coppose pp	1 1 2 3	(L) D=% P/F
PURGING / FIELD SCREENING Purge Volume: Probe Vol. X Sample Container: 1 4 L Equilibration Time After Purging:  Time Volume CH <sub>4</sub> Purged (L) (%)	mmc Star	t: 11:01 Finish: 11:38 Total Pillibration Time Between Consecutive Samples:  Vacuum Flow Rate PID	Flow Rate: 12 m/mil durge Time: 2:37 min
11.18 3.0 0.0 11.23 3.6 0.0 11.29 5.0 0.0 11.36 6.5 0.0	0.5 21.5 - 1.1 20.0 - 1.1 20.3 - 1.1 20.8 -	0.7 183.6 0.2 0.8 181.7 0.3 0.6 183.5 0.5 0.8 176.8 0.6	
SAMPLE COLLECTION RECORD  Sample ID: Lab ID/Serial No.: Sample Media Type: Sample Time Required (min): Sample Start Time: Sample End Time: Sample Total Elapsed Time (min): Sample Volume:	11:56 11:49	Sample Elevation: Canister Vacuum Pressure: Pre Sampling: Canister Vacuum Pressure: Post Sampling: Flow Regulator Serial No.: Laboratory: Sample Pump Type and ID: Sample Pump Calibrated Flow Rate (lab cal'd Sample Pump Actual Flow Rate (at probe):	905 mgs) -25" Hg -3.5" Hg E1 4088 AGAT

Sample Volume: Sample Pump Ac

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	OIL VAPOUR AMPLING DATA	☐ Probe Installation ☑ Purging/Sampling ☐ Field Blank ☐ Equipment Blank	Sample ID: <u>K19-SV18-09</u>
Project Name: Location: GPS Coordinates: Weather & Temperature: Wind Direction: Mean Humidity Est. P	Speed: recipitation (w/ 48 hrs):	Project No.: 155 Date: 22 7 Completed By: Reviewed By: Barometric Pressure:	7709 (600) Jan - 2018 Jejoy Trend:
SOIL GAS PROBE INFORMATI Condition of sample location? Land use of adjacent site?: Probe type (steel drive point, PVC): Probe location (indoor? subslab? subslab depth: Building use within 30 m? Depth to water in nearby well: 7. % ("volume is calculated using the soil purge withto/boolderportal/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/GroupBcRegional/Rehip/apdicental/Technical/Technical/GroupBcRegional/Rehip/apdicental/Technical/Techni	surface?: Subarface m bgs Basement present?: Well ID: K19-141119 me calculation 1/Field%20Procedures/Forms/Per	Probe diameter:  Borehole diameter:  Length of sandpack:  Length of probe:  Diameter of tubing:  Length of tubing:  Probe and 30% sandpack	0.025 m m m m (1/4 in. = 0.006 m) m
FIELD SCREENING EQUIPMEN Fixed Gas Meter: Model: Organic Vapour Meter: Model: Other: Model: Pump:  None VSKC	TLIST Gen2000 Hini Rae 3000 MGD 2002 Peristaltic  Other:	Gases Detected: CH	4, O2, CO2
LEAK TRACER TEST  Completed:  Type of leak tracer used:  Volume Purged:  A. [He] below shroud, start:  B. [He] below shroud, finish:  C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{A+B}{2}\right)10,0000}\right) 100$ D must be < 2% to pass. If fail, improve set	1. 30.0%. 2. 19. 6%. 3. 125 ppm. D= 0.05 % P/F	1	L) (L) (L) 2
PURGING / FIELD SCREENING Purge Volume: Probe Vol. X Sample Container: 4 Equilibration Time After Purging:	= litres	Calibrated Flow Rate: Start: 1218 Finish: 13.19 Equilibration Time Between Consecut	ive Samples
Time Volume Purged (L) (%) 13.00 1.0 0.1 13.00 1.0 0.1 13.13 8.0 0.1	CO <sub>2</sub> O <sub>2</sub> H <sub>2</sub> S (ppm)  CO, 2 20.1 -  O. 2 19.9 -	Vacuum Flow Rate P	PID Remarks om) (moisture, restricted flow, etc.)
SAMPLE COLLECTION RECOR	D		
Sample ID: Lab ID/Serial No.: Sample Media Type: Sample Time Required (min): Sample Start Time: Sample End Time:	K19-SV18-09 04320-02 SV 10:00 13:21 13:36	Sample Elevation: Canister Vacuum Pressure: Pre Canister Vacuum Pressure: Pos Flow Regulator Serial No.: Laboratory: Sample Pump Type and ID:	
Sample Total Elapsed Time (min): Sample Volume:	9.00	Sample Pump Actual Flow Pate	



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	DIL VAPOUR MPLING DATA	1	□ Probe Installa <b>X</b> Purging/Sam □ Field Blank □ Equipment B	pling :	Sample ID:	K19-5V	18-10
Project Name: Location: GPS Coordinates: Weather & Temperature: Wind Direction: Mean Humidity Est. Pre	Speed:speed:		Project No.: Date: Completed By: Reviewed By: Barometric Pres	1657 21-00 C-Lov	709 In-2018 Gay	Trend:	
SOIL GAS PROBE INFORMATIO Condition of sample location? Land us Land use of adjacent site?: Probe type (steel drive point, PVC): Probe location (indoor? subslab? subs Slab depth: Building use within 30 m? Depth to water in nearby well: (' volume is calculated using the soil purge volum http://golderportal/Technical/GroupBcRegional/Rem ures%2FProcedures%2FPROC%2D34%2D37%20 7-9575-4318-95D3-20C60AB87A1B)	urface?): 5000  m bgs  Basement preser  Well ID: K19-  et calculation 1/Field%20Procedures	nt?: <u>no</u> MW18-10 <sup>1</sup>	Probe diameter: Borehole diameter: Length of sandp Length of probe. Diameter of tubin Length of tubing Probe and 30%  spx?RootFolder=%2FTeccedures&FolderCTiD=0x0	ter: ack: : ng: : sandpack v	InRcPegianalPamer	0.025 m 0.15 m m m 0.006 (1	/4 in. = 0.006 m)
Organic Vapour Meter: Model: Other: Model:	Gem 2000 Mini Rae Peristaltic Other:		Gases Detected Lamp eV: Gases Detected		,002,0	)2	
LEAK TRACER TEST  Completed: Type of leak tracer used: Volume Purged: A. [He] below shroud, start: B. [He] below shroud, finish: C. [He] in tedlar bag: $D = \left(\frac{c}{\left(\frac{A+B}{2}\right)^{10.000}}\right) 100$ D must be < 2% to pass. If fail, improve sea	1. 29.9 2. 20.1 3. 25.ppm	(L) 	1. 20.1 2. 26.7 3. 0 ppr	1.4 (L) % P/F	1 2 3 D=		(L) % P/F
PURGING / FIELD SCREENING Purge Volume: Probe Vol. X Sample Container: 1.41.8 Equilibration Time After Purging: 1	-min     -	Start:	d Flow Rate: Finish: tion Time Between	14:28			
Time Volume Purged (L) (%)  14:12 1.4 0.0  14:20 2:85 0.0  14:20 3:95 0.0	CO <sub>2</sub> (%) (%) 1.9 [8.5] 1.7 [8.7] 1.8 [8.9]	(ppm) ("H — 1	Flow Ra (mL/mir 4 ) 80.0	(ppr ) 20.	m) (moisture	Remarks e, restricted	flow, etc.)
Lab ID/Serial No.:  Sample Media Type:  Sample Time Required (min):  Sample Start Time:  Sample End Time:	17 54 16 105 04316 07 5V 10:00 14:40 14:40	Ca Ca Flo La	Imple Elevation: Inister Vacuum Presinister Vacuum Presow Regulator Serial boratory: Imple Pump Type a	Ssure: Post No.:		905 -27 -3 El 3135 AGA	
			ample Pump Calibrated Flow Rate (lab cal'd): ample Pump Actual Flow Rate (at probe):				



	DIL VAPOUR MPLING DATA	☐ Probe Installation  ☐ Purging/Sampling ☐ Sample ID:
Project Name: Location: GPS Coordinates: Weather & Temperature:	1,BC 1 - T°C	Project No.: 1651709 6000  Date: 24 Jon 2018  Completed By: Reviewed By:
Wind Direction:  Mean Humidity Est. Pre	Speed:ecipitation (w/ 48 hrs):	Barometric Pressure: Trend:
SOIL GAS PROBE INFORMATIO Condition of sample location? Land use Land use of adjacent site?:	N	Probe diameter:
Probe type (steel drive point, PVC): Probe location (indoor? subslab? subs Slab depth: Building use within 30 m? Depth to water in nearby well: (* volume is calculated using the soil purge volum http://golderportal/Technical/GroupBcRegionalRemures%2FProcedures%2FPROC%2D34%2D37%20.7-9575-4318-95D3-20C60AB87A1B)	m bgs  Basement present?:  Well ID:  the calculation 1/Field%20Procedures/Forms/Proc	Length of sandpack:  Length of probe:  Diameter of tubing:  Length of tubing:  Probe and 30% sandpack volume:  M  M  (1/4 in. = 0.006 m)  m  litres *  redures.aspx?RootFolder=%2FTechnical%2FGroupBcRegionalRemediation%5F1%2FField%20Proced g%20Procedures&FolderCTID=0x012000839DDA92DA17D04ABFC928D7E521E61F&View={0562CD8}
FIELD SCREENING EQUIPMENT Fixed Gas Meter: Model: Organic Vapour Meter: Model: Other: Model: Pump: None SKC F	Mint Rac 3000  Mint Rac 3000  MGD 2000  Peristaltic	Gases Detected: CH4, CD2, D2 Lamp eV: Gases Detected: Delium
Completed:  Type of leak tracer used:  Volume Purged:  A. [He] below shroud, start:  B. [He] below shroud, finish:  C. [He] in tedlar bag:  D = (A+B)10,000 100  D must be < 2% to pass. If fail, improve sea	helium  1.4 (L)  1. 33.4 /-  2. 30.9 /-  3. 0 pm  D= 0 % P/F	(L) (L)  1.
PURGING / FIELD SCREENING Purge Volume: Probe Vol. X Sample Container: 1 4 3 Equilibration Time After Purging:	umma s	alibrated Flow Rate: 200 mulmActual Flow Rate: 4.43 Finish: 15.25 Total Purge Time: 42 quilibration Time Between Consecutive Samples:
Time Volume Purged (L) (%) 15:01 3.4 0.1 15:06 4.6 0.0 15:12 5.8 0.0 15:19 7.2 0.0	CO <sub>2</sub> (%) (%) (ppm)  O.3 21.0 —  O.3 20.9 —  O.3 21.0 —  O.3 21.0 —	Vacuum ("H2O)         Flow Rate (mL/min)         PID (ppm)         Remarks (moisture, restricted flow, etc.)           0.8         200         0.4           0.9         199         0.3           0.7         195         0.5           0.7         195         0.9
SAMPLE COLLECTION RECORD	NO. 11. 12. 12. 12. 12. 12. 12. 12. 12. 12	
Sample ID: Lab ID/Serial No.:	04320-04	Sample Elevation: 025 Canister Vacuum Pressure: Pre Sampling: -25
Sample Media Type: Sample Time Required (min): Sample Start Time: Sample End Time:	10:00 15:36	Canister Vacuum Pressure: Post Sampling:  Flow Regulator Serial No.:  Laboratory:  Sample Pump Type and ID:
Sample Total Elapsed Time (min): Sample Volume:	141	Sample Pump Calibrated Flow Rate (lab cal'd):  Sample Pump Actual Flow Rate (at probe):

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	OIL VAPOUR AMPLING DATA	☐ Probe Installation  ☑ Purging/Sampling ☐ Field Blank ☐ Equipment Blank	Sample ID: <u>KI9- SV18-17</u>
Project Name: Location: GPS Coordinates: Weather & Temperature: Wind Direction:	C. Claudy Speed:	Project No.: Date: Completed By: Reviewed By:	57709/6005 27Jan 2018 2604
Mean Humidity Est. Pr	ecipitation (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? subside slab depth:  Building use within 30 m?  Depth to water in nearby well:  (* volume is calculated using the soil purge volumintp://golderpordul/Technica/GroupBcRegionalRenues%2FProcedures%2FPROC%2D34%2D37%207-9575-4318-95D3-20C60AB87A1B)	surface?): Subsurface m bgs Basement present?: Well ID: me calculation 1/F-ield/9/2/Procedures/Forms/Forms/Procedures/Forms/F	Probe diameter: Borehole diameter: Length of sandpack: Length of probe: Diameter of tubing: Length of tubing: Probe and 30% sandpack res.aspx?RootFolder=%2FTechnical%2FG OProcedures&FolderCTID=0x012000839D	D.   DO   m   m   m   m   m   m   m   m   m
FIELD SCREENING EQUIPMENT Fixed Gas Meter: Model: Organic Vapour Meter: Model: Other: Model: Pump: None SKC	LIST   Gem 2000   HITT RUC 3000   HGD 2000   Peristaltic   Other:	Gases Detected: CH Lamp eV: Gases Detected:	4,(02,02 lium
LEAK TRACER TEST  Completed:  Type of leak tracer used:  Volume Purged:  A. [He] below shroud, start:  B. [He] below shroud, finish:  C. [He] in tedlar bag: $D = \left(\frac{C}{\left(\frac{A+B}{2}\right)10,000}\right) 100$ D must be < 2% to pass. If fail, improve sea	1.4 (L) 1. 21.6 % 2. 15.6 % 3. 25 pcm D= % P/F	1	L) (L) 1. 2. 3. D=% P/F
Equilibration Time After Purging:           Time         Volume Purged (L)         CH4 (%)           13.51         3.0         0.0	Start: Equil	Finish:  ibration Time Between Consecut  Vacuum ("H2O) (mL/min) (p)  C 5	PID Remarks pm) (moisture, restricted flow, etc.)
H: 00 4.8 0.0 14.00 5.0 0.0 H: B 7.4 0.0	0.1 21.2 -	0.6 20 6 0.6 0.6 195.10.0 0.7 195.0 0.	0
Sample ID: Lab ID/Serial No.: Sample Media Type: Sample Time Required (min): Sample Start Time: Sample End Time: Sample Total Elapsed Time (min): Sample Volume:	KIR-SNIB-17 04254-05 SV 10:00 14:26 14:36 10:00	Sample Elevation: Canister Vacuum Pressure: Pre Canister Vacuum Pressure: Pos Flow Regulator Serial No.: Laboratory: Sample Pump Type and ID: Sample Pump Calibrated Flow I Sample Pump Actual Flow Rate	st Sampling: -3 5" El 3153  Rate (lab cal'd):

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#### **K19 ENVIRONMENTAL INVESTIGATION**

# **APPENDIX F**

**Analytical Reports** 





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 (V1)

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Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLING SITE: SAMPLED BY:

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						******* === = **		
			AGA	AT Westeri	n Canada - C	OC Pesticides (Water)		
DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-2								
		SAMPLE DES	CRIPTION:	04309-11	04309-12			
		SAMI	PLE TYPE:	Water	Water			
		DATES	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	Acceptab	le Limits					
TCMX	%	50-1	140	76	107			
Decachlorobiphenyl	%	60-1	140	105	115			

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9018113-9018115 Results relate only to the items tested.

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

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### BTEX / VPH (C6-C10) Water

I .				•	•					
DATE RECEIVED: 2018-01-18							Ι	DATE REPORTI	ED: 2018-01-24	
		SAMPLE DESCRIPTION: SAMPLE TYPE:	04309-02 Water	04309-05 Water	04309-06 Water	04309-08 Water	04309-09 Water	04309-10 Water	04310-01 Water	04310-02 Water
Parameter	Unit	DATE SAMPLED: G/S RDL	2018-01-13 9018098	2018-01-14 9018104	2018-01-14 9018106	2018-01-14 9018109	2018-01-14 9018111	2018-01-14 9018112	2018-01-14 9018117	2018-01-16 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.

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

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### CCME F1 (C6-C10) (Water)

DATE RECEIVED: 2018-01-18						DATE REPORTED: 2018-01-24
		SAMPLE DESCRIPTI	ON: 04310-03	04310-04	04310-05	
		SAMPLE TY	PE: Water	Water	Water	
		DATE SAMPL	ED: 2018-01-16	2018-01-16	2018-01-16	
Parameter	Unit	G/S RD	L 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 Limi	ts			
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

**SAMPLING SITE:** 

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.

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**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

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**CCME F2-F4 (Water)** 

DATE RECEIVED: 2018-01-18							DATE REPORTED: 2018-01-24
		SAMPLE DES	CRIPTION:	04310-03	04310-04	04310-05	
		SAM	PLE 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%.

**SAMPLING SITE:** 

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: 18N303317** 

PROJECT: 1657709/6000

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#### Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18							[	DATE REPORTE	ED: 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

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**SAMPLED BY:** 

**ATTENTION TO: Erin O'Brien** 

Public Works LEPH/HEPH in Water Low Level

**DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-24** 

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#### Public Works LEPH/HEPH in Water Low Level

DATE RECEIVED: 2018-01-18								DATE REPORTI	ED: 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

Certified By:

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**SAMPLED BY:** 

**ATTENTION TO: Erin O'Brien** 

Public Works LEPH/HEPH in Water Low Level

**DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-24** 

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#### Public Works LEPH/HEPH in Water Low Level

		Pur	DIIC WORKS L	EPH/HEPH IN Water Low Level
DATE RECEIVED: 2018-01-18				DATE REPORTED: 2018-01-24
Parameter	Unit	SAMPLE DESCRIPTION:  SAMPLE TYPE:  DATE SAMPLED:  G/S RDL	04310-05 Water 2018-01-16 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	

Certified By:

NPopukolof



### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

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Burnaby, British Columbia

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA **SAMPLING SITE:** 

**SAMPLED BY:** 

#### Public Works LEPH/HEPH in Water Low Level

**DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-24** 

RDL - Reported Detection Limit; G / S - Guideline / Standard Comments: 9018095-9018131 LEPH & HEPH results have been corrected for PAH contributions.

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

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#### **Volatile Organic Compounds in Water**

			V Olutilo O	igaine con	ipodilido III	· · · · · · · · · · · · · · · · · · ·				
DATE RECEIVED: 2018-01-18							I	DATE REPORTI	ED: 2018-01-24	
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04309-01 Water 2018-01-13 9018095	04309-03 Water 2018-01-13 9018099	04309-04 Water 2018-01-14 9018101	04309-07 Water 2018-01-14 9018107	04309-11 Water 2018-01-14 9018113	04309-12 Water 2018-01-14 9018115	04310-03 Water 2018-01-16 9018127	04310-04 Water 2018-01-16 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

Certified By:

MPopurkolof



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

### Volatile Organic Compounds in Water

DATE RECEIVED: 2018-01-18								DATE REPORTI	ED: 2018-01-24	
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04309-01 Water 2018-01-13 9018095	04309-03 Water 2018-01-13 9018099	04309-04 Water 2018-01-14 9018101	04309-07 Water 2018-01-14 9018107	04309-11 Water 2018-01-14 9018113	04309-12 Water 2018-01-14 9018115	04310-03 Water 2018-01-16 9018127	04310-04 Water 2018-01-16 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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### **Certificate of Analysis**

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#### **Volatile Organic Compounds in Water**

			volatile Or	ganic Compounds in Water
DATE RECEIVED: 2018-01-18				DATE REPORTED: 2018-01-24
Parameter	S. Unit	AMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04310-05 Water 2018-01-16 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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NPopukolof



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PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

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#### **Volatile Organic Compounds in Water**

			voiatile Org	anic Compounds in Water
DATE RECEIVED: 2018-01-18				DATE REPORTED: 2018-01-24
	٤	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:	04310-05 Water 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

Certified By:

NPopukolof



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### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

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#### Chloride in Water

					Chloride i	n water					
DATE RECEIVED: 2018-01-18								DA	ATE REPOR	ΓED: 2018-01-24	
		SAMPLE DESC	CRIPTION:	04309-02		04309-03		04309-04		04309-06	
		SAME	PLE TYPE:	Water		Water		Water		Water	
		DATE S	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	
loride mg/L			0.05	0.32	0.5	217	5	873	0.05	22.5	
		SAMPLE DESC	CRIPTION:	04309-07		04310-02		04310-03		04310-04	04310-05
		SAME	PLE TYPE:	Water		Water		Water		Water	Water
		DATE S	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

Certified By:

Andre Cernoil



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### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLED BY:

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#### **Public Works Dissolved Metals**

DATE RECEIVED: 2018-01-18	3							DATE REPORTE	D: 2018-01-2	4
Parameter	Unit	SAMPLE DESCRIPTION:  SAMPLE TYPE:  DATE SAMPLED:  G/S RDL	04309-01 Water 2018-01-13 9018095	RDL	04309-02 Water 2018-01-13 9018098	04309-03 Water 2018-01-13 9018099	RDL	04309-04 Water 2018-01-14 9018101	RDL	04309-05 Water 2018-01-14 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

Certified By:

Ander Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### **Public Works Dissolved Metals**

DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-24											
	SA	MPLE DES	CRIPTION: PLE TYPE:	04309-01 Water		04309-02 Water	04309-03 Water		04309-04 Water		04309-05 Water
Parameter	Unit	DATE S	SAMPLED: RDL	2018-01-13 9018095	RDL	2018-01-13 9018098	2018-01-13 9018099	RDL	2018-01-14 9018101	RDL	2018-01-14 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

Certified By:

Andre Cernorl



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#### **Public Works Dissolved Metals**

			Fublic	MADIK2 DI	SSUIVEU IVIELA	13				
DATE RECEIVED: 2018-01-18							D	ATE REPOR	TED: 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	

Certified By:

ander Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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ATTENTION TO: Erin O'Brien

SAMPLED BY:

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Burnaby, British Columbia

Unit 120, 8600 Glenlyon Parkway

#### **Public Works Dissolved Metals**

DATE RECEIVED: 2018-01-18								DATE REPORTED: 2018-01-24					
	SA	SAMPLE DESCRIPTION:				04309-07		04309-08		04309-09			
		SAMPLE TYPE:		Water	Water			Water		Water			
		DATES	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			

Certified By:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### **Public Works Dissolved Metals**

			Public	WOLKS DIS	ssoived weta	ais				
DATE RECEIVED: 2018-01-18								DATE REPORTE	ED: 2018-01-24	
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04309-10 Water 2018-01-14 9018112	RDL	04309-11 Water 2018-01-14 9018113	04309-12 Water 2018-01-14 9018115	RDL	04310-01 Water 2018-01-14 9018117	04310-02 Water 2018-01-16 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	

Certified By:

Ander Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

AGAT WORK ORDER: 18N303317

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### **Public Works Dissolved Metals**

3 4600 130100 21000100													
DATE RECEIVED: 2018-01-18									DATE REPORTE	ED: 2018-01-24			
	SA	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:		04309-10 Water 2018-01-14		04309-11 Water 2018-01-14	04309-12 Water 2018-01-14		04310-01 Water 2018-01-14	04310-02 Water 2018-01-16			
Parameter	Unit		DL	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	C	).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	C	).1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1			
Hardness (calc)	ug CaCO3/L	1	00	240000	100	249000	244000	100	318000	127000			

Certified By:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLED BY:

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#### **Public Works Dissolved Metals**

			Public	Works Dis	sorved weta	ais
DATE RECEIVED: 2018-01-18						DATE REPORTED: 2018-01-24
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04310-03 Water 2018-01-16 9018127	04310-04 Water 2018-01-16 9018129	04310-05 Water 2018-01-16 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	

Certified By:

ander Cernol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### **Certificate of Analysis**

**AGAT WORK ORDER: 18N303317** 

PROJECT: 1657709/6000

**ATTENTION TO: Erin O'Brien** 

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### **Public Works Dissolved Metals**

	Fubile Works Dissolved Metals													
DATE RECEIVED: 2018-01-18							DATE REPORTED: 2018-01-24							
	SA	AMPLE DESC	CRIPTION:	04310-03	04310-04	04310-05								
		SAMF	PLE TYPE:	Water	Water	Water								
		DATE S	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:

Andre Cernoil



# **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:

			Trac	e Org	ganio	cs Ar	alysi	is							
RPT Date: Jan 24, 2018			Г	UPLICATI	 E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
		Sample				Method Blank	Measured		ptable nits		1 1 1	ptable mits		Lin	ptable
PARAMETER	Batch	ld	Dup #1	Dup #2	RPD	Diank	Value	Lower	Upper	Recovery	Lower	1	Recovery	Lower	
Public Works LEPH/HEPH in Wa	ter Low Le	evel		1		I .	I	ı			1	1	I		
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%		120%				92%		130%
Benzo(b)fluoranthene	68613	W-MS1	0.36	0.37	2.7%	< 0.01	102%		120%				73%		130%
Benzo(j)fluoranthene	68613	W-MS1	0.47	0.51	8.2%	< 0.01	98%		120%				95%		130%
Benzo(k)fluoranthene	68613	W-MS1	0.44	0.40	9.5%	< 0.01	99%		120%				89%		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%		130%
Dibenzo(a,h)anthracene	68613	W-MS1	0.38	0.37	2.7%	< 0.01	100%	80%	120%				76%		130%
Benzo(g,h,i)perylene	68613	W-MS1	0.42	0.41	2.4%	< 0.01	101%	80%	120%				85%		130%
1-Methylnaphthalene	68613	W-MS1	0.40	0.40	0.0%	< 0.05	100%		120%				80%		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%		130%				78%		130%
EPH C19-C32	68613	W-MS1	13200	14400	8.7%	< 100	99%	70%	130%				83%		130%
Naphthalene - d8	68613	W-MS1	92	93	1.1%	< 100	100%	80%	120%				92%		130%
2-Fluorobiphenyl	68613	W-MS1	94	96	2.1%		101%		120%				94%		130%
P-Terphenyl - d14	68613	W-MS1	93	93	0.0%		100%	80%	120%				93%	60%	130%
Comments: RPDs are calculated us	sing raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.								
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%		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		9013031	<1	<1	NA	< 1	100%		120%				105%	70%	130%
Dichloromethane		9013031	<1	<1	NA	< 1	100%		120%				90%		130%
Methyl tert-butyl ether (MTBE)	68636	9013031	<1	<1	NA	< 1	101%		120%				95%		130%
2-Butanone (MEK)		9013031	<10	<10	NA	< 10	100%		120%						

### AGAT QUALITY ASSURANCE REPORT (V1)

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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	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Jan 24, 2018				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
		Sample				Method Blank	Measured		eptable mits		1 1 1	eptable mits			ptable nits
PARAMETER	Batch	ld	Dup #1	Dup #2	RPD	Dialik	Value	Lower	1	Recovery	<b></b>	Upper	Recovery	Lower	
trans-1,2-Dichloroethylene	68636	9013031	<1	<1	NA	< 1	100%	80%	120%		1	1	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%	
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%					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%					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%

### AGAT QUALITY ASSURANCE REPORT (V1)

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ATTENTION TO: Erin O'Brien

### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317 PROJECT: 1657709/6000

**SAMPLING SITE:** SAMPLED BY: **Trace Organics Analysis (Continued) DUPLICATE** REFERENCE MATERIAL METHOD BLANK SPIKE RPT Date: Jan 24, 2018 MATRIX SPIKE Method Acceptable Acceptable Acceptable Sample Massurad Blank Limits Limits Dup #2 **PARAMETER** Batch Dup #1 RPD Recovery Value Lower Upper Lower Upper Lower Upper 9019835 < 0.5 NA 100% 80% 120% 91% 70% 130% Benzene 68621 < 0.5 < 0.568621 99% 70% 130% Toluene 9019835 80% 120% 91% < 0.5 < 0.5 NA < 0.5130% 9019835 Ethylbenzene 68621 5.0 5.2 3.9% < 0.5 98% 80% 120% 90% 70% 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% 68621 9019835 <0.5 <0.5 NA < 0.5 100% 80% 120% 95% 70% 130% Styrene VPH 9019835 68621 <100 <100 NA < 100 VΗ 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% 68621 9019835 99 100% 70% 130% 99% 70% 130% Toluene - d8 97 2.0% 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 <100 NA 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 99 2.0% 100% 70% 130% 99% 70% 130% 97 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 10.2% 4470 4950 < 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)

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).

