



**Phase II Environmental Site  
Assessment (2018-2019):  
5<sup>th</sup> Avenue (Rogers Street to  
Jeckell Street)**

Whitehorse, Yukon

November 23, 2018

Prepared for:

Government of Yukon  
Environment Yukon  
Site Assessment and Remediation Unit

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## Executive Summary

The Government of Yukon, Department of Environment, Site Assessment and Remediation Unit (SARU) retained Stantec Consulting Ltd. (Stantec) to complete a Phase II Environmental Site Assessment (ESA) for a parcel of land along 5<sup>th</sup> Avenue, in Whitehorse, Yukon Territory (YT), between Rogers and Jeckell Streets (the Site). Pending the results of the Phase II ESA, Stantec will also prepare a Quantitative Human Health and Environmental Risk Assessment (QHHERA), and/or a Plan of Restoration (POR) for the Site (the Project). The Project is being conducted in two stages: Stage 1 includes the Phase II ESA (herein referred to as Phase II ESA [2018-2019]), while Stage 2 is reliant on the results from Stage 1 and includes the QHHERA and/or POR. This report is to satisfy the requirements of Stage 1; results from the possible QHHERA and/or POR will be reported under separate cover.

The overall objective of this Project is to prepare the Site for future development, which is currently proposed to be a multi-family residential and commercial complex. The objective of the Phase II ESA (2018-2019) was to achieve vertical and horizontal delineation of the contamination previously identified on the Site. The Phase II ESA (2018–2019) included the collection of soil, groundwater, and soil vapor samples (where applicable) to assist with: 1) the delineation of on-site areas of environmental concern (AECs), 2) the development of the Site's conceptual site model (CSM), and 3) provide adequate data for the QHHERA and/or POR.

Based on the results of the Phase II ESA (2018–2019), Stantec offers the following conclusions for the Site:

- It was determined, through interpretation of the Environment Yukon *Protocol 6: Application of Water Quality Standards*, that the drinking water standards do not apply at the Site
- LEPH contamination in soil has been identified and delineated to exist within the middle of the Site, stretching in a narrow corridor in a north-south direction with borehole data indicating that the geological heterogeneity is the dominant control on its distribution
- Similarly, LEPH contamination in groundwater has been identified and delineated within the middle of the Site, stretching in a narrow corridor in a north-south direction
- Naphthalene contamination in groundwater was identified in monitoring well MW17-17, coinciding with the highest levels of LEPH, and is delineated both horizontally and vertically
- Predicted indoor vapour concentrations were calculated based on the analyzed soil vapour concentrations and vapour attenuation factors and compared to BC CSR Standards. One soil vapour sample, VP18-39, had reported concentrations of volatile petroleum hydrocarbons (VPH) greater than the BC CSR standard for residential land use.
- Reported concentrations of the other PCOCs in soil and groundwater samples were below the applicable standards, or less than laboratory RDLs

While Stantec is confident in the outcomes of the field program and subsequent interpretation, physical drilling constraints such as power lines, the base of the cliffs, and pathways/roadways, have potentially resulted in some minor data gaps that should be acknowledged. However, through the use of the CSM, a good understanding of the depositional environment and the distribution of the physical properties of the sediment, these data gaps are considered minor with multiple lines of evidence indicating delineation has been achieved. These minor data gaps include:



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- There is more than a 40 m distance between MW18-33 and MW18-51, down-gradient of the groundwater contamination. However, the soils are of low permeability and coarse-grained channel deposits appear to be oriented north-south, not east-west, and both wells indicated no exceedances of analyzed parameters in groundwater. The powerline precluded optimal well placement in this area for safety reasons though an additional well in this area would reduce any perceived uncertainty.
- Area west of MW18-49 is a potential data gap given the soil and groundwater contamination in this area. However, the slope at the base of the cliff makes access difficult for borehole drilling. Further this area is likely not to be disturbed during any development and any soil and/or groundwater contamination would be at significant depth.

Through use of the 3D CSM, however, a good understanding of the depositional environment and the distribution of the physical properties of the soils has been achieved. These data gaps are considered minor with multiple lines of evidence indicating delineation has generally been achieved.

Based on the pumping tests completed after the standard Phase II ESA scope of work, the following additional conclusions can be made:

- Mobility of groundwater hydrocarbon contamination appears to be limited given the coincident location of groundwater and soil contamination with no appreciable down-gradient contamination in the eastern portion of the Site
- Removal or remediation of contaminated soil is likely to further limit groundwater contamination given it is coincident or proximal to soil hydrocarbon contamination
- Distribution of groundwater contamination is limited within the permeable geological bodies identified on-site
- Data gaps have been addressed to the extent possible given drilling and site constraints through the use of pumping testing. Despite some physical data gaps in the monitoring network (i.e., sub-optimal well placement), significant recharge boundaries were not observed from the pumping test data indicating the analytical data collected to delineate the groundwater contamination is sufficient to characterize site conditions.

The statements made in this Executive Summary are subject to the same limitations included in the Statement of Limitations section of this report (Section 11.0) and are to be read in conjunction with the remainder of this report.



## Abbreviations

AE	Associated Engineering
AEC	area of environmental concern
APEC	area of potential environmental concern
AST	above-ground storage tank
AWF	standards to protect freshwater aquatic life
BC	British Columbia
BTEX	benzene, toluene, ethylbenzene, xylenes
CALA	Canadian Association for Laboratory Accreditation
CL	Commercial Land Use
COC	contaminant of concern
CRM	certified reference material
CSM	conceptual site model
CSR	Contaminated Sites Regulation
DOC	dissolved organic carbon
DW	standards to protect drinking water
EA	<i>Environment Act</i>
EC	electroconductivity
EM	electromagnetic
EPH	extractable petroleum hydrocarbons



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ESA	Environmental Site Assessment
EY	Environment Yukon
GPR	Ground penetrating radar
HEPH	heavy extractable petroleum hydrocarbons
LEL	lower explosive limit
LEPH	light extractable petroleum hydrocarbons
LIF	laser induced fluorescence
LNAPL	light non-aqueous phase liquid
LTDL	less than detection limit
mbgs	metres below ground surface
MOECCS	BC Ministry of Environment and Climate Change Strategy
NAPL	non-aqueous phase liquid
PAH	polycyclic aromatic hydrocarbon
PCOC	potential contaminant of concern
PHC	petroleum hydrocarbon
POR	Plan of Restoration
ppmv	parts per million by volume
QA/QC	quality assurance/quality control
QHHERA	Quantitative Human Health and Ecological Risk Assessment
RDL	reportable detection limit
RL	residential land use





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ROW	right-of-way
RPD	relative percent difference
SARU	Site Assessment and Remediation Unit
TOC	total organic carbon
UST	underground storage tanks
VOC	volatile organic compounds
VPH	volatile petroleum hydrocarbons, excluding BTEX concentrations
YT	Yukon Territory



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Introduction  
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## 1.0 INTRODUCTION

The Government of Yukon, Department of Environment, Site Assessment and Remediation Unit (SARU) retained Stantec Consulting Ltd. (Stantec) to complete a Phase II Environmental Site Assessment (ESA) for a parcel of land along 5<sup>th</sup> Avenue, in Whitehorse, Yukon Territory (YT), between Rogers and Jeckell Streets (the Site). Pending the results of the Phase II ESA, Stantec will also prepare a Quantitative Human Health and Environmental Risk Assessment (QHHERA), and/or a Plan of Restoration (POR) for the Site (the Project). The Project is being conducted in two stages: Stage 1 includes the Phase II ESA (herein referred to as Phase II ESA [2018–2019]), while Stage 2 is reliant on the results from Stage 1 and includes the QHHERA and/or POR. This report is to satisfy the requirements of Stage 1 of the work program.

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

## 2.0 BACKGROUND

The Site is comprised of undeveloped lots that are heavily treed with some clearings connected by a walking/biking trail network. Historically there was no reported activity at the Site until the 1940's, when a rail line, pipeline, and barracks were constructed. The infrastructure was removed following World War II. Fuel handling activities were inferred to have occurred onsite. A Phase I ESA, conducted by Laberge Environmental Services (2014), indicated the past presence of military barracks, a railway wye, and associated fueling facility with two 10,000-gallon above-ground storage tanks (ASTs). However, upon further review of historical aerials and some analysis completed by the Stantec GIS team, it was determined that the ASTs were approximately 16 m in diameter. Although it could not be determined what the height of the ASTs were, it was estimated that for every metre of height, the volume of the tank would increase by approximately 200,000 L. Therefore, a 3 m high AST, would have a volume of approximately 600,000 L. In addition to the ASTs, there may have been buried flowlines between the ASTs, and a fill port. The previous Phase I ESA (Laberge Environmental Services, 2014) identified the ASTs as being operational from approximately 1942 to the 1950s. In 1953, a mudslide reportedly partially covered and damaged the ASTs, potentially resulting in a release of fuel (Laberge Environmental Services, 2014). The volume of fuel released, if any, is unknown.

### 2.1 SITE SETTING

The Site is approximately 3.2 hectares (ha) in size and is located in the southwest area of downtown Whitehorse. The Site is bounded on the west side by silt cliffs (also known as the "clay cliffs") approximately 40 m high, on top of which is the Whitehorse International Airport. A manmade berm is located at the south end of the Site, immediately adjacent to the west side of the St. Elias Adult Group Home, as a measure to protect against potential mudslides from the cliffs located to the west. The Site is bounded to the north, east, and south by residential neighbourhoods. The Yukon River, flowing from the south, is approximately 300 m to the south of the Site, and 500 m to the east of the Site, as it bends to the east at the south end of downtown Whitehorse.



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The Site is relatively flat with some slope to the west as it approaches the cliffs, and a part of the broad Yukon River Valley. The regional surficial geology of the Valley is glacio-fluvial deposits. The cliffs appear to be eroding, as evident from the outwash of silt down the slope and onto the Site. In general, the soil stratigraphy consists mainly of sandy silt, with the northern area of the Site having some sand and gravel layers. In the middle of the Site, some locations include a gravelly silt layer or layers at depths of approximately 5.5 to 7.3 metres below ground surface (mbgs). The gravelly silt layers encountered within boreholes in the middle and northern portions of the Site were observed to have a petroleum hydrocarbon (PHC) sheen and odour.

Authorization was granted by the owners (the City of Whitehorse) to the west of the Site, in order to complete the investigation on the adjacent property. The City of Whitehorse property to the west is also associated with the former AST locations, and investigation was required to assess the extents of the identified contamination.

## 2.2 PREVIOUS ENVIRONMENTAL SITE ASSESSMENTS

The Site has been the subject of several environmental investigations to identify areas of potential environmental concern (APECs) and to delineate possible plumes of contaminants. A Phase I ESA, conducted by Laberge Environmental Services (2014), indicated the past presence of military barracks, a railway wye, and associated fueling facility with two 10,000-gallon ASTs, in addition to the underground storage tanks (USTs) currently on-site associated with the residential units. Given past land use, the primary contaminants of concern were identified as PHCs, metals, phenols, and creosote (Laberge 2014). Recent investigations by CH2M Hill (2018) confirmed exceedances of light extractable petroleum hydrocarbons (LEPH) or extractable petroleum hydrocarbons (EPHC<sub>10-19</sub>) in soil and/or groundwater, relative to standards within YT Contaminated Sites Regulations (CSR) for residential land use (RL); some dissolved metals concentrations in groundwater also exceeded the drinking water standards. Exceedances were generally reported down-gradient of the suspected source areas (i.e., the locations of the two former ASTs). However, given the Site's complex stratigraphy, vertical and/or horizontal delineation of the contaminant plume was not achieved during the supplemental Phase II ESA in 2017-2018 (CH2M Hill, 2018).

### 2.2.1 Historical Reports

Stantec was provided with, and reviewed, the following historical reports:

- Hoge—Jeckell Street Lots, Whitehorse, Yukon, Phase I Environmental Site Assessment, prepared by Laberge Environmental Services, July 2014
- Geotechnical Evaluation, St. Elias Adult Group Home, Whitehorse, YT, prepared by TetraTech EBA Inc., August 2014
- Terrain Stability Assessment, St. Elias Adult Group Home, Whitehorse, YT, prepared by TetraTech EBA Inc., October 2014
- Desktop Geotechnical Evaluation, Slope Assessment, and Detailed Berm Design, Block 338, fifth and Rogers Street Property, Whitehorse, YT, prepared by TetraTech EBA Inc., May 2016
- Detailed Phase II Environmental Site Assessment on the Jeckell and Hoge Street Lots (Block 338), prepared by Associated Engineering (BC) Ltd., October 2016
- Phase II Environmental Site Assessment (2017-18): 5<sup>th</sup> Avenue (Rogers to Jeckell Street), prepared by CH2M Hill, March 2018
- Screening Level Risk Assessment, 5<sup>th</sup> Avenue (Rogers Street to Jeckell Street), Whitehorse, Yukon, prepared by CH2M Hill, March 2018
- Jeckell Hoge 2018-2019 Workplan, prepared by CH2M, March 2018



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A summary of each report is included below.

### **Hoge—Jeckell Street Lots, Whitehorse, Yukon, Phase I Environmental Site Assessment (Laberge 2014)**

The 2014 Phase I ESA completed by Laberge (2014) identified seven APECs:

- APEC 1—UST located at the group home on Block P, Lot 2
- APEC 2—UST located at the group home on Block O, Lot 2
- APEC 3—North AST inundated by a landslide in 1953 (also referred to in this report as “AST1”)
- APEC 4—Fill stem where there is anecdotal evidence of possible staining
- APEC 5—South AST inundated by a landslide in 1953 (also referred to in this report as “AST2”)
- APEC 6—Railway ROW
- APEC 7—Potential underground fuel piping

A Phase II ESA was recommended.

### **Geotechnical Evaluation, St. Elias Adult Group Home, Whitehorse, YT (Tetra Tech EBA 2014)**

The geotechnical evaluation involved a test-pit program in support of providing recommendations for the design and construction of foundations for a proposed development (now the St. Elias Adult Group Home) located near the southwest portion of the Site, including the collection of soil samples for laboratory analysis. Three test-pits were excavated to approximately 4 mbgs. Observed stratigraphy included topsoil overlying silty sand to approximately 2 mbgs, underlain by sand and gravel to approximately 3 mbgs, which was then underlain by a clayey silt to the maximum investigated depth of approximately 4 mbgs. The clayey silt layer was of “stiff” consistency. No seepage of groundwater was observed, but wet soil was encountered at approximately 2 mbgs near the base of the sand layer. It was suspected that a perched groundwater table was lying above the relatively impermeable clayey silt stratum. Samples collected from the test-pits were submitted for analysis of hydrocarbons (light and heavy extractable petroleum hydrocarbons [LEPH and HEPH], polycyclic aromatic hydrocarbons [PAH], volatile organic compounds [VOC]), metals, and glycol. Metals were detectable, but not in exceedance of any applicable standards. Other analysed parameters reported results less than the laboratory’s reportable detection limits (RDL).

### **Terrain Stability Assessment, St. Elias Adult Group Home, Whitehorse, YT (Tetra Tech EBA 2014)**

The terrain stability assessment for the proposed development (St. Elias Group Home) identified the location to be within a zone of moderate hazard and could be impacted from upslope mass movement processes. The report recommended that the construction of a berm would reduce the risk from upslope mass movement processes. Conclusions were that buildings should be located at a 10 m set-back from the berm.

### **Desktop Geotechnical Evaluation, Slope Assessment, and Detailed Berm Design—Block 338, Fifth and Rogers Street property, Whitehorse, YT (Tetra Tech EBA 2016)**

A desktop geotechnical evaluation was performed, and recommendations were given for the design and construction of foundations for the proposed development. The evaluation consisted of a review of borehole and test-pit data from locations close to the Site. Subsurface conditions in the area were observed to generally consist of approximately 2 to 3 metres (m) of sand and gravel overlying silt, and a suspected silt layer of unknown thickness overlying the sand and gravel stratum. Groundwater was indicated to be approximately 4 to 6 mbgs. Permafrost and bedrock was not encountered in any of the test-pit or borehole logs reviewed. The maximum depth of investigation was 5 mbgs.



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### Detailed Phase II Environmental Site Assessment on the Jeckell and Hoge Street Lots (Block 338), Whitehorse, YT (Associated Engineering 2016)

In this Phase II ESA program (2016), soil sample results were compared to YT CSR RL standards. Associated Engineering (AE) noted in their report that, given the distance to the nearest surface water body (Yukon River) is about 300 m from the Site, and more than 20 water wells were identified within 1.5 km, the standards for the protection of aquatic life freshwater (AWF) and drinking water (DW) were applied to groundwater.

Potential contaminants of concern (PCOCs) identified at the APECs from the Laberge (2014) Phase I ESA were PHCs and metals (all APECs), and chlorinated and non-chlorinated phenols at APEC 6.

Prior to drilling, an electromagnetic (EM) survey was completed with an EM-31 unit, and leak testing was performed on USTs and flow lines at APECs 1 and 2. Shallow boreholes (0.2 mbgs) were drilled with an electric drill. Deeper boreholes were advanced with a direct-push geoprobe and a rotary auger with both solid and hollow-stem augers. Sixteen boreholes were drilled, 11 of which were completed as groundwater monitoring wells.

Twenty soil samples and ten groundwater samples were collected for laboratory analysis. One well (MW7-1) was found to be dry. A screening-level soil vapour assessment was completed (modelling)—no soil vapour samples were collected.

The EM survey indicated no obvious contamination plumes however the following highly-conductive anomalies were noted:

- Possible UST and piping adjacent to APEC 4
- Possible piping and former 10,000-gallon AST at APEC 3, north of APEC 4
- Metal piping associated with APEC 7
- Possible piping towards the former AST at APEC 5, south of APEC 4
- Rail corridor (APEC 6)

It was reported that the leak testing of the two USTs and associated flowlines at APECs 1 and 2 passed.

Two of the 20 soil samples collected exceeded the YT CSR RL standards: MW4-1 at a depth of 2.25 to 3.75 mbgs (east of APEC 4) exceeded for benzene (0.06 mg/kg, where the soil standard protective of drinking water is 0.04 mg/kg), and MW5-3 at a depth of 2.0 to 2.3 mbgs exceeded for LEPHs (2,560 mg/kg, where the CSR RL standard is 1,000 mg/kg). No other hydrocarbon samples exceeded the applicable standards. The reported metals and phenol concentrations were below the RL standards.

The reported concentrations of LEPH in groundwater were greater than the applicable standard at MW3-1 (1,800 µg/L northeast of APEC 3), MW7-2 (27,600 µg/L ENE of APEC 3), and MW7-4A (10,200 µg/L north-northeast of APEC 3). Iron, magnesium, and manganese concentrations also exceeded the YT CSR DW guidelines in groundwater from several wells.

The AE (2016) report provided the following recommendations:

- No follow up work at APECs 1 and 2, as the leak tests passed
- Complete further assessment to try to confirm the location of rail ties (APEC 6)
- Complete further assessment where soil impacts were identified at the former south AST and fill stem areas (APECs 4 and 5)



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- Complete additional delineation of groundwater in the area of the former north AST and flow lines, where hydrocarbon contamination was identified (APECs 3 and 7). The groundwater plume was believed to originate near MW7-2 and extend north-northwest beyond MW7-4A. Additional delineation was recommended.
- Complete additional assessment of soil vapour at APECs 4 and 7 prior to development
- Perform seasonal groundwater modeling to determine if the flow direction is affected by seasonal changes
- It was suggested that the concentrations of metals in groundwater that exceed the drinking water standards may be due to microbial action and natural attenuation. Note that per the discussion in Section 3.2 of this report, it is expected that the drinking water standards do not currently apply to the Site.

### **Phase II Environmental Site Assessment (2017–2018): 5<sup>th</sup> Avenue (Rodgers Street to Jeckell Street) (CH2M Hill 2018)**

CH2M Hill (2018) identified more complex site conditions in terms of surficial geology and contaminant distribution than initially anticipated. Therefore, the objective of their assessment was modified from delineation to obtaining a better understanding of the geology by determining depths, distribution, connectivity, and thickness of coarse units.

CH2M Hill (2018) did not assess APECs 1 and 2 (identified during previous work) as the USTs present at the time passed leak tests. Their investigation focused on APEC 3 (AST1—north), APEC 4 (Fill port), APEC 5 (AST2—south), APEC 6 (Railway ROW), and APEC 7 (flowline between AST1 and AST2), which essentially includes the area between the north and south former clay-bottomed ASTs.

CH2M Hill (2018) completed two intrusive assessments: auger drilling to advance boreholes and install monitoring wells, and a direct push program including laser-induced fluorescence (LIF) testing. The monitoring wells installed by AE (2016) were re-named to follow SARU naming conventions.

During LIF, the laser light causes the aromatic fraction of PHC in the subsurface to fluoresce; it only detects non-aqueous phase liquid (i.e., not dissolved). The LIF probe was combined with an electroconductivity (EC) probe to assess conductivity of soils. Due to structural and safety challenges associated with drilling on the berm, the south AST2 was not investigated as part of the LIF survey. Following LIF, some locations were drilled, and soil samples collected, to verify the findings of the LIF survey.

A total of 17 locations were investigated with the LIF and EC probes, using a direct push rig, to a maximum depth of 7.8 mbgs. Site conditions prevented access around the perimeter of AST1 along the western border. Following the survey, nine boreholes were drilled to confirm and quantify LIF measurements. The confirmatory boreholes were advanced to a maximum depth of 7.5 mbgs using the direct push rig.

Fifteen soil samples were analyzed during the November 2017 event, and an additional 12 soil samples were analyzed during the January 2018 assessment. The analytical data collected to date (at that time) did not differentiate between APECs 3 and 5 to 7 (i.e., the northernmost of the two large ASTs, the fill stem, the underground line, and the railway right-of-way [ROW]). As a result, these APECs were combined into a single area of environmental concern (AEC), which was identified as the “North AEC”, and includes the APECs of the former AST1, the fill stem, and the flowline. The “South AEC” is the former AST2.



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Stantec completed a review of the 2017-2018 soil analytical data, compared to the LIF data, and concluded that there was little to no correlation between the reported EPH concentrations and the LIF survey results. The heterogeneity of the subsurface and compaction of the soil cores (due to the use of a direct push rig) limited effective correlation of the LIF results to the analytical data.

In 2017-2018, eight samples contained LEPH concentrations that exceeded YT CSR RL standards. Two samples contained exceedances of other YT CSR RL standards, including for ethylbenzene and naphthalene. None of the phenol or metals parameters analyzed exceeded the standards. The PHC impacts were observed in silt at depths ranging from 2.0 to 4.5 mbgs (from BH18-21, BH18-22, BH18-25, BH18-28) and were concluded to be near the PHC source. Impacts within the coarse material were generally located down-gradient from the contaminant source.

CH2M Hill (2018) drilled one borehole in the South AEC (BH18-29). None of the analyzed parameters exceeded the YT CSR RL standards.

In November 2017, the average depth to groundwater was 4.98 mbgs. Near the North AEC, which is located closer to the cliffs, the groundwater flow direction was interpreted to generally be easterly and was reported to mimic surface topography. The South AEC is situated further west and at a distance from the base of the cliff. Groundwater flow in this area was interpreted to generally be towards the north. Overall, the data from CH2M Hill (2018) indicates that groundwater flow is easterly, immediately below the cliffs, and more northerly closer to the Yukon River. CH2M Hill (2018) noted that PHC contamination appears to flow from the North AEC source area to the north-northeast during the summer months, but during the drier winter months, it appears to flow in a more easterly direction.

Groundwater collected from monitoring wells located near the North AEC contained LEPH exceeding YT CSR AWF and DW. The greatest concentrations were observed at MW16-11, which is located just outside the identified area of LEPH contamination in soil. Dissolved phenanthrene was identified at concentrations exceeding the YT CSR AWF standard in two wells (MW16-9 and MW16-11). CH2M Hill (2018) reported that dissolved pyrene was identified at a concentration exceeding YT CSR AWF standard in MW16-9. The PHC contamination in groundwater appeared to be in a very narrow band, trending north of the North AEC, and the concentrations appeared to vary seasonally.

The 2017-2018 groundwater samples from the monitoring wells met YT CSR AWF standards for dissolved metals. Dissolved iron and manganese concentrations in groundwater exceeded the YT CSR DW standards at seven wells. Except MW16-2 and MW16-10, these locations generally coincide with monitoring wells containing PHC concentrations in groundwater above standards. Only groundwater at monitoring well MW16-01 contained dissolved arsenic concentrations exceeding the YT CSR DW standard.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Regulatory Context  
November 23, 2018

### 3.0 REGULATORY CONTEXT

Contaminated sites in YT are governed by the *Environment Act* (EA) and regulations thereto, including the CSR (Department of Environment, 2002), as well as protocols, procedures, and guidance documents established by the Government of Yukon, Department of Environment (Environment Yukon or EY).

A detailed discussion of the regulatory framework and YT CSR standards that apply to the Site is provided in Appendix B of this report. The soil, groundwater, and soil vapour standards applicable to the Project are discussed below.

#### 3.1 SOIL STANDARDS

According to the City of Whitehorse Zoning By-Law 2012-20, the Site is zoned as “Mixed Use Commercial (CM1)”. Zone CM1 includes both residential and commercial possible use. Further, the reported proposed future land use for the Site will be mixed residential and commercial. Therefore, for this investigation, the Residential Land Use (RL) and Commercial Land Use (CL) standards were applied.

In the YT CSR, generic standards are intended to protect human health at any site without consideration of site-specific factors other than land use, whereas matrix numerical standards, which have been developed for a subset of PCOCs, are applied according to land use and site-specific factors. Per the YT CSR, mandatory factors (i.e., factors applicable to all properties) include ingestion of contaminated soil, and toxicity to soil invertebrates and plants. Additional site-specific factors that apply at the Site are groundwater flow to surface water used by aquatic life (freshwater).

The YT CSR section 6(4) specifies that, regardless of the land use at the surface of a site, soil below a depth of 3 m is considered to be remediated if the commercial land use standards are met. Therefore, soils collected below 3 mbgs were compared solely to the CL standard.

In summary, the soil use standards deemed applicable for the Site are the YT CSR RL and CL standards.

#### 3.2 GROUNDWATER STANDARDS

Previous investigations have applied the protection of drinking water standards to groundwater at the Site; however, after review of the YT CSR, Stantec has determined that DW does not apply. Site-specific factors are used to determine what YT CSR standards protective of groundwater use apply at the Site. Per Environment Yukon *Protocol 6: Application of Water Quality Standards* (p. 3):

If the leading edge of a contaminated groundwater plume is located within a 1.5 km radius (travel time of less than or equal to 100 years) of the closest existing or probable future drinking water source, the Drinking Water use standards are applicable to the site due to the potential for the groundwater to pollute the receiving waters.





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Based on the current available Site information available, only three down-gradient registered water wells are located within 1.5 km of the Site on the same side of the Yukon River, none of which are drinking water wells. The three wells are located within the industrial area of Whitehorse, north of downtown, and are likely used for process water in industrial activities. There are multiple wells located within 1.5 km southeast of the Site, on the eastern side of the Yukon River, as well as two located east of the Yukon River and northeast of the Site.

The current hydrogeological assessment of the Site determined that groundwater flow direction is easterly, at a relatively fast flow rate of 105 m/year. Based upon the flow direction, groundwater from the Site would not migrate towards the northern wells. Further, none of the wells on the east side of the Yukon River are considered to be at risk from potential migration of contaminants from the Site as the Yukon River acts as a groundwater flow boundary. Additionally, it has been reported that the City of Whitehorse receives its drinking water from water wells located on the east side of the Yukon River, and south of the city (up-gradient of the Site). As such, it is unlikely that groundwater beneath the Site will be used as a drinking water source nor will it migrate to a drinking water well, and therefore the standards protective of drinking water have not been applied at the Site.

Regional surface drainage (anticipated shallow groundwater flow direction) for the Site appears to be to the east or northeast, towards the Yukon River approximately 520 m east (cross or down-gradient) of the Site. Therefore, the standards to protect freshwater aquatic life (AWF) are deemed applicable to the Site.

Water at the Site, and within 1.5 km of it, is not currently used for irrigation or livestock watering. Therefore, irrigation and livestock watering standards are deemed not applicable to the Site.

In summary, the YT CSR AWF are the water standards deemed applicable for the Site.

### 3.3 SOIL VAPOUR STANDARDS

The YT CSR does not currently regulate soil vapour contamination. Therefore, soil vapour analytical data collected as part of the Phase II ESA (2018–2019) has been tabulated against the British Columbia (BC) CSR standards for comparison purposes. As with generic soil quality standards, these are determined by land use. Guidance on conducting soil vapour investigations, interpreting soil vapour data, and otherwise applying BC CSR Schedule 3.3 standards is provided in *Technical Guidance 4: Vapour Investigation and Remediation* (“TG4”) (MOECCS, 2017).

Although there are no applicable YT CSR standards for soil vapour, Stantec has concluded that the applicable standards for the Site are the RL and CL standards, based on the discussion provided in Section 3.1.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Objectives and Scope of Work  
November 23, 2018

### 4.0 OBJECTIVES AND SCOPE OF WORK

The objective of the Phase II ESA (2018–2019) was to achieve vertical and horizontal delineation of the contamination previously identified on the Site. The Phase II ESA (2018–2019) included the collection of soil, groundwater, and soil vapor samples (where applicable) to assist with: 1) the delineation of on-site AECs, 2) the development of the Site's conceptual site model (CSM), and 3) provide adequate data for the QHHERA and/or POR.

The Phase II ESA (2018-2019) carried out by Stantec was conducted in general accordance with the *CSA Phase II ESA Standard Z769-00 (R2013)*, and the previously submitted Detailed Work Plan, and consisted of the following:

#### Health and Safety:

- Completing a health and safety plan for field work at the Site

#### Monitoring Well Installation and Soil Sampling:

- Retaining Midnight Sun Drilling Inc. to drill a total of 26 boreholes using solid and/or hollow stem auger and sonic drilling methods, as follows (see Table 4-1 for further rationale for each of the proposed boreholes):
  - Sixteen boreholes to approximately 6.1 mbgs, with 14 completed as monitoring wells, to address data gaps in lateral delineation of soil and groundwater contamination
  - Six boreholes ranging in depth from 7.0 to 9.0 mbgs, completed as monitoring wells, to address data gaps in vertical delineation of soil and groundwater contamination
  - Three boreholes to approximately 15 mbgs, completed as monitoring wells, to address data gaps in vertical delineation of soil and groundwater contamination, and provide data to assess vertical groundwater gradients
  - One borehole had refusal at approximately 2.75 mbgs and was backfilled
  - Five groundwater monitoring wells had an accompanying soil vapor probe installed for assessment of subsurface vapour
- Obtaining soil samples from auger flights, or core barrels, depending on drilling technique
- Logging soils (including grain size, color, moisture content, and headspace vapor concentrations) in general accordance with the modified Unified Soil Classification System
- Submitting select soil samples for laboratory analysis of one or more of the contaminants of concern (COCs) identified in previous investigations, including:
  - Light and heavy extractable petroleum hydrocarbons (LEPH and HEPH)
  - Benzene, toluene, ethylbenzene, xylene(s) (BTEX), and volatile petroleum hydrocarbons (VPH)
  - Polycyclic aromatic hydrocarbons (PAH)
  - Grain size analysis
  - Total organic carbon (TOC) for QHHERA support
- Requesting the driller to collect suspected contaminated drill cuttings into steel drums, and arranging disposal of them at an approved facility
- Collecting surface soil samples for support of a QHHERA, including analysis for metals, and TOC



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

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### Groundwater Sampling:

- Development of the 23 new monitoring wells
- Low-flow groundwater sampling of new and existing monitoring wells with submission of groundwater samples for laboratory analysis of COCs, including:
  - LEPH and HEPH
  - EPH
  - BTEX and VPH
  - PAH
  - Dissolved metals (from select samples/monitoring wells)
  - Dissolved organic carbon (DOC; from select monitoring wells) for QHHERA support
- Temporarily storing suspected contaminated groundwater in steel drums on the Site until receipt of analytical results (which were used to assess the quality of the contained water)
- Contracting the driller to collect the steel drums, and arrange disposal of them at an approved facility

### Soil Vapour Sampling:

- Conducting soil vapour sampling at five monitoring wells with installed soil vapour probes
- Submission of soil vapour samples for diesel-related vapour contaminants and fractionated PHCs for QHHERA support

### Hydrogeological Testing:

- Conducting single well response tests in select groundwater monitoring wells to determine hydraulic conductivity
- Deploying Solinst Level Logger pressure transducers in five different groundwater monitoring wells, per pumping well, at varying distances from the pumping well and in different directions (see Section 5.4.2 for the list of wells)
- Conducting sustained groundwater pumping from two select groundwater monitoring wells (MW16-09 and MW18-31)
- Collecting the previously deployed pressure transducers and download the data



**PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)**

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**Table 4-1 Rationale for 2018 Boreholes for 5th Avenue (Rogers Street to Jeckell Street)**

BH/MW ID	Location	Depth of Borehole (mbgs)	Depth of Monitoring Well (mbgs)	Rationale
MW18-30 VP18-30	North of AST1 West MW17-16	6.10	6.10	Northwest delineation of the groundwater plume. Provide water table elevation data up-gradient, given the easterly component of groundwater flow indicated from previous water table contouring. Soil vapour concentration data (VP18-30) for assessment and potential use in a QHHERA
MW18-31	Down-gradient Area	6.10	6.10	Lateral delineation of LEPH in groundwater down-gradient/cross-gradient of previous contamination identified at MW17-16.
MW18-33	East of reported contamination	7.30	6.10	Eastern delineation of dissolved phase petroleum hydrocarbons groundwater plume. Provide water table elevation data transverse to the dominant flow direction (given the easterly component of groundwater flow indicated from previous water table contouring). Allow resolution of the permeable sand and gravel boundaries.
MW18-34 VP18-34	East of reported contamination	6.10	6.10	Wide delineation of dissolved phase petroleum hydrocarbons groundwater plume further upgradient of MW18-33. Provide water table elevation data down-gradient, given the easterly component of groundwater flow indicated from previous water table contouring. Provide resolution of the permeable sand and gravel boundaries Soil vapour concentration data (VP18-34) for assessment and potential use in QHHERA
MW18-35 VP18-35	East of reported contamination	8.85	6.10	Attempted delineation of dissolved phase hydrocarbons groundwater plume. Provide resolution of the permeable sand and gravel boundaries Soil vapour concentrations data (VP18-35) for assessment and potential use in QHHERA within the identified contaminant plume
MW18-36	East of reported contamination	6.10	4.90	Delineation of dissolved phase petroleum hydrocarbons groundwater plume. Provide water table elevation data down-gradient, given the easterly component of groundwater flow indicated from previous water table contouring. Provide resolution of the permeable sand and gravel boundaries



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**Table 4-1 Rationale for 2018 Boreholes for 5th Avenue (Rogers Street to Jeckell Street)**

BH/MW ID	Location	Depth of Borehole (mbgs)	Depth of Monitoring Well (mbgs)	Rationale
MW18-37	East of reported contamination	15.25	15.25	In the same effective position as MW18-36, this location will allow deep soil conditions to be evaluated. Provide a deep monitoring well to be installed offset from the dominant groundwater flow direction allowing both better triangulation of potentiometric pressure and determination of a vertical gradient.
MW18-38	Northwest of reported contamination	6.10	6.10	Lateral delineation of soil and groundwater contamination. Provide resolution of the permeable sand and gravel boundaries.
MW18-39 VP18-39	Down-gradient Area	9.15	6.10	Lateral delineation of LEPH in groundwater down-gradient of MW17-16. Leverage the deep installation at MW17-15 with a shallow monitoring well (MW18-39) to use as a nested pair for vertical gradient determination. Soil vapour concentration data (VP18-39) for assessment and potential use in QHHERA at the northern edge of the identified plume
MW18-40	AST1/Fill Point Source Area	15.25	15.25	Supplementary soil analytical data in source area. To install a monitoring well with a screened interval to collect representative water table samples and depth to groundwater measurements. To further determine geometry of permeable sand and gravel layer in source area.
MW18-41	AST1/Fill Point Source Area	6.10	6.10	To provide a nested pair with MW18-40 above for vertical gradients/deep groundwater flow direction. Evaluate groundwater quality at depth in the source zone (vertical delineation).
MW18-42	AST2 Source Area	6.10	6.10	Water table monitoring well to provide depth to groundwater measurements near AST 2.
MW18-43 VP18-43	AST2 Source Area	15.25	15.25	To provide a nested pair with MW18-42 for vertical gradients/deep groundwater flow direction. To evaluate groundwater quality at depth in the AST2 source area. Soil vapour concentration data (VP18-43) for assessment and potential use in QHHERA at the identified contamination at AST2
MW18-44	Northwest area of the Site	7.60	4.60	Down gradient delineation of soil and groundwater contamination. Provide better triangulation of water table elevation such that site scale groundwater flow patterns outside of the area of contamination can be determined.



**PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JEKELL STREET)**

Objectives and Scope of Work  
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**Table 4-1 Rationale for 2018 Boreholes for 5th Avenue (Rogers Street to Jeckell Street)**

<b>BH/MW ID</b>	<b>Location</b>	<b>Depth of Borehole (mbgs)</b>	<b>Depth of Monitoring Well (mbgs)</b>	<b>Rationale</b>
MW18-45	AST2 Source Area	6.10	5.00	Water table monitoring well to provide depth to groundwater measurements near AST2. Provide representative background soil and groundwater conditions.
BH18-46	AST1/Fill Point Source Area	2.75 (refusal)	N/A	Attempted western delineation of identified soil and groundwater contamination at AST1
BH18-47	AST1/Fill Point Source Area	6.10	N/A	Attempted western delineation of identified soil and groundwater contamination at AST1
MW18-48	AST1/Fill Point Source Area	9.15	7.60	Western delineation of identified soil and groundwater contamination at AST1
MW18-49	Down-gradient Area	6.10	5.80	North of observed suspected contamination at MW18-31
MW18-50	Down-gradient Area	6.10	5.80	East of observed suspected contamination at MW18-31
MW18-51	Down-gradient Area	6.10	5.00	East of observed suspected contamination at MW18-39
MW18-52	Down-gradient Area	6.10	6.10	North of observed suspected contamination at MW18-31 and MW18-49
MW18-53	Down-gradient Area	6.10	4.60	Northeast of observed suspected contamination at MW18-31 and MW18-49
MW18-54	Down-gradient Area	6.10	4.90	Northeast of observed suspected contamination at MW18-31 and MW18-49
MW18-55	Down-gradient Area	6.10	4.90	Northeast of observed suspected contamination at MW18-31 and MW18-49
MW18-56	Cross Gradient (Northwest)	9.15	9.15	Northwest delineation of the groundwater plume. Provide water table elevation data up-gradient, given the easterly component of groundwater flow indicated from previous water table contouring. Installed after identifying that MW18-30 was dry.



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## **5.0 METHODS**

### **5.1 SERVICE AND BURIED UTILITY LOCATE**

The locations of services and utilities were established prior to the drilling investigation. Utility and service records were obtained by means of direct request to local utility providers at least three days prior to the desired date of investigative work involving ground disturbance. The locations of underground utilities were confirmed prior to drilling by a private underground utility locator using ground penetrating radar (GPR) and EM scanning, and proposed drilling locations were confirmed or adjusted according to the locations of buried utilities.

During the field work, Arcrite Northern of Whitehorse, YT, was retained to conduct the buried utility locating work.

### **5.2 SOIL SAMPLING**

Drilling services were provided by Midnight Sun Drilling Inc. of Whitehorse, YT, on July 24 to 28, and August 1, 2018. Solid and hollow-stem augers were used for drilling for July 24 to 26, 2018, and sonic drilling was used for July 27 to 28, and August 1, 2018. Borehole locations are shown on Figure 2 in Appendix A.

Soil samples were obtained directly from the auger flights during auger drilling and from core barrel samples during sonic drilling. Stantec generally collected soil samples at each major change in stratigraphy, and continuously in proximity to the water table for environmental analysis. Each soil sample was split into two portions, with one portion placed into clean, laboratory-supplied glass containers for analysis of COCs, and the remaining portion placed into a re-sealable plastic bag for visual classification and field vapour screening. Samples were field-screened for the presence of volatile vapours using a fixed-volume headspace technique with an RKI Eagle II hydrocarbon vapour analyzer with PID (Eagle II), with no methane response. The Eagle II was calibrated to 40 % lower explosive limit (LEL) of hexane and 100 parts per million by volume (ppmv) isobutylene calibration gas and zeroed using ambient air prior to field use. A sealable polyethylene bag was half-filled with soil and sealed for a minimum of 10 minutes prior to puncturing the bag and analyzing the headspace vapour level. The vapour analyzer provided digital readings for the volatile organic vapours concentrations in ppmv. Stantec recorded sample observations including depth interval, colour, soil type, grain size, and moisture content on Stantec field forms. Based on these observations and field vapour screening results, Stantec selected and submitted soil samples for laboratory chemical analysis using standard chain of custody procedures.

Samples were placed in ice-chilled coolers for delivery to Maxxam Analytics International Corporation (Maxxam) in Whitehorse, YT, for preparation and shipment to the Maxxam lab in Burnaby, BC.



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## **5.3 GROUNDWATER MONITORING AND SAMPLING**

### **5.3.1 Monitoring Well Installation**

To characterize groundwater quality of the identified AECs, PVC monitoring wells (50 mm O10 slot size) were installed.

During installation, the annular space of each monitoring well was filled with a silica sand pack to a minimum of 0.3 m above the slotted screen section of PVC pipe, followed by a minimum 0.9 m bentonite seal placed above the sand pack. The remainder of the annular space was filled with silica sand and cement to grade. The wells were completed with a J-plug and a stick-up monument, except for MW18-33, MW18-42, and MW18-43, which were completed with flush-mounted well casings. Five monitoring wells had an accompanying vapour probe installed, which are outlined in Table 4-1 and discussed in more detail in Section 5.5.

### **5.3.2 Monitoring Well Development**

The newly-installed monitoring wells were developed prior to sampling to obtain groundwater that is representative of the formation. During development, each well was purged until a minimum of 10 well volumes were removed, or until the purge water was visually free of sediment. Monitoring wells were purged with the use of a dedicated Waterra® foot valve, surge block, and HDPE tubing, and were allowed to stabilize at least one week prior to the collection of a groundwater sample, in most cases.

### **5.3.3 Groundwater Sampling**

Newly-installed and existing groundwater wells were monitored for well vapour levels, depth to groundwater, and presence/absence of non-aqueous phase liquid (NAPL). Well vapour levels were measured using an RKI Eagle II gas detector. Groundwater levels were measured using a Solinst oil/water interface probe and the probe was cleansed with a mixture of Alconox® and water prior to each measurement to prevent cross-contamination from well to well.

Groundwater purging, and sample collection was performed with the use of a low-flow pump. Prior to sampling, the monitoring wells were purged while monitoring the pH, conductivity, dissolved oxygen, and temperature of the groundwater, and were purged until a total of three well casing volumes were removed or until the monitored parameters stabilized, whichever came first. Groundwater samples were then collected using the low-flow pump and dedicated tubing to transfer the groundwater into laboratory-supplied containers. The samples were then stored in ice-chilled coolers prior to delivery to the laboratory.

Groundwater samples were dropped off at Maxxam in Whitehorse, YT, for preparation and shipment to the Maxxam lab in Burnaby, BC.





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## 5.4 HYDROGEOLOGICAL TESTING

### 5.4.1 In Situ Single Well Hydraulic Response Testing

Single-well response tests were performed by removing a slug of water from each well using a single-use bailer and monitoring water level recovery versus time using a Solinst Levellogger™. Single well response tests were completed on MW16-02, MW16-11, MW17-15, MW18-35, and MW18-44.

The hydraulic conductivity of each screened interval was determined using the Bouwer-Rice method of analysis and verified against field classifications of stratigraphy (Freeze and Cherry 1979). A minimum of three response tests were conducted in each well to confirm accuracy.

In the Bouwer-Rice method, recovery data are plotted as normalized drawdown ( $(H-h)/(H-H_0)$ ) versus time ( $t$ ). A semi-log plot of the data is then used to determine the base time lag coefficient ( $T_0$ ). Hydraulic conductivity ( $K$ ) is then calculated as:

$$K = \frac{r_c^2 \ln\left(\frac{R_e}{r_w}\right)}{2L_e} \frac{1}{t} \ln \frac{h_0}{h}$$

Where:

$K$  = hydraulic conductivity (L/T)

$r_c$  = radius of the well casing (L)

$r_w$  = radius of the well (L)

$R_e$  = radial distance over which the head dissipated (L)

$L_e$  = length of the screen (L)

$t$  = time since  $t = 0$  (T)

$h_0$  = drawdown at time  $t = 0$  (T)

$h$  = drawdown at time  $t = t$  (T)

Response tests were performed after the wells were developed. In cases where the water level drops within the screened interval during the test, the plot often has an initial high slope and then a smaller slope at later time (known in the literature as the “double straight-line effect”). In this case, the line was fit to the second straight-line portion of the data, as recommend by Bouwer (1989).

### 5.4.2 Pump Testing

The objective of the pumping test, or dynamic stress test, was to determine the extent of hydraulic connectivity of the north-south oriented, channelized, sand and gravel deposit that has been identified on the Site. As the hydrocarbon contamination appears to have followed the channelized, higher permeability geo-body, the pumping test will provide further information to determine the appropriate remediation strategy for the hydrocarbon contamination on the Site.

The testing required that appropriate wells be identified with screened intervals set within the permeable channel deposit and a small submersible pump be used to draw down the water level. During the pumping of a well to lower the water table, the water levels are monitored in other nearby wells to assess drawdown at varying distances from the pumping well. In both pumping tests, five automated data logging pressure transducers were deployed in wells



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ranging in radial distance from 12.9 m to 72.0 m from the pumping well. A barometric pressure logger was also deployed to compensate the unvented-pressure transducer data for barometric pressure changes during the testing (Appendix C). The pumping wells and adjacent monitored wells were as follows:

1. Pumping Test 1:
  - a. Pumping well: MW16-09
  - b. Adjacent monitored wells: MW16-02, MW16-12, MW18-34, MW18-51, and MW18-56
2. Pumping Test 2:
  - a. Pumping well: MW18-31
  - b. Adjacent monitored wells: MW16-12, MW18-51, MW18-52, MW18-54, and MW18-55

Depending on the timing and magnitude of the hydraulic response measured in other monitoring wells, this process was repeated in two separate wells (i.e., MW16-09 and MW18-31) located in areas of the Site with pre-established hydrocarbon contamination in soil and with screened intervals located in permeable sand and gravel intervals that extend at least 1 m below the water table to induce significant draw down. This process was intended to determine if there are clear boundaries or well-established hydraulic connection between wells in different areas of the Site. This in turn allows for remedial planning to consider the area of influence of various in-situ or subsurface remediation methods such as chemical oxidation injections, pump and treat systems, and even the need for dewatering should an excavation method be used to remediate soil at or below the water table.

Water samples for LEPH were collected throughout each test to quantify the water quality with respect to the contaminant of concern. A total of four samples were collected at pump start-up (0 mins), and every two hours after that (i.e., 120 mins, 240 mins and at the end of the test) to quantify if the pumped groundwater quality changed over the duration of the test.

## 5.5 VAPOUR PROBE INSTALLATION AND SAMPLING

In five locations (MW18-30, MW18-34, MW18-35, MW18-39, and MW18-42) vapour probes were installed in the same borehole as the monitoring well to assess soil vapour concentrations. A 15 cm long, stainless-steel vapour probe was strapped to the PVC casing of the well and installed at an approximate depth of 2.1 mbgs. The annulus around the vapour probe was filled with silica sand, and the annulus above and below was filled with bentonite to facilitate a vapour sample collected from a specific depth. The newly installed vapour probes were integrity tested to confirm adequate flow rate by a vacuum test, as well as a leak (or short circuit) test using helium to determine if the probe was adequately sealed off from inadvertently sampling ambient air. Following satisfactory helium shroud testing, a laboratory-supplied Summa Cannister was connected to the sampling port and sampled at a rate of 140 mL/min for ten minutes. Summa cannisters were dropped off at Maxxam in Whitehorse, YT, for preparation and shipment to the Maxxam vapour lab in Mississauga, Ontario, for applicable petroleum hydrocarbon analysis.



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Predicted indoor vapour concentrations were calculated based on the soil vapour concentrations and vapour attenuation factors. As per BC Ministry of Environment and Climate Change Strategy (MOECSS) CSR *Technical Guidance 4: Vapour Investigation and Remediation* (TG4) <sup>1</sup> depth-related attenuation factors were applied to reported soil vapour concentrations to accurately predict potential indoor air concentrations at the Site. Vapour attenuation factors were applied based on vapour probe installation depths below the current ground surface.

### 5.6 LEVEL AND SPATIAL SURVEY

The newly-installed monitoring wells and borehole locations were vertically and horizontally surveyed relative to a geodetic datum. The geodetic elevation for the top of pipe and grade of each monitoring well was measured.

Level and spatial surveys of the Site and investigation locations were conducted by Stantec.

### 5.7 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The data quality objective for the investigation were to collect precise, accurate, representative, and reproducible data. This was achieved through the use of standard field practices, analysis of field duplicates, and adherence to the proposed scope of work.

During the Site investigation, sampling work was conducted in accordance with EY regulations, protocols, and procedures, and Stantec's standard field procedures. A new pair of nitrile gloves was used for each sample to reduce the risk of cross-contamination between samples. Samples were collected in laboratory-supplied clean jars/bottles as appropriate for the intended analysis.

Samples were placed into ice-chilled coolers, which were delivered to Maxxam in Whitehorse, YT, within the recommended hold time and temperature limits. Samples were delivered with a chain-of-custody form.

Maxxam is a Canadian Association for Laboratory Accreditation (CALA)-accredited laboratory that uses YT CSR-recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, control standards samples, certified reference material (CRM) standards, method spikes, replicates, duplicates and instrument blanks are routinely analyzed as part of their QA/QC programs.

Blind field replicate soil samples and blind field duplicate groundwater samples were submitted for lab analysis to measure the precision of the field sampling and laboratory analysis.

### 5.8 THREE-DIMENSIONAL CONCEPTUAL SITE MODEL

To facilitate the development of the Site's three-dimensional conceptual site model (3D CSM), the previously-collected site characterization data and the recent data collected by Stantec during the Phase II ESA (2018–2019) was compiled and normalized into a unified database. The database incorporates the investigation data into Leapfrog

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<sup>1</sup> "MoE Technical Guidance 4 on Contaminated Sites - Vapour Investigation and Remediation", dated September 2010.



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3D Hydro, a three-dimensional geological computer modeling program, to present the previous and recent findings of the site investigation in a clear, highly visual, easy to understand format.

The previous site investigation data incorporated into the 3D CSM was primarily sourced from two final reports provided to SARU by CH2M HILL (CH2M Hill, 2018), and AE (Associated Engineering, 2016). The data from these reports that were used to generate the 3D CSM included:

- Survey data including ground elevations for boreholes, top of casing data from monitoring wells, and site features
- Lithological data collected from completion of boreholes (including monitoring well installation details)
- Monitoring data collected from 2014 through March 2018 including depth to groundwater measurements
- Analytical soil data obtained from sample collection during borehole drilling
- LIF data (CH2M Hill, 2018)
- Chemical groundwater data collected from sample analysis from monitoring wells
- Thematic geospatial data of salient site features in either ArcGIS and/or AutoCAD format
- Any remote sensed data if available (such as site-specific digital elevation model data)
- Summary reports detailing the work completed to obtain the data listed above.

There were three phases of existing site investigation data provided to Stantec at the outset of the project with which a preliminary 3D CSM was generated. This was done to facilitate discussion related to data gaps and associated field planning prior to the Phase II ESA (2018–2019) site investigation that included borehole drilling, monitoring well installation, and submission of analytical soil and groundwater samples to better determine the PHC contamination distribution at the Site.

The model was then updated using the new data from Phase II ESA (2018–2019) such that a final assessment of the contamination using the model could be discussed.