NA

< 0.04

96%

50% 140%

105%

50% 140%

< 0.04

< 0.04

Certified By:



50% 140%



AGAT WORK ORDER: 18N303317

**ATTENTION TO: Erin O'Brien** 

# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709/6000

SAMPLING SITE: SAMPLED BY:

				Wate	er An	alys	is								
RPT Date: Jan 24, 2018				UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SP	IKE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured		eptable mits	Recovery	Lie	ptable nits	Recovery		eptable mits
		la la					Value	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%		110%	109%		110%			
Lithium Dissolved	9019686		<0.5	<0.5	NA	< 0.5				95%		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%		110%			
Molybdenum Dissolved	9019686		0.58	0.51	12.3%	< 0.05	105%	90%	110%	95%		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%		110%			
Silicon Dissolved	9019686		2070	2080	0.3%	< 50				108%		110%			
Silver Dissolved	9019686		<0.02	<0.02	NA	< 0.02				104%		110%			
Sodium Dissolved	9019686		10600	10500	0.3%	< 50	97%	90%	110%	103%		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	2070	- 5 , 5	, 0	107%		110%			
Thallium Dissolved	9019686		0.03	0.02	NA	< 0.01	104%	90%	110%	97%		110%			
Tin Dissolved	9019686		<0.05	< 0.05	NA	< 0.05	10170	0070	11070	95%		110%			
Titanium Dissolved	9019686		0.6	0.6	NA	< 0.05				94%		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%		110%			
Zinc Dissolved	9019686		<2	<2	NA	< 2	108%		110%	101%		110%			
Zirconium Dissolved	9019686		<0.1	<0.1	NA	< 0.1	10070	0070	11070	100%		130%			
	30.3000		٠٠.١	-0.1	. 17 1	- 0.1				10070	. 5 / 0	10070			

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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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303317
ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

**SAMPLING SITE:** 

SAMPLED BY:

Water Analysis (Continued)															
RPT Date: Jan 24, 2018	DUPLICATE				REFERENCE MATERIAL			METHOD	BLANK	SPIKE	MATRIX SPIKE				
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Accep Lim	otable nits	Recovery		otable nits Recovery		Acceptable Limits	
7,117,1112.12.11		ld					Value	Lower	Upper	۱۰۰۰۰۰۰۰	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: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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				

# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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					

# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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					



# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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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									

# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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					



# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N303317
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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

# Golder

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

13N303317 No. 04309 page 1 of Z

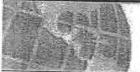
EEE Coldon					See Market																		
Asso	Associates														Labo	Laboratory Name: AGAT							
00 − 2920 Virtual Way √ancouver, British Columbia, Canada V5M 0C4			Short Title: Golder Co Golder E-mail Address 1: Golder F-mail Address					Contact:				Address: 17 0 - 8600 61 w- Telephone/Fax: Contact 778 - 457 - 4009 49					Lyon Akum	نام					
							older.cc	Golde	r E-mail Addre	ss 2:	@9	older	.com		phone/l	Fax:	- 41	004	С	Contact:			
Office Name:	1.7					FOul	IO E		7 2017	20 - 6									Ta				
					S upload:	2							Ar	nalyses	Requ	iired	Vin	18	· 8	-13			
Turnaround Time Criteria: CSR		ME	☐ 48 hr ☐ BC W	ater Qu	ality	72 hr	Other	N	Regular	(5 Days)	S.		+		115		5				(e)	N: CO A T	
Note: Final Repor	ts to be issued	l by e-mail			Que	ote No	.:				Containers	( in [	UPH	<u></u>	Epul/HEPH/PAH	न्	N 1				RUSH (Select TAT above)	ACAT	
											f Cor	Metals	_	5.7	CPH	Inloide.	Pesticides				ct TA	Sample	
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth	Sampl Matrix		ate pled	Time Sampled	Sample Type	QAQC Code	Related SCN	Number of		(L)	9	T	3	J.				(Sele	Remarks	
Number (SCN)	K19-MW17-	ากน	(m)	(over	) (D/N	VI / Y)	(HH:MM)	(over)	(over)	(over)	Num	7:55	BTEX		To	0	3				RUSH	(over)	
04309-01.	MINIT OF		7.4	W6	13/0	1118	15:00	GRAZ.			7	\ \	\ \ \		V						-	9018095	-
- 02	K19-MW09-	04	69			1	16:30	1			8	V										093	
- 03	KI9-MWI	7-06	1		1,1	/	12:20		2	- 13	X	V	Ŷ	X		<b>?</b>					1	099	
- 04	KI9-MWF	-10	8.8		146	1/18	11:00		160		2				$\Diamond$		1.					101	
- 05	K19-MW17	-77	9.1		1 1/0	410	1Z:00				0 1				$\frac{1}{2}$			+			1	104	1
- 06	K19-MW16	- 10D	12.1				13:30				支		V			1						106	+
- 07	K19-MW 10	-03	10.4				16:00				0												+
- 08	119-HWF	-31	6.7				10:20				0			X	X	X				$\dashv$	-	[6]	-
- 09	K19-MW17	71	10-9				11:15	+			7	X	X		X		-			$\dashv$	-	109	-
- 10	K19-MW17	-18	6.8				13:00				7.	X	X				-				-	111	-
- 11	K19-1016	010-	8.7				14:10		TINA	04309-12		X		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							-	112	-
- 12	K19-MW Lb.	010	31							04309-11	8	X	×	X		- /	$\langle \cdot  $			1	1	115	-
ampler's Signature:	1	2	Relinqui	shed by	: Signatu	ure	200	Compa		Date .			Tim	e		Rece	ivedb	v Si	gnature	/	Corr	npany	4
ommente:	A	5	24-41			5	15th	00	1dx		011	Torre	0	84			Ü	M	XX	5	0011	AbAT	
comments: Full		D 0	Method	or Shipn	nent:	L		Waybill	Waybill No.: Received for La				for La	Lab by: Date Time					Time 47				
Dancos	Santua	pe	Shipped	by:					ent Conditi	on			np (°C	Co	Cooler opened by: Date						Time		
									Seal Intact:				0									5	

# Golder

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18W303317
No. 04310 page Zof 2

EEECO	dor			Desta	of Minneston										_					
H Go Asso	ciates	5			ct Number:	1657	709/	6000						Labo	ratory	Name:	A	SAT		
200 – 2920 Virtual Wa				Short	Title:	1 Inv	estig	ation	Golder			Rai		Addr	ess:	20	-86	000	Gl	enly May
Vancouver, British Co Telephone (604) 296-	4200 Fax (	604) 298-5	24 3253		FE-mail Add	ress 1:		Golder	E-mail Addre	ss 2:			com	Telep	hone/l	Fax:			Contac	enlyon Always:
Office Name:				132.00	7.20 34	101169	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	111	cretaco		wy	oluei	.com	177	045	57.4	200	_	Ja	spirit Galinili
	/amoi	wer			EQu EQu	IS Facility C	ode: _Z	843	3859						alyses		10			8.55
Turnaround Time Criteria: CSR	24 hr □ CC		☐ 48 hr ☐ BC W		√ □ 72 hr			Regular (	(5 Days)	S	()()			346	ulyses	requ	illed			
Note: Final Repor	ts to be issued	d by e-mail			Quote No	o.;				ntaine	(j.j.) %	1+0.	V	197 H	boide				(Select TAT above)	A in AT Sample
			Sample	Sample	Date	Time	Camala	0400	Dalata I	of Co	Metals (	7	1	HERH	50		7		ect TA	Th
Sample Control Number (SCN)	Sample Location	Sa. #	Depth (m)	Matrix (over)	Sampled (D / M / Y)	Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	755.K	RIEX	1100	(Hotal	1		1-2-1		RUSH (Sel	Remarks (over)
04310-01				W6	14/01/18	10:25	GRAZ			7	X	X		X						117
- 02	K19-4W	16-109	6	WG	16/01/8	10:18				8	Ź	X		X	X					125
- 03	K19-M1	N17-291	8.5			14:50		0, =		8	X	X	X	X	X	X .	X			127
- 04	419-MW	17-35	072			11:25		FDA	04310-05	8	X	V	X	X	X	V	y			129
- 05	K19-MWI	1-35 D	7.2	4	4	11:25	9		04310-04		X	X	X	X	X	X.	X			131
- 06			0.4	-4r - 1	3					-52-1										
- 07																				
- 08									vanle - Lie							E"				
- 09						-		(	4											
- 10																				
- 11																				
- 12																				
Sampler's Signature:	4	P.	Relinqui	shed by:	Signature	18	Compan	W.	Date 17/0	01/1	8	Time	-	15.	Rece	eived b	y: Sign	ature	Cor	npany AT
Comments:  TWO  Dave OS	oice	ne	Method	of Shipme	nt:		Waybill N	No.I			Rec	eived	for Lab	b by		J	Date		j	Time
Dave os	JUTUOF (	PC	Shipped	by:			Shipmen Seal Inta	nt Condition	on:			p (°C)	Cod	oler op	ened b	oy:	Date		,	Time
1000								- 200												( )



# AGAT Laboratories

# SAMPLE INTEGRITY RECEIPT FORM

100	5 (1.50 AM MANA MANAGEMENT)
RECEIVING BASICS - Shipping	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: QOLDER	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $0+3+6=5$ °C 2(Bottle/Jar) + + = °C
	3 (Bottle/Jar) 4 + 1 + 2 = 0 °C 4 (Bottle/Jar) + + = 0 °C
Waybill#	5 (Bottle/Jar)++=°C 6 (Bottle/Jar)++=°C
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar)++=°C 8 (Bottle/Jar)++_=°C
Custody Seal Intact: Yes (No) NA	9 (Bottle/Jar)++=°C 10 (Bottle/Jar)++_=°C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	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:
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	



### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18 N 3 - 33 1 +

Received From:	Waybill #:
SAMPLE QUANTITIES: Coolers: Containers:	
TIME SENSITIVE ISSUES: Earliest Date Sampled: 3 20	ALREADY EXCEEDED? Yes No
sample ID's) *use jars when available	each cooler: (record differing temperatures on the CoC next to  = 0 °C (3)++= °C (4)++= °C  o
Account Project Manager: Whom spoken to:	
Whom spoken to:	
Whom spoken to:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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 (V3)

Page 1 of 23



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

O/ (WII EII VO OITE.						GANNI EED DT.
					Arsenic in	Soil
DATE RECEIVED: 2018-01-18						DATE REPORTED: 2018-02-14
	S	AMPLE DES	CRIPTION:	04301-07	04301-09	
		SAM	PLE TYPE:	Soil	Soil	
		DATES	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 Bend



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18							Ι	DATE REPORTE	ED: 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:

ander Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

# Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

OF TIME EIT OF OTTE.	O/MINI EED DT.										
		Pt	ublic Work	s LEPH/HE	PH in Soil L	ow Level					
DATE RECEIVED: 2018-01-18							[	DATE REPORT	ED: 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	

Certified By:

Andre Cernorl



AGAT WORK ORDER: 18N303338

Public Works LEPH/HEPH in Soil Low Level

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA ATTENTION TO: Erin O'Brien SAMPLING SITE:

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

# DATE RECEIVED: 2018-01-18 **DATE REPORTED: 2018-02-14**

D7112 112021123. 2010 01 10							_	on the fitting	_D	
		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:

ander Cerrorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

		Pι	ublic Works	LEPH/HEPH in Soil Low Level				
DATE RECEIVED: 2018-01-18					I	DATE REPORT	ED: 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:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

μg/g

0.05

< 0.05

# Certificate of Analysis

AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY: Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

SAMPLING SITE:					SAMPLED BY:
		Р	ublic Work	s LEPH/HEP	H in Soil Low Level
DATE RECEIVED: 2018-01-18	3				DATE REPORTED: 2018-02-14
	S	AMPLE 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	

Certified By:

ander Cerron

Benzo(b+j)fluoranthene

< 0.05



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

		Pι	ıblic Work	s LEPH/HEF	PH 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:

Ander Cernorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

### BTEX / VPH (C6-C10) Soil

				`	,					
DATE RECEIVED: 2018-01-18							ļ	DATE REPORT	ED: 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:

Andre Cernorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### BTEX / VPH (C6-C10) Soil

				`	,					
DATE RECEIVED: 2018-01-18							ſ	DATE REPORTI	ED: 2018-02-14	
		SAMPLE DESCRIPTION	1: 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:

Andre Cernorl



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: Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

			BTE	X / 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 De	ta a Cara I Carte	G / S - Guideline / Standar		

9018142-9018190 Results are based on dry weight of sample.

VPH results have been corrected for BTEX contributions.

Certified By:

ander Cerrol



# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

SAMPLING SITE:								S	SAMPI	_ED B	Y:					
					Soi	l Ana	alysis	3								
RPT Date: Feb 14, 201	8			D	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETE	:R	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Lie	ptable nits	Recovery	Lie	ptable nits
			ld	·	·			Value	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 Bend



# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

			Trac	e Org	ganio	s An	alys	is							
RPT Date: Feb 14, 2018				UPLICATI	<u> </u>		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		eptable mits	Recovery	Lin	ptable nits
. ,		ld					Value	Lower	Upper		Lower	Upper			Upper
Public Works LEPH/HEPH in So	il Low Lev	/el													
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		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		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 us	ing raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.								
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%
Bromofluorobenzene Dibromofluoromethane	68608	9018142							140% 140%				93% 104%		

AGAT QUALITY ASSURANCE REPORT (V3)

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# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000 K19 Investigation

SAMPLING SITE:

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	<b>)</b>					
RPT Date: Feb 14, 2018			[	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	1 1:-	ptable nits	Recovery	Lin	ptable nits
		ld	'				Value	Lower	Upper	]		Upper		Lower	Upper
Toluene - d8	68608	9018142	101	100	1.0%	•	100%	60%	140%				95%	60%	140%
Comments: RPDs are calculated us	sing raw ana	lytical data	and not the	e rounded	duplicate	values rep	orted.								
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:

ander Cerrorl



# Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338
ATTENTION TO: Erin O'Brien

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	•	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

# Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

SAMPLING SITE.		SAMPLED BY.	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis		Madifications BOMOTA AND	
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
		Modified from BC MOE Lab Manual	



# Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

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

CI	HAIN OF CUSTODY REC	CORD/ANALYSIS REQUE	ST No. 04308 page 1 of 4
Golder Associates	Project Number: 7709/60	000	Laboratory Name:
00 – 2920 Virtual Way ⁄ancouver, British Columbia, Canada V5M 0C4	Short Title: Turistiantio	Golder Contact:	Address:
elephone (604) 296-4200 Fax (604) 298-5253	Golder E-mail Address 1:  @golder.com	Golder E-mail Address 2:  @golder.com	Telephone/Fax: Contact:

Telephone (604) 296	4200 Fax (6	604) 298-5	253		1-0 DV	2001ess		older.com		r E-mail Addre	55 Z.	@g	older.c		epnone/Fa:		009	Yas	nal	Calida
	Duver					EQuIS u	acility C	ode: 그	8433	3859				A	nalyses R	tequirec	ı JA	¥ 18 a	8:57	
Turnaround Time Criteria: ☐ CSR			☐ 48 hr ☐ BC W		□ 7 ty	72 hr □ O	ther	X	Regular	(5 Days)	ers		PAHS					ve)		
Note: Final Repor	ts to be issued	by e-mail			Quot	te No.:					ontain	194						TAT above)		
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Samp (D / M	led Sa	Time ampled IH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	BEX /1	CETH HEPHI				3	RUSH (Select T.	ş	Remarks (over)
04308 - 01	K19-TPB-01		0.5	Soil	12/01	18 12	:15	Discrete			4							<	90	18141
- 02		2	1.5			12	2:30				4	X	X							142
- 03	V	3	2.5			17	2:50	-	_	- We	4						>			143
104308-04	K19-TP18-02		11.4			14	:06	*	34	W.	2						7			145
- 05		2	1,5				1:20				4	X	X							146
<b>V</b> - 06	V	3	2.6		4	11	4:40	V			4						>			147
- 07	K19-TP8-03	1	0.5		13/01/1	8 10	30		FDA	04308-08	4	X	X							148
- 08		1	05				30		FD	04308-07	1.7	X	X							149
- 09		2	915			10	:50				4							4		150
- 10	V	3	2.6			11	10				2						×			151
- 11	KATPBOY	)	0.5			11	:50				4	X	X				1			152
<u></u> - 12	1	2	15	V	1	1 12	2310	V			4						7	<	1	153
Sampler's Signature:	n. J		Relinqui	ished by:	Signatu	re 4	38	Compa	ny I des	Date 17/1	27/	18	Time	845		ed by:	Signature	M <sub>Co</sub>	mpany	GAT
Comments:	ave		Method	of Shipme	ent:	4		Waybill	No.:			Red	ceived fo	r Lab by:	1.0	M Da	ate		Time	8:35
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CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04299 page Zof 4

ASSO	ciates				t Number:	774	1/90	600	0	40				Laborato	Nam-	e:			
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elephone (604) 296-	4200 Fax (6	604) 298-5	5253		E-mail Add	dress 1:	older.cor		ari do	ss 2:			.com	Telephor	ne/Fax:	524		Conta	
Office Name:		/										,01401	100111	7 7%	- 9	2 / 1			MINO Celuda.
	ncou	Vev			EQu	IS Facility C	Y .	The state of the s						Analy	ses Red	uired			#5.D/
Turnaround Time Criteria: CSR	: □ 24 hr □ CC	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr ty ☐	Other	×	Regular	(5 Days)	S		-						(e)	
Note: Final Report	ts to be issued	l by e-mail			Quote No	o.:				Number of Containers	HAN	PHIPPH/PAH						RUSH (Select TAT above)	
			Sample	Sample	Date	Time	Sample	QAQC	Related	of Co		中					3	ect TA	
Sample Control Number (SCN)	Sample Location	Sa. #	Depth	Matrix	Sampled	Sampled	Туре	Code	SCN	mber	BTEX				-		4	H (Sel	Remarks
			(m)	(over)	(D/M/Y)	(HH:MM)	(over)	(over)	(over)	Ž	NO	13					4	RUS	(over)
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- 02	K19-TP18-05		0.5			present	13:510			4							Y		1 156
- 03		2	15			MAS	14.20			4	X	X	4						157
- 04	V	3	2.5			WEDEN S	14 40			4					E		X		158
- 05	K19-TP18-06		0.5			1520				4	X	X						12	159
- 06		2	1,5			15 30				4							_ \		160
- 07		3	25		<b>√</b>	15:40				2							7		161
- 08	K19-TP18-07	1	0,5		14/01/18	10:30				2							X		162
- 09		2	15			10:40				4				_			V		163
- 10		3	25			10:50				4	X	X							164
- 11	V	4	3.4			11:10		FDA	04299-12	4	V	X							165
√ - 12	V	4	3.4	y	V	11:10	V		04299-11	4	X	X							166
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	- 02		2	15		7	12:30				4								1	170
	- 03		3	25		V	12:50				4	X	V							171
	- 04	19-TP18-09	1	0							1,	-	/							172
		TO COLUMN	- (	11.5			140511				11									
	- 05		2	1.5			14:50				4	V	\/				$\rightarrow$			172
	- 05		2	1.5			15:30				4	X	X				X			
	- 05 - 06	V	2 3	1.5		V	15:30 15:50				4 4 4	X	X				×			174
	- 05 - 06 - 07	V	1	1.5		15/01/18	15:30 15:50 10:00				4444	X	X				× × × × ×			174
	- 05 - 06 - 07 - 08	V	1 2	1.5		15/01/18	15:30 15:50 10:00 10:30		FOA	04300-01	44 4 4 4 4 4	X	X				×			
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Sampler's Signature: Relinquished by: Signature Company Time Received by: Signature Date Company Inolder-0845 Received for Lab Ann Method of Shipment: Waybill No.: Date Shipped by: Temp (°C) Shipment Condition: Cooler opened by: Date Time Seal Intact:

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- 11

- 12 KI9-TP18-11

18N303338

## CHAIN OF CUSTODY DECORDANAL VOIC DE

N- 04301 1/ 1/

Golder Associates
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Turnaround Time: 24 hr

- 01

- 02

- 04 - 05 - 06 - 07

- 08 - 09 - 10 - 11 - 12

Sampler's Signature:

Office Name:

Criteria: CSR

Sample Control

Number (SCN)

1430

200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253

Note: Final Reports to be issued by e-mail

Sample

Location

K19-TP16-1

19-MW18-0

- 03 K9-7918-12

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CCME

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Temp (°C)

Comments:

Shipped by:

Cooler opened by:

Date

WHITE: Golder Copy YELLOW: Lab Copy

Shipment Condition:

Seal Intact:



# AGAT Laboratories

# SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: GOLDER	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $+ \bigcirc + \bigcirc + \bigcirc = \bigcirc $
Waybill#	3 (Bottle/Jar) + + = 5 °C 4 (Bottle/Jar) + + = °C
waybiii#	5 (Bottle/Jar)++=°C 6 (Bottle/Jar)++_=°C
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar)++=°C 8 (Bottle/Jar)++_=°C
Custody Seal Intact: Yes No NA	9 (Bottle/Jar)++=°C 10 (Bottle/Jar)++_=°C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	Workorder No: Samples Damaged: Yes No If YES why? No Bubble Wrap Frozen Courier Other: Account Project Manager: above issues: Yes No Whom spoken to: Date/Time: CPM Initial General Comments:
SAMPLE INTEGRITY - Shipping	
Hazardous Samples: YES NO Precaution Taken:	×
Legal Samples: Yes No	
International Samples: Yes (No.)	

Free Water None

Tape Sealed: Yes No
Coolant Used: Icepack

Bagged Ice Free Ice



## SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N303338

RECEIVING BASICS: Received From:	Wayt	bill #:	
Sample Quantities: Coolers: Containers:	66		
TIME SENSITIVE ISSUES: Earliest Date Sampled:	18	ALREADY EXCEEDED?	Yes No
Non-Conformances:  3 temperatures of samples* and average of sample ID's) *use jars when available  (1)			
Account Project Manager: Whom spoken to: ADDITIONAL NOTES:		peen notified of the above issu	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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 (V1)

Page 1 of 15

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

# Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

SAMPLING SITE:			SAMPLE	SAMPLED BY:									
	Public Works Arsenic in Soil												
DATE RECEIVED: 2018-01-18									DATE REPORTED: 2018-01-24				
	;	SAMPLE DES	CRIPTION:	04313-06	04313-07	04313-08	04313-09	04313-10					
		SAMI	PLE TYPE:	Soil	Soil	Soil	Soil	Soil					
		DATE S	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:

ander Cerrol



SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

# Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works Metals in Soil

			Publ	IC WOLKS IVI	etais in Soi	I		
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:

Ander Cernarl



AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia

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: 2018-01-18											
			SAMPLE DES	CRIPTION:	04313-01	04313-02	04313-03	04313-04	04313-05		
			SAM	PLE TYPE:	Soil	Soil	Soil	Soil	Soil		
			DATE	SAMPLED:	2018-01-15	2018-01-15	2018-01-15	2018-01-15	2018-01-15		
Par	ameter	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:

ander Carrol



SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

# Certificate of Analysis

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works LEPH/HEPH in Soil Low Level

		· '	abiio vvoik	5 LL: : :/: :L:	11 III OOII L	OW LOVO		
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:

ander Cerrol



AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA SAMPLING SITE:

	Public Works LEPH/HEPH in Soil Low Level										
DATE RECEIVED: 2018-01-18 DATE REPORTED: 2018-01-2											
		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:

ander Carrol



# **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:

SAMPLING SITE.								JAIVIE	LLD D	1.				
				Soi	l Ana	alysis	3							
RPT Date: Jan 24, 2018			DUPLICATE				REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPIKE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		Acceptable Limits		Acceptable Limits		Recovery	Acceptable Limits
		ld	''	''			Value	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%		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%		101%		110%		
Nickel	9018596		2.2	2.6	NA	< 0.5	112%	70%		99%		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%		97%		110%		
Sodium	9018596		337	346	2.7%	< 5	129%	70%		95%		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%		110%		
Uranium	9018596		0.5	0.5	NA	< 0.2	122%	70%	130%	110%		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:

Ander Cerrol

AGAT QUALITY ASSURANCE REPORT (V1)

Page 7 of 15



# **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:

SAMI LING SITE.							`	J, KIVII							ANII EINO STE.							
Trace Organics Analysis																						
RPT Date: Jan 24, 2018			DUPLICATE				REFERENCE MATERIAL		METHOD BLANK SPIKE			MAT	MATRIX SPIKE									
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits				Recovery	Acceptable Limits		Recovery		ptable					
		lu lu					value	Lower	Upper		Lower	Upper		Lower	Upper							
Public Works LEPH/HEPH in Soil	Low Lev	rel				,																
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:

ander Cernarl

**AGAT** QUALITY ASSURANCE REPORT (V1)

Page 8 of 15

# Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N303359 ATTENTION TO: Erin O'Brien

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



# Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

SAMPLING SITE:

SAMPLED BY:

		9, <u>-1-</u> 5		
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	

## 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:

OAWI LING OTTE.		O/ (IVII EED D1.	
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



ANALYTICAL TECHNIQUE

## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303359

PROJECT: 1657709-6000

2-Fluorobiphenyl

**PARAMETER** 

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

ORG-180-5102

AGAT S.O.P

Modified form BCMOE Lab Manual	GC/MS
Section D (PAH)	GC/IVIS

P-Terphenyl - d14 ORG-180-5102

Modified form BCMOE Lab Manual Section D (PAH)

LITERATURE REFERENCE

GC/MS

AGAT METHOD SUMMARY (V1)

# Golder

## CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

1813-3359 No. 04313 page\_lof\_1

HASSO	lder ociates			Projec	Project Number: 1657709 16000						Laboratory Name: A6AT					3)			
200 – 2920 Virtual W Vancouver, British Co Telephone (604) 296	ay olumbia, Cana	ida V5M 00	C4 5253	Golde	Short Title: Golde						Contact.				at:				
Office Name:				1.36	1000	grow (wgc	nuer.cor	a	zacnaco		<u>@g</u>	older.	com	778-	452	, 40	29	4981	mine by lindo
1	/an wo	ver			FQu	IS Facility C	ode:	8433	859					Analys	os Por	ruirod	JAN	18 ax	8:독기 (1)
Turnaround Time Criteria: CSR	: ☐ 24 hr	S 15/01/18	☐ 48 hr ☐ BC W	ater Quali	72 hr			Regular (	5 Days)	S.			4-14	Allarya	Jes Net	quired		(9)	
Note: Final Repor	ts to be issue	d by e-mail			Quote No	o.:				Containers	7.5	2	PH 1P					√T abo√	
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 Co	Arsen	Meta	CEPHIMEPHIAGH		AG	ATS.	ngles	RUSH (Select TAT above)	Remarks (over)
04313 - 01	K19-SP18-	OIDI	0.05	80	15/01/18	13:00	Discret			2		X	×		90	1831	4		Clay
- 02		D2		1		13:05						X				3 U			Bachfill
- 03	-	\ D3				13:10						X	X			33			
- 04	Y	D4				13:15						X	X		12	331			
205	17	DS				13:20							X			332			
- 06	K19-5918-	07 DI				15:00					~					333			Proch
- 07	1	200				15:10					V					33			Sand
- 08		D3	7			15.20										33.			
- 09		Du	7			15:30					<b>Q</b>					332			
· - 10	1/	DK				15:40										33			
- 11	11		7.0							V						-)/	C		
- 12	) (																	7	
Sampler's Signature:	4	7	Relinquis	shed by: \$	Signature	138	Compan	y Ides.	Date 17 / 6	11	18	Time	245	Re	ceived	by: Sign	ature	Con	npany A G A T
Comments:  FWOIC	e to		Method	of Shipme	nt:	C	Waybill N				Rec	eived fo				Date	1		Time 7 4
					Shipmen Seal Inta	t Conditio	on:		Tem	np (°C)	TA	r opene	d by:	Date			Time		
WHITE: Golder Copy YELLOW: Lab Copy																			



# AGAT Laboratories

## SAMPLE INTEGRITY RECEIPT FORM

RE	CEIVING	BASICS	- Ship	ping		
Company/Consultant:	G	10 4	1	ER	_	(4.)
Courier:				Pr	epaid	> Collect
Waybill#				_		
Branch: EDM GP FN	FM RD	VAN	LYD	FSJ	EST	Other:
Custody Seal Intact: Yes	No NA	4				
TAT: <24hr 24-48hr	48-72hr	Reg	Oth	er		
Cooler Quantity:	1					

	_
TIME SENSITIVE ISSUES - Shipping	
ALREADY EXCEEDED HOLD TIME? Yes No	
Inorganic Tests (Please Circle): Mibi, BOD, Nitrate/Nitrite, Turbidit Microtox, Ortho PO4, Tedlar Bag, Residual Chlorine, Chlorophyll* Chloroamines*	:У, ,
Earliest Expiry:	
Hydrocarbons: Earliest Expiry	

SAMPLE INTEGRITY - Sh	nipping
Hazardous Samples: YES NO Precaution Ta	
Legal Samples: Yes No	. 4
International Samples: Yes No	
Tape Sealed: Yes No	
Coolant Used: Icepack Bagged Ice Free Ic	e 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) $+4=4$ 0°C
3 (Bottle/Jar)++=°C 4 (Bottle/Jar)++=°C
5 (Bottle/Jar) + + = OC 6 (Bottle/Jar) + + = OC
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:
The second secon



#### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # \3\N3\3359

RECEIVING BASICS: Received From:	Waybill #:
SAMPLE QUANTITIES:  Coolers: Containers:	
TIME SENSITIVE ISSUES: Earliest Date Sampled: Jan 15, 20	ALREADY EXCEEDED? Yes No
sample ID's) *use jars when available  (1)	each cooler: (record differing temperatures on the CoC next to  =°C (3)++ =°C (4)++ =°C
Integrity Issues:	
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	Date and Time:
Additional Notes:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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 (V1)

Page 1 of 51

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

SAMPLING SITE:		-		SAMPLED BY:
			Public We	orks Metals in Soil
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-01-29
	5	SAMPLE DESCRIPTION: SAMPLE TYPE:	04304-09 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:

ander Cernarl



### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Public Works	Metals in Soil
--------------	----------------

DATE RECEIVED: 2018-01-23					DATE REPORTED: 2018-01-29
	S	AMPLE DES	CRIPTION:	04304-09	
		SAMI	PLE TYPE:	Soil	
		DATES	SAMPLED:	2018-01-19	
Parameter	Unit	G/S	RDL	9025012	

 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

SAMPLING SITE:

Certified By:

ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Frie OlDrice

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

http://www.agatlabs.com

TEL (778)452-4000 FAX (778)452-4074

#### Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-23	1							DATE REPORTED: 2018-01-29
	S	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	

Certified By:

ander Cernol



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### 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.

SAMPLING SITE:

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.

Certified By:

Ander Carrol



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA SAMPLING SITE:

BC Routine VOC package in Air (Canister) -ug/m3									
DATE RECEIVED: 2018-01-23							[	DATE REPORTE	D: 2018-01-29
		SAMPLE DESCRIPTION: SAMPLE TYPE:	04316-01 Air	04316-02 Air		04316-06 Air	04316-07 Air	04316-08 Air	
Parameter	Unit	DATE SAMPLED: G / S RDL	2018-01-19 9025032	2018-01-19 9025036	RDL	2018-01-21 9025040	2018-01-21 9025041	2018-01-21 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	

Certified By:

ander Cerrol



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### 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.

SAMPLING SITE:

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:

Ander Cernonl



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

BTFX /	VPH	(C6-C10)	Soil
レートハ	V I I I		, 0011

			ווט	_X / VI II (O	0-010) 0011	
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:

SAMPLING SITE:

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:

Ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.aqatlabs.com

Unit 120, 8600 Glenlyon Parkway

#### CCME BTEX/F1-F4 (Water)

			CCI	VIL DILA/II	i-i <del>-i</del> (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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andre Canarl



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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Public Works: BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23							I	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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ander Cerrol

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Burnaby, British Columbia CANADA V5J 0B6

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Unit

%

Acceptable Limits

70-130

110

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

SAMPLED BY:

113

ATTENTION TO: Erin O'Brien

112

123

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 G/S **RDL** 9025032 9025036 RDL 9025040 9025041 9025042 Parameter Unit 1.2-Dibromoethane ug/m3 6.0 <6.0 <6.0 15.0 <15.0 <15.0 <15.0 10.0 Tetrachloroethene ug/m3 4.0 17 20 <10.0 <10.0 <10.0 Chlorobenzene ug/m3 4.0 <4.0 <4.0 10.0 <10.0 <10.0 <10.0 Ethylbenzene 3.6 <3.6 <3.6 9.0 <9.0 <9.0 < 9.0 ug/m3 m&p-Xylene ug/m3 6.0 8.1 6.6 15.0 35 <15.0 <15.0 Bromoform 20.0 <20.0 ug/m3 8.0 <8.0 <8.0 <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 ug/m3 8.0 20.0 Total Xylenes 8.1 <8.0 41 <20.0 <20.0

114

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ander (envor)

Surrogate

4-Bromofluorobenzene

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Burnaby, British Columbia CANADA V5J 0B6

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

ATTENTION TO, EITH O'BHE

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

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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 analysis 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 analysis 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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Burnaby, British Columbia

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

Public Works: BC VOCs in Air (Canister) - ug/m3

ATTENTION TO: Erin O'Brien

SAMPLED BY:

DATE RECEIVED: 2018-01-23 **DATE REPORTED: 2018-01-29** 

9025042

SAMPLING SITE:

VOC analysis 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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Burnaby, British Columbia CANADA V5J 0B6

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

#### SAMPLING SITE: 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 G/S RDL 9025059 9025067 9025068 9025069 Parameter Unit 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 μg/L 0.02 < 0.02 < 0.02 < 0.02 < 0.02 Acenaphthene 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 µg/L Chrysene 0.01 < 0.01 < 0.01 < 0.01 0.03 0.01 Benzo(b)fluoranthene μg/L 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 μg/L 0.01 < 0.01 < 0.01 <0.01 0.01 Benzo(b+j)fluoranthene Surrogate Unit Acceptable Limits 82 82 Naphthalene - d8 % 50-130 83 83

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74

77

83

79

ander Ceman

2-Fluorobiphenyl

P-Terphenyl - d14

%

%

50-130

60-130

84

81

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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Burnaby, British Columbia

Unit 120, 8600 Glenlyon Parkway

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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SAMPLING SITE:				SAMPLED BY:
			Volatile Organic	Compounds in Soil
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-01-29
	S	SAMPLE DESCRIPTION: SAMPLE TYPE:	04306-04 Soil	
Parameter	Unit	DATE SAMPLED: G/S RDL	2018-01-20 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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Toluene - d8

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57 (IVIII 21110 5112)				67 WW 225 5 T.
			Volatile Or	ganic 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	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

60-140

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9024976 Results are based on dry weight of sample.

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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 G/S RDL 9025059 9025067 9025068 9025069 Parameter Unit Chloromethane μg/L <1 <1 <1 Vinyl Chloride μg/L <1 <1 <1 <1 Bromomethane μg/L <1 <1 <1 <1 μg/L Chloroethane <1 <1 <1 <1 Trichlorofluoromethane μg/L <1 <1 <1 <1 <10 <10 Acetone μg/L 10 <10 <10 1,1-Dichloroethylene μg/L <1 <1 <1 <1 Dichloromethane μg/L <1 <1 <1 <1 Methyl tert-butyl ether (MTBE) μg/L <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-Dichloroethane μg/L <1 <1 <1 <1 <1 <1 cis-1,2-Dichloroethylene μg/L <1 <1 Chloroform μg/L <1 <1 <1 <1 1,2-Dichloroethane μg/L <1 <1 <1 <1 1,1,1-Trichloroethane μg/L 1 <1 <1 <1 <1 0.5 Carbon Tetrachloride μg/L < 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 Trichloroethene μg/L <1 <1 <1 <1 Bromodichloromethane μg/L <1 <1 <1 <1 trans-1,3-Dichloropropene μg/L <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 1,1,2-Trichloroethane μg/L <1 <1 <1 <1 0.5 <0.5 <0.5 <0.5 <0.5 Toluene μg/L Dibromochloromethane μg/L <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 1,1,1,2-Tetrachloroethane <1 <1 <1 <1 μg/L

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ander Ceman

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Burnaby, British Columbia CANADA V5J 0B6

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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 RDL 9025059 9025067 9025068 9025069 Parameter Unit G/S Chlorobenzene μg/L <1 <1 <1 <1 Ethylbenzene μg/L 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 Bromoform μg/L <1 <1 <1 <1 Styrene μg/L 0.5 < 0.5 < 0.5 < 0.5 < 0.5 0.8 <0.8 <0.8 1,1,2,2-Tetrachloroethane μg/L <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 VΗ μg/L 100 <100 <100 <100 <100 VPH 100 <100 <100 <100 <100 μg/L 1,3-Dichloropropene (cis + trans) μg/L 1 <1 <1 <1 <1 Total Trihalomethanes μg/L <2 <2 <2 <2 Total Xylenes μg/L 1 <1 <1 <1 <1 Unit Acceptable Limits Surrogate Bromofluorobenzene % 70-130 90 99 86 100 70-130 100 Dibromofluoromethane % 97 85 91 % 94 99 Toluene - d8 70-130 109 113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

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Comments:

Parameter

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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	Chloride in Water

**DATE REPORTED: 2018-01-29** DATE RECEIVED: 2018-01-23

> SAMPLE DESCRIPTION: 04319-03 SAMPLE TYPE: Water DATE SAMPLED: 2018-01-21 G/S RDL 9025068

Unit Chloride mg/L 0.5 81.3

RDL - Reported Detection Limit; G / S - Guideline / Standard

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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#### Public Works Dissolved Metals

			Public	WORKS DIS	sorved ivieta	315	
DATE RECEIVED: 2018-01-23							DATE REPORTED: 2018-01-29
Parameter	Unit	SAMPLE DESCRIPTION:  SAMPLE TYPE:  DATE SAMPLED:  G/S RDL	04319-01 Water 2018-01-21 9025059	04319-02 Water 2018-01-21 9025067	04319-03 Water 2018-01-21 9025068	04319-04 Water 2018-01-21 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:

Andre Cernarl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Public Works	Dissolved Metals
--------------	------------------

DATE RECEIVED: 2018-01-23							DATE REPORTED: 2018-01-29
	S	AMPLE 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:

Andre Cernorl



#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AG

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

				Soi	l Ana	alysis	3								
RPT Date: Jan 29, 2018				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable	Recovery	l 1 is	ptable	Recovery		ptable nits
		lu					value	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.

Certified By:

Ander Canarl

AGAT QUALITY ASSURANCE REPORT (V1)

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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:

			Trac	e Orç	ganio	cs An	alysi	is							
RPT Date: Jan 29, 2018				UPLICATE	<u> </u>		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		eptable mits	Recovery		ptable nits
		la la					Value	Lower	Upper	·	Lowe	Upper		Lower	Upper
Public Works LEPH/HEPH in Soil	Low Lev	rel													
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%					106%		130%
Benzo(b)fluoranthene	68653	9024976	0.06	0.06	NA	< 0.02	97%	80%					92%		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%	
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	299 84	82	0.0% NA	< 20	103%	70%	130%				101%	80%	120%
Naphthalene - d8		9024976				< 20		80%	120%					50%	130%
2-Fluorobiphenyl	68653	9024976	76 79	67 72	12.6% 7.9%		100% 101%	80%	120%				100% 100%	50%	130%
P-Terphenyl - d14	68653 68653	9024976	83	73 80	3.7%		99%		120%				100%		130%
r-reiphenyr-ur4	00000	3024370	03	80	3.7 /6		33 /6	00 /6	12076				10176	00 /6	130 /6
Comments: RPDs are calculated using	ng raw ana	alytical data	and not the	e rounded o	duplicate v	values rep	orted.								
Volatile Organic Compounds in S	oil														
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%		120%				105%		140%
Bromomethane		9024976	< 0.05	< 0.05	NA	< 0.05	97%		120%				118%	60%	
Chloroethane	68643		<0.05	<0.05	NA	< 0.05	100%		120%				96%		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%

#### AGAT QUALITY ASSURANCE REPORT (V1)

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#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491

ATTENTION TO: Erin O'Brien SAMPLED BY:

#### SAMPLING SITE: Trace Organics Analysis (Continued) **DUPLICATE** REFERENCE MATERIAL METHOD BLANK SPIKE RPT Date: Jan 29, 2018 MATRIX SPIKE Method Acceptable Acceptable Acceptable Sample Measured Blank Limits Limits Dup #2 **PARAMETER** Batch Dup #1 RPD Recovery Recovery Value Lower Upper Lower Upper Lower Upper 9024976 < 0.05 < 0.05 < 0.05 100% 80% 120% 91% 70% 130% 1.1-Dichloroethane 68643 NA cis-1.2-Dichloroethene 101% 130% 68643 9024976 < 0.05 < 0.05 80% 120% 90% 70% < 0.05 NA 130% Chloroform 68643 9024976 < 0.05 < 0.05 NA < 0.05 100% 80% 120% 89% 70% 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% 9024976 0.17 < 0.02 101% 80% 70% 130% Benzene 68643 0.17 0.0% 120% 90% 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% 68643 9024976 < 0.05 < 0.05 < 0.05 102% 80% 84% 60% trans-1.3-Dichloropropene NA 120% 140% 4-Methyl-2-pentanone (MIBK) 9024976 < 0.5 101% 80% 70% 130% 68643 < 0.5 NA < 0.5 120% 81% 68643 101% cis-1,3-Dichloropropene 9024976 < 0.05 < 0.05 < 0.05 80% 85% 60% 140% NA 120% 1,1,2-Trichloroethane 70% 130% 68643 9024976 < 0.05 < 0.05 NA < 0.05 101% 80% 120% 86% 87% Toluene 68643 9024976 0.12 0.12 NA < 0.05 101% 80% 120% 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 < 0.05 101% 80% 87% 70% 130% NA 120% 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 0.41 80% 70% 130% 0.39 5.0% < 0.05 101% 120% 87% Bromoform 68643 9024976 < 0.05 < 0.05 101% 80% 70% 130% NA < 0.05120% 85% Styrene 68643 9024976 80% 70% 130% < 0.05 < 0.05 NA < 0.05 102% 120% 86% 70% 130% 1,1,2,2-Tetrachloroethane 68643 9024976 < 0.05 < 0.05 NA < 0.05 100% 80% 120% 89% 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% 70% 130% 89% 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 120 101% 60% 105% 60% 140% 68643 9024976 118 1.7% 140% VH 68643 9024976 19 19 NA < 10 **VPH** 68643 9024976 NΑ 18 18 < 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) 70% 130% 68643 9025533 97% < 0.1 < 0.1 NA < 0.1 100% 80% 120% Benzene 68643 9025533 < 0.02 < 0.02 NA < 0.02 99% 80% 120% 95% 70% 130%

AGAT QUALITY ASSURANCE REPORT (V1)

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## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Jan 29, 2018				UPLICATE	<u> </u>		REFEREN	NCE MA	TERIAL	METHOD	BLANK S	PIKE	MAT	RIX SPI	KE
		Sample				Method Blank	Measured		ptable nits	_	Accept Limit				ptable nits
PARAMETER	Batch	Id	Dup #1	Dup #2	RPD	Jiaiii	Value	Lower	Upper	Recovery		Jpper	Recovery	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%
Comments: RPDs are calculated u	ising raw ana	alytical data	and not the	e rounded o	duplicate	values rep	orted.								
Public Works LEPH/HEPH in W	ater Low Le	evel													
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%		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%		120%				96%		130%
Benzo(b)fluoranthene	68644	W-MS1	0.39	0.38	2.6%	< 0.01	97%		120%				78%		130%
Benzo(j)fluoranthene	68644	W-MS1	0.53	0.53	0.0%	< 0.01	102%	80%	120%				107%		130%
Benzo(k)fluoranthene	68644	W-MS1	0.35	0.36	2.8%	< 0.01	99%		120%				71%		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%		130%
Dibenzo(a,h)anthracene	68644	W-MS1	0.41	0.42	2.4%	< 0.01	99%		120%				83%		130%
Benzo(g,h,i)perylene	68644	W-MS1	0.43	0.45	4.5%	< 0.01	100%		120%				89%		130%
1-Methylnaphthalene	68644	W-MS1	0.36	0.38	5.4%	< 0.05	100%		120%				73%		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%		130%				84%		130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%		130%				90%		130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%	- 100	101%		120%				83%		130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%		120%				82%		130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%				89%	60%	130%

#### AGAT QUALITY ASSURANCE REPORT (V1)

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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:

	Т	race	Orga	anics	Ana	lysis	(Cor	ntinu	ued	)					
RPT Date: Jan 29, 2018			С	UPLICAT	E		REFEREN	ICE MAT	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER						Method Blank	Measured		otable nits	Recovery	Lin	ptable nits	Recovery	Lin	ptable nits
		ld					Value	Lower	Upper	,	Lower	Upper	,	Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated us	sing raw analyt	tical data a	and not the	e rounded d	luplicate v	values repo	orted.					
Volatile Organic Compounds in	Water											
Chloromethane	68658 90	025583	<1	<1	NA	< 1	98%	80%	120%	105%	70%	130%
Vinyl Chloride	68658 90	025583	<1	<1	NA	< 1	98%	80%	120%	112%	70%	130%
Bromomethane	68658 90	025583	<1	<1	NA	< 1	97%	80%	120%	83%	70%	130%
Chloroethane	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	99%	70%	130%
Trichlorofluoromethane	68658 90	025583	<1	<1	NA	< 1	99%	80%	120%	104%	70%	130%
Acetone	68658 90	025583	10	<10	NA	< 10	100%	80%	120%			
1,1-Dichloroethylene	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	111%	70%	130%
Dichloromethane	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	104%	70%	130%
2-Butanone (MEK)	68658 90	025583	<10	<10	NA	< 10	100%	80%	120%			
trans-1,2-Dichloroethylene	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	105%	70%	130%
1,1-Dichloroethane	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	104%	70%	130%
cis-1,2-Dichloroethylene	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
Chloroform	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	103%	70%	130%
1,2-Dichloroethane	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	102%	70%	130%
1,1,1-Trichloroethane	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	101%	70%	130%
Carbon Tetrachloride	68658 90	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	99%	70%	130%
Benzene	68658 90	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	70%	130%
1,2-Dichloropropane	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	105%	70%	130%
Trichloroethene	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	102%	70%	130%
Bromodichloromethane	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	100%	70%	130%
trans-1,3-Dichloropropene	68658 90	025583	<1	<1	NA	< 1	102%	80%	120%	106%	70%	130%
4-Methyl-2-pentanone (MIBK)	68658 90	025583	<10	<10	NA	< 10	101%	80%	120%			
cis-1,3-Dichloropropene	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
1,1,2-Trichloroethane	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	105%	70%	130%
Toluene	68658 90	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	70%	130%
Dibromochloromethane	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	103%	70%	130%
1,2-Dibromoethane	68658 90	025583	<0.3	<0.3	NA	< 0.3	101%	80%	120%	106%	70%	130%
Tetrachloroethylene	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	85%	70%	130%
1,1,1,2-Tetrachloroethane	68658 90	025583	<1	<1	NA	< 1	101%	80%	120%	99%	70%	130%
Chlorobenzene	68658 90	025583	<1	<1	NA	< 1	100%	80%	120%	100%	70%	130%
Ethylbenzene	68658 9	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	100%	70%	130%
m&p-Xylene	68658 9	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	100%	70%	130%
Bromoform	68658 9	025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
Styrene	68658 9	025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%	100%	70%	130%
1,1,2,2-Tetrachloroethane	68658 9	025583	<0.8	<0.8	NA	< 0.8	100%	80%	120%	101%	70%	130%
o-Xylene	68658 9	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	101%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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70% 130%

70% 130%

70% 130%

70% 130%

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100%

99%

99%

### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

AGAT WORK ORDER: 18N304491

F4 (C34-C50)

Toluene - d8

Bromofluorobenzene

Dibromofluoromethane

SAMPLING SITE:								SAMP	LED B	Y:					
		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Jan 29, 2018				UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	1.00	ptable mits	Recovery	l lie	ptable
		ld		·			Value	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 u	ısing raw ana	alytical data	and not the	e rounded (	duplicate	values rep	orted.								
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%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

W-MS1

68649 9025003

68649 9025003

68649 9025003

4610

93

103

98

4680

96

106

98

68644

	(Canister) -ug/m3													4.4007
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%

1.5%

3.2%

2.9%

0.0%

102%

100%

99%

99%

80% 120%

70% 130%

70% 130%

70% 130%

Dichlorodifluoromethane 1

**AGAT** QUALITY ASSURANCE REPORT (V1)

< 1.0 0.0% < 1.0 30% 140% 1,2-Dichlorotetrafluoroethane 30% 140% 1 < 1.4 < 1.4 0.0% < 1.4 138% 60% 140% 122% 50% 140% NA 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:

5, 1111 21112								J, (IVII							
		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Jan 29, 2018				UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		eptable mits Upper	Recovery	1 1 1:	ptable nits Upper	Recovery	l lie	ptable nits Upper
Chloromethane	1	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%		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%

AGAT QUALITY ASSURANCE REPORT (V1)

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AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

ERVICES CANADA AGAT WORK ORDER: 18N304491
ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

	7	Гrасе	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Jan 29, 2018 DUPLICATE REFERENCE MATERIAL METHOD BLANK SPIKE MATRIX SPIKE															
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		otable nits	Recovery	Lin	ptable nits	Recovery	Lin	ptable nits
		la la		'			Value	Lower	Upper	]	Lower	Upper		Lower	Upper

Certified By:

Ander Cernonl



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

SAMPLING SITE:								SAIVIP	LED R	۲:					
				Wate	er Ar	nalys	is								
RPT Date: Jan 29, 2018			С	UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		ptable nits	Recovery		ptable nits
		la la	,	·			Value	Lower	Upper	ĺ	Lower	Upper	ĺ	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%		110%	99%		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%		110%			
Titanium Dissolved	9025583		1.8	1.7	NA	< 0.5				100%		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%		101%		110%			
Zinc Dissolved	9025583		7	7	NA	< 2	105%		110%	102%		110%			
Zirconium Dissolved	9025583		0.2	0.2	NA	< 0.1	/ 0		, 0	99%		130%			
	502000		~· <b>-</b>	٠.ــ						00,0	, .	. 55 70			

AGAT QUALITY ASSURANCE REPORT (V1)

Chloride in Water Chloride

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

0.21

0.21

9014203

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NA

< 0.05

99%

90% 110%

96%

90% 110%



### **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			С	UPLICAT	E		REFEREN	ICE MAT	ERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPII	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Accep Lim		Recovery	Lin	ptable nits	Recovery	Lin	ptable nits
. ,		ld					Value	Lower	Upper		Lower	Upper			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

		9 === =	T
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



### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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

### **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
Trace Organics Analysis		Madifications BOMOTA And	
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
		Modified from BC MOE Lab Manual	

### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

		• • • • • • • • • • • • • • • • • • • •	
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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

	SAMPLED BY:	
AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
		GC/MS
ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
	ORG-180-5133 ORG-180-5134 ORG-180-5134 ORG-180-5134 ORG-180-5134 ORG-180-5133 ORG-180-5134 ORG-180-5133 ORG-180-5134 ORG-180-5133 ORG-180-5134 ORG-180-5134 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5103 ORG-180-5103 ORG-180-5103	AGAT S.O.P         LITERATURE REFERENCE           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (EPH)

### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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

### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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

### **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



### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491

ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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

### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

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



### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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

### Golder Associates

### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04306 page 1 of

Asso	ciates	i.			ct Number:	657	701	1600	20				La	boratory Nam	97			
200 – 2920 Virtual Wa					Title: 19	Fiele	17	nu	Golder	Contac	B	ria.	Ad	dress:	006	2/0./		Pku
/ancouver, British Co Telephone (604) 296-	4200 Fax (	da V5M 00 604) 298-5	C4 5253		er E-mail Add		older.c	Golde om Kons	r E-mail Addre	ss 2:			Те	ephone/Fax:		1	Contac	
Office Name:	anci	Duve			EQu	IS Facility C								Analyses Red	quired	JANI	is exi	079
Turnaround Time: Criteria: ☐ CSR	24 hr	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr ty ☐	Other		Regular	(5 Days)	SIS		#0					(e)	
Note: Final Report	ts to be issue	d by e-mai	I		Quote No	).:				ntaine	UPH	HE 144/194					T abov	ACMT
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sampl Type (over	Code	Related SCN (over)	Number of Containers			VOCS				RUSH (Select TAT above)	Remarks (over)
The second secon	KM-MW18-10	1100	03-05	Soil	20/01/18	12:50	Disce	ē		2								9024921
- 02	1	2 MA)	2.0-2.5			1310				4								923
- 03		3784	35-40		1	13:20				4								975
- 04		4 411	5.5-6.0			13:40				4	X	X						926
- 05		5#	7.0-7.5		ł	14:00				4								977
- 06		64	85-9.0			14:20				2								47-3
- 07	V	77	10.1-10.6			14:50				4								979
- 08	KM-HW18-10S	1	55-6,6			16:00		FOA	04306-09	4								970
- 09			5.5-6.0		V	16:00		FD	04306-08	4								981
- 10						14			1 1									
- 11					7													10
V - 12				V			V											
Sampler's Signature:	1		11	Tora	Signature	7_		Idon	Date 2)_/	011	18		1:45	Received	by Sign	nature	Cor	npany +6AT
Comments: Invarce	Davi	,		of Shipme	nt:	-61	Waybi	il No.:	en.		Rece	eved for	tab by	Ju	Date		1	Time 50
Invoice Osqui	Horz	e	Shipped	by:			Shipm Seal In	ent Conditi ntact:	on:		Tem	(°C)	Cooler	opened by:	Date			Time
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WHITE: Golder Copy YELLOW: Lab Copy

### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04305 page 2 of 5

GO ASSO	lder ciates			Projec	ct Number:	573	709/	600	0					Labor	ratory Na	me:	I		
200 – 2920 Virtual Wa Vancouver, British Ço	ау		~/ ·	Short	C19	Reme	diat	ion	Golder	0 0		ier		Addre	2/	00	G-140	hom ?	Kuya 1
Telephone (604) 296-					r E-mail Add		older.cor		E-mail Addre		@g	older	.com	Telep	hone/Fax	E TZ -	400	Conta	ct: Smire Galandes
Office Name:	n COUV	cr			EQui	IS Facility C	ode: 2	4433	859					An	alyses R	eguirea		23 ax1	
Turnaround Time Criteria: ☐ CSR	: 24 hr	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr			Regular (	5 Days)	S.	H							(e)	<b>,</b>
Note: Final Repor	ts to be issued	by e-mai			Quote No	0.;				ntaine	1 189	4						AT above)	ĮŽ.
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	ган/нан	STEX/VPH	METALS					RUSH (Select TAT	Remarks (over)
M305 - 01	K19-MW18-19	7	0-7.6	50	19/01/18	14:20	Discrete			4	X	X							984
- 02	1	9	6-9-1			14:30				4	7 - 4 -								9.86
- 03	4	10-	1-10-6		J	15:00				2									987
- 04	K19-11WB09	1	0.305		20/01/18	10:10				2			凝						988
- 05	1	2	20-25			10.20				4									989
- 06		3	3540			10:30				4									990
- 07		4	5.0-5.5			10:50				4	X	X	Mr.			-			992
- 08		5	70-15			11:10				2				ý_					993
- 09		6	8.5-9.0			11:40				4									994
- 10	1	7	10.0-105			12:00	V	*		4									495
<sub>7</sub> -11	K19 - AF6	V-arco	0.45			1200				1									945
V - 12	KI9-FECIO	forkfil	0,30	V	V	1300				2									997
Sampler's Signature:		2		The second	Signature	-	Compar	1 de	Date 22/6	21/16		Tim	701-6	4		ed by:	Signature	Co	ompany A
Comments:	e Dav	13	Method	of Shipme	ente		Waybill	No.:		. 1.0	Red	Pived	for la	b by	du	Da	ate T		Time 956
Frivoi	Lorpe	_	Shipped	by:			Shipmer Seal Inta	nt Conditio	on:		Ten	T/°C	) Co	ooler op	ened by:	Da	ate		Time
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## Golder Golder

### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

13/ 304 ay
No. 04304 page 305

Asso	ciates			100	/	65 7	409	160	100				Lab	A (	AT			1
00 – 2920 Virtual Wa				Short	Title:	Epla	1		Golder (	Contac	t:		Add	ress:				
ancouver, British Co	lumbia, Canad	da V5M 00	04	Golde	r E-mail Add	ress 1:	In	Colda	E-mail Addres		Brien		10		20 G	donly	2m 8	ky
elephone (604) 296-	4200 Fax (6	504) 298-5	5253		ha brie		older.cor		E-mail Addres		@gold	er.cor		phone/Fax:	7-	York	Contac	time Galando
Office Name:		- 1								100			1.7	7.0-75	-	1207	_	
	ancou	Nev			EQu EQu	IS Facility C	ode: 2	34338	85 9				A	nalyses Rec	uired		23 or	10:19
Turnaround Time: Criteria: CSR	24 hr ☐ CC	ME	☐ 48 hr ☐ BC Wa	ater Qualit	72 hr	Other	X	Regular	(5 Days)	S	H						(e)	
Note: Final Repor	ts to be issued	l by e-mail			Quote No	).:				Number of Containers	PH/PAH	-	,				TAT above)	4
										f Co	出出	1	Ś				ct TA	
Sample Control	Sample	Sa. #	Sample Depth	Sample Matrix	Date Sampled	Time Sampled	Sample Type	QAQC Code	Related SCN	per c	PH/HE			¥ .			(Select	Remarks
Number (SCN)	Location		(m)	(over)	(D / M / Y)	(HH:MM)	(over)	(over)	(over)	Num	LEA	-/	-				RUSH	(over)
1430+ - 01	K19-MW18-	b7 48	3.5-4.0	Soil	18/01/18	15.00		40A	04304-02	4	XX	/						943
- 02		1834	3,5-4,0			15:00		FOA	M314-01	4								6000
- 03	-	LM505	50-65		V	1545		40	01201 01	U							-	522
- 04		65	6.5-70		19/01/19	1009:40		- 91		4								152 U
- 05		748	8.0-8.5			10:00				2								5005
- 06	V	有公	9.5-10.0		V	10:45				4								5009
- 07		9	4550			12:10		FOA	04304-08	4								5010
- 08		9	45-50	-	V	12:10		FD	04304-07	4								5011
- 09	K12- HU8-08		03015			3:15		1 10		3		X						5012
- 10		2	20-25			13:36				4								5013
- 11		3.	3.5.40			13:45				4	*							(014
- 12		4	5.0-55	V		14:00				4							100	5515
ampler's Signature:	7.		Relinquis	shed by:	Signature		Compan	The second second	Date		Т	me		Received	by: Sig	gnature	Cor	npany
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### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

19N324497 No. 04316 page 4 of 5

HASSO	lder ciates				t Number:	165	770	9/	6000	1			La	porator	Name	e: A	6AT			
00 – 2920 Virtual Wa ancouver, British Co elephone (604) 296-	ay Iumbia, Canad	da V5M 0C			r E-mail Add	ress 1:	elder.com	Golder	E-mail Addres	ss 2:	0'5		Te	dress: lephone	IZ c	52-	600	Contact Yu	snine but	) Cia
Office Name:	1/mic	مارو		7.	EQu EQu	IS Facility C	ode: <u>28</u>	433	859		1	-		Analys						
Turnaround Time Criteria: CSR	: ☐ 24 hr <b>∑</b> CCI		☐ 48 hr ☐ BC Wa	ater Qualit	☐ 72 hr	Other	X	Regular (	5 Days)	ers.	F2	X			Salver			(ev		
Note: Final Repor	ts to be issued	by e-mail			Quote No	).:				Containers	/k1	5		J.	1 Sol			AT above)		
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 Co	CWS PH	VOCS/VE	Hexare	Naph	hlarinal	A	CAT	RUSH (Select T	Remarks (over)	
04316-01	M1-3V18	-04		SV	19/01/18	and the same of th					X	X \	XX	X	X		03	2_	fart - 24"	
- 02	KIG-MWB	-02			70=70	#:35	15:02	*		-1	X	XX	X	X	X		03	-	Start: -25.5	-11
- 03	K19-541	8-03				16.48		FDA	04316-01	1							03		Start . 25%	11
- 04	"			V	1	16:37-		FD	04316-03								03	9 -	fort: 251 Find: 35	
- 05										-			1	ļ						
- 06	K19-SUI	8-05			21/01/18	1				1	X	X	$\times$	X	X		04		start: -210"	7
- 07	K19-5V1	8-10%				14 40 - 14 48					X	X	$\langle \rangle$	X	X	ľ	o h		Start: -27" End: -3"	
- 08	K19-5V15		Je.	J	1	16:07-		_ 1		1-	X	X	X	X	X		04		Start: -26" End: -4"	
- 09	\\\.	, E	-					[											4	
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- 12		1						D	SHO .						L.,		. 1	A		
Sampler's Signature:	3	38	1	Hard	Signature		Compan	de	Date 22/01	1/19	7	Time	145	Re	ceived	by: Si	gnature	Co	mpany.	
Comments: Twoid Dwc 0	10 × 200	A	Method	of Shipme	ent:	-	Waybill I	No.:			Rece	eived fo	Labby	A	m	Date	9		Time SD	
Dave 0	Syntwell		Shipped	by:			Shipmer Seal Inta	nt Conditio	oni		Tem	f°C)	Cooler	opene	d by:	Date	9		Time	- 1
7 14												6.10							lulio:	

## Golder Associates

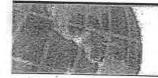
CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Project Number:

No. 04319 page Sof 5

Associates		1657709	1/6000			Laborato	GAT		
200 – 2920 Virtual Way	Short Title:	Field	lm/	Golder Cont	act: O'Bre	Address:		al - ( -	int .
Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253	Golder E-mail Add	dress 1:	Golder E	-mail Address 2		Tolophon	-4600 (S	Contact:	PKW
Office Name:	enno obrie	@golder	r.com kona	ne_dion-los	lair@golder		452.4009	Ya5v	Mne Gali
Vancouvel	EQu	IS Facility Code:	28433	859	0				
Turnaround Time: 24 hr 48 hr	EQu	IS upload: 🗵			3	T Analys	es Required	9A 23 ex10	20
Criteria: CSR CCME BC Wate	72 hr er Quality	Other	Regular (5	Days) ν	1	T .			
Note: Final Reports to be issued by e-mail	Quote No		(1-12	ai ne	I Te	モン		above	AGA T Semple ED
		(0,3		Cont	0	HA	1	TAT	sample
Sample Control Sample S			nple QAQC	Related	3 5	田文了	4	eect	DO
Location	Matrix Sampled over) (D / M / Y)	Sampled Tyl		Related SCN (over) Number of Containers	Dissolved BTEX/V	MULEPH WOCS	17 17	RUSH (Select TAT above)	Remarks
	(0,111,1)	(TITT-MINE)	ver) (over)	(over)	0 00	S 0 >	47	RUS	(over)
09319 - 01 KI9 HW18 OL 10 W	y 61 24/61/18	15:47 GRY	AB		XX	XXX	XX		1059
- 02 KI9-MNTB-02 11.3	4	13-11	7		XX	XXX	VV		062
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- 05						X X	X		069
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Page 49 of 51



# AGAT Laboratories

### SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping	T
	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: GOLDER	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $\frac{14+14+5=-14}{}$ C 2(Bottle/Jar) $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$
Waybill#	3 (Bottle/Jar) + + Suma C 4 (Bottle/Jar) + + Suma C
	5 (Bottle/Jar) $-1/+9+1/0=1/0$ °C 6 (Bottle/Jar) $+ + = 0$ C
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar) + + = 0°C 8 (Bottle/Jar) + + = 0°C
Custody Seal Intact: Yes NA NA	9-(Bottle/Jar) + + = 0°C 10 (Bottle/Jar) + + = 0°C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	Workorder No: Samples Damaged: Yes No If YES why? No Bubble Wrap Frozen Courier Other: Account Project Manager: above issues: Yes No Whom spoken to: CPM Initial General Comments:
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	



### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 13N 30 hu9

Received From:COUVIEW	Waybill #::
SAMPLE QUANTITIES: Coolers: Containers: ?	
TIME SENSITIVE ISSUES: Earliest Date Sampled: Jan 18, 2, 15	ALREADY EXCEEDED? Yes No
(1) \[ \left( + \frac{1}{2} = \left( \color	each cooler: (record differing temperatures on the CoC next to $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 5 \text{ °C}$ $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 6 \text{ °C (4)}$ $= \frac{6 \text{ °C (4)}}{4} = 6 \text{ °$
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	Date and Time:
Additional Notes:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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 (V3)

Page 1 of 21

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

					Arsenic ii	n Soil		
DATE RECEIVED: 2018-01-24								DATE REPORTED: 2018-03-01
	S	AMPLE DES	CRIPTION:	04302-01	04302-03	04302-10	04302-12	
		SAMI	PLE TYPE:	Soil	Soil	Soil	Soil	
		DATE S	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

SAMPLING SITE:

Certified By:

Angela Bend

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

http://www.agatlabs.com

TEL (778)452-4000 FAX (778)452-4074



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

			Public	Works Metals in Soil
DATE RECEIVED: 2018-01-24				DATE REPORTED: 2018-03-01
Parameter	S Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04303-04 Soil 2018-01-18 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 Bend



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18V304890 PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

				Public	Works Metals in Soil
DATE RECEIVED: 2018-01-24					DATE REPORTED: 2018-03-01
	S	AMPLE DESC	CRIPTION:	04303-04	
		SAME	PLE TYPE:	Soil	
		DATE S	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	
pri 1.2	pri units		0.00	3.93	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9027736 Results are based on the dry weight of the sample

Certified By:

Angela Bend



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

### Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-24							[	DATE REPORTE	ED: 2018-03-01	
	5	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:

ander Cerrorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 086 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

		Pu	ıblic Works	LEPH/HEPH in Soil	Low Level				
DATE RECEIVED: 2018-01-24						ı	DATE REPORT	ED: 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:

Andre Cernorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

SAMPLING SITE.					SAIVIFLED DT.
		Pt	ıblic Work	s 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:

Ander Cernorl



AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

SAMPLED BY:

ATTENTION TO: Erin O'Brien

		Pι	ıblic Work	s LEPH/HEF	PH 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	

RDL - Reported Detection Limit; G / S - Guideline / Standard Comments:

9027725 Results are based on dry weight of sample.

SAMPLING SITE:

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:

ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18V304890

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

RTEX / V/PH (C6-C10) Soil

			БП	EX / VPH (C	6-C (U) SUII					
DATE RECEIVED: 2018-01-24							Ι	DATE REPORTI	ED: 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:

SAMPLING SITE:

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:

ander Cerrol

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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TEL (778)452-4000 FAX (778)452-4074



### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

AGAT WORK ORDER: 18V304890 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

						alysis									
RPT Date: Mar 01, 2018				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		ptable mits	Recovery		ptable nits
		ld		- 44			Value	Lower	Upper		Lower	Upper		Lower	Uppe
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%		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		0.02	0.01	NA	< 0.01	96%	70%	130%	110%		110%			
Molybdenum	9027736	9027736	1.2	1.3	11.8%	< 0.2	108%	70%	130%	102%		110%			
Nickel	9027736		9.4	10.2	8.4%	< 0.5	110%	70%	130%	106%		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		0.2	0.3	NA	< 0.1				103%		110%			
Silver	9027736		<0.5	<0.5	NA	< 0.5	127%	70%	130%	106%	90%				
Sodium	9027736		60	60	0.0%	< 5	126%	70%	130%	97%		110%			
Strontium	9027736		22	24	9.6%	< 1	125%	70%	130%	105%		110%			
Thallium	9027736	9027736	0.2	0.2	NA	< 0.1	117%	70%	130%	108%	90%	110%			
Tin	9027736		0.4	0.4	NA	< 0.2	105%	70%	130%	105%		110%			
Titanium	9027736		63	71	10.6%	< 1	99%	70%	130%	96%		110%			
Uranium	9027736		0.5	0.5	NA	< 0.2	107%	70%	130%	107%	90%				
Vanadium	9027736		37	40	6.4%	< 1	116%	70%	130%	105%		110%			
Zinc	9027736	9027736	41	42	2.2%	< 1	110%	70%	130%	103%	90%	110%			
Zirconium	9027736		0.6	0.3	NA	< 0.1	102%	70%		99%		110%			
pH 1:2	9027736		5.95	5.96	0.2%	~ U.1	98%		110%	99%		105%			
Comments: RPDs are calculated	using raw anal	ytical data	and not the	e rounded	duplicate v	/alues rep	orted.								
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%		110%	99%		105%			

AGAT QUALITY ASSURANCE REPORT (V3)

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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

ATTENTION TO: Erin O'Brien

AGAT WORK ORDER: 18V304890

SAMPLING SITE: SAMPLED BY:

Soil Analysis (Continued)															
RPT Date: Mar 01, 2018				UPLICAT	E		REFEREN	ICE MAT	ERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER Batch Sample Dup #1 Dup #2				RPD	Method Blank	Measured	Accep Lim		Recovery	Lir	ptable nits	Recovery	Acceptable Limits		
		ld		i i			Value	Lower	Upper	,	Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

Angela Bend



### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

AGAT WORK ORDER: 18V304890 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Public Works LEPH/HEPH in Soil Low Level   Naphthalene				Trac	e Org	ganio	cs An	alysi	S							
PARAMETER Batch Batch PARAMETER Batch Bat	RPT Date: Mar 01, 2018				UPLICATE	Ē		REFEREN	ICE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
Public Works LEPH/HEPH in Soil Low Level  Naphthalene	DADAMETED	Ratch		Dup #1	Dup #2	PDD					Pacayary			Pacayary		
Naphthalene	TANAMETER	Dateir	ld	Бир #1	Dup #2	IN D		Value	Lower	Upper	recovery	Lowe	r Upper	Recovery	Lower	Upper
2-Methylnaphthalene	Public Works LEPH/HEPH in Soi	l Low Lev	el													
Heltphylaphthalene	Naphthalene	68656	9027763	0.006	0.013	NA	< 0.005	102%	80%	120%				98%	50%	130%
Acenaphthylene 6865 9027763	2-Methylnaphthalene	68656	9027763	0.006	0.012	NA	< 0.005	99%	80%	120%				93%	50%	130%
Acenaphthene 6865 9027763	1-Methylnaphthalene	68656	9027763	0.006	0.011	NA	< 0.005	100%	80%	120%				98%	50%	130%
Fluorene   8865   9027763																