## 6.0 OBSERVATIONS

The field observations and well monitoring data from the soil and groundwater investigation are presented and discussed in the following sections.

### 6.1 SOIL STRATIGRAPHY

In general, the soil stratigraphy consisted mainly of sandy silt. Locations at the northern end of the Site were observed to have sand and gravel layers to a maximum observed depth of 6.1 mbgs, underlain by a layer of sandy silt. Locations in the centre and southern portion of the Site did not have the sand and gravel layer; however, in the middle of the Site, some locations were observed to include a gravelly silt layer or layers at depths of approximately 5.5 to 7.3 mbgs. The gravelly silt layers encountered within boreholes in the middle and northern portions of the Site were observed to have a PHC sheen and odour.

Soil stratigraphy is provided in the borehole records located in Appendix D. Further discussion is included in Section 9.1 of this report. Figure 8 in Appendix A presents a cross-section of the soils on the Site.



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### 6.2 SOIL FIELD SCREENING

Hydrocarbon combustible vapour level readings ranged from less than detection limit of the instrument (LTDL) in multiple samples to 175 ppmv at MW18-43 SA06, collected from 4.3 to 4.6 mbgs. The headspace measurements for total organic vapour concentration ranged from LTDL in multiple samples to 170 ppmv at MW18-31 SA06, collected from 4.6 to 4.9 mbgs. Combustible vapour level readings are presented on the borehole logs in Appendix C.

Staining and odour were observed at the sample locations and depths listed in Table 6-1.

**Table 6-1 Summary of PHC Observations During Drilling**

Investigation Location	Depth (mbgs)	Observations
BH18-47	2.5–2.8	Petroleum hydrocarbon (PHC) odour, immediately below concrete pad, soil was dry
MW18-30	2.7–3.0	PHC odour, sandy silt was moist
MW18-31	4.6–4.9	PHC odour within the sand and gravel layer, soils were saturated
MW18-35	5.5–7.6	PHC odour within the silt and gravel layer, soils were saturated
MW18-39	4.6–7.0	Strong PHC odour and sheen within the sand and gravel layer, soils were saturated
MW18-49	4.9–5.8	PHC odour within the sand and gravel layer, soils were saturated
MW18-56	2.7–3.0	PHC odour, sandy silt was moist

### 6.3 GROUNDWATER MONITORING

The newly-installed wells and accessible existing monitoring wells were monitored for headspace, depth to water, and depth to non-aqueous phase liquids (NAPL) (if present) on July 30, 2018. Headspace vapour level readings were measured from each monitoring well. The values measured ranged from LTDL in multiple wells to 55 ppmv (MW18-41) for hydrocarbon vapours, and from LTDL in multiple wells to 33 ppmv (MW17-20) for total organic vapours. Headspace vapour concentrations are measured to assess for the presence of volatile compounds that may have volatilized from the groundwater and may be used as an indication of the presence of the volatile compounds. Observed depth to groundwater ranged across the Site from approximately 3.33 mbgs in MW18-45 to approximately 6.55 mbgs in MW16-05. No NAPL was detected by the interface probe during the monitoring of the wells.

Wells MW18-30, MW18-38, and MW16-08 were dry. Locations MW16-04 and MW16-05 were damaged, and as such were not monitored or sampled. Well MW16-03 was not located and is suspected to be under the fence line of the new St. Elias Group Home.

Groundwater elevations were calculated using water levels measured on July 30, 2018, from top of casing (TOC) and casing elevations measured during the vertical survey of the monitoring wells. Groundwater elevations ranged from 634.33 m above sea level (masl) at MW18-44 to 637.27 masl at MW17-19. The inferred direction of shallow groundwater flow at the Site is expected to include both horizontal and vertical components.

Groundwater monitoring data are summarized in Table I in Appendix E.



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## 7.0 RESULTS

### 7.1 SOIL ANALYTICAL RESULTS

Thirty-nine soil samples, including four field replicates, were submitted for analysis for one or more of the following compounds: BTEX, VPH, MTBE, VOC, LEPH, HEPH, PAH, TOC, and grain size. Reported concentrations of the analyzed PCOCs in the 2018-2019 soil samples were below the applicable YT CSR RL and CL standards, and in many cases were below laboratory RDLs.

A summary of the 2018-2019 soil analytical results is provided in Table II in Appendix E and copies of laboratory certificates of analysis are included in Appendix F. A summary of the soil analytical results, including results from previous investigations, is presented on Figure 3 in Appendix A.

### 7.2 GROUNDWATER ANALYTICAL RESULTS

Thirty-six groundwater samples, including three field duplicates, were submitted for analysis of one or more of the identified PCOCs. The reported analytical results were below the applicable standards, with the exception of:

- Concentrations of LEPH were greater than the applicable YT CSR AWF standard in groundwater sampled from:
  - MW16-01
  - MW16-09
  - MW16-13
  - MW17-16
  - MW17-17
  - MW17-20
  - MW18-31
  - MW18-39
  - MW18-49
- Reported concentration of naphthalene was greater than the AWF standard in groundwater sampled from MW17-17

The groundwater analytical results are summarized in Table III in Appendix E and copies of laboratory certificates of analysis are included in Appendix F. A summary of the groundwater analytical results is presented on Figure 4 in Appendix A.

#### 7.2.1 Pump Test Analytical Data

##### 7.2.1.1 Pump Test 1 (MW16-09)

Reported concentrations of LEPH were 4.8 mg/L initially (greater than the applicable standard of 0.5 mg/L) but decreased by an order of magnitude and stabilized at 0.31–0.32 mg/L for the subsequent three samples.



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### 7.2.1.2 Pump Test 2 (MW18-31)

Reported concentrations of LEPH were marginally above the standard and were consistent throughout the four sampling times ranging between 0.51 mg/L to 0.56 mg/L.

Analytical results from the pump test water are summarized in Table IIIa in Appendix E.

## 7.3 HYDROGEOLOGICAL TESTING RESULTS

The calculated hydraulic conductivities are presented in Table 7-1 below. Further details can be found in Appendix C.

**Table 7-1 Hydraulic Conductivity—Single Well Response Tests**

MW ID	Analysis Type	Screened in Material	Hydraulic Conductivity (m/s) <sup>1</sup>
MW16-02	Bouwer-Rice	Silty sand with gravels <sup>2</sup>	8.95 x10 <sup>-6</sup>
MW16-11	Bouwer-Rice	Clay, some silt, Gravel, trace sand <sup>2</sup>	6.20 x10 <sup>-3</sup>
MW17-15	Bouwer-Rice	Silt <sup>3</sup>	5.87 x10 <sup>-7</sup>
MW18-35	Bouwer-Rice	Sandy silt, some gravel	6.51 x10 <sup>-5</sup>
MW18-44	Bouwer-Rice	Sand, trace silt and gravel	6.87 x10 <sup>-5</sup>

NOTES:

1. m/s—metres per second
2. Soil description from Detailed Phase II Environmental Site Assessment on the Jeckell and Hoge Street Lots, prepared by Associated Engineering, October 2016
3. Soil description from Phase II Environmental Site Assessment (2017–18): 5th Avenue (Rogers to Jeckell Street), prepared by CH2M, March 2018.

### 7.3.1 Groundwater Flow Direction

The Site is relatively long and narrow and previous boreholes and monitoring wells were focused on determining the north-south extent of the hydrocarbon contamination. The new monitoring wells completed by Stantec, as part of the Phase II ESA (2018–2019), were intentionally offset from the areas with known contamination both to delineate the contamination in an east-west orientation and to provide additional water table elevations off-set from the original wells.

Water level measurements were collected from the on-site monitoring wells between July 30 and August 2, 2018. In total, 26 monitoring wells screened across or near the water table surface were used to map the groundwater elevation contours and flow direction. The groundwater elevation contours indicate the influence of topography with two water table “mounds” (i.e., high-points) on the west side of the Site where two side-slope mounds are present at the base of the cliff. These mounds create convergent, easterly flow at the base of the cliff that transitions to dominantly west to east flow across the flatter portion of the Site. In the north portion of the Site, there is evidence of mounding under the un-vegetated road/driveway where increased recharge or infiltration is likely to occur relative to the treed areas. The water level at MW18-51 is reflective of the topographic depression in which it is installed.



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Generally, in the northern part of the Site, the groundwater flow is north-easterly, while across the rest of the Site, the groundwater flow is to the east.

### 7.3.2 Hydraulic Gradients and Linear Groundwater Flow Velocity

#### 7.3.2.1 Horizontal Gradients

Using the groundwater elevations, groundwater elevation contours were plotted as shown on Figure 5 in Appendix A. The lateral hydraulic head gradient varies across the Site with a maximum gradient of 0.06 m/m at the base of the cliff to 0.013 m/m on the eastern portion of the Site in the flat topographic area.

#### 7.3.2.2 Vertical Gradients

Using pairs of adjacent monitoring wells screened across different depths, vertical gradients were calculated with the following equation.

$$G_{vert} = \frac{(H_a - H_b)}{(D_a - D_b)}$$

Where

$G_{ver}$  = vertical gradient (negative value is upwards vertical flow)

$H_a$  = head in monitoring well *a*

$D_a$  = elevation of bottom of screen in monitoring well *a*

The calculation of vertical hydraulic head gradients based on observed groundwater elevations across the Site indicated that, with the exception of one nested pair located at the base of the cliff (MW18-42 and MW18-43), there are near neutral to negative gradients, indicating no vertical flow to weak recharge (upward flow) conditions (i.e., minor discharge). Negative gradients were observed at MW18-40/MW18-41, MW18-36/MW18-37 and MW17-15/MW18-39 located in the flat, central to northern portion of the Site. The near neutral to recharge (downward flow) conditions, observed at MW18-42/MW18-43, is likely the result of localized groundwater mounding, which is expected given the topographic change created by the cliffs.

#### 7.3.2.3 Estimated Groundwater Flow Direction and Velocity

The average linear velocity for groundwater flowing under a hydraulic gradient in a saturated porous medium was estimated using the following relationship derived from Darcy's Law (Freeze and Cherry, 1979):

$$v_{avg} = \frac{K}{\phi_{eff}} \left( \frac{\partial h}{\partial l} \right)$$

Where:

$K$  = hydraulic conductivity

$\partial h/\partial l$  = hydraulic gradient

$\phi_{eff}$  = effective porosity





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The above sections derive the hydraulic conductivities and hydraulic gradients. Effective porosity was estimated conservatively (producing highest estimate of average linear groundwater velocity) of 0.40 for sandy silt (Freeze and Cherry, 1979) and 0.35 for the monitoring well installed in the sand and gravel found in isolated areas of the Site. Average linear groundwater velocity for the Site should consider the geological framework in which the coarse-grained, high-permeability layers are oriented transverse to groundwater flow direction. If the hydraulic conductivity of the coarse-grained intervals was the only input used to calculate the average linear groundwater flow velocity, it would be a gross over-estimation of the site-scale flow velocity. As such, the average hydraulic conductivity from the silt-dominated intervals at or near the water table elevation was used to estimate the site-scale groundwater flow velocity. The results of the five in-situ hydraulic response tests are presented in Table 7-2 below, including an average for the silt-dominated unit types for the site-scale calculation of groundwater flow velocity.

**Table 7-2 Summary of Hydrogeological Parameters and Calculations**

Single/AVG	Location of Measurement	Material Type	$\phi_{eff}$	K (m/s)	Average Gradient		$V_{avg}$ (m/yr)
					Magnitude (m/m)	Direction (° Azimuth)	
-	MW16-11	Clay, some silt, Gravel, trace sand*	0.35	$6.20 \times 10^{-3}$	0.013	90	7,262.3
-	MW18-44	Sand, trace silt and gravel	0.40	$6.9 \times 10^{-5}$	0.013	90	70.7
-	MW18-35	Sandy silt, some gravel	0.40	$6.5 \times 10^{-5}$	0.013	90	66.6
-	MW16-02	Silty sand with gravels*	0.40	$8.9 \times 10^{-6}$	0.013	90	9.1
-	MW17-15	Silt**	0.40	$5.9 \times 10^{-7}$	0.013	90	0.6
Avg. excluding MW16-11	N/A	N/A	0.40	$3.6 \times 10^{-5}$	0.013	90	104.6

NOTES:  
m = metres  
s = seconds  
d = day  
y = year (calculations assume 365.25 d/y)  
\*soil description from Detailed Phase II Environmental Site Assessment on the Jeckell and Hoge Street Lots, prepared by Associated Engineering, October 2016  
\*\*soil description from Phase II Environmental Site Assessment (2017-18): 5th Avenue (Rogers to Jeckell Street), prepared by CH2M, March 2018.



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The K value from MW16-11 appears to be an outlier from the rest of the data and was excluded from calculating the Site average. The nearest receptor is the Yukon River, 520 m east of the Site. The estimated time to reach the receptor is approximately 5 years based upon the average hydraulic conductivity and lateral hydraulic head gradient and associated groundwater velocity as determined for the dominant silt-based lithology. These findings support the determination that standards protecting drinking water are not applicable at the Site, as any hypothetical contamination migrating off-site (not currently observed), will migrate east towards the Yukon River, and not towards the existing wells (of unknown use) north of the city nor across the Yukon River and south towards the City's drinking water supply wells.

Groundwater flow direction is summarized in Figure 5 in Appendix A.

### 7.3.3 Results of the Pumping Test

Two separate pumping tests were completed to investigate subsurface hydraulic connections between the former AST2 area, in the central portion of the Site, and outlying areas where groundwater contamination delineation has been achieved. Two specific wells were selected from the desktop study and the 3D CSM described herein to be pumped with the following criteria:

- Wells to be tested are within the centre of a mapped contaminated groundwater zone associated with interpreted source areas
- Well, and specifically the screened interval, is installed in a permeable vertical interval that appears to be connected to permeable material observed in lithological observations from nearby monitoring wells
- Permeable interval is at or near the water table elevation with at least 1 m of screened interval located below the current water table position

Based on these criteria, as well as on-site testing as described above, MW16-09 (a pre-established well) and MW18-31 (a new well installed to investigate the groundwater quality of the northern contaminated area) were chosen as pumping wells for the approximately 6-hour (360 min) tests. The key parameters of each pumping test completed on October 29 and 30, 2018 consecutively on MW16-09 and MW18-31 are summarized below in Table 7-3. Pumping test hydrographs show the logger data (and manual measurements for the pumping well: Appendix C) with logger data corrected to geodetic hydraulic head elevations (Figure 6; Appendix A).

The pumping testing confirmed lithological observations from the borehole drilling program and interpretation from 3D CSM exercise that the high permeability sediments including sand and gravel are discrete, somewhat chaotic small-scale channel deposits. Further the dynamic stress or hydraulic connectivity testing indicate that there is little to no connection between wells at short distances as observed from both pumping tests completed. Both pumping tests completed on MW16-09 and MW18-31 produced over 0.09 L/s (1.5 US gpm) sustainable flow rates for the duration of the test generating 1.01 m and 0.84 m of drawdown respectively. In both cases, only the nearest observation well indicated any drawdown in response to pumping. The test completed on October 29, 2018, pumping MW16-09, indicated the only well to show a drawdown response of 0.009 m was MW16-12, located 12.9 m away from the pumping well. In the second test on October 30, 2018, on MW18-31, only one monitoring well (MW18-52, located approximately 26.5 m north of the pumping well) indicated a pumping response with 0.033 m of drawdown.



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Given the single response testing results, which indicate some very permeable, high hydraulic conductivity sediments, we would expect to see small magnitude drawdown responses measured at greater distances from the pumping well if the strata were laterally extensive and hydraulically connected. However, even at relatively short radial distances from the pumping well, only small drawdown magnitudes were observed, indicating the presence of permeability boundaries or the presence of fine-grained, low-permeability soils between monitoring wells at a small spatial scale. This indicates that the low-permeability silt-dominated strata are likely rate-limiting for groundwater flow on-site. It also indicates that no significant connected permeable pathways are present in areas of the Site with known soil and groundwater hydrocarbon contamination, as no significant recharge boundaries were observed during the pumping tests.

**Table 7-3 Summary of Pumping Test Characteristics**

<b>Pumping Test 1</b>				
<b>Test Date:</b>	October 29, 2018			
<b>Pumping Well:</b>	MW16-09			
<b>Pumping Rate:</b>	0.098 L/s (1.59 US gpm)			
<b>Test Duration:</b>	6 h (360 mins)			
<b>Volume Pumped:</b>	2.16 m <sup>3</sup>			
<b>Drawdown:</b>	1.01 m			
<b>Observation Wells</b>		<b>Radial Distance (m)</b>	<b>Direction from PW</b>	<b>Max. Drawdown (m)</b>
<b>Observation Well 1:</b>	MW16-02	35.58	South	0
<b>Observation Well 2:</b>	MW16-12	12.87	Northeast	0.009
<b>Observation Well 3:</b>	MW18-34	37.14	East	0
<b>Observation Well 4:</b>	MW18-51	71.9	North	0
<b>Observation Well 5:</b>	Mw18-56	50.73	Northwest	0
<b>Pumping Test 2</b>				
<b>Test Date:</b>	October 30, 2018			
<b>Pumping Well:</b>	MW18-31			
<b>Pumping Rate:</b>	0.105 L/s (1.67 US gpm)			
<b>Test Duration:</b>	5.5 h (330 mins)			
<b>Volume Pumped:</b>	2.08 m <sup>3</sup>			
<b>Drawdown:</b>	0.84 m			
<b>Observation Wells</b>		<b>Radial Distance (m)</b>	<b>Direction from PW</b>	<b>Max. Drawdown (m)</b>
<b>Observation Well 1:</b>	MW16-12	72.75	South	0
<b>Observation Well 2:</b>	MW18-51	25.91	Southeast	0
<b>Observation Well 3:</b>	MW18-52	26.55	Northwest	0.033
<b>Observation Well 4:</b>	MW18-54	59.40	Northeast	0
<b>Observation Well 5:</b>	MW18-55	48.94	Northeast	0



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### 7.4 SOIL VAPOUR ANALYTICAL RESULTS

Five soil vapour samples were submitted for analysis of the following parameters associated with vapour contamination at gasoline and diesel sites, as identified in the Soil Vapour Advice and Practice Guidelines Development Panel—Stage 1, developed by the BC Contaminated Sites Approved Professionals Society (CSAP, 2009): 1,3-Butadiene

- 1,2,4-Trimethylbenzene
- 1,2-Dichloroethane
- 1,3,5-Trimethylbenzene
- Benzene
- Cumene (Isopropyl benzene)
- n-Decane
- Ethylbenzene
- Ethylene Dibromide
- n-Hexane
- Methyl t-butyl ether (MTBE)
- Methylcyclohexane
- Naphthalene
- Styrene
- Toluene
- Xylenes
- VPH

Predicted indoor vapour concentrations were calculated based on the soil vapour concentrations and vapour attenuation factors, which in turn are based upon the depth of the soil vapour probe. The reported concentration of VPH, after the application of the appropriate attenuation factor, based upon the current grade of the Site, was greater than the BC CSR RL standard, in vapour sampled at VP18-39. However, since there is no YT CSR standard, this was for comparison purposes only.

The soil vapour analytical results are summarized in Table IV in Appendix E and laboratory certificates are included in Appendix F. A summary of the soil vapour analytical results is presented on Figure 7 in Appendix A.

### 7.5 QA/QC SUMMARY

#### 7.5.1 Laboratory QA/QC

Maxxam is a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory that uses CCME, BC MOECCS, and YT CSR recognized methods to conduct laboratory analyses. As conveyed by the laboratory, method blanks, control standards samples, certified reference material (CRM) standards, method spikes, replicates, duplicates and instrument blanks are routinely analyzed as part of their QA/QC programs.



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Prescribed laboratory methods were used by the laboratory, and the sample holding times were met, with the exception of some soil samples analyzed for BTEX/VPH or EPH. In the instances where the hold time was not met, the reported concentration was less than the laboratory RDL or at least one order of magnitude lower than the applicable standard and is considered to be representative of the soil conditions. Laboratory quality assurance samples such as matrix spikes and matrix spike duplicates were collected and analyzed according to the laboratory method, and the laboratory quality control sample results were within method acceptance limits with the exception of the following:

- Lab certificate B862213: The CRM for tin was outside of the acceptance criteria. The lab allows a failure rate of 10% of analytes in a multielement scan.
- Lab certificate B863863: The percent recovery of the RPD for arsenic, lead, anthracene, and benzo(b&j) fluoranthene were outside the control limits. The laboratory certificate stated that “the overall quality control for this analysis meets acceptability criteria”.
- Lab certificate B896179: The lab certificate notes that the water samples were decanted and results of EPH and/or PAH may be biased low. As the samples were collected from known areas of contamination, the lab analytical data does not change the conclusions of the Phase II ESA.

Stantec has reviewed the quality assurance data for the subject batch and the analytical results and concluded that data quality is sufficient for the purposes of the investigation.

### 7.5.2 Field Duplicates and Relative Percent Difference

During soil and groundwater sampling activities, field duplicates or replicates were collected and analyzed.

The relative percent difference (RPD) between original samples and duplicates or replicates was calculated where the analytical results were at least five times the value of the reportable detection limit. The calculated RPDs were within the acceptance criteria for RPD values. The RPDs are presented in Table V and Table VI in Appendix E.

It is industry best practice that one of every 10 representative samples (10%) be analyzed in duplicate, to conduct a check on the laboratory analysis protocol. For this investigation, four replicates of 33 soil samples (12%) and three of 33 groundwater samples (9%) were analyzed in duplicate. As such, the recommended percentage of replicates/duplicates for Quality Assurance procedures is considered to have been achieved.

Our review of the field and analytical data indicate that the analytical data are representative and meet the data objective for the Phase II ESA (2018–2019) program.



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## 8.0 DISCUSSION

### 8.1 SOIL CONTAMINATION

Soil contamination has been delineated laterally except west at the north end of the Site. This is summarized in Table 8-1 and in Figure 3 in Appendix A.

Vertical soil delineation was completed in previous investigations and is summarized in Table 8-1.

**Table 8-1 Delineation of PHC Contamination in Soil**

Investigation Location	Area of the Site
MW18-45, MW18-42, MW18-43	South and east of AST2
MW18-36, MW18-37, MW18-33, MW18-34	East of AST1
MW18-44, MW18-52, MW18-53, MW18-54, MW18-55	North and northeast of AST1
MW18-30, MW18-48, MW18-41, MW18-42	West and southwest of AST1
MW16-05 (2.6–3.0 mbgs), MW17-16 (6.2–6.8 mbgs), MW17-17 (7.6–8.4 mbgs), BH18-21 (6.0–6.5 mbgs), BH18-25 (5.0–5.5 mbgs),	Vertical

### 8.2 GROUNDWATER CONTAMINATION

#### 8.2.1 Petroleum Hydrocarbons

The groundwater flow direction has little effect on the distribution of residual hydrocarbon contamination to soil and groundwater. The orientation of the observed contamination is transverse to the Site-scale groundwater flow direction and are likely the result of free-phase hydrocarbon migration during the historical release of hydrocarbons and/or the orientation of the rail spur historically present.

Groundwater with LEPH concentrations greater than the AWF standard was identified in the middle of the Site, consistent with previous investigations and with the historical activities on the Site. Naphthalene concentrations above applicable standard was identified in groundwater from one well, MW17-17. The PHC contamination, including naphthalene, has been delineated horizontally and vertically except the northwest, and is summarized in Table 8-2 and Figure 4 in Appendix A. There is still a data gap in the northwest. However, based upon the inferred groundwater flow direction, the northwest would likely be delineated at the base of the cliff as contamination is not anticipated to have migrated directly west, counter to the groundwater flow direction and the regional topography. There is still a potential that some contamination is flowing east through connective gravelly silt layers; however, at this time there are no data to indicate that the gravelly silt layers, where the majority of the contamination has been found, are connected and act as a contiguous aquifer. Nor is it evident that any gravelly silt layers are present east of the identified plume, as none have been observed to date in borehole or monitoring well locations.



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**Table 8-2 PHC Delineation in Groundwater**

Investigation Location	Direction of Delineation
MW18-52, MW18-53, MW18-54, MW18-55, MW18-44	North/northeast
MW16-12, MW18-33, MW18-34, MW18-35, MW18-36, MW18-50, MW18-51	East
MW16-02, MW16-03, MW16-04, MW16-05, MW16-10, MW18-41, MW18-42, MW18-45	South
MW16-11, MW17-19, MW18-48, MW18-56	West
MW17-15, MW18-37, MW18-40, MW18-42	Vertical

### 8.3 SOIL VAPOUR

The reported concentration of VPH, after the application of the appropriate attenuation factor, based upon the current grade of the Site, was greater than the BC CSR RL standard, in vapour sampled at VP18-39.

### 8.4 HYDROGEOLOGY

The hydrogeological scope of work completed as part of this Phase II ESA has clarified the hydrogeological conditions present on-site. The additional monitoring well installations have indicated the following:

- Groundwater flow is generally to the east towards the Yukon River
- Vertical Gradients do not suggest contamination significantly below the water table (i.e. weak recharge to weak discharge conditions)
- There are two areas on the Site with mappable accumulations of coarse-grained permeable deposits, including sand at or above the water table near AST1, and sand and gravel at or below the water table in the north portion of the Site

The additional pumping tests completed on October 29 and 30, 2018 indicate the following:

- Highly permeable soils at the Site is effectively encapsulated in low-permeability silt deposits and does not provide a clear preferential hydraulic pathway for contaminated groundwater to migrate off-site
- Highly permeable soil on the Site has a north-south orientation and may have provided a preferential pathway between permeable bodies as described above
- Low-permeability silt deposits govern linear groundwater flow velocities given the lack of indication that the permeable intervals are laterally extensive and oriented perpendicular to prevailing groundwater flow direction
- Groundwater contamination, as observed on the Site during the Phase II ESA, are likely localized in the vicinity of residual soil contamination
- Given the apparent lack of hydraulic connection between the two areas of the Site with known soil and groundwater contamination, it is difficult to determine if these areas of contamination are from a common source (AST1), or from two separate sources (AST1 and potentially an unknown fueling/transfer area near MW17-16). Groundwater impacts at MW17-20 confounds the interpretation of single or multiple sources given its location at the approximate mid-point between the two area with known soil contamination.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Conceptual Site Model (CSM)  
November 23, 2018

The spatial correlation between observed soil hydrocarbon contamination, groundwater contamination, and the lack of apparent permeable pathways indicates that the groundwater contamination is unlikely to migrate off the Site. The field data collected indicates no groundwater exceedances at significant distances downgradient of the source areas. However, there is a possibility of preferential distribution to the north, perpendicular to groundwater flow direction.

### 9.0 CONCEPTUAL SITE MODEL (CSM)

The 3D CSM was used to synthesize and interpret the Site conditions based on both the relevant historical Site data as well as the data collected for this Phase II ESA (2018–2019) completed by Stantec. The use of the CSM for the Site provided a visual means to evaluate the complex geological setting including features of the geology and hydrogeology and contextualize the analytical results for both soil and groundwater at the Site.

The notable outcomes of interpretation of the field investigation data in the CSM are described below and broken into three categories including: an integrated Site-wide geological summary, a hydrogeological summary, and a summary of the extent of both soil and groundwater hydrocarbon contamination.

#### 9.1 SITE-WIDE GEOLOGICAL SUMMARY

The geology of the Site is now well-characterized given the spatial distribution and number of historical and recent borehole data. Data from AE, CH2M Hill, and Stantec, from 2016 to present, were available for 54 boreholes. The spatial distribution of boreholes now covers a larger area of the Site with new boreholes completed as part of this investigation located east of the previous cluster of boreholes located at or near the base of the slope/cliff to the west and the historical AST locations where the soil contamination was initially discovered. The number of boreholes confirms the initial desktop interpretation that the depositional environment created fluvial-type deposits with a high degree of heterogeneity.

The intent of completing boreholes and associated monitoring wells east of the historical investigation locations were three-fold. The distribution of boreholes was to provide delineation of contaminated soil/groundwater, better spatial coverage to resolve the complex groundwater flow patterns (i.e., not relying on an approximately linear distribution of water level data), and to delineate or resolve the sub-surface geology transverse (i.e., east) of the cluster of pre-existing, sub-surface geology data. At a Site-scale, the following conclusions can be drawn regarding the spatial distribution of the groundwater and soil contamination:

- Dominant geology, or matrix material, is fluvial/overbank deposits of silt with varying proportions of sand and minor gravel. Despite the presence of coarse-grained material in the silty deposits, the mix of fine and coarse-grained sediment result in a low-permeability sediment.
- In the south and central portion of the Site, near the base of the cliffs, where the ASTs were historically located, borehole logs indicate a shallow accumulation of sand-dominated sediment approximately 0.5 to 2.0 mbgs (Figures 8, 9.1 and 9.2 in Appendix A)





## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Conceptual Site Model (CSM)

November 23, 2018

- In the south and central portion of the Site, near the base of the cliffs, where the ASTs were historically located, borehole logs indicate locally mappable sand and gravel channel sediment approximately at or near the water table which, at the time of hydrocarbon release, likely provided a preferential pathway for free-phase hydrocarbons in the sub-surface. While the topography is variable at the base of the cliff, these coarse-grained channel deposits range in depth from approximately 3.5 to 5.5 mbgs (Figure 8 in Appendix A).
- Geological data collected from the wells located to the east of the previous investigations borehole distribution indicate that the channel deposits are not laterally extensive to the east. With the exception of some isolated sandy lenses at variable depths, the silt-dominated fluvial/overbank deposits are observed from surface to well below the water table surface. This is important as the inferred groundwater flow direction is dominantly to the east, the preferential pathway created by the channel deposits described in the bullet above are effectively encapsulated in a low permeability sediment.
- North of AST1, the channel deposits at or near the water table are either truncated or thin, isolated channels surrounded by silt fluvial/overbank deposits from surface to below the water table surface as indicated by MW18-30 and MW18-33 (which are in and out of the section plane from MW17-20 on Figure 8 in Appendix A). Historical geological data from MW16-11 may indicate there is some connection via a thin channel deposit running north.
- In the northern portion of the Site (i.e., north of MW17-15/MW18-39) there is another locally mappable accumulation of sand and gravel that exists at or below the water table. This suggests it may be an isolated channel deposit from the channel deposits located below AST1 in the middle portion of the Site (Figure 8 in Appendix A).

## 9.2 HYDROGEOLOGICAL SUMMARY

The hydrogeology of the Site is better characterized based on the spatial distribution of new and existing monitoring wells with collected water level data, in-situ hydraulic response testing completed on selected monitoring wells and establishing lateral and vertical hydraulic gradients. Prior to this investigation, the co-linear spatial distribution of the wells, the lack of nested monitoring well pairs, and the lack of hydraulic conductivity analysis meant that there was a high degree of uncertainty as to the hydrogeological setting of the Site.

Conclusions drawn, based on the interpretation of the hydrogeological setting, are:

- Groundwater flow is dominantly to the east towards the Yukon River. This is not consistent with previous interpretations of groundwater flow direction; however, the current investigation has had the benefit of a more robust data set, involving additional groundwater monitoring wells, to assess flow direction.
- There is substantial local-scale (i.e., 10 to 20 m scale) variability in flow direction, likely driven by heterogeneity in the sub-surface
- There is a large range in hydraulic conductivities in the soils at the Site, ranging from  $5.9 \times 10^{-7}$  to  $6.2 \times 10^{-3}$  m/s. This large range of hydraulic conductivities is reflective of the dominant silt fluvial/overbank deposits and the coarse-grained sand and gravel channel deposits.
- Silt fluvial/overbank deposits are the rate-limiting geology at a Site scale with respect to groundwater flow velocities, given the encapsulation of the coarse-grained deposits
- Vertical gradients indicate a transition from near neutral to minor recharge (downwards flow) conditions at the base of the cliff, on the west side of the Site, and minor discharge (upwards flow) conditions over the rest of the Site as measured at four separate nested monitoring well pairs



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Conceptual Site Model (CSM)

November 23, 2018

### 9.3 SUMMARY OF DISTRIBUTION OF CONTAMINATION

The distribution of contamination, as observed and delineated, can be explained and supported by the interpretations of the geological and hydrogeological setting as outlined in Section 9.1 and Section 9.2 above. The summary points related to the spatial distribution of contamination are presented below:

- Observed spatial distribution of soil and groundwater contamination indicate that the PHCs released from the historical ASTs followed the coarse-grained channel deposits located at or near the current water table
- Groundwater flow direction has little effect on the distribution of residual hydrocarbon contamination in soil and groundwater. The orientation of the observed contamination is transverse to the Site-scale groundwater flow direction and are likely the result of free-phase hydrocarbon migration during the historical release of hydrocarbons and/or the orientation of the rail spur historically present.
- Pumping test data indicates that the hydrocarbon contamination present may be related to discrete areas of soil contamination, including the AST1 area as well as an unidentified source area in the north portion of the Site due to the lack of apparent hydraulic connection between the two areas
- Mapped extent of groundwater contamination indicates that it is coincident with and slightly beyond (to the north and east) the identified soil contamination and do not appear to be mobile in groundwater at this time
- Vertical gradients confirm the observation that the PHC contamination (an light non-aqueous phase liquid [LNAPL]) did not significantly penetrate below the water table, and dissolved phase contamination shouldn't be present at depth given the upward vertical flow component of groundwater over the majority of the Site.
- Data collected during this Phase II ESA (2018–2019) indicates localized soil and groundwater contamination from PHCs
- Given the location of historical soil contamination, the extents of the current groundwater contamination are localized and appear to be constrained to coarse-grained sediments within the overall fine-grained the geological/hydrogeological framework.

### 9.4 REMAINING DATA GAPS

While Stantec is confident in the outcomes of the field program and subsequent interpretation, physical drilling constraints such as power lines, the base of the cliff, and pathways/roadways, have potentially resulted in some data gaps that should be acknowledged. These data gaps include:

- There is more than a 40 m distance between MW18-33 and MW18-51, down-gradient of the groundwater contamination. However, the soils are of low permeability and coarse-grained channel deposits appear to be oriented north-south, not east-west, and both wells indicated no exceedances of analysed parameters in groundwater. The powerline precluded optimal well placement in this area for safety reasons though an additional well in this area would reduce any potential uncertainty.
- Area west of MW18-31 and MW18-49 is a potential data gap given the identified soil and groundwater contamination. However, the slope at the base of the cliff makes access difficult in this area for drilling. Further, this area is likely not to be disturbed during any development and any soil and/or groundwater contamination if present, would be at significant depth.