### AGAT QUALITY ASSURANCE REPORT (V3)

Page 12 of 21

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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18V304890 ATTENTION TO: Erin O'Brien

SAMPLED BY:

	Trace Organics Analysis (Continued)														
RPT Date: Mar 01, 2018				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Lir	ptable nits	Recovery	Lin	ptable mits
		ld					Value	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 I	Low Lev	el										
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%
Danza (a) anthra anna	00000	0000000	.0.00	.0.00	NIA	. 0. 00	000/	000/	4000/	000/	000/	1200/
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:

Andre Cernonl

AGAT QUALITY ASSURANCE REPORT (V3)

Page 13 of 21



### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

AGAT WORK ORDER: 18V304890 ATTENTION TO: Erin O'Brien

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



### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18V304890 ATTENTION TO: Erin O'Brien

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

### **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

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



## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: K19 Field Inv 1657709-6000

AGAT WORK ORDER: 18V304890 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 No. 04302 page for 3

Golder Associates
-------------------

200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4

Project Number: 65 7709/6000	Laboratory Name: JAN 24 av 10:42
KIG Field INV Frin O'Brien	Address: 120-4600 Glanlyon Pkway
Golder E-mail Address 1: Golder E-mail Address 2: @golder.com	Telephone/Fax: Contact:

Telephone (604) 296	-4200 Fax (	604) 298-5	5253		h-o br		older.cor		E-mail Addre		@golder	.com Tele	phone/Fax:	778-4	152-400K	Vasa Vasa	min Coalunda
Office Name:    Couver   EQuis Facility Code: 28433859										+			nalyses Rec				i i
Criteria: CSR	: ☐ 24 hr ☐ CC	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr ity ☐	Other	×	Regular (	5 Days)	9.TS	世界					ve)	4
Note: Final Repor	ts to be issued	d by e-mai	I		Quote No	).:				ontain	NP14					4T above)	
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	STEX/V					RUSH (Select TAT	Remarks (over)
04302 - 01	K19-MW18-02		0.3-0.5	Soil	17/01/17	10:20	Discret			2						k	PITTEOF
- 02		2	25-3.0	)		10:30				2							723
- 03		3	4.8-53			10:50				2							724
- 04		4	65-712			11:20				4	XX						725
- 05		5	85-90			12:00				4							726
- 06		6	10.0-10.5			12:30				4							727
- 07	V	7	11.5-120			13:20				2						Ī	728
- 08	K19-518-03	l l	25-30			14:40				2						1	729
- 09	pa	7,	4853		1	maral Co	7			4						Ī	7
- 10	K19-SV18-03		4.8-5.0			15:00				4							730
- 11	K19-5418-04		2.0-2.3			15:45				2						T	731
- 12		2	3,8-4,2	J		16:00	V			2							V 732
Sampler's Signature:	4		1/2	Tur	Signature		Compar	ly Ida	Date - 18/0/	112	Tim /	e 1:00	Received	by: Signa	ature	Com	ipany
Comments: ————————————————————————————————————	Dave			of Shipme	int		Waybill	No.i	( 2 )		Received	for Lab by:	Lu	Date			Time
Throice L Osgust	lorpe		Shipped	by:			Shipmer Seal Inta	nt Condition	on:		Temp (°C	Cooler o	pened by:	Date			Time

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YELLOW: Lab Copy

18/304890

No. 04303 page 2 of 3

TOX 50 010142

CAR C.H.	CHAIN OF CUSTODY RECORD/AN	NALYSIS REQUEST
Golder Associates	Project Number: 7709 6000	Laboratory Name:
200 – 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4	KIGH FALL TIME	Folder Contact: Address: 4600
	Golder E-mail Address 1: Golder E-mail	Address 2: Talanhana/Fave

200 – 2920 Virtual W Vancouver, British Co		da V5M 00	24	Short	KIG		16 -	Inu.		In C	by	ien	Add	dress: 4600	,	Color	1/0	1kn
Telephone (604) 296	-4200 Fax (	604) 298-5	5253	100000000000000000000000000000000000000	er E-mail Add		older.cor		E-mail Addres		@g	older.c	om 7	ephone/Fax:	2 4		Contac	
Office Name:  Vancouvev  EQuis Facility Code: 28433851  EQuis upload:											A	nalyses Re	quired					
Turnaround Time Criteria: CSR		ME	☐ 48 hr ☐ BC Wa	ater Quali	☐ 72 hr ty ☐	Other	3	Regular (	5 Days)	S.		PAT					ve)	
Note: Final Repor	rts to be issued	by e-mail			Quote No	D.:				ntain	士		4				AT above)	
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	STEX /UPH	<u>-</u>	Z				RUSH (Select TAT	Remarks (over)
	KM-SN18-05	1	0.3-25	Soil	18/01/18	10:10				4								9027733
- 02		2	1.3-1.5			10:15				4								1 734
- 03	V	3	2.2-2.5			10:40				4								735
- 04	K17-MU18-06		0.3-05			11:20				3		<b>&gt;</b>						736
- 05		2	15-20			11:40				4								737
- 06		3	30-35			11:50				4	X	X						738
- 07		4	5.0-5.5			12:10				4								739
- 08		5	70-7.5			12:30				4								740
- 09		6	85-90	7		13:00				2								741
- 10	V	7	10.0-10.6			13:30				2								742
The state of the s	KI9MWHC07		1.3-0.5			15:00				2								743
<b>V</b> - 12	1	2	20-25	V	V	15:15				4								V151
Sampler's Signature:		2	- Ac	84	Signature		Compar	Company Date Time 19:1				0	Received	d by: Si	gnature	Cor	mpany	
Comments:	1,00		Method	of Shipme	ent:					Received for Lab by:   Date						Time		
Dave C	25gutho	pe	Shipped	by:			Shipmer Seal Inta	nt Conditio	on:		Tem	ip (°C)	Cooler	opened by:	Date	9		Time

WHITE: Golder Cor YELLOW: Lab Copy

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST No. 04315 page 3



200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4

Project Number:	657709	16000	Laboratory Name:	1
	geld Inv	Golder Contact:	Address: 120-4600 Glentras DKn 8	N
Golder E-mail Address 1		der E-mail Address 2:	Telephone/Fax: Contact:	
enu-obner	@golder.com	man & dian-belait @golder.co	om 778-4524008. Jusime Calinda	

Telephone (604) 296	-4200 Fax (6	504) 298-5	5253	21	14-0'50	en @go	older.cor	n /Lour	nuc_dian-1	belai	(@g	older.	com	778-	152	400	8.	Jush	me Calindo
Office Name:    Code: 28433859   EQuil Service   Code: 28433859   EQUIL Service   Code: 28433859   Code: 2843389   Code: 284389   Co																			
Turnaround Time Criteria: CSR		ME	☐ 48 hr ☐ BC W	48 hr						SLS	PAH	+		ilalyses	tequiit			(e)	
Note: Final Repor	rts to be issued	by e-mai			Quote No	).;				Containers	HEDNI/MAH	COT					C,	AT abov	
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 Co	LEPH/HD	1 +318					Hoc	RUSH (Select TAT above)	Remarks (over)
	K19-TP18-	- 13	0.5	80	18/01/18	1020	GRAB			4	X	X					X		9027753
- 02		*	1.5			1045	}	FDA	04315-03	4	X	X							1 754
- 03			2.5			1	· 11.	FO	04315-02	1	4	4							755
- 04			7.5			1100	45		1002	Ц	Ť	1							758
- 05			3.2			1170				乙									760
- 06	140-000	111				1750				11							X		761
- 07	KIGTPIS	-19	0.5			7				4									762
- 08						1320				4	X	X						Fig. 1	
- 09			7.5			1345				4	X	$\times$							763
- 10	V		3.0	- U		1430				4	X.	X	35 18/	01/10	5-	-		_	1764
- 11																			
- 12								t.											
Sampler's Signature:	4	4		shed by:	mAZ		Compan		Date /8/01	//	R	Time 19	a	Recei	/ed by:	Signat	ture	Con	npany
Comments:			Method	of Shipme	nt:		Waybill I	No.:				eived fo	or Lab by:	( Da	10	ate			Time
BUL							Shipmer Seal Inta		dition: Temp (C) Cooler opened by: Date					Time					
	/						Sear inte	101.											

WHITE: Golder Copy YELLOW: Lab Copy



#### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18V304890

Received From: COULTE	Waybill #:
Sample Quantifies: Coolers: Containers:	06
TIME SENSITIVE ISSUES: Earliest Date Sampled: 17- JAN - 1	ALREADY EXCEEDED? Yes No
cumple in of use jais when available	each cooler: (record differing temperatures on the CoC next to $S = 3 \cdot c$ (3) $4 + 4 + 3 = 4 \cdot c$ (4) $4 + 4 + 6 = 6 \cdot c$ do
Account Project Manager: Whom spoken to:	have they been notified of the above issues: Yes No Date and Time:
Additional Notes: One cooler has c	ustody seal-intact

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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
ERSION 2: Sample receipt temperature 5°C.
ersion 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 1st, 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 (V2)

\*NOTE O

age i oi si



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

SAMPLING SITE:				SAMPLED BY:								
	Public Works Metals in Soil											
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-02-05								
	S	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:

ander Cerrol



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

Public Works Motals in Soil

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

	I ublic works wetals in son	
DATE RECEIVED: 2018-01-23		DATE REPORTED: 2018-02-05

	SA	MPLE DES	CRIPTION:	04304-09	
		SAME	PLE TYPE:	Soil	
		DATE S	SAMPLED:	2018-01-19	
Parameter	Unit	G/S	RDL	9025012	
nc	μg/g		1	58	
rconium	μg/g		0.1	0.4	
l 1:2	pH units		0.05	7.68	

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025012 Results are based on the dry weight of the sample

SAMPLING SITE:

Certified By:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

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#### Public Works LEPH/HEPH in Soil Low Level

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DATE RECEIVED: 2018-01-23							[	DATE REPORTE	ED: 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:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works LEPH/HEPH in Soil Low Level

				<u> </u>		
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.

SAMPLING SITE:

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:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

SAMPLING SITE:

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	
,2,4-Trimethylbenzene	ug/m3	6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0	
,3,5-Trimethylbenzene	ug/m3	6.0	<6.0	<6.0	15.0	<15.0	<15.0	<15.0	
,3-Butadiene	ug/m3	4.0	<4.0	<4.0	10.0	<10.0	<10.0	<10.0	
sopropylbenzene	ug/m3	3.20	<3.20	<3.20	8.00	<8.00	<8.00	<8.00	
fethylcyclohexane	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	
laphthalene	ug/m3	8.0	<8.0	<8.0	20.0	<20.0	<20.0	<20.0	
-Decane	ug/m3	5.2	15	<5.2	13.0	<13.0	210	160	
-Hexane	ug/m3	4.4	4.7	50	11.0	21	310	110	
/PHv (C>6-C13)	ug/m3	60	3000	3000	150	25000	27000	25000	
Surrogate	Unit	Acceptable Limits							
-Bromofluorobenzene	%	70-130	110	109		112	112	123	

Certified By:



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA SAMPLING SITE:

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:



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### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

BTEX / VPH	(C6-C10)	Soil
	100-010	

			ВП	EX / VPH (C	6-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:

SAMPLING SITE:

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:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### CCMF BTFX/F1-F4 (Water)

			001	VIL D I L/VI	i i i (vvator)	•	
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	
l .							

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard

SAMPLING SITE:

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.

Certified By:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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	

Certified By:

Angela Bend

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

Public Works: BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23							DATE REPORTED: 2018-02-05		
	5	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:

Angela Bend

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Public Works: BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23 **DATE REPORTED: 2018-02-05** 

Comments:

SAMPLING SITE:

RDL - Reported Detection Limit; G / S - Guideline / Standard

9025032

VOC analysis 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 analysis 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 analysis 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:

Angela Bend

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia

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CANADA V5J 0B6



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Public Works: BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23 DATE REPORTED: 2018-02-05

9025042

SAMPLING SITE:

VOC analysis 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 Bend

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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	

Certified By:

Angela Bend

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

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

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Vo	platile Organic Compounds in So	il
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			voiatile O	rganic Compounds in Soil
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-02-05
	S	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:



Bromofluorobenzene

Toluene - d8

Dibromofluoromethane

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

			Volatile O	Organic Compounds in Soil
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-02-05
	S	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		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

%

%

60-140

60-140

60-140

109

109

118

9024976 Results are based on dry weight of sample.

Certified By:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Volatile	Organic	Compounds in Water	
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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	

Certified By:



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

#### Volatile Organic Compounds in Water

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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:



Chloride

Comments:

Parameter

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

DATE RECEIVED: 2018-01-23 DATE REPORTED: 2018-02-05

SAMPLE DESCRIPTION: 04319-03
SAMPLE TYPE: Water
DATE SAMPLED: 2018-01-21
G/S RDL 9025068

mg/L 0.5 81.3

RDL - Reported Detection Limit; G / S - Guideline / Standard

Unit

Certified By:

ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works Dissolved Metals

			Public	WORKS DIS	sorved ivieta	318	
DATE RECEIVED: 2018-01-23							DATE REPORTED: 2018-02-05
		SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:	04319-01 Water 2018-01-21	04319-02 Water 2018-01-21	04319-03 Water 2018-01-21	04319-04 Water 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:

Ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Dublic Works	Dissolved Metals	
PUDIIC VVOIKS	TUSSOIVED MEIAIS	

	1 ubile Works Dissolved Metals													
DATE RECEIVED: 2018-01-23								DATE REPORTED: 2018-02-05						
	SA	MPLE DES	CRIPTION:	04319-01	04319-02	04319-03	04319-04							
		SAME	PLE TYPE:	Water	Water	Water	Water							
		DATE S	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:

Andre Cernorl



PROJECT: 1657709-6000

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

ATTENTION TO: Erin O'Brien

#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491

SAMPLING SITE: SAMPLED BY:

				Soi	l Ana	alysis	3							
RPT Date: Feb 05, 2018				DUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPIKE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		eptable mits	Recovery		eptable mits	Recovery	Acceptable Limits
FANAMETER	Dateil	ld	Dup #1	Dup #2	Krb		Value	Lower	Upper	Necovery	Lower	Upper	Recovery	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		8.0	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.

Certified By:

ander Canal

AGAT QUALITY ASSURANCE REPORT (V2)

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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:

					_		-									
RPT Date: Feb 05, 2018				UPLICATI	<b></b>		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	IX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery		ptable nits Upper	Recovery		ptable nits Uppe	
Public Works LEPH/HEPH in Soil	Low Lev	el														
Naphthalene	68653	9024976	0.678	0.571	17.1%	< 0.005	102%	80%	120%				104%	50%	1309	
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	g raw ana	lytical data	and not the	e rounded (	duplicate v	/alues rep	orted.									
Volatile Organic Compounds in Sc	oil															
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	

#### AGAT QUALITY ASSURANCE REPORT (V2)

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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 05, 2018			DUPLICATE			REFEREN	NCE MA	TERIAL	METHOD BLANK SPIKE			MAT	RIX SPI	KE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery		ptable nits Upper	Recovery	Lin	ptable nits Upper
1.1-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%		Lower	Оррог	91%		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) 70% 130% 68643 9025533 NA 80% 120% 97% < 0.1 < 0.1 < 0.1 100% Benzene 68643 9025533 < 0.02 < 0.02 NA < 0.02 99% 80% 120% 95% 70% 130%

AGAT QUALITY ASSURANCE REPORT (V2)

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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	Orga	anics	Ana	lysis	(Cor	ntin	ued	)				
RPT Date: Feb 05, 2018			Г	UPLICATE	<u> </u>		REFERE	NCE MA	TERIAL	METHOD	BLANK SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Acceptable Limits	Recovery	Lie	ptable nits
		ld		.			Value	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%		140%			113%	60%	140%
Comments: RPDs are calculated us	sing raw an	alytical data	and not the	e rounded o	duplicate	values rep	orted.							
Public Works LEPH/HEPH in Wa	iter Low Lo	evel												
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%		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%				78%	60%	130%
Benzo(j)fluoranthene	68644	W-MS1	0.53	0.53	0.0%	< 0.01	102%	80%				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%		120%			83%		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%		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%				84%		130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%	70%				90%		130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%	- 100	101%		120%			83%		130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%		120%			82%		130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%			89%	60%	130%

#### AGAT QUALITY ASSURANCE REPORT (V2)

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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:

	٦	Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 05, 2018		DUPLICATE				REFERENCE MATERIAL			METHOD	BLANK	SPIKE	MATRIX SPIKE			
PARAMETER	AMETER Batch Sample Id	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Lin	ptable nits Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated us	ing raw analyt	tical data a	and not the	e rounded d	luplicate v	values repo	orted.					
Volatile Organic Compounds in	Water											
Chloromethane	68658 9	025583	<1	<1	NA	< 1	98%	80%	120%	105%	70%	130%
Vinyl Chloride	68658 9	025583	<1	<1	NA	< 1	98%	80%	120%	112%	70%	130%
Bromomethane	68658 9	025583	<1	<1	NA	< 1	97%	80%	120%	83%	70%	130%
Chloroethane	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	99%	70%	130%
Trichlorofluoromethane	68658 9	9025583	<1	<1	NA	< 1	99%	80%	120%	104%	70%	130%
Acetone	68658 9	025583	10	<10	NA	< 10	100%	80%	120%			
1,1-Dichloroethylene	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	111%	70%	130%
Dichloromethane	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658 9	025583	<1	<1	NA	< 1	101%	80%	120%	104%	70%	130%
2-Butanone (MEK)	68658 9	025583	<10	<10	NA	< 10	100%	80%	120%			
trans-1,2-Dichloroethylene	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	105%	70%	130%
1,1-Dichloroethane	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	104%	70%	130%
cis-1,2-Dichloroethylene	68658 9	025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
Chloroform	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	103%	70%	130%
1,2-Dichloroethane	68658 9	9025583	<1	<1	NA	< 1	100%	80%	120%	102%	70%	130%
1,1,1-Trichloroethane	68658 9	025583	<1	<1	NA	< 1	100%	80%	120%	101%	70%	130%
Carbon Tetrachloride	68658 9	025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	99%	70%	130%
Benzene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	70%	130%
1,2-Dichloropropane	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	105%	70%	130%
Trichloroethene	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	102%	70%	130%
Bromodichloromethane	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	100%	70%	130%
trans-1,3-Dichloropropene	68658 9	9025583	<1	<1	NA	< 1	102%	80%	120%	106%	70%	130%
4-Methyl-2-pentanone (MIBK)	68658 9	9025583	<10	<10	NA	< 10	101%	80%	120%			
cis-1,3-Dichloropropene	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
1,1,2-Trichloroethane	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	105%	70%	130%
Toluene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	102%	70%	130%
Dibromochloromethane	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	103%	70%	130%
1,2-Dibromoethane	68658 9	9025583	<0.3	< 0.3	NA	< 0.3	101%	80%	120%	106%	70%	130%
Tetrachloroethylene	68658 9	9025583	<1	<1	NA	< 1	100%	80%	120%	85%	70%	130%
1,1,1,2-Tetrachloroethane	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	99%	70%	130%
Chlorobenzene	68658 9	9025583	<1	<1	NA	< 1	100%	80%	120%	100%	70%	130%
Ethylbenzene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	100%	70%	130%
m&p-Xylene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	100%	70%	130%
Bromoform	68658 9	9025583	<1	<1	NA	< 1	101%	80%	120%	101%	70%	130%
Styrene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%	100%	70%	130%
1,1,2,2-Tetrachloroethane	68658 9	9025583	<0.8	<0.8	NA	< 0.8	100%	80%	120%	101%	70%	130%
o-Xylene	68658 9	9025583	<0.5	<0.5	NA	< 0.5	101%	80%	120%	101%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V2)

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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	Uiga	anics	Alla	uysis				)					
RPT Date: Feb 05, 2018			DUPLICATE		Έ					METHOD BLANK SPIKE			MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lir	ptable mits	Recovery	Lir	ptable mits	Recovery	Lir	ptable nits
								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	g raw ana	alytical data	and not the	e rounded (	duplicate	values rep	orted.								
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	g raw ana	alytical data	and not the	e rounded (	duplicate	values rep	orted.								
BC Routine VOC package in Air (C	anister)	-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%		111%		140%	NA		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 (Ca	anister) -	ug/m3													
Dichlorodifluoromethane	1		< 1.0	< 1.0	0.0%	< 1.0	133%	60%	140%	138%	50%	140%	NA	30%	140%
4.0 D'ablanatates(bases of bases	1		< 1.4	< 1.4	0.0%	< 1.4	138%	60%	140%	122%	50%	140%	NA	30%	140%
1,2-Dichlorotetrafluoroethane	1		< 1.4	< 1. <del>-</del>	0.076	< 1. <del>4</del>	10070	00 /0	14070	122/0	JU /0	140 /0	INA	JU /0	1 10 /0

AGAT QUALITY ASSURANCE REPORT (V2)

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PROJECT: 1657709-6000

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

ATTENTION TO: Erin O'Brien

# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491

SAMPLING SITE: SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
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		ptable nits Upper	Recovery	1 1 1 1 1	ptable nits Upper	Recovery	Lin	ptable nits Upper
Chloromethane	1	1	< 0.60	< 0.60	0.0%	< 0.60	140%	60%	140%	137%	50%	140%	NA 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		< 2.5	< 2.5	0.0%	< 2.5	129%	60%	140%	138%	50%	140%	NA	30%	140%
1,4-Dichlorobenzene	'		1 2.0	1 2.0	,									0070	

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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

SAMPLING SITE:							9	SAMPI	LED B	Y:				
		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)				
RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD	BLANK SPIKE	MATRIX SPIKE		
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value		eptable mits Recovery		Acceptable Limits	Recovery		ptable nits
		lu					value	Lower	Upper		Lower Upper	-	Lower	Upper
Public Works LEPH/HEPH in Soi	l Low Lev	el												
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:



# **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:

				Wate	er Ar	alys	is								
RPT Date: Feb 05, 2018			DUPLICATE				REFEREN	REFERENCE MATERIAL			BLANK	SPIKE	MATRIX SPIKE		
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery		ptable
		"					Value	Lower	Upper		Lower	Upper		Lower	Uppe
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%	< 0.03	98%		110%	99%		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%		110%	103%		110%			
Lithium Dissolved	9025583		2.0	2.1	NA	< 0.5	10170	0070	11070	100%		110%			
Magnesium Dissolved	9025583		7890	7860	0.4%	< 50	103%	90%	110%	104%	90%	110%			
Manganese Dissolved	9025583		400	400	0.1%	< 1	105%		110%	104%		110%			
Mercury Dissolved	9021813		<0.01	<0.01	NA	< 0.01	99%	90%	110%	100%		110%			
Molybdenum Dissolved	9025583		1.69	1.72	1.6%	< 0.05	96%			99%		110%			
Nickel Dissolved	9025583		6.0	6.0	1.0%	< 0.2	97%	90%	110%	100%		110%			
Potassium Dissolved	9025583		5670	5700	0.5%	< 50	94%	00%	110%	97%	00%	110%			
Selenium Dissolved	9025583		1.1	1.0	NA	< 0.5	96%		110%	99%		110%			
Silicon Dissolved	9025583		4810	4830	0.3%	< 50	30 70	30 70	11070	105%		110%			
Silver Dissolved	9025583		<0.02	<0.02	0.3 % NA	< 0.02				105%		110%			
Sodium Dissolved	9025583		6320	6320	0.1%	< 50	98%	90%	110%	101%		110%			
Cturation Discalord	0005500		250	250	0.00/	.0.4	000/	000/	4400/	000/	000/	4400/			
Strontium Dissolved	9025583		350	359	2.6%	< 0.1	99%	90%	110%	99%		110%			
Sulphur Dissolved Thallium Dissolved	9025583		30900	31200	1.1%	< 500	059/	000/	1100/	104%		110%			
Tin Dissolved	9025583		0.05	0.05	0.0%	< 0.01	95%	90%	110%	97%		110%			
	9025583		0.12	0.12	NA NA	< 0.05				105%		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%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Chloride in Water

Chloride 9014203 0.21 0.21 NA < 0.05 99% 90% 110% 96% 90% 110%

AGAT QUALITY ASSURANCE REPORT (V2)

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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			D	UPLICAT	E		REFEREN	ICE MAT	ΓERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Accep Lim	ite	Recovery	Lin	ptable nits	Recovery	Lin	ptable nits
		ld	- '	- '			Value	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

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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



### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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



### 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
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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

OAWI EINO OITE.		OAIWI LLD D1.	
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

### 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
1,2-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			GC/MS
Styrene	AQM-248-16000 AQM-248-16000	EPA TO15 EPA TO15	GC/MS GC/MS
•			GC/MS GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	
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 Quinoline	AQM-248-16000 ORG-180-5133	EPA TO15  Modified from BC MOE Lab Manual Section D (PAH)	GC/MS 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

### 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
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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### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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
√PH	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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

SAMPLING SITE.		SAIVIPLED 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



### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

SAMPLED BY:

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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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



### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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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

### Golder Associates

### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04306 page 1 of

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200 – 2920 Virtual Wa					Title: 19	Fiele	17	nu	Golder	Contac	B	ria.	Ad	dress:	006	2/0./		Pku
/ancouver, British Co Telephone (604) 296-	4200 Fax (	604) 298-5	C4 5253		er E-mail Add		older.c	Golde om Kons	r E-mail Addre	ss 2:			Те	ephone/Fax:		1	Contac	
Office Name:	anci	Duve			EQu	IS Facility C								Analyses Red	quired	JANI	is exi	079
Turnaround Time: Criteria: ☐ CSR	24 hr	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr ty ☐	Other		Regular	(5 Days)	SIS		#0					(e)	
Note: Final Report	ts to be issue	d by e-mai	I		Quote No	).:				ntaine	UPH	HE 144/194					T abov	ACMT
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sampl Type (over	Code	Related SCN (over)	Number of Containers			VOCS				RUSH (Select TAT above)	Remarks (over)
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- 02	1	2 MA)	2.0-2.5			1310				4								923
- 03		3784	35-40		1	13:20				4								975
- 04		4 411	5.5-6.0			13:40				4	X	X						926
- 05		5#	7.0-7.5		1	14:00				4								977
- 06		64	85-9.0			14:20				2								47-3
- 07	V	77	10.1-10.6			14:50				4								979
- 08	KM-HW18-10S	1	55-6,6			16:00		FOA	04306-09	4								970
- 09			5.5-6.0		V	16:00		FD	04306-08	4								981
- 10						14			1 1									
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### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04305 page 2 of 5

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200 – 2920 Virtual Wa Vancouver, British Ço	ау		~/ ·	Short	C19	Reme	diat	ion	Golder	0 0		ier		Addre	2/	00	G-140	Gan 1	Kuya 1
Telephone (604) 296-					r E-mail Add		older.cor		E-mail Addre		@g	older	.com	Telep	hone/Fax	E TZ -	400	Conta	ct: Smire Galandes
Office Name:	n COUV	cr			EQui	IS Facility C	ode: 2	4433	859					An	alyses R	eguirea		23 ax1	
Turnaround Time Criteria: ☐ CSR	: 24 hr	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr			Regular (	5 Days)	S.	H							(e)	<b>,</b>
Note: Final Repor	ts to be issued	by e-mai			Quote No	0.;				ntaine	1 189	4						AT above)	ĮŽ.
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	ган/нан	STEX/VPH	METALS					RUSH (Select TAT	Remarks (over)
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- 02	1	9	6-9-1			14:30				4	7 - 4 -								9.86
- 03	4	10-	1-10-6		J	15:00				2									987
- 04	K19-11WB09	1	0.305		20/01/18	10:10				2			凝						988
- 05	1	2	20-25			10.20				4									989
- 06		3	3540			10:30				4									990
- 07		4	5.0-5.5			10:50				4	X	X	Mr.			-			992
- 08		5	70-15			11:10				2				ý_					993
- 09		6	8.5-9.0			11:40				4									994
- 10	1	7	10.0-105			12:00	V	*		4									495
<sub>7</sub> -11	K19 - AF6	V-arca	0.45			1200				1									945
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Sampler's Signature:		2		The second	Signature	-	Compar	1 de	Date 22/6	21/16		Tim	701-6	4		ed by:	Signature	Co	ompany A
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### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

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No. 04304 page 305

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00 – 2920 Virtual Wa				Short	Title:	Epla	1		Golder (	Contac	t:		Add	ress:				
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elephone (604) 296-	4200 Fax (6	504) 298-5	5253		ha brie		older.cor		E-mail Addres		@gold	er.cor		phone/Fax:	7-	York	Contac	time Galando
Office Name:		- 1								100			1.7	7.0-75	-	1207	_	
	ancou	Nev			EQu EQu	IS Facility C	ode: 2	34338	85 9				A	nalyses Rec	uired		23 or	10:19
Turnaround Time: Criteria: CSR	24 hr ☐ CC	ME	☐ 48 hr ☐ BC Wa	ater Qualit	72 hr	Other	X	Regular	(5 Days)	S	H						(e)	
Note: Final Repor	ts to be issued	l by e-mail			Quote No	).:				Number of Containers	PH/PAH	-	,				TAT above)	4
										f Co	出出	1	Ś				ct TA	
Sample Control	Sample	Sa. #	Sample Depth	Sample Matrix	Date Sampled	Time Sampled	Sample Type	QAQC Code	Related SCN	per c	PH/HE			¥ .			(Select	Remarks
Number (SCN)	Location		(m)	(over)	(D / M / Y)	(HH:MM)	(over)	(over)	(over)	Num	LEA	/	-				RUSH	(over)
1430+ - 01	K19-MW18-	b7 48	3.5-4.0	Soil	18/01/18	15.00		40A	04304-02	4	XX	/						943
- 02		1834	3,5-4,0			15:00		FOA	M314-01	4								6000
- 03	-	LM505	50-65		V	1545		40	01201 01	U							-	522
- 04		65	6.5-70		19/01/19	1009:40		- 91		4								152 U
- 05		748	8.0-8.5			10:00				2								5005
- 06	V	有公	9.5-10.0		V	10:45				4								5009
- 07		a a	4550			12:10		FOA	04304-08	4								5010
- 08		9	45-50	-	V	12:10		FD	04304-07	4								5011
- 09	K12- HU8-08		03015			3:15		1 10		3		X						5012
- 10		2	20-25			13:36				4								5013
- 11		3.	3.5.40			13:45				4	×							(014
- 12		4	5.0-55	V		14:00				4							100	5515
ampler's Signature:	7.		Relinquis	shed by:	Signature		Compan	The second second	Date		Т	me		Received	by: Sig	gnature	Cor	npany
comments:	THE		Method o	of Shipme	nt	_	Waybill I	de	12/0	7///	0 1	09:	1.00		1	LINE	AL	AGAT
4											Receive	OU	OL:	An	Date			Time (5)
4			Shipped	by:			Shipmer Seal Inta	nt Condition	on:		Temp (	C) C	ooler o	pened by:	Date			Time
						WHITE: C	older C	OF I	YELLOW: I	ah C	DDV						-	

### CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

19N324497 No. 04316 page 4 of 5

HASSO	lder ciates				t Number:	165	770	9/	6000	1			La	porator	Name	e: A	6AT			
00 – 2920 Virtual Wa ancouver, British Co elephone (604) 296-	ay Iumbia, Canad	da V5M 0C			r E-mail Add	ress 1:	elder.com	Golder	E-mail Addres	ss 2:	0'5		Te	dress: lephone	IZ c	52-	600	Contact Yu	snine but	) Cia
Office Name:	1/mic	our		7.	EQu EQu	IS Facility C	ode: <u>28</u>	433	859		1	-		Analys						
Turnaround Time Criteria: CSR	: ☐ 24 hr <b>∑</b> CCI		☐ 48 hr ☐ BC Wa	ater Qualit	☐ 72 hr	Other	X	Regular (	5 Days)	ers.	F2	X			Salver			(ev		
Note: Final Repor	ts to be issued	by e-mail			Quote No	).:				Containers	/k1	5		J.	1 Sol			AT above)		
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 Co	CWS PH	VOCS/VE	Hexare	Naph	- hlorina fo	A	CAT	RUSH (Select T	Remarks (over)	
04316-01	M1-3V18	-04		SV	19/01/18	and the same of th					X	X \	XX	X	X		03	2_	fart - 24"	
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- 03	K19-541	8-03				16.48		FDA	04316-01	1							03		Start . 25%	11
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- 06	K19-SUI	8-05			21/01/18	1				1	X	X	$\times$	X	X		04		start: -210"	7
- 07	K19-5V1	8-10:				14 40 - 14 48					X	X	$\langle \rangle$	X	X	ľ	o h		Start: -27" End: -3"	
- 08	K19-5V15		Je.	J	1	16:07-		_ 1		1-	X	X	X	X	X		04		Start: -26" End: -4"	
- 09	\(\frac{1}{2}\)	, E	-					[											4	
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Sampler's Signature:	3	38	1	Hard	Signature		Compan	de	Date 22/01	1/19	7	Time	145	Re	ceived	by: Si	gnature	Co	mpany.	
Comments: Twoid Dwc 0	10 × 200	A	Method	of Shipme	ent:	-	Waybill I	No.:			Rece	eived fo	Labby	A	m	Date	9		Time SD	
Dave 0	Syntwell		Shipped	by:			Shipmer Seal Inta	nt Conditio	oni		Tem	f°C)	Cooler	opene	d by:	Date	9		Time	- 1
7 14												6.10							lulio:	

# Golder Associates

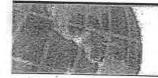
CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Project Number:

No. 04319 page Sof 5

Associates		1657709	1/6000			Laborato	GAT		
200 – 2920 Virtual Way	Short Title:	Field	lm/	Golder Cont	act: O'Bre	Address:		al - ( -	int .
Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253	Golder E-mail Add	dress 1:	Golder E	-mail Address 2		Tolophon	-4600 (S	Contact:	PKW
Office Name:	enno obrie	@golder	r.com kona	ne_dion-los	lair@golder		452.4009	Ya5v	Mne Gali
Vancouvel	EQu	IS Facility Code:	28433	859	0				
Turnaround Time: 24 hr 48 hr	EQu	IS upload: 🗵			3	T Analys	es Required	9A 23 ex10	20
Criteria: CSR CCME BC Wate	72 hr er Quality	Other	Regular (5	Days) ν	1	T .			
Note: Final Reports to be issued by e-mail	Quote No		(1-12	ai ne	I Te	モン		above	AGA T Semple ED
		(0,3		Cont	0	HA	1	TAT	sample
Sample Control Sample S			nple QAQC	Related	3 5	田文了	4	eect	DO
Location	Matrix Sampled over) (D / M / Y)	Sampled Tyl		Related SCN (over) Number of Containers	Dissolved BTEX/V	MULEPH WOCS	17 17	RUSH (Select TAT above)	Remarks
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- 05						X X	X		069
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Comments: Invoice Method of S			ybill No.:	4-10110	Received f	or Lab by:	n Date	CATI	ime/
Dave Osgethorpe Shipped by:		Ship	oment Condition:		Temp (°C)	A	V		150
			I Intact:		4	Jooder opened	by. Date		îme

Page 49 of 51



# AGAT Laboratories

### SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping	T
	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: GOLDER	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $\frac{14+14+5=-14}{}$ C 2(Bottle/Jar) $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$
Waybill#	3 (Bottle/Jar) + + Suma C 4 (Bottle/Jar) + + Suma C
	5 (Bottle/Jar) $-1/+9+1/0=1/0$ °C 6 (Bottle/Jar) $+ + = 0$ C
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar) + + = 0°C 8 (Bottle/Jar) + + = 0°C
Custody Seal Intact: Yes NA NA	9-(Bottle/Jar) + + = 0°C 10 (Bottle/Jar) + + = 0°C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	Workorder No: Samples Damaged: Yes No If YES why? No Bubble Wrap Frozen Courier Other: Account Project Manager: above issues: Yes No Whom spoken to: CPM Initial General Comments:
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	



### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 13N 30 hua \

Received From:COUVIEW	Waybill #::
SAMPLE QUANTITIES: Coolers: Containers: ?	
TIME SENSITIVE ISSUES: Earliest Date Sampled: Jan 18, 2, 15	ALREADY EXCEEDED? Yes No
(1) \[ \left( + \frac{1}{2} = \left( \color	each cooler: (record differing temperatures on the CoC next to $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 5 \text{ °C}$ $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 6 \text{ °C (4)}$ $= \frac{6 \text{ °C (4)}}{4} = 6 \text{ °$
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	Date and Time:
Additional Notes:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO 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 (V1)

Page 1 of 12

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

### 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	
,2,4-Trimethylbenzene	ug/m3	1.5	1.6	<1.5	<1.5	4.5	
,3,5-Trimethylbenzene	ug/m3	1.5	<1.5	<1.5	<1.5	1.9	
,3-Butadiene	ug/m3	1.0	<1.0	<1.0	<1.0	<1.0	
sopropylbenzene	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	
/PHv (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

SAMPLING SITE:

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.



SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

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:



5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

http://www.agatlabs.com

TEL (905)712-5100 FAX (905)712-5122



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

SAMPLING SITE: Public Works: BC VOCs in Air (Canister) - ug/m3 DATE RECEIVED: 2018-01-30 **DATE REPORTED: 2018-02-05** 04320-03 SAMPLE DESCRIPTION: 04320-01 04320-02 04320-04 SAMPLE TYPE: Air Air Air Air DATE SAMPLED: 2018-01-22 2018-01-22 2018-01-22 2018-01-24 Unit G/S **RDL** 9036418 9036421 9036422 9036423 Parameter 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 2.0 <2.0 <2.0 < 2.0 <2.0 ug/m3 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 0.9 1.2 < 0.9 < 0.9 6.2 ug/m3 1,3-Dichlorobenzene ug/m3 2.5 4.1 2.6 <2.5 <2.5 2.5 <2.5 <2.5 <2.5 <2.5 1.4-Dichlorobenzene ug/m3 1,2-Dichlorobenzene ug/m3 2.5 <2.5 <2.5 <2.5 <2.5 Total Xylenes ug/m3 2.0 <2.0 3.1 <2.0 16 Unit Surrogate Acceptable Limits 4-Bromofluorobenzene % 70-130 120 102 106 105

Certified By:



5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

http://www.agatlabs.com

TEL (905)712-5100 FAX (905)712-5122



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306644

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Prion

SAMPLING SITE: SAMPLED BY:

ATTENTION TO: Erin O'Brien

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 analysis 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 analysis 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 analysis 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.

Wind Same

Certified By:

5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO

http://www.agatlabs.com

CANADA L4Z 1Y2

TEL (905)712-5100 FAX (905)712-5122



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:

SAMPLING SITE:								SAMPL	ED B	Y:					
			Trac	e Or	ganio	cs Ar	alysi	is							
RPT Date: Feb 05, 2018			С	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	IKE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		nits	Recovery	, Lir	ptable nits	Recovery	Lir	eptabl mits
								Lower	Upper		Lower	Upper		Lower	Upp
Public Works : BC VOCs in Air (Ca	anister) - u	ıg/m3													
Dichlorodifluoromethane	1		< 1.0	< 1.0	0.0%	< 1.0	136%		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%		140%	102%	50%	140%	NA	30%	140
Chloromethane	1		< 0.60	< 0.60	0.0%	< 0.60	129%		140%	108%	50%	140%	NA	30%	140
/inyl 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		140%	140%	50%	140%	NA	30%	140
Trichlorofluoromethane	1		< 2.3	< 2.3	0.0%	< 2.3	138%		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		-10	< 1.0	0.0%	< 1.0	114%	60%	140%	104%	50%	140%	NΙΔ	30%	140
rans-1,2-Dichloroethene	1		< 1.0 < 0.80			< 0.80	100%		140%	104%	50%		NA	30%	140
1,1-Dichloroethane	1			< 0.80	0.0%							140%	NA		140
	1		< 1.2 < 0.80	< 1.2	0.0%	< 1.2	116% 106%		140% 140%	100% 100%	50% 50%	140% 140%	NA	30% 30%	140
is-1,2-Dichloroethene Chloroform	1			< 0.80	0.0%	< 0.80							NA		
Suloroioiiii	ı		< 1.0	< 1.0	0.0%	< 1.0	118%	60%	140%	103%	50%	140%	NA	30%	140
,2-Dichloroethane	1		< 0.30	< 0.30	0.0%	< 0.30	122%	60%	140%	102%	50%	140%	NA	30%	140
I,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%		140%	111%	50%	140%	NA	30%	140
rans-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
Foluene	1		< 0.80	< 0.80	0.0%	< 0.80	134%		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%		140%	105%	50%		NA	30%	
1,2-Dibromoethane	1		< 1.5	< 1.5	0.0%	< 1.5	132%		140%	110%	50%	140%	NA	30%	140
Tetrachloroethene Chlorobenzene	1 1		< 1.0 < 1.0	< 1.0 < 1.0	0.0%	< 1.0 < 1.0	128% 139%	60% 60%		118% 110%	50% 50%	140% 140%	NA NA	30% 30%	
Ethylbenzene	1		< 0.9	< 0.9	0.0% 0.0%	< 0.9	130%	60%		73%		140%	NA NA	30%	
n&p-Xylene	1											140%		30%	
nαp-⊼ylene Bromoform	1		< 1.5 < 2.0	< 1.5 < 2.0	0.0% 0.0%	< 1.5 < 2.0	140% 133%	60% 60%		68% 68%		140%	NA NA	30%	
	•		- 2.0	- 2.0	0.070	. 2.0	. 30 / 0	5576		5570	2370			23/0	
Styrene	1		< 1.0	< 1.0	0.0%	< 1.0	133%	60%		76%		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%	
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 QUALITY ASSURANCE REPORT (V1)

Page 6 of 12

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



PROJECT: 1657709/6000

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

ATTENTION TO: Erin O'Brien

### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306644

SAMPLING SITE: SAMPLED BY:

	٦	Ггасе	Orga	anics	Ana	lysis	(Cor	ntin	ued	)													
RPT Date: Feb 05, 2018			DUPLICATE				REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE											
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured			Measured Value				Measured Limi		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
		lu					value	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) -ı	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:



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306644
PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis	710711 0.0.11	ETTEROTIONE THE EXERTION	/////ZTTIO//ZTZOTI///QGZ
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 AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloro-1,2,2-trifluoroethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Chloromethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Vinyl Chloride	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Bromomethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Chloroethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Vinyl Bromide	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Trichlorofluoromethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Methylene Chloride	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
trans-1,2-Dichloroethene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,1-Dichloroethane		EPA TO15	GC/MS GC/MS
cis-1,2-Dichloroethene	AQM-248-16000	EPA TO15	GC/MS
Chloroform	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloroethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,1,1-Trichloroethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Carbon Tetrachloride	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Benzene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,2-Dichloropropane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
2,2-Dichloropropane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Trichloroethene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS GC/MS
cis-1,3-Dichloropropene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene			
Methyl Isobutyl Ketone (MIBK) 1,1,2-Trichloroethane	AQM-248-16000 AQM-248-16000	EPA TO15 EPA TO15	GC/MS GC/MS
Toluene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
2-Hexanone	AQM-248-16000	EPA TO15	GC/MS
Dibromochloromethane 1,2-Dibromoethane	AQM-248-16000	EPA TO15 EPA TO15	GC/MS GC/MS
<b>'</b>	AQM-248-16000	EPA TO15	GC/MS
Tetrachloroethene	AQM-248-16000		
Chlorobenzene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Ethylbenzene		EPA TO15	GC/MS GC/MS
m&p-Xylene	AQM-248-16000	EPA TO15 EPA TO15	
Bromoform	AQM-248-16000		GC/MS
Styrene	AQM-248-16000	EPA TO15	GC/MS
1,1,2,2-Tetrachloroethane	AQM-248-16000	EPA TO15	GC/MS



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306644 ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

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

15 N 3066/111



Turnaround Time: 24 hr Criteria: CSR

Office Name:

Sample Control

Number (SCN)

74320-01

- 02 - 03 - 04 - 05 - 06

200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253

Note: Final Reports to be issued by e-mail

Sample

Location

☐ CCME

Sa. #

DaveOsquthape Shipped by:

Method of Shipment:

																. 1	-	~uq
СН	AIN (	OF CU	STODY	REG	CORE	D/ANAL	YSI	SF	REQ	UE	ST				No.	04	32	O page of
	Projec	t Number:	65770	9/6	000								Name:	1	46,	AT	7	
	Short	Title:	9 Fei	ld Ir	uest	Golder C	Contac	t: Eric	OF	Vier	Addre		120	) - '	86	00	Gler	ntyon Porkway
C4 5253	100000000000000000000000000000000000000	E-mail Add		lder.con		E-mail Addres		@g	older	.com		hone/	Fax:	2-	40	0	Contact	mine Galindo
		EQui	IS Facility 0	ode: 28	4338	59			2	diene	An	alvse	s Req	uired		w 31	) ekjj	119
☐ 48 hr ☐ BC W	ater Qualit	☐ 72 hr			Regular (	5 Days)	ers		dvien	- Fulle	ZGNP						ove)	4 4
		Quote No	).:				Containers		HY	2,13 n-13	Tre Ci		0	1			TAT ab	
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 C	FI/F2	STEX/VIE	D-de xoor	12 85	VÕCS	Chlaim	1 ACK	-		RUSH (Select TAT above)	Remarks (over)
	SV	Moils	11:49- B 11:56			9036418		X	X	X	X	X	X					Start: -25" End: -3.5"
	1	- 1 - 13	13:27-			( 421		1				1	-					Stort: -25" Fod: -35"
			15:05-			422												Start -23.51 Ext -2.51
	V	24/01/1	915:30-			1 423	1	1/	V	V	1,	J	do					5+art: -26" End: -3"

Sampler's Signature:	Relinquished by; S	ignature	Company	Date	-2015	Time	Received	by. Signature	Company
- 12		X							
- 11									
- 10									
- 09									
- 08									
- 07									

WHITE: Golder Cor

Waybill No.:

Seal Intact:

Shipment Condition:

YELLOW: Lab Copy

Received for Lab W:nn /n

Temp (°C) Cooler opened by:

Date /

Date

Comments:

Inviceto

Time



# AGAT Laboratories

## SAMPLE INTEGRITY RECEIPT FORM

RECEIVING	G BASICS -	Shipping		
Company/Consultant:	OLDE	ER		1.
Courier:		Pr	epaid	Collect
Waybill#		(	opola)	conce
Branch: EDM GP FN FM RE	D VAN L	YD FSJ	EST O	ther:
Custody Seal Intact: Yes No	NA ~			
TAT: <24hr 24-48hr 48-72hi	r Reg	Other		
Cooler Quantity:/				
TIME SENSITI	VE ISSUES	- Shinning		
LREADY EXCEEDED HOLD TIME?		)	•	
norganic Tests (Please Circle): Mil ficrotox , Ortho PO4 , Tedlar Bag hloroamines*	bi , BOD , N , Residual (	litrate/Nit Chlorine ,	rite , Tu Chloropi	rbidity, hyll*;
arliest 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

	perature (Bottles/Jars only) N/A if only Soil Bags Received	
	EN (Please Circle if samples received Frozen)	
	41-71-3	
	tle/Jar) + + =°C 2(Bottle/Jar) + + = _ °C	2
	tle/Jar)++=°C	С
5 (Bot	tle/Jar)++=°C	С
7 (Bot	tle/Jar)++=°C	
9 (Bot	tle/Jar)++=°C	_
(If mo	re than 10 coolers are received use another at	_
	LOGISTICS USE ONLY	_
Worko	order No:	
Sample	es Damaged: Yes No If YES why?	
	oble Wrap Frozen Courier	
Othor:	Courier Courier	
Accoun	A District	
above i	t Project Manager:have they been notified of the ssues: Yes No	е
	spoken to: Date/Time:	
CPM Ini		
C		
Genera	Comments:	
Genera		
Genera	SUMMA CANISTER  SAMPLES	
Genera	SUMMA CANISTER	
Genera	SUMMA CANISTER	



### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18 w 3 6 6 6 4 9

RECEIVING BASICS: Received From:	Waybill #:								
SAMPLE QUANTITIES: Coolers: Containers: 4									
TIME SENSITIVE ISSUES: Earliest Date Sampled: 3 an 22, 701 8									
(1) $f + f + f = f \cdot C$ (2) $f \cdot f \cdot C$ (2) Was ice or ice pack present: Yes No Integrity Issues:	cooler: (record differing temperatures on the CoC next to  _°C (3)++ =°C (4)++ =°C								
	_ have they been notified of the above issues: Yes No Date and Time:								

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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

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 (V1)

\*NOTES

Page 1 of 15

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SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

### Public Works LEPH/HEPH in Soil Low Level

		г	JUIC WOIK	3 LLF11/11LF	11111 3011 1	LOW LEVE				
DATE RECEIVED: 2018-01-30							[	DATE REPORTE	ED: 2018-02-05	
		SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:	04307-04 Soil 2018-01-23	04307-05 Soil 2018-01-23		04317-03 Soil 2018-01-23	04318-01 Soil 2018-01-24	04318-12 Soil 2018-01-24	04321-07 Soil 2018-01-25	04322-05 Soil 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:

ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Public Works LEPH/HEPH in Soil Low Level													
					[	DATE REPORT	ED: 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					
Unit	Acceptable Limits	9036831	9036834	9036862	9036890	9036901	9036908	9036919					
%	50-130	67	80	71	58	63	63	54					
%	50-130	67	79	72	61	63	64	66					
%	60-130	82	89	84	75	75	76	76					
	%	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: Unit Acceptable Limits % 50-130 % 50-130	SAMPLE DESCRIPTION: 04307-04   SAMPLE TYPE: Soil   DATE SAMPLED: 2018-01-23   Unit   Acceptable Limits 9036831   % 50-130 67   % 50-130 67	SAMPLE DESCRIPTION: 04307-04 04307-05 SAMPLE TYPE: Soil Soil DATE SAMPLED: 2018-01-23 2018-01-23 Unit Acceptable Limits 9036831 9036834 % 50-130 67 80 % 50-130 67 79	SAMPLE DESCRIPTION:         04307-04         04307-05         04317-03           SAMPLE TYPE:         Soil         Soil         Soil           DATE SAMPLED:         2018-01-23         2018-01-23         2018-01-23           Unit         Acceptable Limits         9036831         9036834         9036862           %         50-130         67         80         71           %         50-130         67         79         72	SAMPLE DESCRIPTION: 04307-04 04307-05 04317-03 04318-01     SAMPLE TYPE: Soil Soil Soil Soil Soil DATE SAMPLED: 2018-01-23 2018-01-23 2018-01-23 2018-01-24     Unit Acceptable Limits 9036831 9036834 9036862 9036890     % 50-130 67 80 71 58     % 50-130 67 79 72 61	SAMPLE DESCRIPTION: 04307-04	SAMPLE DESCRIPTION: 04307-04 04307-05 04317-03 04318-01 04318-12 04321-07     SAMPLE TYPE: Soil Soil Soil Soil Soil Soil Soil Soil					

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9036831-9036834 Results are based on dry weight of sample.

SAMPLING SITE:

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:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306694

PROJECT: 1657709-6000 K19 Field Inv.

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

### BTEX / VPH (C6-C10) Soil

BTEXT VITI (CO-CTO) SOII									
DATE RECEIVED: 2018-01-30		DATE REPORTED: 20				D: 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	2018-01-24	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:

SAMPLING SITE:

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:

Andre Cernorl



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Field Inv.

AGAT WORK ORDER: 18N306694 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

			mac		janic	s An	arysi	3							
RPT Date: Feb 05, 2018			DUPLICATE			REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE	
		Sample				Method Blank	Measured		ptable			eptable			ptable
PARAMETER	Batch	ld	Dup #1	Dup #2	RPD	DIAIIK	Value	Lower		Recovery		mits Upper	Recovery		Upper
Public Works LEPH/HEPH in Soi	l Low Lev	el				,						•		'	
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	ng raw ana	alytical data	and not the	e rounded o	duplicate v	values rep	orted.								
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	68602	9037253	109	109	0.0%		100%	60%	140%				97%	60%	140%

AGAT QUALITY ASSURANCE REPORT (V1)

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AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Field Inv.

AGAT WORK ORDER: 18N306694 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Trace Organics Analysis (Continued)															
RPT Date: Feb 05, 2018				DUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acceptable Limits		Recovery	Lir	ptable nits	Recovery	Lin	ptable nits
		ld		''			Value	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 S	Soil Low Lev	'el										
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:

Andre Cernonl

AGAT QUALITY ASSURANCE REPORT (V1)

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## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Field Inv.

AGAT WORK ORDER: 18N306694 ATTENTION TO: Erin O'Brien

OAWI LING OTTE.		O/ (IVII EED D1.	
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

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Field Inv.

AGAT WORK ORDER: 18N306694 ATTENTION TO: Erin O'Brien

		_	
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



200 - 2920 Virtual Way

Project Number: 165770916000	Laboratory Name:
Short Title: 19 Field Thy Golder Contact: Golder E-mail Address 1: Golder E-mail Address 2:	Address: 120 4600 Gladge Pkug Telephone/Fax: Contact:
erin D bren @golder.com Kangte Dan-beler@golder.com	778-452-4509 Yasmine Galand

Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253	Solder E-mail Address 1:	Golder E-m	nail Address 2:	@golder.com 7	0-4600 G phone/Fax: 18-452-46	Contact:	17
Office Name:  Out Out Court  Turnaround Time: 24 hr	EQuIS Facility (	Code: 2843389	59			JAN 80 AN 11:22	d-
Criteria: SR CCME BC Water C	☐ 72 hr Quality ☐ Other	Regular (5 Da	iys) <u>v</u>	H		G C	
Note: Final Reports to be issued by e-mail	Quote No.:		ntaine	HOM		T above)	
Sample Control Number (SCN)  Sample Location  Sample Sa. #  Depth (m)  Mat	rix Sampled Sampled	Type Code :	over) Number of Containers	BEX V		Remarks (over)	
04307-01 KAMDI8-11 1 7.3-0550	23/01/8 10:00	Dissete	2			9036767	_
1 - 02 / 2 2025	1 10:10		24			1 824	
-03 3 40-45	10:30		4			827	
-04 4 5.560	10:40		4	XX		831	-
-05 570-75	10:50		4			834	
-06 6 85-9.0	11:10		1			852	7
-07 \ 7   0,0-105	W 11:30		4			853	
- 08 K19-MW18-12 7 D3-0,5	13:10		2				
-09   2 20-25	13:15		2			854	
-10 3 40-415	13:20		2			855	
2 /0 110						856	
-12 5 4025 1	13:30		4			857 858	
110 (3)	V 13:50	V					
Sampler's Signature: Relinquished by Relinquis		Company Da	6/01/2018	8 Time 8:00	Received by: Signatu	re Company	
Comments: Method of Ship	oment:	Waybill No.:	, ,	Received for Lab by:	Date	Time	
Dan Osyntope Shipped by:		Shipment Condition: Seal Intact:		Temp (°C) Cooler op		Time	

WHITE: Golder Copy YELLOW: Lab Copy



## CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N30684 No. 04317 page 2 of 5

V	Asso	ciates			200	//	65 1	140716000							Laboratory Name:					
200 – 2920	Virtual Wa	ау			Short	Title:	e U II	nv		Golder C	Contac	Bre	4_	Addr	ess; 0-460	56	10.1	121		
elephone (	(604) 296-	lumbia, Cana 4200 Fax (6	da V5M 00 604) 298-5	C4 5253	1000000	r E-mail Add		older.cor		E-mail Addres	ss 2:			Tele	phone/Fax:			Contac	ti min tralin do	
Office Na		ncou	ver	-		EQu EQu	IS Facility C	ode: 2/	338	559				Ar	nalyses Rec	ruirod	2633		E	
Turnarou Criteria:		24 hr □ CC		☐ 48 hr ☐ BC Wa	ater Quali	☐ 72 hr			Regular (	(5 Days)	S		P. 8. 8.		laryses Net	quireu	15.8 66 08			
Note: Fi	nal Report	ts to be issued	d by e-mai			Quote No	o. <u>.</u>				ontain	NPH	HEINIPAR					AT above)		
Sample ( Number		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	BREX/	LEPH/H					RUSH (Select TAT	Remarks (over)	
X4317	- 01	K19-MW18-12		8,5-9.0	Soil	23/01/18	14:10	Discrete			4								9036860	
	- 02			10.0-10.5		1	14:20				4								1 861	
	- 03			11.5-12.0			14:40				4	X	X						86Z	
	- 04	1		13.2-13.7		1	15:10		FDA	14317-05	4								863	
	- 05			13,2-13.7		4/	16:10		FO	04317-04	4								864	
	- 06	SP-BH18-13		0.3-0.5			16:25				2								866	
	- 07		2	2.0-2.5			16:30				2							1- 1-	867	
	- 08		3	4045	-		16:40				2								868	
	- 09	Y	4	55-60		V	16:52				2								869	
	- 10		5	70-75		24/01/18	09:30				4								870	
	- 11		6	8,59,17			09:50				4								871	
1	- 12	V	7	10.0-105	1	V	10:10	V			4								V872	
Sampler's S	ni	921		69	24	Signature		Compan		Date 26/01/	120	18	Time	00	Received	by: Si	gnature	Cor	npany	
comments:	Inva	ic Dal	e	Method	of Shipme	nt:		Waybill I	Vo.:				eived for	Lab by:	Ann n	Date	)		Time	
059	jutho.	pa		Shipped	by:			Shipmen Seal Inta	nt Condition	on:		Tem	P (°C)	Cooler o	pened by:	Date			Time	
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# Golder

## CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306694 No. 04318 page 3 of 5

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200 – 2920 Virtual W 2ancouver, British Co		do VENA O	0.4	Short	19 F	ield -	Invi		Golder	Contac	Bri	PIN	Addre 120		lin	PKus		
elephone (604) 296	-4200 Fax (	604) 298-5	5253		er E-mail Add		older.cor	Golder	E-mail Addre	ess 2:		older.c	Telep	hone/Fax:	7 4	ma	Contac	t / / /
Office Name:										.100*	69	oldel.e	20111	70 73	4-1	01	1050	mire Galando
Va	ncouve	V			EQu EQu	IS Facility C	ode: 28	4338	59	-		~	An	alyses Re	mulrod		ii a∗1	1:22
Turnaround Time Criteria: ☐ CSR	: 24 hr CC	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr			Regular (	5 Days)	ψ,				alyses he	quireu			
Note: Final Repor	ts to be issued				Quote No				*	Containers	H	PAH					above)	
											5	841/PA					t TA1	
Sample Control Number (SCN)	Sample	Sa.#	Sample Depth	Sample Matrix	Date Sampled	Time Sampled	Sample Type	QAQC Code	Related SCN	o Jec	太	HE					Selec	Remarks
Number (SCN)	Location DH		(m)	(over)	(D / M / Y)	(HH:MM)	(over)	(over)	(over)	Number of	S	2					RUSH (Select TAT	(over)
04318 - 01	K19-11418-13	8	115-12.17	Soil	24/01/18	10:40	Discrete			4	X	X						9036890
- 02		9	13-13.7			11:20				Ц								1 891
- 03	(A-SV18-14		63-25			12:00				Ů.								892
- 04	V	7	1.3-1.5			12:10				4								893
- 05	(19-MW18-15		03-0.5		1	13:00				0								894
- 06		2	OF BUT	.15		13:10				2								895
- 07		12-3	4.0-4.5			3:30				2								896
- 08		4-1/6	5.5-61	2		1350			). ·	4								897
- 09		54	10-75	-		14:10				4								898
- 10		156	8,5-9,0			14:30		-		4								899
- 11		47	100-1015			14:50			-	4								900
- 12	V	18	11.5-12	, V	V	15:00	V	FDA	04321-01	4	X.	X						1/901
ampler's Signature:	2.11		Relinquis	hed by:	Signature		Compan		Date	, .		Time		Received	by: Sig	nature	Con	npany
omments:	ME		Method o	of Shipme	nt:		Waybill N		26/01	120			00					
Dave D	MIL	20									Rece	eived 10	r Late by:	M	Date			Time
Dan Og	yurno p		Shipped	by:			Shipmen Seal Inta		n.		Tem	P(°C)	Cooler ope	ened by:	Date			Time
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CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

18N306	694	
No.	04321	page of

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5	ASSO	lder ociates			Proje	ct Numbery	577	09/6	000	,			Labor	Laboratory Name;					
200 – 2 Vancou	920 Virtual Walver, British Co		da V5M 0	C4 5253	Golde	Title:	Teld- Iress 1:	Inv	Golder	Golder G	ss 2:	210		1 /2c	Address: 120-4600 (Jan 40. Phuay Telephone/Fax: 1 + 78-452 4009 Yasmire Galin				
		anco	uvei			EQu	IS Facility (	ode:28							alyses Red	uired	JAN 3	-	
Turr	around Time eria: X CSR	: 24 hr	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr	Other		Regular (	(5 Days)	ίν.		# #		aryses rec	unea			He 2 hai haa
Note	: Final Repor	ts to be issued				Quote No					Containers	116	1/1/C PH/PA					TAT above)	
	ple Control nber (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 Co	的成	1/M detal					RUSH (Select T.	Remarks (over)
19432	- 01	KM-MW18-15	8	11.5-120	Soil	25/01/18	14:40	Dauch	FO	64318-12	4								9036902
1	- 02	KA-MWIB-IL		03-05			09:40	1			2								903
_	- 03	1	2	20-25			09:50				2							i	904
4	- 04		3	4.0-4.5			10:00				2								905
-	- 05		4	5.5-610			10:15				4								906
	- 06		5	70-7.5			10:30				4								907
	- 07		6	85-9.0			10:50				4	X	X					ı	908
	- 08	V	7	10.0-10.5			11:10				4								909
	- 09	K19-15V18-17		1.3-0.5			12:40				2								911
	- 10		2	2.0-2.5			12:50				2								912
	- 11		3	4.0-4.5			13:10	1			2								913
1	- 12	V	4	5.5-6.0	V	V	13:30	V			4								1914
San le	r's Signature:	Bu		Relinquis	shed by:	Signature		Compan		Date 26/6	1/	18	Time	06	Received	by: Sig	nature	Con	npany
Comme	ents: nvoice Osguth	Davo		Method o	of Shipme	nt: –		Waybill I					eived fo	or Lab by	in m	Date			Time
8	osguth	orpe		Shipped	by:			Shipmer Seal Inta	t Condition	on:			p (°C)	Cooler op	ened by:	Date			Time
	-						WHITE: C	Solder C	or Y	ELLOW: L	ab Co								~

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Golder Associates
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200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4

IN OF CUSTODY RECORD/ANALYSIS REQUES	3N306694 ST No. 04322 page 5 of 5
Project Number: 1657 709 16000	Laboratory Name:
KIT Held thu Evino Brien	Address: 120-4600 Olenlyon Pkwan
Golder E-mail Address 1:  Golder E-mail Address 2:  Golder E-mail Address 2:  Golder E-mail Address 2:  Golder E-mail Address 2:	Telephone/Fax: Contact: YAR-452-4009 Yasmire Galast

elephone (604) 296-	-4200 Fax (6	304) 298-5	5253			cy_ @go		n Kanan	E-mail Addres	ss 2:	_ @gc	older.	com Fele	phone/Fax:	2-4	209	Contac	Emire Galad
Office Name:  Compared to the second of the							ode: 2	6433	859				Ar	nalyses Re	quired	JANS	-	
Criteria: CSR	CCI	ME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 h ty [	r ☐ Other	X	Regular (	5 Days)	ers	n.	±					ve)	
Note: Final Repor	ts to be issued	l by e-mai	ı		Quote N	o.:				Containers	-	#/24					AT abo	
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 C	1	FP#/FFP#					RUSH (Select TAT above)	Remarks (over)
	K19-SV18-17	5	70-75	Soil	25/11/8	1013:50	Diareto	ò	ah a	4								9036915
- 02			85-9.0			14:10				4								1 916
- 03		7	100-10.5			14:25				4								917
- 04		8	11.5-D.C			14:35			4	4								918
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- 06																		-3
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Sampler's Signature:	1911		7 .	STORY V	Signature		Compan		Date 26/6	1//	18	Time		Received	d by: Sigr	nature	Con	npany
Comments: Method of Shipment:					Waybill I	No.:		7	Rece	ived f	or Lab Ay	n M	Date			Time		
			Shipped	by:			Shipmer Seal Inta	nt Conditio	on:		Tem	) (°C)		pened by:	Date			Time

WHITE: Golder Co

YELLOW: Lab Copy



# **EAT** Laboratories

## SAMPLE INTEGRITY RECEIPT **FORM**

RECEIVING BASICS - Shipping	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: GOLDER	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $/+0+6=3$ °C 2(Bottle/Jary) $+0+/-0$ °C
Waybill#	3 (Bottle/Jar) $8+2+0=9$ °C 4 (Bottle/Jar) $+$ + = 0
	5 (Bottle/Jar) + + = °C 6 (Bottle/Jar) + + = °C
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar) + + = °C 8 (Bottle/Jar) + + = °C
Custody Seal Intact: Yes No NA	9 (Bottle/Jar) + + = 0C 10 (Bottle/Jar) + + = 0C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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:	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:
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	

<sup>\*</sup> Subcontracted Analysis (See CPM)



## SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N306694

Vaybill #:
76
ALREADY EXCEEDED? Yes No
f each cooler: (record differing temperatures on the CoC next to $5 = 5 \cdot \text{C}$ (3) $5 + 5 + 5 = 5 \cdot \text{C}$ (4) $- + - + - = - \cdot \text{C}$
have they been notified of the above issues: Yes No
F



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 (V1)

Page 1 of 28

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



## Certificate of Analysis

ATTENTION TO: Erin O'Brien

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

SAMPLING SITE: SAMPLED BY:

BC Routine VOC package in Air (Canister) -ug/m3									
DATE RECEIVED: 2018-01-30				DATE REPORTED: 2018-02-06					
	5	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:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

CCME F	I (C6-C10)	(Mater)
COME	1 (00-010)	(vval <del>e</del> i)

				001	71L 1 1 (OO-C	(vvalci)		
DATE RECEIVED: 2018-01-30								DATE REPORTED: 2018-02-06
		SAMPLE DESC	RIPTION:	04254-01	04254-02	04254-03	04254-04	
		SAMP	LE TYPE:	Water	Water	Water	Water	
		DATE S	AMPLED:	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	Acceptabl	e Limits					
Bromofluorobenzene	%	70-1	30	101	101	95	100	
Dibromofluoromethane	%	70-1	30	94	95	88	94	
Toluene - d8	%	70-1	30	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:

ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

CCME F2-F4 (Water)

CCME F2-F4 (vvater)										
DATE RECEIVED: 2018-01-30								DATE REPORTED: 2018-02-06		
		SAMPLE DES	CRIPTION:	04254-01	04254-02	04254-03	04254-04			
		SAM	PLE 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%.