Through use of the 3D CSM, however, a good understanding of the depositional environment and the distribution of the physical properties of the soils has been achieved. These data gaps are considered minor with multiple lines of evidence indicating delineation has generally been achieved.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Conclusions  
November 23, 2018

### 10.0 CONCLUSIONS

Based on the results of the Phase II ESA (2018-2019), Stantec offers the following conclusions for the Site:

- It was determined, through interpretation of the Environment Yukon *Protocol 6: Application of Water Quality Standards*, that the drinking water standards do not apply at the Site.
- LEPH contamination in soil has been delineated within the middle of the Site, stretching in a narrow corridor in a north-south direction with borehole data indicating that the geological heterogeneity is the dominant control on its distribution.
- Similarly, LEPH contamination in groundwater has been delineated within the middle of the Site, stretching in a narrow corridor in a north-south direction.
- Naphthalene contamination in groundwater was identified in monitoring well MW17-17, coinciding with the highest levels of LEPH, and is delineated both horizontally and vertically.
- Predicted indoor vapour concentrations were calculated based on the analyzed soil vapour concentrations and vapour attenuation factors and compared to BC CSR Standards. One soil vapour sample, VP18-39, had reported concentrations of volatile petroleum hydrocarbons (VPH) greater than the BC CSR standard for residential land use.
- Reported concentrations of the other PCOCs in soil and groundwater samples were below the applicable standards, or less than laboratory RDLs.

Based on the pumping tests completed after the standard Phase II ESA scope of work, the following additional conclusions can be made:

- Mobility of groundwater hydrocarbon contamination appears to be limited given the coincident location of groundwater and soil contamination with no appreciable down-gradient contamination in the eastern portion of the Site.
- Removal or remediation of contaminated soil is likely to further limit groundwater contamination given it is coincident or proximal to soil hydrocarbon contamination.
- Distribution of groundwater contamination is limited even within the permeable geological bodies identified on-site.
- Data gaps have been addressed to the extent possible given drilling and site constraints through the use of pumping testing. Despite some physical data gaps in the monitoring network (i.e., sub-optimal well placement), significant recharge boundaries were not observed from the pumping test data indicating the analytical data collected to delineate the groundwater impacts is sufficient to sufficiently characterize and delineate site conditions.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

Limitations

November 23, 2018

### 11.0 LIMITATIONS

This report documents work that was performed in accordance with the scope, schedule and limitations set out in the contract between Stantec and its Client. Stantec does not represent, warrant, or guarantee that this work has uncovered all potential liabilities associated with the identified property, other than those liabilities which are reasonably discoverable based on our contractual scope.

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

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed. Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report, and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the use of the client identified herein pursuant to the terms of, and for the purposes reasonably contemplated within, the contract between Stantec and the client. Stantec makes no representations, warranties or guarantees that the report will be suitable for other purposes; any use which a third party makes of the report is at that party's own risk, and Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from such third-party use of this report.

This report was prepared by Matthew Deane, P.Ag. and Joseph Riddell, P.Geo., and reviewed by Matthew Redmond, P.Eng. and Tanya Shanoff, P.Geo.



**PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)**

Closure  
November 23, 2018

## **12.0 CLOSURE**

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

Respectfully submitted,

**Stantec Consulting Ltd.**

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## PHASE II ENVIRONMENTAL SITE ASSESSMENT (2018-2019): 5<sup>TH</sup> AVENUE (ROGERS STREET TO JECKELL STREET)

References

November 23, 2018

### 13.0 REFERENCES

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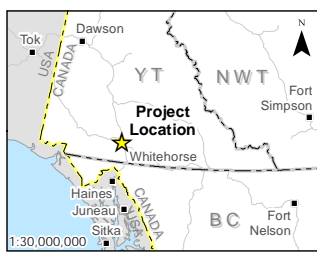
Department of Environment. 2002. Contaminated Sites Regulation. Whitehorse: Government of Yukon.

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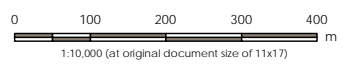
MOECCS (Ministry of Environment and Climate Change Strategy). 2017. Technical Guidance 4: Vapour Investigation and Remediation. Victoria: BC MOECCS.



# **APPENDIX A FIGURES**



- Highway
- Road
- Local Street
- Railway
- Airport Runway
- Watercourse
- Waterbody
- Residential area
- Wooded Area
- Site Boundary



**Stantec** **Yukon**

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180829  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

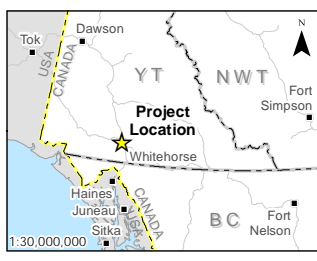
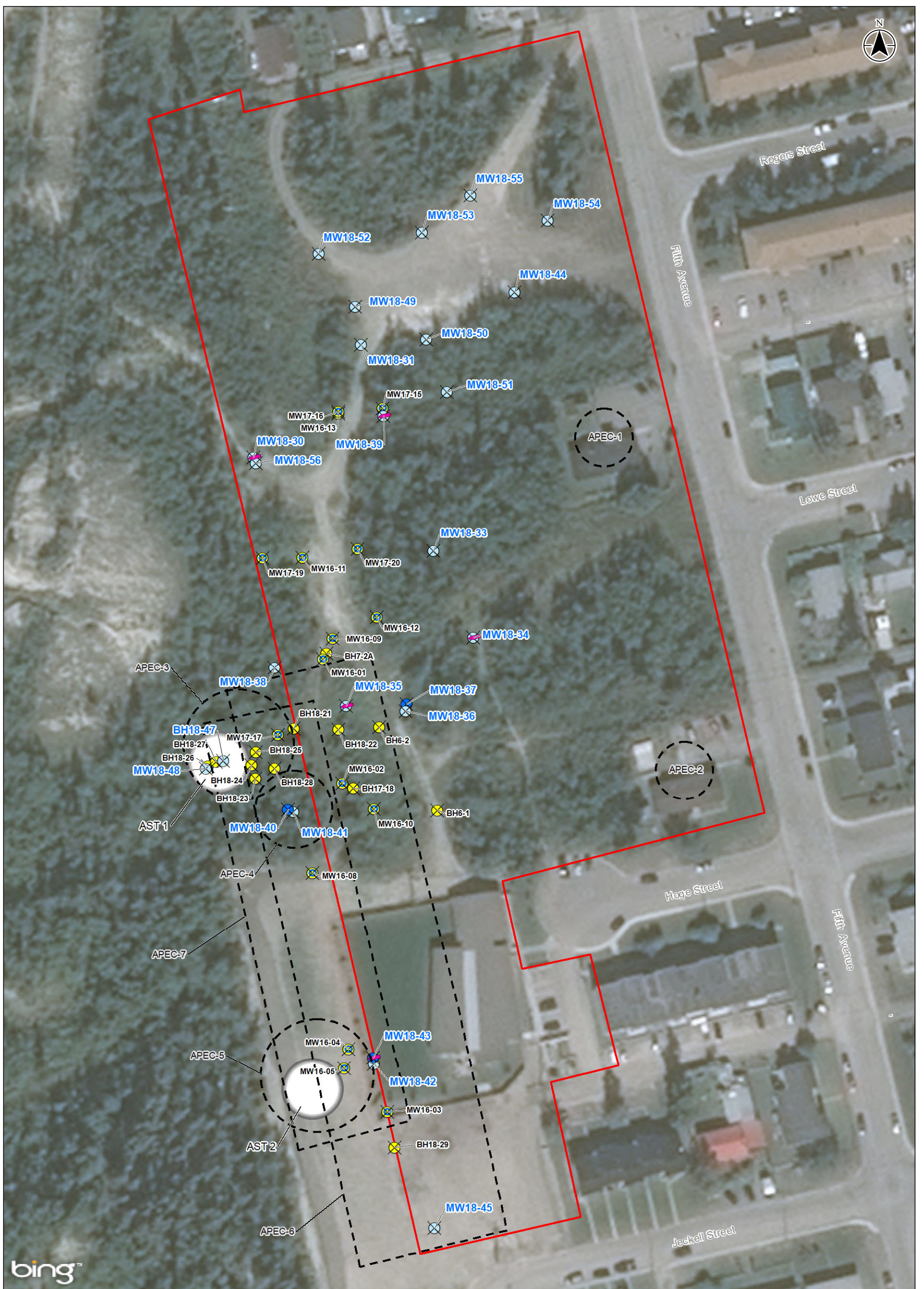
Client/Project/Report:  
 Yukon Government  
 5th Avenue (Rogers Street to Jeckell Street)  
 Phase II ESA

Figure No.: 1  
 Title: Site Location

Notes:  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

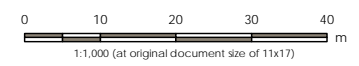
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Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Tank Location (Estimated) (Areas of Environmental Concern)
- Site Boundary
- APEC Site
- Pre-2018 Borehole
- Pre-2018 Monitoring Well
- 2018 Borehole and Monitoring Well, Deep (approx. 15 mbgs)
- 2018 Borehole and Monitoring Well, Shallow (approx. 6-9 mbgs)
- Vapour Probe Installed

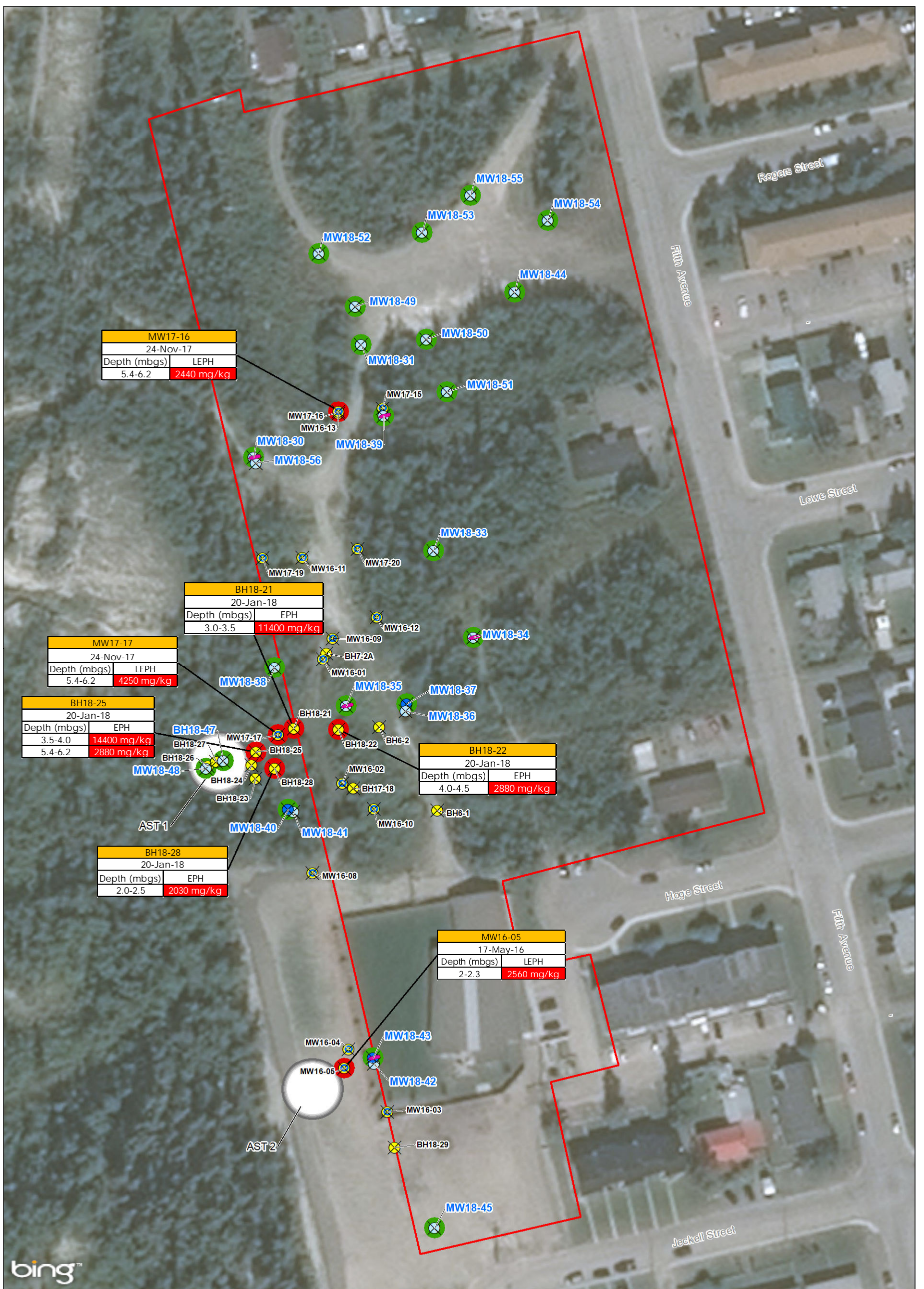


**Stantec** **Yukon**  
 Government

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180829  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

Client/Project/Report: Yukon Government, 5th Avenue (Rogers Street to Jeckell Street), Phase II ESA  
 Figure No.: 2  
 Title: Site Plan

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MW17-16	
24-Nov-17	
Depth (mbgs)	LEPH
5.4-6.2	2440 mg/kg

BH18-21	
20-Jan-18	
Depth (mbgs)	EPH
3.0-3.5	11400 mg/kg

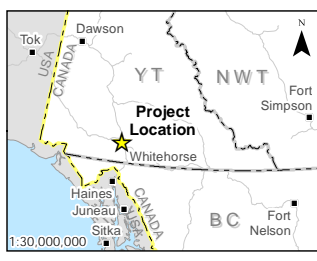
MW17-17	
24-Nov-17	
Depth (mbgs)	LEPH
5.4-6.2	4250 mg/kg

BH18-25	
20-Jan-18	
Depth (mbgs)	EPH
3.5-4.0	14400 mg/kg
5.4-6.2	2880 mg/kg

BH18-22	
20-Jan-18	
Depth (mbgs)	EPH
4.0-4.5	2880 mg/kg

BH18-28	
20-Jan-18	
Depth (mbgs)	EPH
2.0-2.5	2030 mg/kg

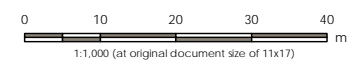
MW16-05	
17-May-16	
Depth (mbgs)	LEPH
2-2.3	2560 mg/kg



Notes  
 1. Coordinate System: NAD 1983 BC Environment  
 2. Data Sources: DataBC, Government of British Columbia, Natural Resources Canada

- Tank Location (Estimated) (Areas of Environmental Concern)
- Site Boundary

- ⊗ Pre-2018 Borehole
- ⊗ Pre-2018 Monitoring Well
- ⊗ 2018 Borehole and Monitoring Well, Deep (approx. 15 mbgs)
- ⊗ 2018 Borehole and Monitoring Well, Shallow (approx. 6-9 mbgs)
- ⊗ Vapour Probe Installed
- Sampled - Meets standards
- Sampled - Exceeds standards



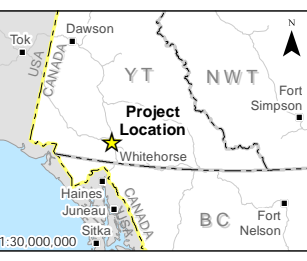
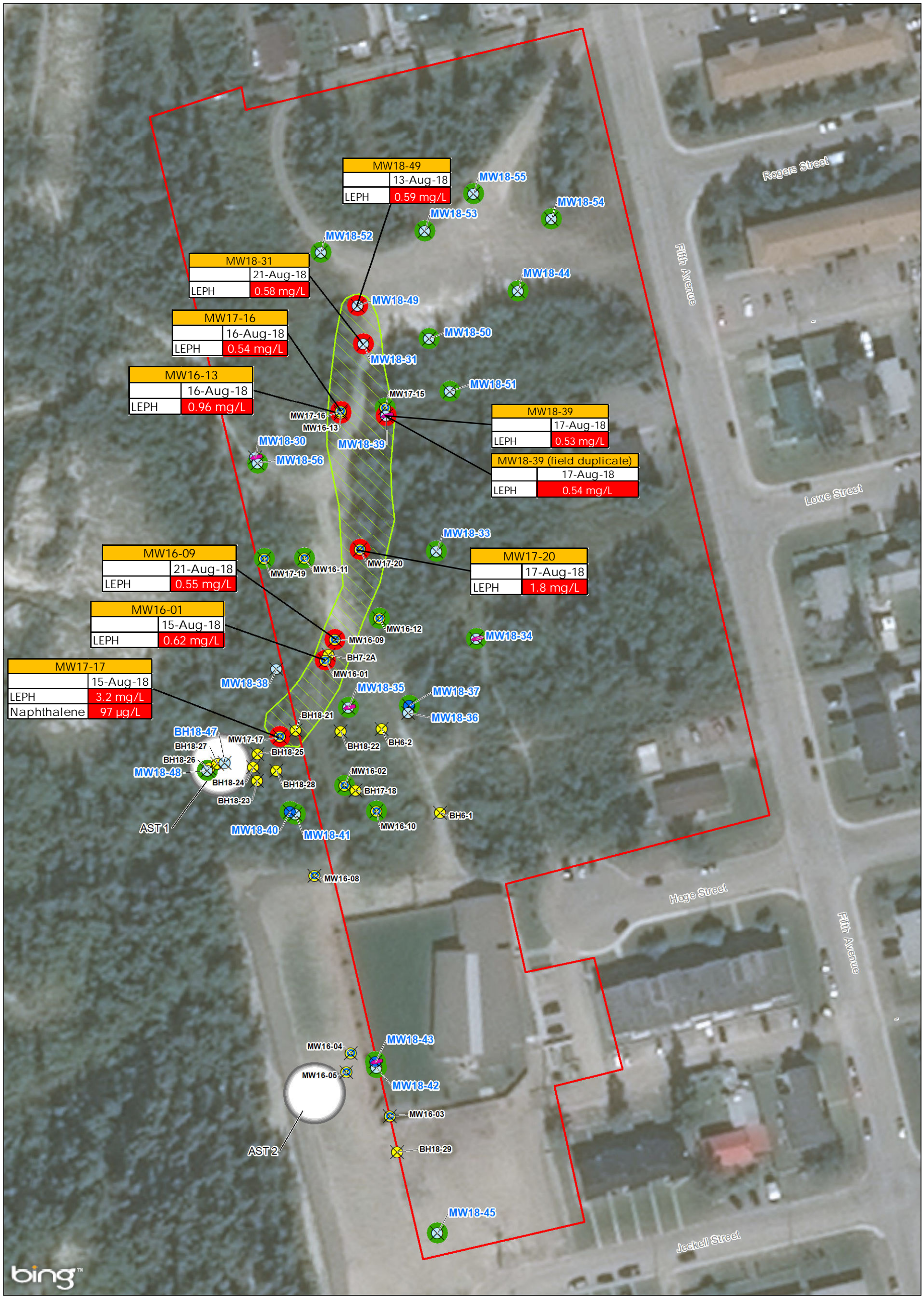
**Stantec** **Yukon**

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180905  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

Client/Project/Report: Yukon Government, 5th Avenue (Rogers Street to Jeckell Street), Phase II ESA

Figure No.: 3  
 Title: Soil Analytical Results

Sampling Standards:  
 1. LEPH: 1,000 mg/kg for soil depths from surface to 3.0 m below ground surface; 2,000 mg/kg for soil sampled below 3.0 mbgs  
 2. EPH shown is EPH<sub>10-19</sub>

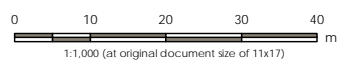


Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Tank Location (Estimated) (Areas of Environmental Concern)
- Site Boundary
- Extent of Hydrocarbon Groundwater Impacts

- Pre-2018 Borehole
- Pre-2018 Monitoring Well
- 2018 Borehole and Monitoring Well, Deep (approx. 15 mbgs)
- 2018 Borehole and Monitoring Well, Shallow (approx. 6-9 mbgs)
- Vapour Probe Installed
- Sampled - Meets Standards
- Sampled - Exceeds Standards

Sampling Standards:  
 1. LEPH: 0.5 mg/L  
 2. Naphthalene: 10 µg/L



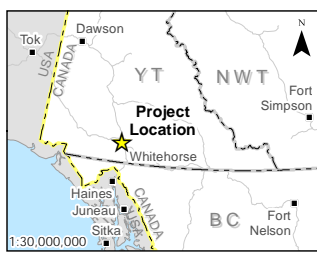
**Stantec** **Yukon**  
 Government

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180905  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

Client/Project/Report:  
 Yukon Government  
 5th Avenue (Rogers Street to Jeckell Street)

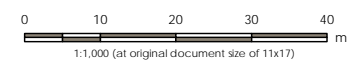
Figure No.: 4  
 Title: Groundwater Analytical Results

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- Flow Contours (m) and Direction Arrows\*
- Tank Location (Estimated) (Areas of Environmental Concern)
- Site Boundary

- Pre-2018 Borehole
- Pre-2018 Monitoring Well
- 2018 Borehole and Monitoring Well, Deep (approx. 15 mbgs)
- 2018 Borehole and Monitoring Well, Shallow (approx. 6-9 mbgs)
- Vapour Probe Installed



**Stantec** **Yukon**  
Government

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180906  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

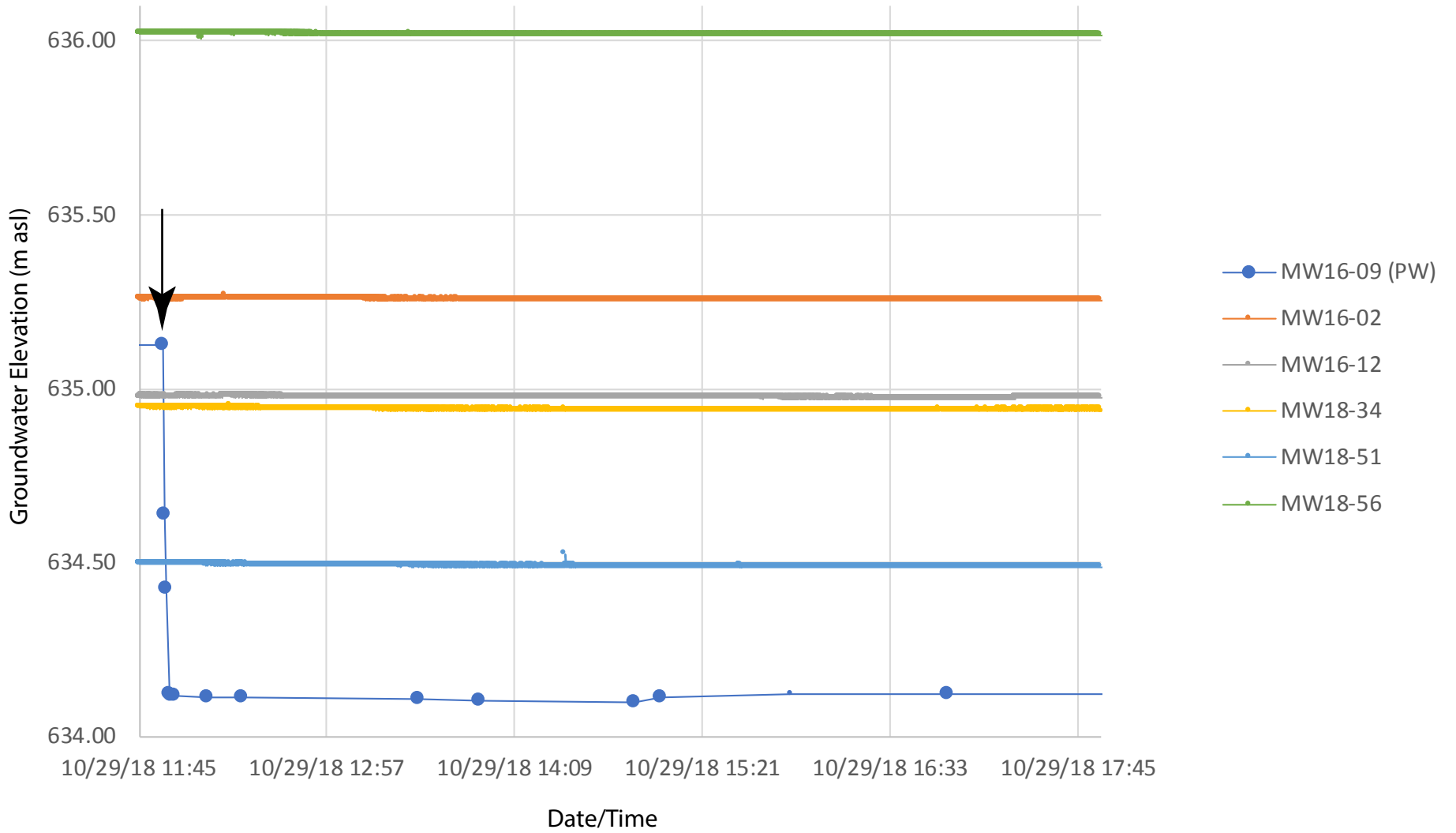
Client/Project/Report:  
 Yukon Government  
 5th Avenue (Rogers Street to Jeckell Street)  
 Phase II ESA

Figure No.: 5  
 Title: Groundwater Elevation and Inferred Groundwater Flow Direction

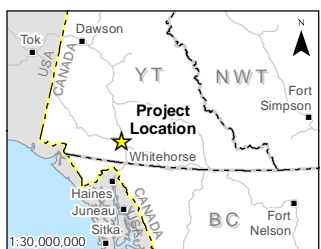
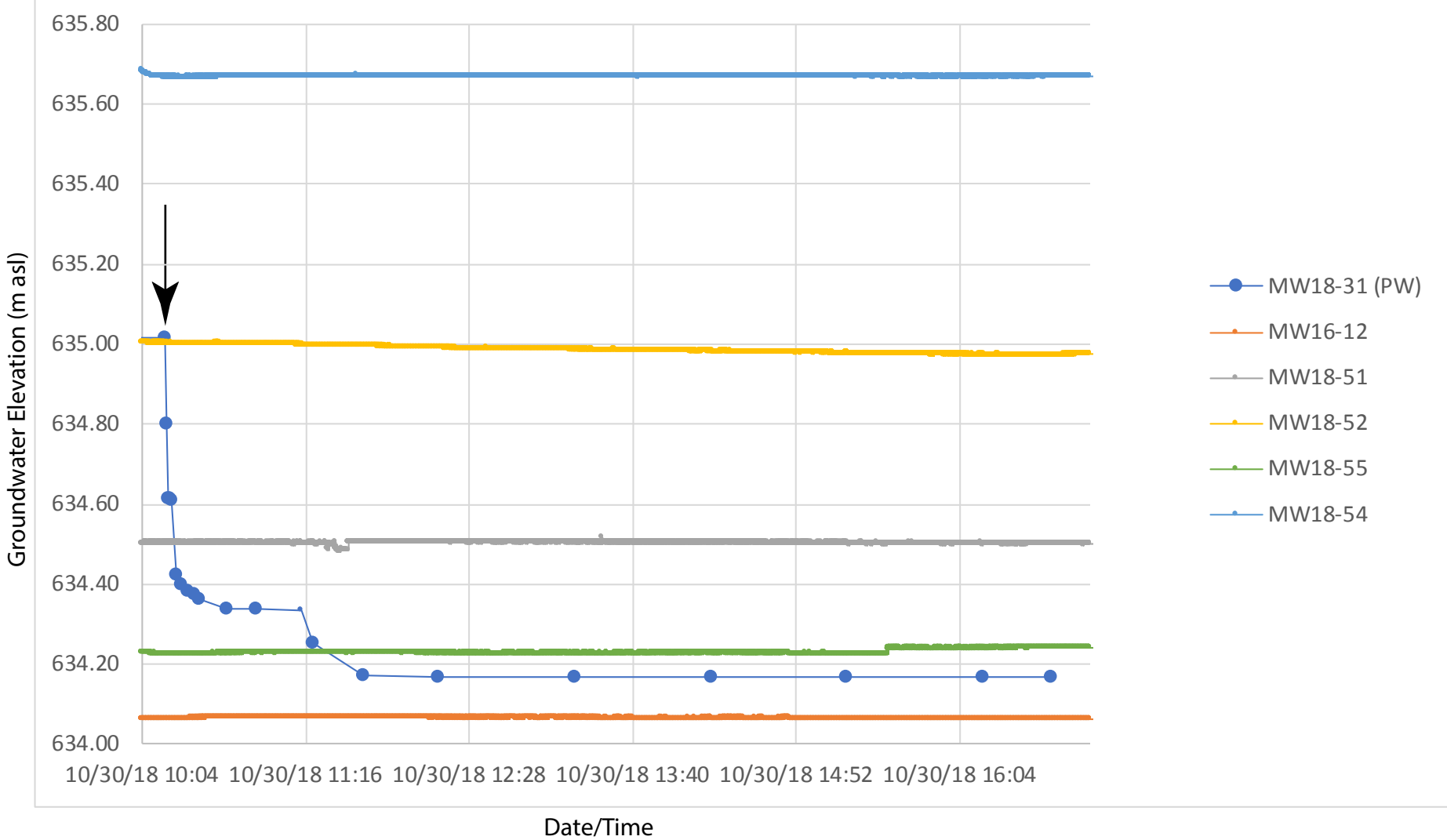
Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 \* Groundwater elevations based on monitoring from July 30 to August 2, 2018.

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October 29, 2018 Pumping Test (Pumping Well MW16-09)



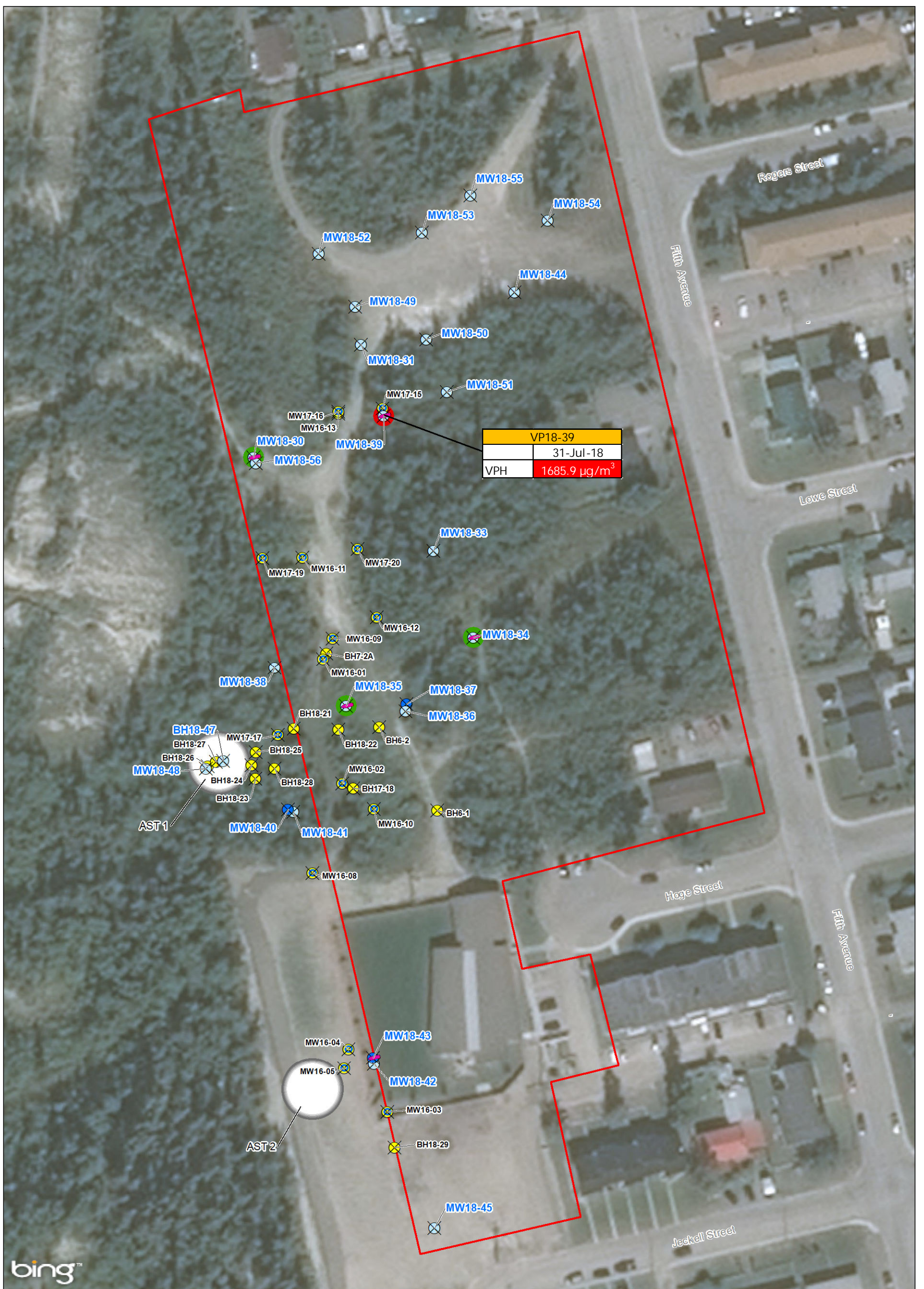
October 30, 2018 Pumping Test (Pumping Well MW18-31)



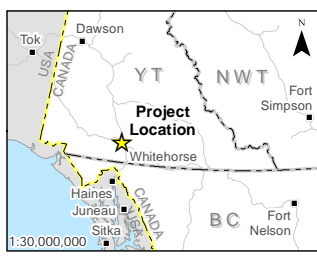
↓ Indicates Start of Pumping Test

Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Source: Natural Resources Canada

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VP18-39	
VPH	31-Jul-18
	1685.9 µg/m <sup>3</sup>

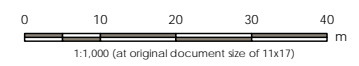


Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Tank Location (Estimated) (Areas of Environmental Concern)
- Site Boundary

- Pre-2018 Borehole
- Pre-2018 Monitoring Well
- 2018 Borehole and Monitoring Well, Deep (approx. 15 mbgs)
- 2018 Borehole and Monitoring Well, Shallow (approx. 6-9 mbgs)
- Vapour Probe Installed
- Sampled - Meets standards
- Sampled - Exceeds standards

BC Sampling Standard:  
 VPH: 1000 µg/m<sup>3</sup>



**Stantec** **Yukon**  
 Government

Project Location: Whitehorse, Yukon  
 Project Number: 123221161  
 Prepared by: KALUCAS on 20180906  
 Discipline Review by: MDEANE on 20181121  
 GIS Review by: RCOATA on 20181121

Client/Project/Report:  
 Yukon Government  
 5th Avenue (Rogers Street to Jeckell Street)  
 Phase II ESA