SAMPLING SITE:

The chromatogram has returned to baseline by the retention time of nC50.

Extraction and holding times were met for this sample.

Certified By:

ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Public Works : BC VOCs in Air (Canister) - ug/m3

		Publi	C VVOTKS : E	BC VOCs in Air (Canister) - ug/m3
DATE RECEIVED: 2018-01-30				DATE REPORTED: 2018-02-06
Parameter	S	AMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04323-01 Air 2018-01-27 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:

ander Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY: Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

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						
,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						

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.

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ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works LEPH/HEPH in Water Low Level

		Pul	DIIC WOLKS	LEPH/HEPI	ı ili vvalei L	LOW Level	
DATE RECEIVED: 2018-01-30							DATE REPORTED: 2018-02-06
Parameter	Unit	SAMPLE DESCRIPTION:  SAMPLE TYPE:  DATE SAMPLED:  G/S RDL	04254-01 Water 2018-01-26 9036496	04254-02 Water 2018-01-26 9036512	04254-03 Water 2018-01-27 9036513	04254-04 Water 2018-01-26 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	

Certified By:

ander Canal



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

TEL (778)452-4000

SAMPLING SITE:

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.

Certified By:

Andre Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Volatile Organic Compounds in Water

			voiatile O	rganic Con	ipounds in	water	
DATE RECEIVED: 2018-01-30							DATE REPORTED: 2018-02-06
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04254-01 Water 2018-01-26 9036496	04254-02 Water 2018-01-26 9036512	04254-03 Water 2018-01-27 9036513	04254-04 Water 2018-01-26 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	

Certified By:

Ander Cerrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

#### Volatile Organic Compounds in Water

			voiatile O	rganic Con	ipoulius ili	vvalei	
DATE RECEIVED: 2018-01-30							DATE REPORTED: 2018-02-06
		SAMPLE DESCRIPTION: SAMPLE TYPE:	04254-01 Water 2018-01-26	04254-02 Water 2018-01-26	04254-03 Water 2018-01-27	04254-04 Water	
Parameter	Unit	DATE SAMPLED: G/S RDL	9036496	9036512	9036513	2018-01-26 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

Certified By:

ander Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works Dissolved Metals

			Public	MOLKS DIS	sorveu meta	ais	
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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ander Canal



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## Certificate of Analysis

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE:							SAMPLE	DBY:
				Public	Works Dis	solved Meta	als	
DATE RECEIVED: 2018-01-30								DATE REPORTED: 2018-02-06
	SA	MPLE DESCR	IPTION:	04254-01	04254-02	04254-03	04254-04	
		SAMPLE	E TYPE:	Water	Water	Water	Water	
		DATE SAI	MPLED:	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	

RDL - Reported Detection Limit; G / S - Guideline / Standard Comments:

Certified By:

ander Cerrol

Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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TEL (778)452-4000 FAX (778)452-4074



## **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:

			Trac	e Or	nani	cs Ar	alvei	is						
RPT Date: Feb 06, 2018				DUPLICAT			REFEREN		EDIVI	METUOP	BLANK SPIKE	NA A T	RIX SPI	IKE
RPT Date: Feb 06, 2016				DUPLICAT	_	Method	KEFEKEI	Accep		METHOL	Acceptable	IVIA		eptable
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Blank	Measured Value		its Upper	Recovery	Lower Upper	Recovery	Lower	Uppe
Volatile Organic Compounds in	Water										1 1			1
Chloromethane	68708	9037125	<1	<1	NA	< 1	98%	80%	120%			95%	70%	1309
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
,2-Dichloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%			97%	70%	130
,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
I,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		<0.5	<0.5	NA	< 0.5	101%	80%				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%				93%	70%	130
1,4-Dichlorobenzene		9037125	<0.5	<0.5	NA	< 0.5	100%	80%				94%	70%	

AGAT QUALITY ASSURANCE REPORT (V1)

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ATTENTION TO: Erin O'Brien

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306660 PROJECT: 1657709/6000

SAMPLING SITE: SAMPLED BY:

		Trace	Orga	anics	Ana	ıysıs	Cor	itin	uea	)				
RPT Date: Feb 06, 2018			С	UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery	Acceptable Limits Lower Upper	Recovery	Lie	ptable nits Uppe
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%	1309
Toluene - d8	68708	9037125	95	80	17.1%		100%	70%	130%			108%	70%	1309
Comments: RPDs are calculated	using raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.							
CCME F1 (C6-C10) (Water)														
F1 (C6-C10)		9036496	<100	<100	NA	< 100								
F1 minus BTEX (C6-C10)	68710		<100	<100	NA	< 100								
Bromofluorobenzene	68710	9036496	101	100	1.0%		100%	70%	130%			99%	70%	130%
Dibromofluoromethane	68710		94	93	1.1%		100%	70%	130%			98%	70%	1309
Toluene - d8	68710	9036496	97	96	1.0%		99%	70%	130%			99%	70%	1309
Comments: RPDs are calculated	using raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.							
CCME F2-F4 (Water)														
F2 (C10-C16)	68694	W-MS1	5530	6060	9.1%	< 100	111%		120%			78%		1309
F3 (C16-C34)	68694	W-MS1	17600	19800	11.8%	< 100	118%	80%	120%			85%	70%	1309
F4 (C34-C50)	68694	W-MS1	4480	5090	12.7%	< 100	104%	80%	120%			75%	70%	130%
Comments: RPDs are calculated	using raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.							
Public Works LEPH/HEPH in W	ater Low Le	evel												
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%	1309
Acenaphthene	68694	W-MS1	0.46	0.46	0.0%	< 0.02	100%	80%	120%			92%	50%	1309
Fluorene	68694	W-MS1	0.49	0.51	4.0%	< 0.02	99%	80%	120%			100%	50%	1309
Phenanthrene	68694	W-MS1	0.42	0.43	2.4%	< 0.04	99%	80%	120%			88%	60%	1309
Anthracene	68694	W-MS1	0.46	0.45	2.2%	< 0.01	98%	80%	120%			93%	60%	1309
Acridine	68694	W-MS1	0.51	0.50	2.0%	< 0.05	98%	80%	120%			102%	50%	1309
Fluoranthene	68694	W-MS1	0.45	0.46	2.2%	< 0.02	98%	80%	120%			92%	60%	1309
Pyrene	68694	W-MS1	0.48	0.49	2.1%	< 0.02	98%	80%	120%			97%	60%	1309
Benzo(a)anthracene	68694	W-MS1	0.45	0.45	0.0%	< 0.01	99%		120%			90%	60%	1309
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%	000/	120%			92%	600/	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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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	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 06, 2018			С	UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable	Recovery		ptable nits	Recovery		ptable nits
		lu lu					value	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%
Comments: RPDs are calculated usin	g raw ana	lytical data	and not the	e rounded	duplicate v	values rep	orted.								
BC Routine VOC package in Air (C	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 (Ca	anister) -	ua/m3													
Dichlorodifluoromethane	1	-9/	< 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%		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%	97% 106%	50%	140%		30%	140%
Vinyl Bromide	1		< 3.20		0.0%		NA	60%	140%	140%		140%	NA NA	30%	140%
Trichlorofluoromethane	1			< 3.20		< 3.20					50%		NA		140%
1,1-Dichloroethene	1		< 9.2 < 4.0	< 9.2 < 4.0	0.0% 0.0%	< 9.2 < 4.0	135% 69%	60% 60%	140% 140%	107% 104%		140% 140%	NA NA	30% 30%	140%
1,1 District contents			V 4.0	V 4.0	0.070	٧ ٦.٥	0370	0070	14070	10470	3070	14070	14/1	0070	1 10 70
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%

#### AGAT QUALITY ASSURANCE REPORT (V1)

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ATTENTION TO: Erin O'Brien

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306660 PROJECT: 1657709/6000

SAMPLING SITE: SAMPLED BY:

	٦	race	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 06, 2018				UPLICATE	Ē		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery	Lir	eptable mits Upper	Recovery		ptable nits Upper
Trichloroethene	1		< 4.0	< 4.0	0.0%	< 4.0	117%	60%	140%	119%	50%	140%	NA 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%

Certified By:

ander Cernarl



## **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:

				Wate	er An	alys	is							
RPT Date: Feb 06, 2018				DUPLICATI			REFERE	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPIKE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		eptable mits	Recovery		eptable mits	Recovery	Acceptable Limits
		lu lu					Value	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.

Page 17 of 28



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660
ATTENTION TO: Erin O'Brien

PROJECT: 1657709/6000

SAMPLING SITE:

SAMPLED BY:

		V	Vater	Ana	lysis	(Cor	ntinu	ed)							
RPT Date: Feb 06, 2018			С	UPLICAT	E		REFEREN	ICE MAT	ΓERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPII	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Accep Lim		Recovery		ptable nits	Recovery	Lin	ptable nits
		ld	- 1	.,	_		Value	Lower	Upper	,	Lower	Upper			Upper

Certified By:

Ander Cernonl

## 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 AQM-248-16000	EPA TO15	GC/MS
Bromodichloromethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
cis-1,3-Dichloropropene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
trans-1,3-Dichloropropene	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Methyl Isobutyl Ketone (MIBK)	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
1,1,2-Trichloroethane	AQM-248-16000 AQM-248-16000	EPA TO15	GC/MS
Toluene	AQM-248-16000	EPA TO15	GC/MS
2-Hexanone Dibromochloromethane	AQM-248-16000	EPA TO15	GC/MS
Dibromochioromethane	AQM-248-16000	EPA TO15	GC/MS

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306660 PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

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

## 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				

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306660 PROJECT: 1657709/6000 ATTENTION TO: Erin O'Brien

SAMPLING SITE.		SAWIFLED DT.						
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					

AGAT WORK ORDER: 18N306660

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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						



## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306660

PROJECT: 1657709/6000

ATTENTION TO: Erin O'Brien

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

18N306660 No. 04254 page 1 of 2

(PA	Golder	0
	Associate	S

200 – 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253

DAMES N. Calle	
Project Number: 1657-709 /6000	Laboratory Name:
Short Title: Golder Contact: En O'Bren	Address: 20-8600 Gilenhon Varkwan
Golder E-mail Address 1: Golder E-mail Address 2: @golder.com	Telephone/Fax: Contact: Vancoung Gally A

Telephone (604) 296-4200 Fax (604) 298-5253 Golder E-mail Address 1: Golder E-mail Address 2: Telephone/Fax									/Fax			Contac	at:	any						
Office Name: @golder.com agam do @golder.com 778452 4009 Yasmunt									mune	Galina										
Vancover EQuIS Facility Code: 28433859							JAM S0 AV11:05 Analyses Required													
Turnaround Time: 24 hr 48 hr 72 hr Regular (5 Days)						ñ	7		3	Anaiyse	es Rec	quired		<u> </u>						
Note: Final Reports to be issued by e-mail  Quote No.:				ntaine	Cta	20	A for					T above								
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. M	DSS	COH MICON	170	H	-2-F4	Acres	RUSH (Select TAT above)		narks /er)
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Ossuthorpe Shipped by:				Shipment Condition: Seal Intact:								er opened by: Date				Time				
	Geal Intact.																			

WHITE: Golder Copy YELLOW: Lab Copy

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST No. 04323 page 2 of Z



200 - 2920 Virtual Way

Project Number: 1657 769 16000		Laboratory Name:	
Short Title:	Golder Contact:	Address:	· ·
KI9 Investigation	Fra Obries	120-8600 Glen	byon Parkway
Golder E-mail Address 1: Gol	lder E-mail Address 2:	Telephone/Fax:	Sentact:
enn_ o'bnen @golder.com	@golder.com	7784524009	Vasmine Gali

/ancouver, British Co elephone (604) 296-	lumbia, Canad 4200 Fax (6	da V5M 0C 604) 298-5	24 253		r E-mail Add				E-mail Addres	ss 2:	100	older.	V	Telep	hone/Fa	ax:			Contact	wine Gal	5
Office Name:											_					0					Ξ
EQuIS Facility Code:					Ŋ	71.74		Analyses Required 2													
Turnaround Time: 24 hr 3 48 hr 72 hr Criteria: CSR CCME BC Water Quality Other					×	Regular (	5 Days)	ers	F2	EX			9	A			ve)	1			
Note: Final Reports to be issued by e-mail							ontain	印作	ME		2	V	ded		JAN	AT abo	A13 (A13 (A3)				
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	VOCS ARPH	Hexane	Decay	Napthral	honnated		3.00 %	RUSH (Select FAT above)	Remarks (over)	
64323-01	K19-5V	18-17		SV	27/01/18		GRA6				X	X	X	X	XX					523	
- 02												t,									
- 03*																					
- 04									_												
- 05																					
- 06																					
- 07																					
- 08																			İ		
- 09																				.1	
- 10																					
- 11																					
- 12																					
Sampler's Signature: Relinquished by: Signature			_	Compan Go /	ler e	Date 28 /01	1/1	ş	Time	e L: O	ひ	Recei	ved by	by: Signature Company			npany Bd-T	Ī			
Comments:	Dave		Method	of Shipme	ent:		Waybill No.:		7			d for Lab by:			Date		Time				
osgutheroe Shipped by:				by:			Shipmer Seal Inta	nt Conditio	on:		Temp (°C) Cooler opened by:				/: I	Date Time					
0																					





# SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping							
Company/Consultant: Colder Associates							
Courier: Prop 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: 25M							

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 INTEG	RITY - Ship	ping	
Hazardous Samples: YES No Prec	aution Take	n:	
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									
I	FROZEN (Please Circle if samples received Frozen)									
	1 (Bottle/Jar) 3	+5	+4	= 4	°C	2(Bottle/Jar)_	+	+	=	_°C
I	3 (Bottle/Jar)	+	_+	=	_°C	4 (Bottle/Jar)	_+	_+	_=	_°C
I	5 (Bottle/Jar)	_+	_+	=	o <sub>C</sub>	6 (Bottle/Jar)_	_+	_+	_=	_°C
	7 (Bottle/Jar)	+	_+	=	_°C	8 (Bottle/Jar)_	_+	_+	_=	_°C
	9 (Bottle/Jar)	+	+	=	°C	10 (Bottle/Jar)_	_+	_+	_=	_oc
	(If more than 10 coolers are received use another sheet of paper and attach)									
ĺ	LOCISTICS LISE ONLY									

L	201211C2 02E (	SILL
Workorder No:		
Samples Damaged: Yes No	If YES why?	
No Bubble Wrap Frozen	Courier	
Other:	-10	
Account Project Manager:above issues: Yes No		_have they been notified of th
Whom spoken to:	Date/Tim	e:
CPM Initial		
General Comments:		
	ě	
	***	
	<u></u>	



#### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 13 N 3 66660

Account Project Manager: Whom spoken to: ADDITIONAL NOTES:	have they been notified of the above issues: Yes No Date and Time:
ase jais when available	ch cooler: (record differing temperatures on the CoC next to°C (3)++_ =°C (4)++_=°C
TIME SENSITIVE ISSUES: Earliest Date Sampled: Fam 26, 20	ALREADY EXCEEDED? Yes No
Received From:	Waybill #:

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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

<u>*NOTES</u>	
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 (V1)

Page 1 of 27

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

CCME F1	(CC C10)	(11/0104)
	(しゅ-し (い)	(vvaler)

				COI		(Water)		
DATE RECEIVED: 2018-01-30								DATE REPORTED: 2018-02-06
		SAMPLE DESC	CRIPTION:	04255-02	04255-03	04255-05	04255-01	
		SAMF	PLE TYPE:	Water	Water	Water	Water	
		DATE S	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	Acceptabl	le Limits					
Bromofluorobenzene	%	70-1	30	98	100	97	95	
Dibromofluoromethane	%	70-1	30	92	94	99	102	
Toluene - d8	%	70-1	30	95	97	100	99	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

SAMPLING SITE:

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:

Ander Carrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

COME	E2-E4	(Water)
CUME	FZ-F4	(vvater)

					(11010)	
						DATE REPORTED: 2018-02-06
	SAMPLE DESC	CRIPTION:	04255-02	04255-03	04255-05	
	SAMF	PLE TYPE:	Water	Water	Water	
	DATE S	SAMPLED:	2018-01-22	2018-01-22	2018-01-22	
Unit	G/S	RDL	9036990	9036992	9036994	
μg/L		100	<100	<100	<100	
μg/L		100	<100	<100	<100	
μg/L		100	<100	<100	<100	
	μg/L μg/L	SAMF DATE S Unit G / S µg/L µg/L	μg/L 100 μg/L 100	SAMPLE DESCRIPTION: 04255-02 SAMPLE TYPE: Water DATE SAMPLED: 2018-01-22 Unit G / S RDL 9036990  µg/L 100 <100  µg/L 100 <100	SAMPLE DESCRIPTION: 04255-02 04255-03 SAMPLE TYPE: Water Water  DATE SAMPLED: 2018-01-22 2018-01-22 Unit G / S RDL 9036990 9036992  μg/L 100 <100 <100 μg/L 100 <100 <100	SAMPLE TYPE:         Water         Water         Water           DATE SAMPLED:         2018-01-22         2018-01-22         2018-01-22           Unit         G / S         RDL         9036990         9036992         9036994           μg/L         100         <100

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard

SAMPLING SITE:

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:

Ander Cerrol



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Burnaby, British Columbia

Unit 120, 8600 Glenlyon Parkway

#### 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:

ander Canal



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLING SITE: SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

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.

Certified By:

Andre Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Volatile Organic Compounds in Water

			voiatile O	rganic Com	ipounds in	water	
DATE RECEIVED: 2018-01-30							DATE REPORTED: 2018-02-06
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04255-02 Water 2018-01-22 9036990	04255-03 Water 2018-01-22 9036992	04255-05 Water 2018-01-22 9036994	04255-01 Water 2018-01-22 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	

Certified By:

Andre Cernoil



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

#### Volatile Organic Compounds in Water

	volatile Organic Compounds in Water												
DATE RECEIVED: 2018-01-30							DATE REPORTED: 2018-02-06						
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04255-02 Water 2018-01-22 9036990	04255-03 Water 2018-01-22 9036992	04255-05 Water 2018-01-22 9036994	04255-01 Water 2018-01-22 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

Certified By:

ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

SAMELING SITE.						SAMPLED BT.
					Chloride in	in Water
DATE RECEIVED: 2018-01-30						DATE REPORTED: 2018-02-06
		SAMPLE DESC	CRIPTION:	04255-02	04255-03	
		SAMF	PLE TYPE:	Water	Water	
		DATE S	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

Certified By:

Andre Cernorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works Dissolved Metals

	Public Works Dissolved Metals												
DATE RECEIVED: 2018-01-30	ı						DATE REPORTED: 2018-02-06						
Parameter	Unit	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: G/S RDL	04255-02 Water 2018-01-22 9036990	04255-03 Water 2018-01-22 9036992	04255-05 Water 2018-01-22 9036994	04255-01 Water 2018-01-22 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							

Certified By:

ander Cerrorl



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Dublic	Morke	Dissolved	Motale

Public Works dissolved Metals												
DATE RECEIVED: 2018-01-30								DATE REPORTED: 2018-02-06				
	S	AMPLE DES	CRIPTION:	04255-02	04255-03	04255-05	04255-01					
		SAM	PLE 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

Certified By:

Andre Cernoil



AGAT WORK ORDER: 18N306717

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 ATTENTION TO: Erin O'brien

SAMPLING SITE: SAMPLED BY:

			Trac	e Or	gani	cs Ar	nalys	IS							
RPT Date: Feb 06, 2018			[	DUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD BLANK SPIKE		SPIKE	MATRIX SPI		KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery		ptable nits	Recovery		ptable nits
		14					Value	Lower	Upper		Lower	Upper		Lower	Uppe
Volatile Organic Compounds in	Water														
Chloromethane	68708	9037125	<1	<1	NA	< 1	98%	80%	120%				95%	70%	1309
Vinyl Chloride	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				102%	70%	1309
Bromomethane	68708	9037125	<1	<1	NA	< 1	97%	80%	120%				85%	70%	1309
Chloroethane	68708	9037125	<1	<1	NA	< 1	99%	80%	120%				101%	70%	1309
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%		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%		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%					98%		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%				10070	1070	.007
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	60700	9037125	<b>_1</b>	-1	NΙΛ	. 1	1000/	Q00/	120%				020/	700/	130%
Ethylbenzene		9037125	<1 <0.5	<1 <0.5	NA NA	< 1 < 0.5	100% 100%		120%				93% 94%	70% 70%	
m&p-Xylene	68708		<0.5	<0.5	NA NA	< 0.5 < 0.5	100%		120%				94% 94%	70%	
Bromoform		9037125	<0.5	<0.5 <1		< 0.5 < 1	100%		120%				94% 95%	70%	
Styrene		9037125	<1 <0.5	<0.5	NA NA	< 0.5	101%		120%				95% 93%		130%
1 1 2 2 Totrophloropthono	60700	0027425	-O O	ه ۵۰	NIA	.00	000/	900/	1200/				069/	700/	1200
1,1,2,2-Tetrachloroethane	68708		<0.8	<0.8	NA NA	< 0.8	99%		120%				96%	70%	
o-Xylene	68708		<0.5	<0.5	NA	< 0.5	100%		120%				94%		130%
1,3-Dichlorobenzene	68708	9037125	<0.5	< 0.5	NA	< 0.5	100%		120%				93%		130%
1,4-Dichlorobenzene	68708	9037125	<0.5	<0.5	NA	< 0.5	100%	80%	120%				94%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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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:

SAMPLING SITE.									LEDB	1.				
		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)				
RPT Date: Feb 06, 2018			С	UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK SPIKE	МАТ	RIX SPI	KE
		Sample				Method Blank	Measured		eptable mits		Acceptable Limits		Liv	ptable mits
PARAMETER	Batch	ld	Dup #1	Dup #2	RPD	Diank	Value	Lower	1	Recovery	Lower Upper	Recovery	Lower	1
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	ng raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.							
Public Works LEPH/HEPH in Water	er Low Le	evel												
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	ng raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.							
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								

#### AGAT QUALITY ASSURANCE REPORT (V1)

68710 9036496

101

100

Bromofluorobenzene

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70% 130%

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1.0%

100% 70% 130%



## **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	Org	anics	Ana	lysis	(Cor	ntin	ued	)			
RPT Date: Feb 06, 2018				DUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD BLANK SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable mits Upper	Recovery Acceptable Limits Lower Upper	Recovery	, Lir	ptable
Dibromofluoromethane	68710	9036496	94	93	1.1%		100%	l	L	Lower Upper	98%	Lower	130%
Toluene - d8	68710	9036496	97	96	1.0%		99%		130% 130%		99%	70%	130%
Comments: RPDs are calculated usi	ng raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.						
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 usi	ng raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.						
Volatile Organic Compounds in V	Vater												
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		<1	<1	NA	< 1	100%		120%		84%		130%

AGAT QUALITY ASSURANCE REPORT (V1)

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AGAT WORK ORDER: 18N306717

ATTENTION TO: Erin O'brien

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

SAMPLING SITE: SAMPLED BY:

Trace Organics Analysis (Continued)															
RPT Date: Feb 06, 2018			С	UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample			Method Blank	Measured		ptable nits	Recovery	منا أ	ptable nits	Recovery		ptable mits	
		ld	·	·			Value	Lower	Upper	,	l	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%

Comments: RPDs are calculated u	Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.											
Public Works LEPH/HEPH in W	ater Low Leve	el										
Naphthalene	68703 V	N-MS1	0.49	0.46	6.3%	< 0.05	99%	80%	120%	101%	50%	130%
Quinoline	68703 V	N-MS1	0.54	0.47	13.9%	< 0.05	97%	80%	120%	110%	50%	130%
Acenaphthylene	68703 V	N-MS1	0.49	0.45	8.5%	< 0.02	99%	80%	120%	99%	50%	130%
Acenaphthene	68703 V	N-MS1	0.47	0.48	2.1%	< 0.02	100%	80%	120%	94%	50%	130%
Fluorene	68703 V	N-MS1	0.50	0.47	6.2%	< 0.02	99%	80%	120%	100%	50%	130%
Phenanthrene	68703 V	N-MS1	0.43	0.45	4.5%	< 0.04	99%	80%	120%	87%	60%	130%
Anthracene	68703 V	N-MS1	0.49	0.47	4.2%	< 0.01	100%	80%	120%	99%	60%	130%
Acridine	68703 V	N-MS1	0.50	0.48	4.1%	< 0.05	98%	80%	120%	100%	50%	130%
Fluoranthene	68703 V	N-MS1	0.46	0.46	0.0%	< 0.02	98%	80%	120%	93%	60%	130%
Pyrene	68703 V	N-MS1	0.46	0.46	0.0%	< 0.02	101%	80%	120%	94%	60%	130%
Benzo(a)anthracene	68703 V	N-MS1	0.45	0.45	0.0%	< 0.01	98%	80%	120%	91%	60%	130%
Chrysene	68703 V	N-MS1	0.47	0.48	2.1%	< 0.01	99%	80%	120%	96%	60%	130%
Benzo(b)fluoranthene	68703 V	N-MS1	0.43	0.44	2.3%	< 0.01	104%	80%	120%	87%	60%	130%
Benzo(j)fluoranthene	68703 V	N-MS1	0.46	0.48	4.3%	< 0.01	101%	80%	120%	94%	60%	130%
Benzo(k)fluoranthene	68703 V	N-MS1	0.41	0.47	13.6%	< 0.01	93%	80%	120%	83%	60%	130%
Benzo(a)pyrene	68703 V	N-MS1	0.45	0.47	4.3%	< 0.01	99%	80%	120%	91%	60%	130%
Indeno(1,2,3-c,d)pyrene	68703 V	N-MS1	0.46	0.48	4.3%	< 0.01	98%	80%	120%	94%	60%	130%
Dibenzo(a,h)anthracene	68703 V	N-MS1	0.45	0.46	2.2%	< 0.01	98%	80%	120%	91%	60%	130%
Benzo(g,h,i)perylene	68703 V	N-MS1	0.46	0.48	4.3%	< 0.01	98%	80%	120%	93%	60%	130%
1-Methylnaphthalene	68703 V	W-MS1	0.47	0.44	6.6%	< 0.05	99%	80%	120%	96%	50%	130%
2-Methylnaphthalene	68703 V	N-MS1	0.44	0.40	9.5%	< 0.05	99%	80%	120%	90%	50%	130%
EPH C10-C19	68703 V	N-MS1	8740	8630	1.3%	< 100	112%	70%	130%	86%	70%	130%

AGAT QUALITY ASSURANCE REPORT (V1)

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AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717 ATTENTION TO: Erin O'brien

PROJECT: 1657709-6000

SAMPLING SITE.

SAMPLED BY:

AMPLING SITE: SAMPLED BY:															
	Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)						
RPT Date: Feb 06, 2018			UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	METHOD BLANK SPIKE			MATRIX SPIKE		
Batch	Sample	Dup #1	Dup #2	RPD	Method Blank				Recovery	1 :-		Recovery		ptable	
	Iu		·			value	Lower	Upper		l .	Upper		Lower	Upper	
68703	W-MS1	13700	13800	0.7%	< 100	100%	70%	130%				89%	70%	130%	
68703	W-MS1	93	86	7.8%		100%	80%	120%				94%	50%	130%	
68703	W-MS1	95	89	6.5%		99%	80%	120%				96%	50%	130%	
68703	W-MS1	95	93	2.1%		99%	80%	120%				95%	60%	130%	
sing raw ana	lytical data	and not the	e rounded	duplicate	values rep	orted.									
68713	9042247	<100	<100	NA	< 100										
68713	9042247	<100	<100	NA	< 100										
68713	9042247	98	97	1.0%		100%	70%	130%				101%	70%	130%	
68713	9042247	102	104	1.9%		99%	70%	130%				98%	70%	130%	
68713	9042247	99	98	1.0%		100%	70%	130%				101%	70%	130%	
sing raw ana	lytical data	and not the	e rounded	duplicate	values rep	orted.									
68703	W-MS1	6090	5960	2.2%	< 100	111%	80%	120%				85%	70%	130%	
68703	W-MS1	18500	18700	1.1%	< 100	116%	80%	120%				90%	70%	130%	
68703	W-MS1	4450	4630	4.0%	< 100	102%	80%	120%				75%	70%	130%	
	68703 68703 68703 68703 68703 sing raw ana 68713 68713 68713 68713 68703 68703 68703	Batch Sample ld  68703 W-MS1 68703 W-MS1 68703 W-MS1 68703 W-MS1 sing raw analytical data  68713 9042247 68713 9042247 68713 9042247 68713 9042247 68713 9042247 sing raw analytical data  68703 W-MS1 68703 W-MS1	Batch Sample   Dup #1    68703 W-MS1 13700   68703 W-MS1 93   68703 W-MS1 95   68703 W-MS1 95   68703 W-MS1 95   sing raw analytical data and not the 68713 9042247	Batch Sample Id Dup #1 Dup #2  68703 W-MS1 13700 13800 68703 W-MS1 93 86 68703 W-MS1 95 89 68703 W-MS1 95 93  sing raw analytical data and not the rounded of 68713 9042247 <100 <100 68713 9042247 <100 <100 68713 9042247 98 97 68713 9042247 102 104 68713 9042247 99 98  sing raw analytical data and not the rounded of 68713 9042247 99 98  sing raw analytical data and not the rounded of 68703 W-MS1 6090 5960 68703 W-MS1 6090 5960 68703 W-MS1 18500 18700	Batch Sample Id Dup #1 Dup #2 RPD  68703 W-MS1 13700 13800 0.7% 68703 W-MS1 93 86 7.8% 68703 W-MS1 95 89 6.5% 68703 W-MS1 95 93 2.1%  sing raw analytical data and not the rounded duplicate  68713 9042247 <100 <100 NA 68713 9042247 <100 <100 NA 68713 9042247 98 97 1.0% 68713 9042247 102 104 1.9% 68713 9042247 99 98 1.0%  sing raw analytical data and not the rounded duplicate	Batch Sample Id Dup #1 Dup #2 RPD Method Blank  68703 W-MS1 13700 13800 0.7% < 100 68703 W-MS1 93 86 7.8% 68703 W-MS1 95 89 6.5%  68703 W-MS1 95 93 2.1%  sing raw analytical data and not the rounded duplicate values represented for the following forms and the following forms and the following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following forms and following following forms and following fo	Trace Organics Analysis (Cor    DUPLICATE	Trace Organics Analysis (Contin    DUPLICATE   REFERENCE MA   Ref	Trace Organics Analysis (Continued Dup #1 Dup #2 RPD Method Blank Measured Value Upper Continued National Dup #1 Dup #2 RPD Method Blank Measured Limits Lower Upper Continued National Dup #1 Dup #2 RPD Method Blank Measured Value Upper Continued National Dup #1 Dup #2 RPD Method Blank Measured Value Upper Continued	Batch   Sample   Dup #1   Dup #2   RPD   Method   Measured   Limits   Lower   Upper   Recovery	DUPLICATE	Trace Organics Analysis (Continued)    DupLicate   Batch   Sample   Dup #1   Dup #2   RPD   Method Blank   Measured Value   Limits   Lower   Upper   Upper   Lower   Upper   U	DUPLICATE	DUPLICATE	

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

ander Cernarl



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N306717

ATTENTION TO: Erin O'brien

SAMPLING SITE: SAMPLED BY:

RPT Date: Feb 06, 2018	<sup>2</sup> T Date: Feb 06, 2018			UPLICATI	E		REFEREN	NCE MA	TERIAL	IAL METHOD BLANK SPIKE		MAT	TRIX SPIKE		
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		otable nits			Acceptable Limits		Accep Lim	
		ld					Value	Lower	Upper	,	Lower	Upper	,	Lower	Uppe
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%			
ron 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 QUALITY ASSURANCE REPORT (V1)

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AGAT WORK ORDER: 18N306717

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 ATTENTION TO: Erin O'brien

SAMPLING SITE: SAMPLED BY:

Water Analysis (Continued)															
RPT Date: Feb 06, 2018 DUPLICATE							REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPII	KE
PARAMETER	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		otable nits	Recovery	Accepta Limits		Recovery		ptable nits	
		ld	·				Value	Lower	Upper		Lower	Upper		Lower	Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Public Works Dissolved Met	tals										
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%		110%	99%	90%	110%
Silicon Dissolved	9036241	1600	1580	1.3%	< 50	10070	3070	11070	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%
	0000211	7 17 0	7000	1.070	100	0170	0070	11070	10170	0070	11070
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%		110%	101%	90%	110%
Zinc Dissolved	9036241	<2	<2	NA	< 2	107%		110%	108%	90%	110%
Zirconium Dissolved	9036241	<0.1	<0.1	NA	< 0.1	. 51 70	5570	73	94%	90%	110%
	0000=	-0.1							0.,0	00/0	

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

AGAT QUALITY ASSURANCE REPORT (V1)

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#### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ATTENTION TO: Erin O'brien

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

SAMPLING SITE: SAMPLED	BY:
------------------------	-----

Water Analysis (Continued)															
RPT Date: Feb 06, 2018 DUPLICATE							REFEREN	ICE MAT	ERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Sample	Dup #1 D	Dup #2	RPD	Method Blank	Measured	Accep Lim		Recovery	Lin	ptable nits	Recovery	Lim	ptable nits	
		Id	,				Value	Lower	Upper	,	Lower	Upper		Lower	Upper

Certified By:

Andre Cernonl

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N306717
PROJECT: 1657709-6000 ATTENTION TO: Erin O'brien

PARAMETER	AGAT S.O.P	ANALYTICAL TECHNIQUE					
Trace Organics Analysis	I						
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				

### **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				
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				

### 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
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

### Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N306717 ATTENTION TO: Erin O'brien

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis	INOD 404 0000	Madified from ON 1440 D	IONI CUIDOMATOODADU
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



### **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N306717

PROJECT: 1657709-6000

ATTENTION TO: Erin O'brien

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

18/306717 No. 04255 page\_of\_

Asso	lder ciates			Projec	ct Number:	55770	9/60	000					Labo	ratory N	ame:	GP	T		4	
200 – 2920 Virtual Wa Vancouver, British Co	ay olumbia, Cana	da V5M 00	C4	Short	Title: KI9 (v	ress 1:	zatro	Golder	Golder C Env	S 2	t; Br	ien		ess: 20-Sephone/F	000		nly	Contact	Parkw	az
Telephone (604) 296-	-4200 Fax (	604) 298-5	253	enn	- o'bne	en @go	older.cor	n aa	arndo		@g	older.c	om 77	778452 4009 Yasmine Galind						
Office Name:	an 60U		☐ 48 hr		EQuIS Facility Code: 28433859 EQUIS upload: X  72 hr X Regular (5 Days)					Analyses Required JAN 30 AX11/22										
Criteria: CSR			BC W	ater Quali	⊔ /2 hr ty □	Other	ĻX	Regular (	(5 Days)	S.	2		PAH					(e)		
Note: Final Repor		Quote No	0.3	ntaine			Metals	T		2				AT above)						
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	D155 M	D155.	LEPH /HEPH,	Chond	F1	-		RUSH (Select TAT	Remark (over)	
04255 - 01	K19-NW	8-10D	10.4	W61	22/01/18	12:23	GRAP		9036989	8	X	×>	< ×		××			1	Hold Ch	uend
- 02	K19-M1	018-09				15=b			990	8	X	X	< ×							
- 03	K19-MU	18-08	D	4	4	16:46	4		992	8	X	X	X						4	
- 04	K19-Mh	B-10D	10.4	4	24/01/18	11:29	4		993	2			X					1		
- 05						3														
- 06						-														
- 07													10	poli				1		
- 08												ΛE	id the	2				-		
- 09											G. C.	En le	- 111					1		
- 10					.> "					no.	¥~							1		-
- 11							-			26.97										
- 12																				
Sampler's Signature:	M		Relinqui	shed by:	Signature		Compan	4	Date 26/01	11	8	Time	00	Recei	ved by:	Signate	ure	Com	pany	
Comments:  Invoice Dave  O squ thorpe  Shipped by:							Waybill				Received for Lab						Time		Time	Ŧ.
o sguthe	rpe	2.	Shipped	by:	- 1	Ш.	Shipmer Seal Inta	Shipment Condition:			Temp (°C) Cooler opened by:			/: D	Date			Time		
				100		WHITE: (			/FLLOW: 1	ah Ca										

	ate	s			ect Number:	6577	09/6	000						Latio	ratory	Name	AG	AT		
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V	න <b>ැ</b> ලට	ver			EQ:	ulS Facility ulS upload:										s Requ				
Andrew Co.				/aler Qual	T2 h	Other	ĎX.	Regular	(5 Days)	iners	Metass	04		PAP.			1	1	(pove)	
Aple: Final Repo	rts to be issue	ed by e-ma	il T			-				Conta	12	T	N	/HESH/	-6	1.	1	1	TAT a	
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 A		700	LEPH /H	Chlonde	工	77-12		RUSH (Select TAT above)	Remark (over)
04255 - 01	K19-NW	08-10D	10.4	Wb	22/1/18	12:23	GRAP			8	×	×	X	×		× 3	4			Hold ch
- 02	K19-M	W18-09			1	15=h				8	X	×	X	X	X	X	×-			
- 03	K19-M4	18-08	D	4	4	16:46	4			8	×	X	×	X	X)	X	×-			4
- 04	1519-MW	18-6D	10.4	4	24/01/18	11:29	4			2	4.5			X	1					1
	Kig -MI			4	4			-1	His and	8	X	X	X	(1		X	XA	1	rde	COLFE
- 06																X				Bri
- 07				177												1	1	1	0	U.
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ampler's Signature		-	Relinquist	ned by: Si	12311	5	Company		Date 26/01	/18	8-	8	٥٥٠		Recei	ved by	: Signa	iture	Cor	npany
mments: Imace &	Dave		Method of	Shipmen			Waybill No	n :					or Lab				Date			Time
sgo the	pe		Shipped by	7			Shipment Seal Intac		i.		Long	mt C1	Coo	or ope	neaf b	y: [	Date	3		Time:
3go The	rpe		елирич Оу		V	VHITE: G	Seal Intac	l:	ELLOW: L	ah Co			147,47	w ope	iksi (*	, ,	-aic	- 3		Tinto.



#### SAMPLE INTEGRITY RECEIPT **FORM**

# GAT Laboratories

REC	CEIVING BASICS - Shipping
Company/Consultant:	GOLDER
Courier:	Prepaid Collect
Waybill#	Collect
Branch: EDM GP (FN)	FM RD VAN LYD FSJ EST Other:
Custody Seal Intact: Yes	
TAT: <24hr 24-48hr 2	
Cooler Quantity:	other
TIME S	SENSITIVE ISSUES - Shipping
ALREADY EXCEEDED HOLD	TIME? Yes (No)
norganic Tests (Please Circ	cle): Mibi , BOD , Nitrate/Nitrite , Turbidity ,
Microtox , Ortho PO4 , Tedl Chloroamines*	lar Bag, Residual Chlorine, Chlorophyll*,
arliest Expiry:	
lydrocarbons: Earliest Exp	iry
	50
SAMI	PLE INTEGRITY - Shipping
razardous Samples: YES	NO) Precaution Taken:
egal Samples: Yes (No)	
nternational Samples: Yes	(No)

Bagged Ice Free Ice Free Water None

Temperature (Bott	les/Jars only) N/A	if only Soil Bags	Received
FROZEN (Please Ci	rcle if samples rec	eived Frozen)	
1 (Bottle/Jar) / + 4	2+6=3°c	2(Bottle/Jary	+O+/=0°c
3 (Bottle/Jar) $8 + 6$	2+0=9°c	4 (Bottle/Jar)_	•
5 (Bottle/Jar)+_	+=_ °C		_++C
7 (Bottle/Jar)+_			_+_ + = °C
9 (Bottle/Jar)+_	+ = oC	10 (Bottle/lar)	+ + = °C
(If more than 10 co attach)	olers are received	use another she	et of paper and
	LOGISTICS	USE ONLY	
Workorder No:			
Samples Damaged:	6	hu2	
No Bubble Wrap	1	•	
Other:			
above issues: Yes	lager:	have they	been notified of the
Whom spoken to:			
CPM Initial			
General Comments:			
			T-
4			

Tape Sealed: Yes No

Coolant Used: Icepack





# SAMPLE INTEGRITY RECEIPT FORM - BURNABY Work Order # 18N 300 717

RECEIVING BASICS: Received From:	Waybill #:
SAMPLE QUANTITIES: Coolers: Containers:	
TIME SENSITIVE ISSUES: Earliest Date Sampled: JUN 77,7	2018 ALREADY EXCEEDED? Yes No
comple ID's) to a transition and the	cooler: (record differing temperatures on the CoC next to $ \underline{\int_{^{\circ}C} (3) \underbrace{\int_{^{+}} \underbrace{\int_{^{-}} \underbrace{\int_{^{\circ}C} (4) \underline{+} \underline{+} \underline{+}}_{=} = \underline{\circ}C}} $
Was ice or ice pack present: Yes No Integrity Issues:	
Ţ	
	· ·
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	
Additional Notes:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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.

Member of: Association of Professional Engineers and Geoscientists of Alberta

**AGAT** Laboratories (V2)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 1 of 20



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Public Works LEPH/HEPH III Soll Low Leve	PH in Soil Low Level	FPH/HFPH	Public Works
--	----------------------	----------	--------------

DATE RECEIVED: 2018-01-18							Ι	DATE REPORTI	ED: 2018-02-14	
		SAMPLE DESCRIPTION	ON: 04308-02	04308-05	04308-07	04308-08	04308-11	04299-03	04299-05	04299-10
		SAMPLE TY	PE: Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPL	ED: 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	0.00	5 <0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	<0.005	<0.005
2-Methylnaphthalene	μg/g	0.00	5 0.009	< 0.005	< 0.005	< 0.005	< 0.005	800.0	0.009	0.022
1-Methylnaphthalene	μg/g	0.00	5 0.009	<0.005	<0.005	<0.005	<0.005	0.007	< 0.005	0.032
Acenaphthylene	μg/g	0.00	5 <0.005	< 0.005	< 0.005	< 0.005	<0.005	< 0.005	< 0.005	< 0.005
Acenaphthene	μg/g	0.00	5 <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	0.00	4 <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	0.00	5 <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:

ander Cernoil



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 086 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

		Pι	ıblic Work	s LEPH/HEF	PH in Soil L	ow Level				
DATE RECEIVED: 2018-01-18								DATE REPORTE	ED: 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

Certified By:

Andre Cernorl



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:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Public Works LEPH/HEPH in Soil Low Level

DATE RECEIVED: 2018-01-18							Γ	DATE REPORTE	ED: 2018-02-14	
	5	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:

ander Cernoil



AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA ATTENTION TO: Erin O'Brien

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		Pι	ıblic Works	LEPH/HEPH in Soil Low Level				
DATE RECEIVED: 2018-01-18					[	DATE REPORTE	ED: 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

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

μg/g

μg/g

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AGAT WORK ORDER: 18N303338

PROJECT: 1657709-6000 K19 Investigation

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20

0.05

184

< 0.05

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SAMPLING SITE.						SAIVI	IPLED DT.		
			Pι	ıblic Work	s LEPH/HEP	H in Soil Low Leve	el		
DATE RECEIVED: 2018-01-18								DATE REPORTED: 2018-02-14	
		SAMPLE DESCR	RIPTION:	04301-06	04301-10				
		SAMPL	E TYPE:	Soil	Soil				
		DATE SA	MPLED:	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				

Certified By:

Ander Cernorl

HEPH C19-C32

Benzo(b+j)fluoranthene

112

< 0.05



#### 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

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		Pι	ıblic Work	s LEPH/HEF	PH 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.

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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

SAMPLED BY:

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#### BTEX / VPH (C6-C10) Soil

				-	•					
DATE RECEIVED: 2018-01-18							[	DATE REPORTI	ED: 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:

ander Cerrorl



#### 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

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#### BTEX / VPH (C6-C10) Soil

DATE RECEIVED: 2018-01-18							Γ	DATE REPORT	ED: 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:

Andre Cernorl



#### 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:

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			BTE	X / VPH (C6-C10) Soil
DATE RECEIVED: 2018-01-18				DATE REPORTED: 2018-02-14
	5	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	
		G / S - Guideline / Standa		

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:

Ander Carrol



# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338
ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

RPT Date: Feb 14, 2018				UPLICATI			REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		eptable mits	Recovery	Lin	ptable nits
. ,		ld					Value	Lower	Upper		Lower	Upper	]		Upper
Public Works LEPH/HEPH in So	il Low Lev	/el													
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		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		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 us	ing raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.								
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%
Bromofluorobenzene Dibromofluoromethane	68608	9018142							140% 140%				93% 104%		

AGAT QUALITY ASSURANCE REPORT (V2)

Page 11 of 20

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



# **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N303338
ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000 K19 Investigation

ATTENTION TO: EIIII

SAMPLING SITE:

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 14, 2018				UPLICAT	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	1 1 1 1 1	ptable nits	Recovery	1 1 11	ptable nits
		ld					Value	Lower	Upper	]	Lower	Upper		Lower	Upper
Toluene - d8	68608	9018142	101	100	1.0%	•	100%	60%	140%				95%	60%	140%
Comments: RPDs are calculated us	sing raw ana	alytical data	and not the	e rounded	duplicate	values rep	orted.								
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:

Andre Cernoil



# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

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



# **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000 K19 Investigation

AGAT WORK ORDER: 18N303338 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	CHAIN OF CUSTODY RECO	RD/ANALYSIS REQUES	No. 04308 page 10
Golder Associates	Project Number: 7709 600	00	Laboratory Name:
200 – 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4	short Title: KI9 Investigation	Golder Contact:	Address:
T. I (204) and tone . T	Golder E-mail Address 1: Go	older E-mail Address 2:	Telephone/Fax: Contact:

Telephone (604) 296-	4200 Fax (6	04) 298-5	253	erv	-O Dren	@gc	older.cor	n ago	rido		@go	lder.co		K-45		209	Yas		Calada
Office Name:  Van Co	)uver		☐ 48 hr		EQU	IS Facility ( IS upload:	pq						Ar	alyses Re	quired		W 18 a	857	
Criteria: CSR	CCN		BC W	ater Qualit	72 hi	Other	X	Regular	(5 Days)	SIS		PAHS					ve)		
Note: Final Repor	ts to be issued	by e-mail			Quote N	0.:				ontaine	Hor	-					TAT above)		
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	Brex /	(Equ / Heps)				1 1	RUSH (Select T	,	Remarks (over)
04308 - 01	K19-TPIB-01		0.5	Soil	12/01/18	12:15	Discrete			4							<	90	18141
- 02		2	1.5			12:30				4	X	X						1	142
- 03	V	3	7.5			12:50			- We	u						>			143
104308-04	K19-TP18-02	Ĭ	11.4			14:00	*	34	No.	2							<b>/</b>		145
- 05		2	1,5			14:20				4	X	X							146
<b>V</b> - 06	V	3	2.6		V	14:40	V			4							<		147
- 07	K19-TP8-03	Ī	0.5		13/01/18	10:30		FDA	04308-08	4	X	X							148
- 08		1	05			10.30		FD	04308-07		X	X							149
- 09		2	915			10:50				4							×		150
- 10	V	3	2.6			11-10				2						×	<u> </u>		151
- 11	KHIPBOY	1	0.5			11:50				4	X	X							152
√ - 12	L	2	15	V	W	12:10	V			4						7	<_	1	153
Sampler's Signature:	B. J.		Relinqui	shed by:	Signature	AS	Compar	dis	Date 17/0	21/	18	Time	845.	1 1 2	d by: S	ignature	M <sub>Co</sub>	mpany	GAT
Comments:  Trible 1	ave		Method	of Shipme	nt:		Waybill	No.:			Rece	eived for	Lab by	nn /	Date	e		Time	8:35
Insu D Osgut	ho pe	4	Shipped	by:			Shipmer Seal Inta	nt Condit act:	ion		Tem	p (°C)	Cooler o	pened by:	Date	e		Time	

Page 15 of 20

WHITE: Golder Copy YELLOW: Lab Copy

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 04299 page Zof 4

Asso	ciates				165	774	2/190	600		400			Lab	oratory Nam	e:			
200 – 2920 Virtual Wa Zancouver, British Co		da V/5M 00	`1	Short	(19)	must,	who	200	Golder	Contac		en		ress: 0 - 860	200	1-1-		7).
elephone (604) 296-	4200 Fax (6	604) 298-5	253	The second second	FE-mail Add	dress 1:	older.cor	Golder	E-mail Addres	ss 2:		older.c	Tele	phone/Fax:	57.4		Contac	ti miso Geleda
Office Name:	lin 2000	10/			FOU	IS Facility C	ode: O	1427	1809					14 - 7	3275		-1	49:57
Turnaround Time:	n COU	46.			EQu	IS upload:	V						A	nalyses Re	quired			owest.
Criteria: CSR	CCI	ME	☐ 48 hr ☐ BC Wa	ater Quali	☐ 72 hr ty ☐	Other	×	Regular	(5 Days)	SI							(e)	
Note: Final Report	ts to be issued	l by e-mail			Quote No	D.:				ntaine	HAN	My PAT					T abov	
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 /V	I PH/HERM/PAH				Moth	RUSH (Select TAT above)	Remarks (over)
04299 - 01	K19-TPX-114	3	2.5	50:1	13/01/18	12.20	Ducto			2		7						9018155
- 02	K19-TP18-05		05		is is the	W3150	13510			4								1 156
- 03		2	15			14.28	14.20			4	X	X						157
- 04	V	3	2.5			12/2019	14 40			4				L.		X		158
- 05	K19-TP18-06		0.5			1520				4	X	X					::	159
- 06		2	1,5			15 30				4						X	i	160
- 07		3	25		V	15:40				2						×	i	161
- 08	K19-TP18-07	1	0,5		14/01/18	10:30				2						X		162
- 09		2	15			10:40				4						V		163
- 10		3	25			10:50				4	X	X						164
- 11	V	4	3.4			11:10		FDA	04299-12	4	V	X						165
√ -12	V	4	3.4	y	V	11:10	V		74299-11	4	X	X						166
ampler's Signature:	gir B	ch			Signature	3	1000	1111	Date 17/0	1/1	8	Time	845	Received	by: Sigr	ature	Con	npany,
Comments: Invoice	e Dave		Method of Shipment: Waybill No.:								Rec		Lab by:	yer	Date			Time 3
05gn H	orpe		Shipped	by:			Shipmer Seal Inta	nt Conditio	on:		Ten	D (°C)		pened by:	Date			Time
2						WHITE: 0	Coldor C	one \	/ELLOW: I	- h . C						-		

18N303338

# CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST No. 04300 page 7 of 4

Associate	es		Proje	ct Number:	657	709	1/60	000				Lat	oratory Nam	ie: A	1		
00 – 2920 Virtual Way ′ancouver, British Columbia, C ′elephone (604) 296-4200 F	anada V5M	0C4 8-5253		er E-mail Add				Golder C	s 2:	O Br	ien	Tel	dress: 06 8 ephone/Fax:	600	Glady	ontact	ky
Office Name:	(001)20		DVI	n_o brie	@go	lder.con	n leon	one dipal by	olat	@g	older	.com	78-40	2-40	ין ירסי	lasn	ne Galado
Vanco		42		EQu	IS Facility C	Y							Analyses Re	quired	Į Šķ	180	
Turnaround Time: 24 h	r CCME	☐ 48 hr ☐ BC W	ater Quali	☐ 72 hr	Other	A	Regular (	(5 Days)	က		-					<u>@</u>	_
Note: Final Reports to be is				Quote No					Containers	UPH	H/PAIL				0	AT above	
Sample Control Sample Number (SCN) Location	Sat	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 Co	MX315	E DH/HEPH/PAH				HOE	RUSH (Select TAT above)	Remarks (over)
74300-01 KA-TPIE	-08 1	0.5	50:1	14/01/18	12.20	Disut			2	TV.					X		9018169
- 02	2	1.5		1777	12:30	TO VALE			4								1 170
- 03	3	25		W	12:50				4	X	V					1	171
- 04 KM-TP18	-09 1	0.5			14.50				11		1		5				172
- 05	2	1.5			15:30				4	V	V				X		173
- 06	2	25		11	15 50				4	A	^					1	174
- 07 KIT-TPB	n I	nc		15/01/18	10:00	1			4							_	175
- 08	2	10		13/0/110	10:30		FOA	12/20- 4	11							-	
- 09	2	15			10:30		FD	04300-01	7						X	-	176
- 10	3	2.5			11:00		TU	04300-08	1/	V	V					-	177
- 11 V	11	3.3			11:30				3,	^	^					+	179
V - 12 KI9-TPI	211	0.0	1		12:30	1			4						8	$\dashv$	180
Sampler's Signature:	2	-	ished by: of Shipme	Signature	18	Compan (A) (	W-	Date 17/0	01/	18 Rec	Tim	m-21	Receive 5. Receive		XX	Com	pany Time
I hvoice Pa 05guthorpe		Shipped	l by:			Shipmer Seal Inta	nt Conditi act:	on:		Tem	1p (°C	Cooler	opened by:	Date			Time

18N303338

#### CHAIN OF CUSTODY RECORDIANALYSIS REQUEST

No 04201 - 1/ 0/

-	A P		lde	r
000	0000	 		

Turnaround Time: 24 hr

- 01

- 02

- 04 - 05 - 06 - 07

- 08 - 09 - 10 - 11 - 12

Sampler's Signature:

Office Name:

Criteria: CSR

Sample Control

Number (SCN)

1430

200 - 2920 Virtual Way Vancouver, British Columbia, Canada V5M 0C4 Telephone (604) 296-4200 Fax (604) 298-5253

Note: Final Reports to be issued by e-mail

Sample

Location

K19-TP16-11

19-MW18-0

- 03 K9-7P18-12

ancouver

CCME

Sa. #

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		Proje	ct Nur	nber:	7770	9/60	20				,	Lal	Laboratory Name:				
		Short	Title:	a 6	- //	7	j - j	Golder			-	Ad	dress:	J-7/7	1	· ·	2
٥,		Golde	er E-m	ail Add	lress 1:	INVA	Golder	E-mail Addre	155 2	bris	eh	16	20-86/ lephone/Fa	20 G	lenlyon	PK	2 Bundy BC
2	253	Golder E-mail Address 1: Golder E-mail Address 2: Telephone/Fax: Contact:    Prin - 0 by th @golder.com   Golder E-mail Address 2: Telephone/Fax:   Contact:															
	EQuIS Facility Code: 28433859												Analyses	Peguiro	JĄ	W 18	9 <del>88</del> 57
]	☐ 48 hr ☐ BC W	ater Qual	ty	72 hr		-	Regular (	5 Days)	S.		I		analyses	require	4		
			Qu	ote No	).:				Number of Containers	_	PH/HEPH/PAH					RUSH (Select TAT above)	
	Sample	Sample	D	ate	Time	Sample	QAQC	Related	of Cc	HON	1				2	ect T/	
	Depth	Matrix		npled	Sampled	Туре	Code	SCN	nber	EXI					2	H (Se	Remarks
	(m)	(over)	(D /	M / Y)	(HH:MM)	(over)	(over)	(over)	N	BIE	77				1	RUS	(over)
	1.5	Soil	15/1	1/17	13:00	Discrete			4	X	X						9018181
	1.5			,	13:10				2	-					X		1 182
	6.5				Pod 4:00				2			=			×		183
	1.5				14:30				4		-				×	à	184
	2.5				14:40				4						$\times$		185
	3.0		V		1455				4	X	X						186
	13-0,5		16/0	117	13:10				2						X		187
1	10-23			1	13:20				2						X		188
<	5.58				13:30				2						X		189
1	5-7.0				18:00				4	X	X						190
5	8.0-85		1	/	P64/6:30				4	( )	/ ~				X		191
		V				事			1						-	517	61/13-
Relinquished by: Signature Company Date								Time		Recei	ved by:	Signature	Cor	mpany,			
	Method (	of Shipme	ent:	مَت	A)	Waybill i	No.:	17/	0//	- 107	ceived	for Lab by:	- 1	De	ate /		A GAT Time C/
												Ann	1XV		, (		V35
	Shipped by: Shipment Condition:								Ter	np (°C)	Cooler	opened by	r: Da	ate		Time U	

WHITE: Golder Copy YELLOW: Lab Copy

Seal Intact:



Time U



# AGAT Laboratories

# SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant:	FROZEN (Please Circle if samples received Frozen)
Courier: Prepaid Collect	1 (Bottle/Jar) $+ \bigcirc + \bigcirc + \bigcirc = \bigcirc \circ
	3 (Bottle/Jar) + + + = 5 °C 4 (Bottle/Jar) + + = 0°C
Waybill#	5 (Bottle/Jar) + + = OC 6 (Bottle/Jar) + + = OC
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar) + + = OC 8 (Bottle/Jar) + + = OC
Custody Seal Intact: Yes No NA	9 (Bottle/Jar) + + = OC 10 (Bottle/Jar) + + = OC
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	Workorder No: Samples Damaged: Yes No If YES why? No Bubble Wrap Frozen Courier Other: Account Project Manager: above issues: Yes No Whom spoken to: Date/Time: CPM Initial General Comments:
SAMPLE INTEGRITY - Shipping	
Hazardous Samples: YES NO Precaution Taken:	
Legal Samples: Yes No	
International Samples: Yes No	

Free Water None

Tape Sealed: Yes No Coolant Used: Icepack

Bagged Ice Free Ice



#### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 18N303338

RECEIVING BASICS: Received From:	Waybill #:
SAMPLE QUANTITIES: Coolers: Containers:	
TIME SENSITIVE ISSUES: Earliest Date Sampled:	ALREADY EXCEEDED? Yes No
sample ID's) *use jars when available	ach cooler: (record differing temperatures on the CoC next to  =°C (3)++=°C (4)++_=°C
Was ice or ice pack present: No Integrity Issues:	
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	
ADDITIONAL NOTES:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



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 is 31st, 2018.	sued on February 6th, 2018 to report PAH analysis on samples "04306-05" and "04306-06" as requested by Andrew Bruemmer on January

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V2)

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Page 1 of 53



Bismuth

Cadmium

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

μg/g

μg/g

0.5

0.01

< 0.5

0.34

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 086 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

			Public	Works Metals in Soil
				DATE REPORTED: 2018-02-23
S	AMPLE DES	CRIPTION:	04304-09	
	SAMI	PLE TYPE:	Soil	
	DATES	SAMPLED:	2018-01-19	
Unit	G/S	RDL	9025012	
μg/g		10	9800	
μg/g		0.1	0.6	
μg/g		0.1	8.4	
μg/g		0.5	168	
μg/g		0.1	0.5	
	Unit µg/g µg/g µg/g µg/g	SAMPLE DES SAMI DATE S Unit G / S µg/g µg/g µg/g µg/g µg/g	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED: Unit G/S RDL  µg/g 10 µg/g 0.1 µg/g 0.1 µg/g 0.5	SAMPLE DESCRIPTION: 04304-09

Calcium μg/g 10 9540 Chromium 17 μg/g Cobalt μg/g 0.1 6.3 0.2 13.2 Copper μg/g Iron 10 17300 μg/g 0.1 25.7 Lead μg/g Lithium 0.5 μg/g 8.4 Magnesium μg/g 10 2840 Manganese μg/g 1 171 0.01 0.04 Mercury μg/g Molybdenum μg/g 0.2 1.8 Nickel 0.5 13.4 μg/g 5 **Phosphorus** μg/g 511 Potassium 1380 μg/g Selenium 0.1 μg/g 0.6 Silver μg/g 0.5 < 0.5 Sodium μg/g 5 54 Strontium μg/g 30 Thallium 0.1 0.2 μg/g 0.2 8.0 μg/g Titanium μg/g 1 35 0.2 1.0 Uranium μg/g 37 Vanadium μg/g

Certified By:

Ander Convorl



#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

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	

		DATE	SAMPLED.	2010-01-18
Parameter	Unit	G/S	RDL	9025012
nc	μg/g		1	58
rconium	μg/g		0.1	0.4
l 1:2	pH units		0.05	7.68

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9025012 Results are based on the dry weight of the sample

SAMPLING SITE:

Certified By:

ander Cernoil



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### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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#### Public Works LEPH/HEPH in Soil Low Level

		г	JUIC WOIK	3 LLF11/11L1	TITIII SOII L	JW FEAGI				
DATE RECEIVED: 2018-01-23							[	DATE REPORTE	ED: 2018-02-23	
Parameter	Unit	SAMPLE DESCRIPTION:  SAMPLE TYPE:  DATE SAMPLED:  G/S RDL	04306-04 Soil 2018-01-20 9024976	04306-05 Soil 2018-01-20 9024977	04306-06 Soil 2018-01-20 9024978	RDL	04305-01 Soil 2018-01-19 9024984	04305-07 Soil 2018-01-20 9024992	04304-01 Soil 2018-01-18 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	





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#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

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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.

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23							D,	ATE REPORT	TED: 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							





#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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SAMPLED BY:

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#### BC Routine VOC package in Air (Canister) -ug/m3

DATE RECEIVED: 2018-01-23 **DATE REPORTED: 2018-02-23** 

Comments:

SAMPLING SITE:

RDL - Reported Detection Limit; G / S - Guideline / Standard

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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.

The Reporting Detection Limit has been adjusted accordingly.

Analysis done at AGAT 5623 McAdam Road Mississauga location.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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$\Box$	ΓΓV	/ VDI I	(CC C40)	Call
В		/ VPH	(C6-C10)	2011

			ВП	=X / VPH (C	o-C 10) Soli	
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:

SAMPLING SITE:

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.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

#### 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

SAMPLING SITE:

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.

Certified By:



Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Public Works : BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23							I	DATE REPORT	TED: 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
rans-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
rans-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

SAMPLED BY:

ATTENTION TO: Erin O'Brien

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	2018-01-2	
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

ATTENTION TO: Erin O'Brien

SAMPLED BY:

		Publ	c Works	: BC VOCs in Air (Canister) - ug/m3
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-02-23
		AMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:	04316-08 Air 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 <15.0	
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/m3	15.0		
Chloromethane	ug/m3	6.00	<6.00	
Vinyl Chloride	ug/m3	4.00	<4.00	
Bromomethane	ug/m3	19.0	<19.0 <10.0	
Chloroethane	ug/m3	10.0		
Vinyl Bromide Trichlorofluoromethane	ug/m3	8.00	<8.00	
	ug/m3	23.0	<23.0	
1,1-Dichloroethene	ug/m3	10.0 10.0	<10.0 <10.0	
Methylene Chloride trans-1,2-Dichloroethene	ug/m3	8.00	<8.00	
1,1-Dichloroethane	ug/m3 ug/m3	12.0	<0.00	
cis-1,2-Dichloroethene	ug/m3	8.00	<8.00	
Chloroform	ug/m3	10.0	<10.0	
1,2-Dichloroethane		3.00	<3.00	
1,1,1-Trichloroethane	ug/m3	16.0	<16.0	
Carbon Tetrachloride	ug/m3 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	<20.00	
Dibromochloromethane	ug/m3	20.0	<20.0	
Dibiomodilorometriane	ug/III3	20.0	<b>\2</b> 0.0	

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

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OAIVII LIIVO OITL.				OAMI ELD DT.						
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							
1										





## Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

ATTENTION TO: EIIII O BI

Public Works: BC VOCs in Air (Canister) - ug/m3

DATE RECEIVED: 2018-01-23 DATE REPORTED: 2018-02-23

Comments:

SAMPLING SITE:

RDL - Reported Detection Limit; G / S - Guideline / Standard

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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 analysis 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 analysis 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 analysis 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 analysis 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.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY

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.

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

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 analysis 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.

SAMPLING SITE:

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.

COMMITTERS COMMITTERS

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### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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	

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

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Unit 120, 8600 Glenlyon Parkway

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.

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AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

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			Volatile Or	ganic Compounds in Soil
DATE RECEIVED: 2018-01-23				DATE REPORTED: 2018-02-23
	S	SAMPLE DESCRIPTION: SAMPLE TYPE: DATE SAMPLED:	04306-04 Soil 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	

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μg/g

μg/g

μg/g

0.05

0.05

0.05

< 0.05

< 0.05

< 0.05

1,2-Dibromoethane

Tetrachloroethylene

1,1,1,2-Tetrachloroethane



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PROJECT: 1657709-6000

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SAMPLING SITE.				SAMPLED BT.
			Volatile Or	ganic 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 De	etection Limit;	G / S - Guideline / Standa	rd	

9024976 Results are based on dry weight of sample.



CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

#### Volatile Organic Compounds in Water

			voiatiie C	rigariic Con	ipoulius ili	vvalei	
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	





CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

SAMPLED BY:

ATTENTION TO: Erin O'Brien

#### SAMPLING SITE: 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 RDL 9025059 9025067 9025068 9025069 Parameter Unit G/S Chlorobenzene μg/L <1 <1 <1 <1 Ethylbenzene μg/L 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 Bromoform μg/L <1 <1 <1 <1 Styrene μg/L 0.5 < 0.5 < 0.5 < 0.5 < 0.5 0.8 <0.8 <0.8 <0.8 1,1,2,2-Tetrachloroethane μg/L <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 VΗ μg/L 100 <100 <100 <100 <100 VPH 100 <100 <100 <100 <100 μg/L 1,3-Dichloropropene (cis + trans) μg/L 1 <1 <1 <1 <1 Total Trihalomethanes μg/L <2 <2 <2 <2 Total Xylenes μg/L <1 <1 <1 <1 Unit Acceptable Limits Surrogate Bromofluorobenzene % 70-130 90 99 86 100 70-130 97 91 100 Dibromofluoromethane % 85 % 94 99 Toluene - d8 70-130 109 113

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:



Unit 120, 8600 Glenlyon Parkway

Burnaby, British Columbia CANADA V5J 0B6

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Chloride

Parameter

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

#### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

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DATE RECEIVED: 2018-01-23 DATE REPORTED: 2018-02-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Unit

mg/L

Certified By:

ander Carrol



SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

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### Public Works Dissolved Metals

			i ubiic	WOLKS DIS	SUIVEU MEL	ais	
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:

ander Cernorl



SAMPLING SITE:

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

### Certificate of Analysis

AGAT WORK ORDER: 18N304491

PROJECT: 1657709-6000

ATTENTION TO: Erin O'Brien

SAMPLED BY:

Burnaby, British Columbia CANADA V5J 0B6 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

Unit 120, 8600 Glenlyon Parkway

Public Works Dissolved Metals

				i ubiic	WOIKS DIS	SOLVED IVICE	ai S	
DATE RECEIVED: 2018-01-23								DATE REPORTED: 2018-02-23
	SA	AMPLE DES	CRIPTION:	04319-01	04319-02	04319-03	04319-04	
		SAM	PLE TYPE:	Water	Water	Water	Water	
		DATE S	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:

Andre Cernorl



### **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:

				Soi	l Ana	alysis	3							
RPT Date: Feb 23, 2018				UPLICATI	E		REFERE	NCE MA	TERIAL	METHOD	BLAN	( SPIKE	MAT	RIX SPIKE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable mits	Recovery		eptable mits	Recovery	Acceptable Limits
		ld	''				Value	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.

Certified By:

ander Canonal

AGAT QUALITY ASSURANCE REPORT (V2)

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## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

Trace Organics Analysis  PPT Date: Feb 23, 2018 DUPLICATE REFERENCE MATERIAL METHOD BLANK SPIKE MATRIX SPIKE															
RPT Date: Feb 23, 2018				UPLICATE			REFEREN	ICE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery		eptable mits	Recovery		ptable nits
FARAMETER	Daton	ld	Dup #1	Dup #2	KFD		Value	Lower	Upper	Recovery	Lowe	Upper	Recovery	Lower	Upper
Public Works LEPH/HEPH in Soil I	Low Lev	el													
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	g raw ana	lytical data	and not the	e rounded o	duplicate v	values repo	orted.								
Volatile Organic Compounds in So	oil														
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		9024976	<0.05	< 0.05	NA	< 0.05	100%		120%				93%		130%
Dichloromethane		9024976	<0.05	< 0.05	NA	< 0.05	100%		120%				93%	70%	130%
Methyl tert-butyl ether (MTBE)	68643	9024976	<0.1	<0.1	NA	< 0.1	101%	80%	120%				89%		130%
2-Butanone (MEK)	68643	9024976	<0.5	<0.5	NA	< 0.5	100%		120%				88%		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	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 23, 2018			С	UPLICATI	E		REFEREN	ICE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery		ptable nits Upper	Recovery	1 1:0	ptable nits Upper
1,1-Dichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	100%	80%	120%			1	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%		120%				85%		140%
1,1,2-Trichloroethane	68643	9024976	<0.05	<0.05	NA	< 0.05	101%		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%		120%				85%		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%		120%				87%		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%		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%		120%				86%		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%		120%				88%		130%
1,3-Dichlorobenzene	68643	9024976	<0.05	< 0.05	NA	< 0.05	100%		120%				89%		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%		120%				90%		
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%	. 0.00	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%		140%				105%		140%
VH	68643	9024976	19	19	NA	< 10	. 3 1 70	2370	070				.0070	5570	
VPH															

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) 70% 130% 68643 9025533 NA 80% 120% 97% < 0.1 < 0.1 < 0.1 100% 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

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)				
RPT Date: Feb 23, 2018				UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK SPIKE	MAT	RIX SPI	KE
DADAMETED		Sample	- · · ·	D #0	222	Method Blank	Measured		ptable nits		Acceptable Limits	_		ptable nits
PARAMETER	Batch	ld <sup>'</sup>	Dup #1	Dup #2	RPD		Value	Lower	Upper	Recovery	Lower Upper	Recovery	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%
Comments: RPDs are calculated us	sing raw ana	alytical data	and not the	e rounded (	duplicate	values rep	orted.							
Public Works LEPH/HEPH in Wa	iter Low Le	evel												
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%		120%			96%	60%	130%
Benzo(b)fluoranthene	68644	W-MS1	0.39	0.38	2.6%	< 0.01	97%		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%		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%		120%			83%	60%	130%
Benzo(g,h,i)perylene	68644	W-MS1	0.43	0.45	4.5%	< 0.01	100%		120%			89%		130%
1-Methylnaphthalene	68644	W-MS1	0.36	0.38	5.4%	< 0.05	100%		120%			73%		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%		130%			84%		130%
EPH C19-C32	68644	W-MS1	13800	13600	1.5%	< 100	99%		130%			90%		130%
Naphthalene - d8	68644	W-MS1	83	82	1.2%	1 100	101%		120%			83%		130%
2-Fluorobiphenyl	68644	W-MS1	82	84	2.4%		100%		120%			82%		130%
P-Terphenyl - d14	68644	W-MS1	89	87	2.3%		100%	80%	120%			89%	60%	130%

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AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



## **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:

	Т	race	Orga	anics	Ana	lysis	(Cor	ntinu	ued	)					
RPT Date: Feb 23, 2018				UPLICAT	E		REFEREN	ICE MAT	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPII	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value			Recovery	Lin		Recovery	Lin	ptable nits Upper

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated us	ing raw ana	alytical data	and not th	ie rounded d	duplicate v	values repo	orted.					
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%		96%	70%	130%
Methyl tert-butyl ether (MTBE)	68658	9025583	<1	<1	NA	< 1	101%	80%		104%		130%
2-Butanone (MEK)	68658	9025583	<10	<10	NA	< 10	100%		120%	.0.70	. 0 70	.0070
,	00000	002000	1.0	1.0			.0070	0070	.2070			
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	101%	80%		106%	70%	
4-Methyl-2-pentanone (MIBK)	68658	9025583	<10	<10	NA	< 10	102%	80%		100%	10%	130 /6
cis-1,3-Dichloropropene	68658	9025583	<1	<1	NA	< 1	101%	80%		101%	70%	130%
1,1,2-Trichloroethane	68658	9025583	<1	<1	NA	< 1	101%	80%		105%	70%	130%
1,1,2-Themoreulane	00030	9023303	<u> </u>	<u> </u>	INA	<u> </u>	10176	00 /6	12076	103 /6	1076	130 /0
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%		101%	70%	130%
Styrene	68658	9025583	<0.5	<0.5	NA	< 0.5	102%	80%	120%	100%	70%	
· · · · · · · · · · · · · · · · · · ·												
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

PROJECT: 1657709-6000

SAMPLING SITE:

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLED BY:

		Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 23, 2018				UPLICATE			REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery		eptable mits	Recovery		ptable nits
		lu lu	·				Value	Lower	Upper	,	Lower	Upper	Ţ	Lower	Uppe
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	g raw ana	alytical data	and not the	e rounded o	duplicate	values rep	orted.								
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	g raw ana	alytical data	and not the	e rounded o	duplicate	values rep	orted.								
BC Routine VOC package in Air (C	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%		140%	126%		140%	NA		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%		140%	71%		140%	NA		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%		140%	99%		140%	NA		140%
Public Works : BC VOCs in Air (Ca	anister) -	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%		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:

	٦	race	Orga	anics	Ana	lysis	(Cor	ntin	ued	)					
RPT Date: Feb 23, 2018				UPLICATI	•		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits Upper	Recovery		ptable nits Upper	Recovery		ptable nits Upper
Chloromethana			.0.60	.0.60	0.00/	.0.60	1.400/	l		1270/		1	NIA.		
Chloromethane Vinyl Chloride	1 1		< 0.60 < 0.40	< 0.60 < 0.40	0.0% 0.0%	< 0.60 < 0.40	140% 139%	60%	140% 140%	137% 137%	50% 50%	140% 140%	NA NA	30% 30%	140% 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%

### AGAT QUALITY ASSURANCE REPORT (V2)

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PROJECT: 1657709-6000

Unit 120, 8600 Glenlyon Parkway Burnaby, British Columbia CANADA V5J 086 TEL (778)452-4000 FAX (778)452-4074 http://www.agatlabs.com

ATTENTION TO: Erin O'Brien

## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491

SAMPLING SITE: SAMPLED BY:

						`	27 (IVII I		••				
	Trace	Orga	anics	Ana	lysis	(Cor	ntin	ued	)				
			UPLICATE	<b>=</b>		REFEREN	NCE MA	TERIAL	METHOD	BLANK SPIKE	MAT	RIX SPI	KE
Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured			Recovery	Acceptable Limits	Recovery		ptable
	lu lu					value	Lower	Upper		Lower Upper		Lower	Upper
il Low Lev	·el	•					•					•	
68688	9037253	< 0.005	< 0.005	NA	< 0.005	100%	80%	120%			103%	50%	130%
68688	9037253	0.042	0.044	4.7%	< 0.05	98%	80%	120%			95%	50%	130%
68688	9037253	0.034	0.038	11.1%	< 0.05	99%	80%	120%			99%	50%	130%
68688	9037253	< 0.005	< 0.005	NA	< 0.005	99%	80%	120%			97%	50%	130%
68688	9037253	<0.005	<0.005	NA	< 0.005	99%	80%	120%			99%	50%	130%
68688	9037253	<0.02	<0.02	NA	< 0.02	100%	80%	120%			103%	50%	130%
68688	9037253	0.02	0.04	NA	< 0.02	98%	80%	120%			87%	60%	130%
68688	9037253	< 0.004	< 0.004	NA	< 0.004	99%	80%	120%			95%	60%	130%
68688	9037253	< 0.01	< 0.01	NA	< 0.01	98%	80%	120%			98%	60%	130%
68688	9037253	<0.01	<0.01	NA	< 0.01	100%	80%	120%			97%	60%	130%
68688	9037253	<0.03	< 0.03	NA	< 0.03	99%	80%	120%			95%	60%	130%
68688	9037253	< 0.05	< 0.05	NA	< 0.05	100%	80%	120%			95%	60%	130%
68688	9037253	< 0.02	< 0.02	NA	< 0.02	100%	80%	120%			95%	60%	130%
68688	9037253	< 0.02	< 0.02	NA	< 0.02	101%	80%	120%			101%	60%	130%
68688	9037253	<0.02	<0.02	NA	< 0.02	97%	80%	120%			91%	60%	130%
68688	9037253	<0.03	< 0.03	NA	< 0.03	99%	80%	120%			93%	60%	130%
68688	9037253	< 0.02	< 0.02	NA	< 0.02	97%	80%	120%			86%	60%	130%
68688	9037253	< 0.005	< 0.005	NA	< 0.005	97%	80%	120%			87%	60%	130%
68688	9037253	< 0.05	< 0.05	NA	< 0.05	98%	80%	120%			94%	60%	130%
68688	9037253	<0.05	<0.05	NA	< 0.05	97%	80%	120%			106%	50%	130%
68688	9037253	34	21	NA	< 20	110%	70%	130%			99%	65%	120%
68688	9037253	<20	<20	NA	< 20	103%	70%	130%			100%	80%	120%
68688	9037253	95	89	6.5%		99%	80%	120%			100%	50%	130%
68688	9037253	97	88	9.7%		101%	80%	120%			102%	50%	130%
68688	9037253	97	93	4.2%		100%	80%	120%			96%	60%	130%
	il Low Lev 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688 68688	Batch Sample Id  II Low Level 68688 9037253	Batch Sample   Dup #1	Batch Sample   Dup #1   Dup #2	Batch   Sample   Dup #1   Dup #2   RPD	Batch   Sample   Dup #1   Dup #2   RPD   Method Blank	Batch   Sample   Dup #1   Dup #2   RPD   Method   Measured   Mea	Batch   Sample   Dup #1   Dup #2   RPD   Method   Measured   Lower	Batch   Sample   Dup #1   Dup #2   RPD   Method   Blank   Measured   Lower   Lower   Lower   Upper	Batch   Sample   Dup #1   Dup #2   RPD   Method Blank   Measured Value   Limits   Low   Upper   Recovery	Batch   Sample   Dup #1   Dup #2   PPD   Method Blank   Method B	Batch   Sample   DUP   Dup #1   Dup #2   RPD   Method Blank   Measured Value   Measured Value   Dup #2   Recovery   Dup #3   Dup #4   Dup #4   Dup #4   Recovery   Dup #4   Dup #4   Recovery   Dup #4   Dup #4   Recovery   Dup #4   Batch   Sample   DUPLICATE   Batch   Batch   Sample   Dup #1   Dup #2   RPD   Method Blank   Measured   Calimits   Lower   Upper   Calimits   Lower   Upper   Calimits   Cower   Calimits   Cower   Upper   Calimits   Cower   Calimits   Calimi	

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

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Certified By:



## **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA A

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

SAMPLING SITE: SAMPLED BY:

PARAMETER   Batch   Sample Id   Dup #1   Dup #2   RPD   Blank   Measured Value   Limits   Lower   Upper   Recovery   Limits   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper	eptable imits
PARAMETER   Batch   Sample Id   Dup #1   Dup #2   RPD   Blank   Measured Value   Limits   Lower   Upper   Recovery   Limits   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper   Lower   Upper	imits
Public Works Dissolved Metals         Aluminum Dissolved         9025583         27         28         2.5%         < 2	er Upper
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% 106% 90% 110% Bismuth Dissolved 9025583 <0.05 <0.05 NA <0.05	
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% 106% 90% 110% 90% 110% 106% 90% 110% 90% 110% 106% 90% 110% 90% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90% 110% 90%	
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	
Barium Dissolved       9025583       94.4       91.5       3.1%       < 0.2	
Beryllium Dissolved       9025583       0.02       <0.01       NA       < 0.01       103%       90%       110%       90%       110%         Bismuth Dissolved       9025583       <0.05	
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%	
Boron Dissolved 9025583 32 31 3.4% < 2 94% 90% 110% 91% 90% 110%	
Codmium Discolved 0035593 0.43 0.44 6.00/ +0.04 4.040/ 0.00/ 44.00/ 0.00/ 44.00/	
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%	

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Chloride in Water

Chloride 9014203 0.21 0.21 NA < 0.05 99% 90% 110% 96% 90% 110%

AGAT QUALITY ASSURANCE REPORT (V2)

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### **Quality Assurance**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)															
RPT Date: Feb 23, 2018			D	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		otable nits	Recovery	Lin	otable nits	Recovery		ptable nits
		ld	- 1	.,	_		Value	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



## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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



## 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
Trace Organics Analysis		Madifications BOMOTA And	
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
		Modified from BC MOE Lab Manual	

## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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

## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
ODO 400 5400		
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified form BCMOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5133	Modified from BC MOE Lab Manual Section D (PAH)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
ORG-180-5103	Modified from BC MOE Lab Manual Section D (VOC)	GC/MS
	ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5134 ORG-180-5134 ORG-180-5134 ORG-180-5134 ORG-180-5133 ORG-180-5133 ORG-180-5134 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5133 ORG-180-5103 ORG-180-5103 ORG-180-5103	ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (EPH)           ORG-180-5134         Modified from BC MOE Lab Manual Section D (PAH)           ORG-180-5133         Modified from BC MOE Lab Manual Section D (PAH)

## 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

## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA AGAT WORK ORDER: 18N304491
PROJECT: 1657709-6000 ATTENTION TO: Erin O'Brien

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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
√PH	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

## **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



## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

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

## Method Summary

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT: 1657709-6000

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis	INIOD 404 0000	Madiffeed for an OM 4440 D	ION OUROMATOORARU
Chloride	INOR-181-6002 MET-181-6102,	Modified from SM 4110 B	ION CHROMATOGRAPH
Aluminum Dissolved	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



## **Method Summary**

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

AGAT WORK ORDER: 18N304491 ATTENTION TO: Erin O'Brien

PROJECT: 1657709-6000

SAMPLED BY:

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

No. 04306 page 1 of

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elephone (604) 296-				Golde	er E-mail Ado		older.co	Golde kont	r E-mail Addre	ss 2:		older.co	Tel	ephone/Fax:			Contac	
Office Name:	Minc V	1 . 6	10		EQu	IS Facility (												
Turnaround Time:	UNC (	JUVE	V		EQu	IS upload:	M							nalyses Re	quired	JAN.	28 AMÍ	0119
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()4306 - 01	KM-MW18-17	1100	03-05	Soil	20/01/18	12:50	Discrete			2								9024971
- 02	1	22/4/1	2.0-2.5			1310				4								923
- 03		373	35-40			13:20				4								975
- 04		4 4/1	5,560			13:40				4	X	XM						926
- 05		5#	7.0-7.5			14:00				4								977
- 06		614	85-9.0			14:20				2								473
- 07	V	77	10.1-10.6			14:50				4								929
- 08	(19-HW18-10S		5.5-6.6			16:00		FOA	04306-09	4								970
- 09			55-60		V	16:00		FD	04306-08	4								981
- 10						W.			1 1									T
- 11					7													B
V - 12				V			V											
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18N304491 No. 04305 page 2 of 5

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Vancouver, British Ço Telephone (604) 296-				1000000	er E-mail Add	ress 1:		Golder	E-mail Addre	ss 2:	127			Teleph	none/Fax:		11000	Contac	t
Office Name:		_	-	QVI					He-din-t	20161	<u>w</u> g	oluei	.com	FY	18-45	2 -	TONE	3 AM 10	mire Galandes
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Trace: Timar Repor	13 10 00 133000	Dy e-mai								Cont	Hd	NON	5					TAT	12
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- 02	1	9	6-9-1			14:30	1			4	1	1							9.86
- 03	4	10-	1-10-6			15:00				2									987
- 04	K19-11WB09	1	0.3-05		20/01/18					2			獭						988
- 05		2	20-25			10.20				4			,,,						989
- 06		3	35-40			10:30				4	-								990
- 07		4	50-55			10:50				4	X	X	Mr.		1	-			992
- 08		5	70-15			11:10				2				y					993
- 09		6	8.5-9.0			11:40				4									994
- 10	J	7	10.0-105	-		12:00	V	-		4								l - T	495
<sub>7</sub> -11	K19 - AFC	V-ferth	0,50			1300				2									995
V - 12	KI9-PECLO	- Perkin	0.30	V	V	1300				2									997
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181 304 page 305

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elephone (604) 296-	4200 Fax (6	304) 298-5	5253		r E-mail Add		older.cor		E-mail Addres	s 2:		older.c		elephone		2-	400	Conta	ot: Galado
Office Name:	ancou	wel			EQu EQu	IS Facility C	ode: 28	34338	359					Analys	no Doc	اد مداد		4 23 pr	10:19
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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	EPH/HE	BTEX/VP	regal		ž.			RUSH (Select TAT above)	Remarks (over)
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- 02		4834	3.5-4.0			1500			14314-01	4									5000
- 03	-	M505	5.0-65		V	1545		40		4								-	502
- 04		651	6.5-7.0		19/01/19	1009:40			o'	4									524
- 05		748	8.0-8.5			10:00				2									5005
- 06	V	748	9.5-10.0		V	10:45				4									5009
- 07		9	4,5-50			12:10		FOA I	04304-08	4									5010
- 08		9	45-5.0	-	V	12:10		FD	04304-07	4									5011
- 09	K12 HUS-08		03-015			3:15				3			X				-		5012
- 10		2	20-25			13:36				4									5013
-11		3.	3.5.40			13:45				4	×								(014
- 12		4	5.0-55			14:00				4							7	1/13	5015
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13N304491 No. 04316 page 4 of 5

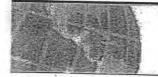
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Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Co	CWS PAR	100s/VPH	Hexare	Decara	Naph	A	CAT	Select	(over	ks
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- 03	K19-5V1					16:48	A		04316-09	1			15,				0	3	start -	3 611
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- 05										-				4						
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- 07	K19-5VT	R-10%				H 40 -					X	X	X	X	XX		o h	1	Start: - 2 End: - 3	111
- 08	K19-5V15		1000	J	14	16:07-		_ 1		1	X	X	X		XX		04	2	Start: -24 End: -4	9
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No. 04319 page Sof 5

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- 02	Short Title:    Short Title:   Sample																			
- 03	K19-MW18	-07D									$\Diamond$	X	<b>○</b> ,		X	1				
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WHITE: Golder Cor

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# AGAT Laboratories

# SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping	Temperature (Bottles/Jars only) N/A if only Soil Bags Received
Company/Consultant: GOLDER	FROZEN (Please Circle if samples received Frozen)
Courier	1 (Bottle/Jar) $\frac{14+14+5=-14}{0}$ 2(Bottle/Jar) $\frac{1}{1}$ + $1$
	3 (Bottle/Jar) + + Summa C 4 (Bottle/Jar) + + Summa C
Waybill#	5 (Bottle/Jar) $-\frac{1}{1} + \frac{9}{1} + \frac{1}{10} = \frac{1}{10}$ °C 6 (Bottle/Jar) $+ + + = 0$
Branch: EDM GP FN FM RD VAN LYD FSJ EST Other:	7 (Bottle/Jar)++=°C 8 (Bottle/Jar)++_=°C
Custody Seal Intact: Yes NA	9 (Bottle/Jar) + + = 0 C 10 (Bottle/Jar) + + = 0 C
TAT: <24hr 24-48hr 48-72hr Reg Other	(If more than 10 coolers are received use another sheet of paper and attach)
Cooler Quantity:	LOGISTICS USE ONLY
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	Workorder No:  Samples Damaged: Yes No If YES why?  No Bubble Wrap Frozen Courier  Other:  Account Project Manager: above issues: Yes No  Whom spoken to:  CPM Initial  General Comments:
SAMPLE INTEGRITY - Shipping Hazardous Samples: VES NO December 7.1	
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	



### SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 13N 30 hua )

Received From:COUVIEW	Waybill #::
SAMPLE QUANTITIES: Coolers: Containers: ?	
TIME SENSITIVE ISSUES: Earliest Date Sampled: Jan 18, 2, 15	ALREADY EXCEEDED? Yes No
(1) \[ \left( + \frac{1}{2} = \left( \color	each cooler: (record differing temperatures on the CoC next to $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 5 \text{ °C}$ $= \frac{7 \text{ °C (3)}}{4} = 6 \text{ °C (4)} = 6 \text{ °C (4)}$ $= \frac{6 \text{ °C (4)}}{4} = 6 \text{ °$
Account Project Manager:	have they been notified of the above issues: Yes No
Whom spoken to:	Date and Time:
Additional Notes:	

Document #: SR-186-9504.001 Revision Date: July 9, 2014



### **K19 ENVIRONMENTAL INVESTIGATION**

## **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<sub>1</sub> is the original sample result, and X<sub>2</sub> 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<sub>1</sub> is the original sample result, and X<sub>2</sub> 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



### Table G-1: Results of January 2018 Supplementary Investigation QAQC Soil Analyses - PAHs K19 - Trutch Former Townsite Alaska Highway, BC

											1				
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			<u></u>
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

## Table G-2: Results of January 2018 Supplementary Investigation QAQC Soil Analyses - VOCs K19 - Trutch Former Townsite

Alaska Highway, BC

Sample Location Sample Name Sample Collection Date Sample Matrix Sample Depth	K19-TP18-03 04308-07 2018-01-13 SO 0.5 - 0.5 m	K19-TP18-03 04308-08 2018-01-13 SO 0.5 - 0.5 m	RDL	RPD (%)	DF	K19-TP18-07 04299-11 2018-01-14 SO 3.4 - 3.4 m	K19-TP18-07 04299-12 2018-01-14 SO 3.4 - 3.4 m	RDL	RPD (%)	DF	K19-TP18-13 04315-02 2018-01-18 SO 1.5 - 1.5 m	K19-TP18-13 04315-03 2018-01-18 SO 1.5 - 1.5 m	RDL	RPD (%)	DF
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

Table G-3: Results of January 2018 Supplementary Investigation
QAQC Groundwater Analyses - Dissolved Metals
K19 - Trutch Former Townsite
Alaska Highway, BC

Sample Location Sample Name Sample Collection Date Sample Matrix	K19-MW16-01D 04309-11 2018-01-14 WG	K19-MW16-01D 04309-12 2018-01-14 WG	RDL	RPD (%)	DF	K19-MW17-35D 04310-04 2018-01-16 WG	K19-MW17-35D 04310-05 2018-01-16 WG	RDL	RPD (%)	DF	K19-MW18-12 04254-01 2018-01-26 WG	K19-MW18-12 04254-02 2018-01-26 WG	RDL	RPD (%)	DF
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 Calcium	< 0.01 60600	< 0.01 59500	0.01 50	n/c 2	0 n/c	< 0.01 99100	< 0.01 97700	0.01 50	n/c 1	0 n/c	< 0.01 75200	< 0.01 72700	0.01 50	n/c 3	0 n/c
Chromium	< 0.5	< 0.5	0.5	n/c	0	< 0.5	97700 < 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	0.03	n/c	0.2	< 0.2	< 0.2	0.03	n/c	0.2
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	0.05	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	0.00	< 0.01	< 0.01	0.01	n/c	0.12	< 0.01	< 0.01	0.01	n/c	0
Tin	0.09	0.07	0.01	n/c	0.4	< 0.01	< 0.01	0.01	n/c	0	0.15	0.12	0.01	n/c	0.6
Titanium	2.3	2.3	0.03	n/c	0.4	3.2	2.8	0.03	13	n/c	1.3	1.4	0.03	n/c	0.0
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	0.01	n/c	0	< 0.5	< 0.5	0.01	n/c	0	< 0.5	< 0.5	0.01	n/c	0
	< 0.5 4	< 0.5 3	0.5 2		-		< 0.5 < 2			0	< 0.5 3		0.5 2		-
Zinc	·	-	0.1	n/c	0.5 0	< 2 0.1		2	n/c	0	-	3 < 0.1	0.1	n/c	0 0
Zirconium	< 0.1	< 0.1	0.1	n/c	U	0.1	0.1	0.1	n/c	U	< 0.1	< 0.1	U.T	n/c	U

### 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

# 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-MW17-35D						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

### Table G-5: Results of January 2018 Supplementary Investigation

QAQC Groundwater Analyses - VOCs

K19 - Trutch Former Townsite

Republic   Republic	DF  1 1 0.8 1 1 1 0.3 0.5 1
Sample Name	1 1 0.8 1 1 1 1 0.3
Sample Matrix   WG   WG   WG   WG   WG   WG   WG   W	1 1 0.8 1 1 1 1 0.3
Sample Matrix   WG   WG   WG   WG   WG   WG   WG   W	1 1 1 1 0.3
Volatile Organic Compounds (VOCs)	1 1 1 1 0.3
1.1.12.4strachroresthane	1 1 1 1 0.3
1,1-1-indirocethane	1 1 1 1 0.3
1.1.2.2-place hance	1 1 1 1 0.3
1,12-(inchloroethane	1 1 1 1 0.3
1,1-dichloroethane	
1.1-dichloroethene	
1.2-4-Tirchlorobenzene	
1.2-diphromethane (Ethylene Dibromide) (EDB)	
1,2-dichlorobenzene	
1,2-dichloroethane	1
1,2-dichloroethylene (cis) (1,2-dichloroethene) (cis)   < 1	1
1,2-dichloroethylene (trans) (1,2-dichloroethylene (trans) (1,2-dichloropropane (Propylene Dichloride)	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1
1,3-dichlorobenzene   < 0.5	1
1,3-dichloropropene (cis)       <1	0.5
1,3-dichloropropene, total   1   1   1   1   1   1   1   1   1	1
1,4-dichlorobenzene	1
2-Butanone	1
4-Methyl-2-pentanone     < 10	0.5
Acetone   Control   Cont	10
Benzene   Senzene   Senz	10
Benzo[j]fluoranthene   C 0.01   C 0.0	10
Bromodichloromethane (BDCM)   Contract   C	0.5
Bromoform (Tribromomethane)	0.01
Bromomethane (Methyl Bromide)	1
Carbon Tetrachloride       < 0.5	1
Chlorobenzene     < 1	0.5
Chloroethane <1 <1 n/c 0 1 <1 <1 1 n/c 0 <1 <1 n/c 0	0.5
	1
Chloroform   <1 <1   n/c 0   1   <1 <1   1 n/c 0   <1 <1   n/c 0	i
Chloromethane	1
Dibromochloromethane (DBCM) <1 <1 n/c 0 1 <1 <1 n/c 0	1
Dichloromethane (DCM) (Methylene Chloride) <1 <1 n/c 0 1 <1 <1 n/c 0	1
Ethylbenzene Co.5 Co.5 Co.5 Co.5 Co.5 Co.5 Co.5 Co.5	0.5
m,p-Xylenes < 0.5 < 0.5 n/c 0 0.5 < 0.5 0.5 n/c 0 < 0.5 < 0.5 n/c 0	0.5
Methyl tert-Butyl Ether	1
o-Xylene < 0.5 < 0.5   0	0.5
Styrene < 0.5 < 0.5   n/c   0   0.5   0.5   0.5   0.5   0.5   n/c   0   0.5	0.5
Tetrachloroethylene (PCE/PERC)	1
Toluene Co.5 < 0.5   n/c   0.5   8.1   7.7   0.5   5   n/c   < 0.5   < 0.5   n/c   0   0.5	0.5
Trichloroethylene (TCE)	1
Trichlorofluoromethane (Freon 11) <1 <1 n/c 0 1 <1 n/c 0 <1 <1 n/c 0	1
Trihalomethanes (Total)	2
Vinyl Chloride (Chloroethene) <1 <1 n/c 0 1 <1 <1 1 n/c 0 <1 <1 <1 0	1
Xylenes, Total	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 0 100 160 100 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

Table G-6: Results of January 2018 Supplementary Investigation
QAQC Soil Vapour Analyses
K19 - Trutch Former Townsite
Alaska Highway, BC

			T		
Sample Location	K19-SV18-03	K19-SV18-03			
Sample Name	04316-03	04316-04			
Sample Collection Date	2018-01-13	2018-01-13	RDL	RPD (%)	DF
Sample Matrix	SV	SV		, ,	
Sample Depth	3.5-3.65	3.5-3.65			
Запріє Беріп	3.3-3.03	3.3-3.03			
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	<2.0	<2.0	20.0	0	n/c
VPH (C6-C10)	5700	2700	150	71.00	n/c
ВТЕХ					
Benzene	1.6	1.4	5.00	n/c	0.04
Toluene	1.3	2.8	8.00	n/c	0.19
Ethylbenzene Styrene	1.2 <1.0	1.1 <1.0	9.0 10.0	n/c n/c	0.01 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) 1.3-Butadiene	<2.0 <1.0	<2.0 <1.0	20.0 10.0	n/c	0 0
Carbon Tetrachloride	<2.0	<1.0 <2.0	20.0	n/c 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 1,3-dichlorobenzene	<2.5	<2.5 <2.5	25.0 25.0	n/c	0
1,4-dichlorobenzene	<2.5 <2.5	<2.5 <2.5	25.0 25.0	n/c n/c	0 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	<2.0	20.0 20.0	n/c	0 0
2,2-Dichloropropane 1,3-dichloropropene (Cis)	<1.0	<2.0 <1.0	10.0	n/c 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	Ō
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 <0.80	7.0	n/c	0.63
Methyl tert-Butyl Ether (MTBE)	<0.80	40	8.0	n/c	0.00
n-Decane n-Hexane	7.4 2.8	40 1.7	13.0 11.0	n/c n/c	2.51 0.10
4-Methyl-2-pentanone	<2.0 <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) Vinyl Bromide	<2.3 <0.80	<2.3 <0.80	23.0 8.0	n/c n/c	0 0
Vinyl Chloride (Chloroethene)	<0.40	<0.40	4.0	n/c	0
	-0.70	٠٠.٦٠	7.∪	11/0	•

### 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

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