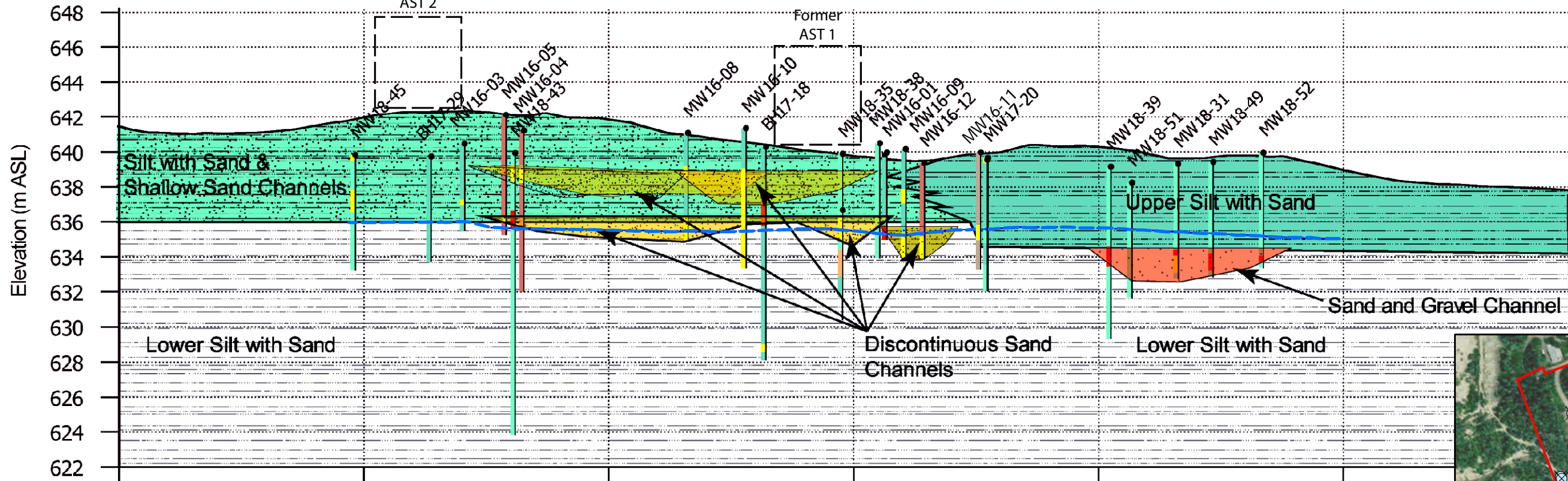
Figure No.: 7  
 Title: Soil Vapour Analytical Results

\\cd1183103\workgroup\123221161\figures\discipline\Remediation\fig\_123221161\_07\_soil\_vapour\_analytical\_results.mxd Revised: 2018-11-21 By: kalucas

South

# South to North Cross Section

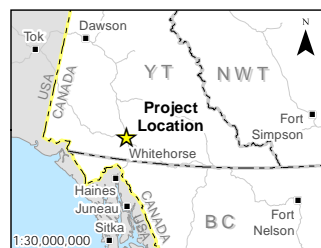
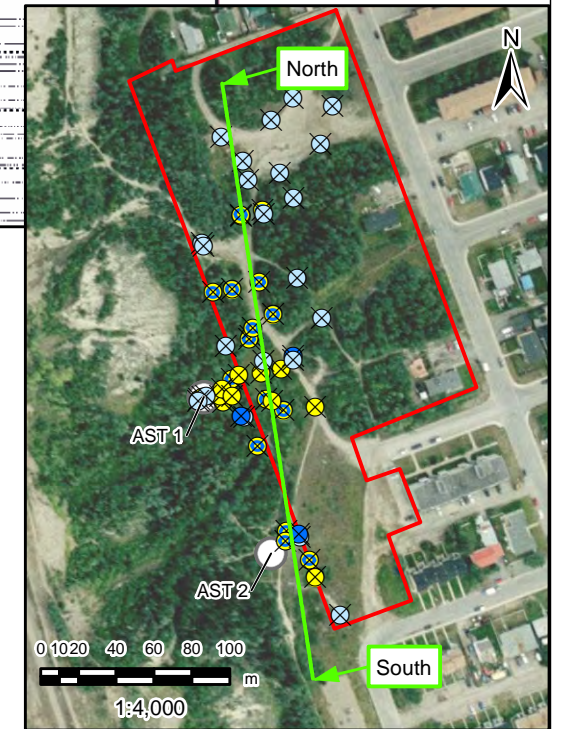
North



x: 496950      x: 496939      x: 496929      x: 496918      x: 496907      x: 496897  
 y: 6730670    y: 6730739    y: 6730808    y: 6730877    y: 6730947    y: 6731016

Coordinates Along Section Line

Vertical exaggeration: 5x



--- Water Table Surface (Groundwater flow direction towards viewer)

- |                  |                           |  |                             |
|------------------|---------------------------|--|-----------------------------|
| <b>Lithology</b> | Sand and Gravel           | Silt / Silt with Sand                  | Upper Silt with Sand        |
| Gravel           | Silt with Sand and Gravel | Silt with Sand & Shallow Sand Channels | Discontinuous Sand Channels |
| Gravel with Silt | Sand                      | Sand and Gravel Channel                | Lower Silt with Sand        |
| Silty Sand       |                           |  |                             |

**Location**  
 South 496950, 6730670  
 North: 496887, 6731080



Project Location  
 Whitehorse,  
 Yukon  
 Project Number 12321161  
 Prepared by KALUCAS on 20180910  
 Discipline Review by XXXX on 2018XXXX  
 GS Review by XXXX on 2018XXXX

Client/Project/Report  
 Yukon Government  
 5th Avenue (Rogers Street to Jeckell Street)

Figure No.  
**8**  
 Title  
**Geological and Hydrogeological Cross Section**

# **APPENDIX B**

## **REGULATORY FRAMEWORK**



## CONTAMINATED SITES REGULATORY STANDARDS IN YUKON TERRITORY

Contaminated sites issues in Yukon Territory are governed by the *Environment Act* (EA) and regulations thereto, including the Contaminated Sites Regulation (CSR), as well as protocols, procedures, and guidance documents established by the Environment Yukon (EY).

### CONTAMINATED SITES REGULATION (CSR) STANDARDS

#### CSR Numerical Soil Standards

CSR numerical soil standards are divided into the categories of generic numerical standards (Schedule 1) and matrix numerical standards (Schedule 2).

Generic standards are intended to protect human and ecological health at any site without consideration of site-specific factors other than land use. The matrix numerical standards are applied according to land use (agricultural, urban park, residential, commercial or industrial), and also according to site-specific factors, which include: (human) intake of contaminated soil; toxicity to soil invertebrates and plants; livestock ingesting soil and fodder; major microbial functional impairment; groundwater used for drinking water; groundwater flow to surface water used by aquatic life (freshwater and marine); groundwater used for livestock watering; and groundwater used for irrigation watering. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants are mandatory and must be applied at all sites. Other factors are determined on a site-specific basis.

CSR section 17(3) also specifies that regardless of the land use at the surface of a site, soil below a depth of 3 m is considered to be remediated if the commercial land use standards are met.

#### CSR Numerical Water Standards

The CSR contains requirements when applying water quality standards to groundwater and surface water to ensure that groundwater at a site is suitable for direct use and has a quality adequate to protect adjacent surface water uses. Generic numerical water standards are presented in Schedule 3 of the CSR, and are determined by four different water uses, aquatic life, drinking water, irrigation, and livestock water use.

*PROTOCOL NO. 6: Application of Water Quality Standards* states that sites within 1 km of a surface water body should include the application of aquatic life water use standards. Sites within 1.5 km of a drinking water well should include the application of drinking water use standards.

The CSR differentiates between aquatic life water use standards protective of freshwater and of marine/estuarine aquatic life.



## PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix B Regulatory Framework  
September 14, 2018

### CSR Numerical Soil Vapour Standards

The Yukon CSR does not currently regulate soil vapour contamination. Therefore, soil vapour analytical data has been compared to the British Columbia (BC) CSR standards. As with generic soil quality standards, these are determined by land use. Guidance on conducting soil vapour investigations, interpreting soil vapour data, and otherwise applying BC CSR Schedule 3.3 standards is provided in *Technical Guidance 4: Vapour Investigation and Remediation* ("TG4").

## REFERENCES

Department of Environment, Yukon Territory. 2002. *Environment Act*, including amendments to SY2016, c.5.  
[http://www.gov.yk.ca/legislation/acts/environment\\_c.pdf](http://www.gov.yk.ca/legislation/acts/environment_c.pdf)

Department of Environment, Yukon Territory. 2002. Contaminated Sites Regulation.  
[http://www.gov.yk.ca/legislation/regs/oic2002\\_171.pdf](http://www.gov.yk.ca/legislation/regs/oic2002_171.pdf)

Ministry of Environment and Climate Change Strategy, BC. 2017a. Technical Guidance 4: Vapour Investigation and Remediation. <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg04.pdf>

Ministry of Environment and Climate Change Strategy, BC. 2017b. Contaminated Sites Regulation.  
[http://www.bclaws.ca/EPLibraries/bclaws\\_new/document/ID/freeside/375\\_96\\_00](http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/375_96_00)



# **APPENDIX C**

## **HYDROGEOLOGY**

**PHASE II ENVIRONMENTAL SITE ASSESSMENT**

Appendix C Hydrogeology  
November 23, 2018

**Appendix C HYDROGEOLOGY**

**C.1 SINGLE WELL RESPONSE TESTS**





Stantec Consulting Ltd.  
10160-112 Street  
Edmonton AB T5K 2L6

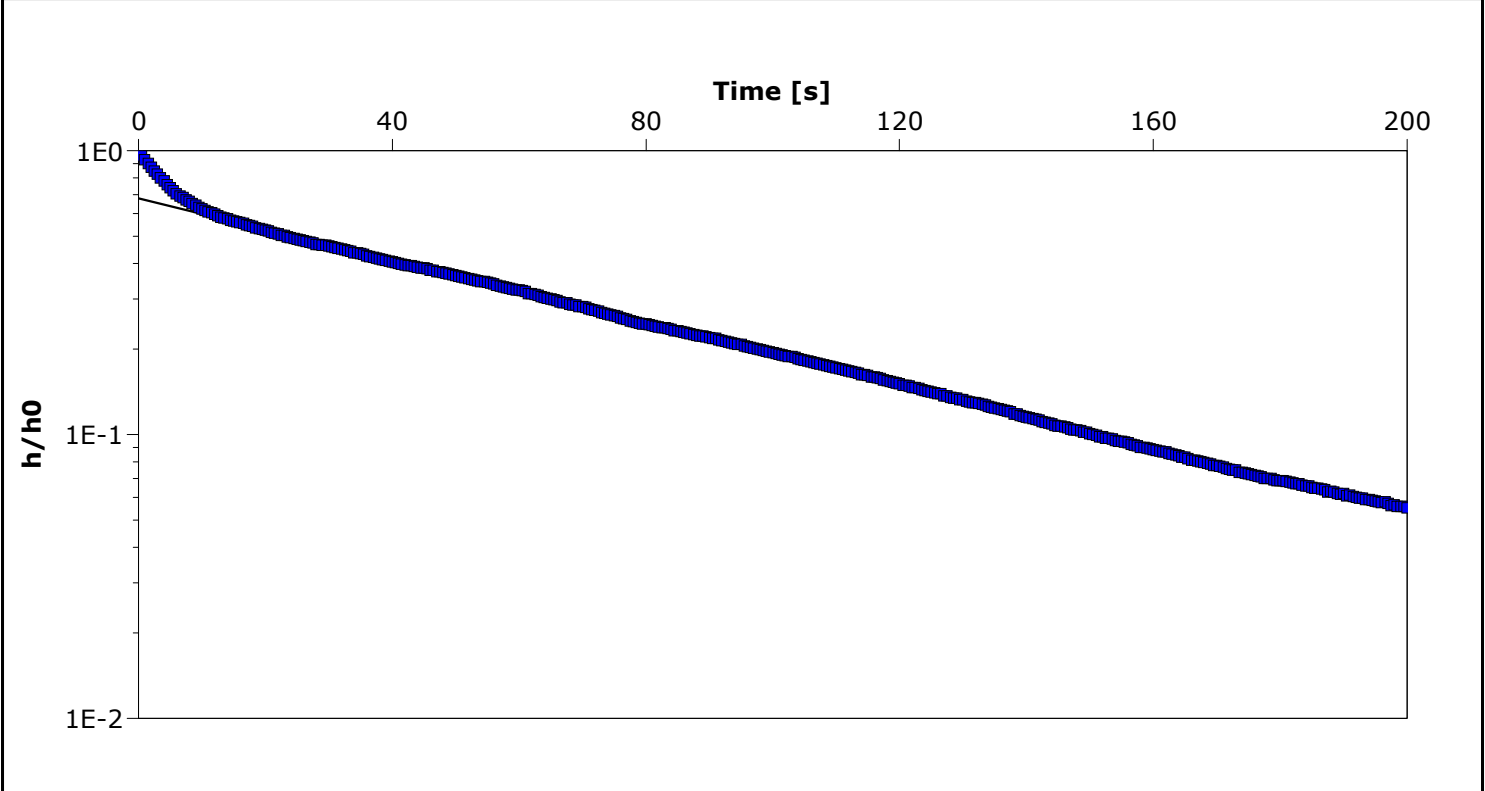
### Slug Test Analysis Report

Project: 5th Avenue Phase II ESA

Number: 123221121

Client: Yukon Government

Location:	Slug Test: Response Test	Test Well: MW16-02
Test Conducted by: M. Deane		Test Date: 7/27/2018
Analysis Performed by: D. King	Response Test	Analysis Date: 8/23/2018
Aquifer Thickness: 2.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW16-02	$8.95 \times 10^{-6}$	



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10160-112 Street  
Edmonton AB T5K 2L6

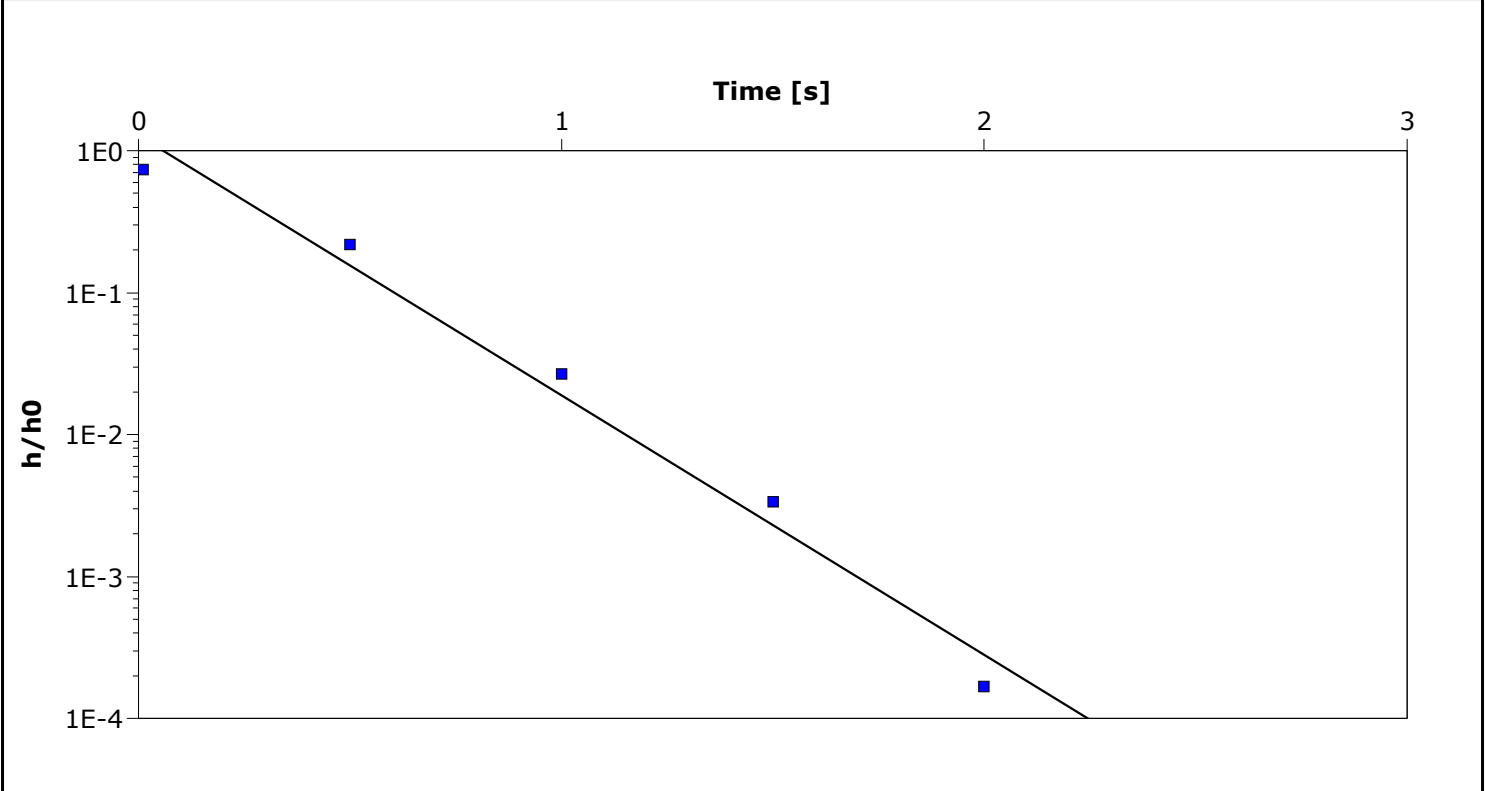
### Slug Test Analysis Report

Project: 5th Avenue Phase II ESA

Number: 123221121

Client: Yukon Government

Location:	Slug Test: Response Test	Test Well: MW16-111
Test Conducted by: M. Deane		Test Date: 7/29/2018
Analysis Performed by: D. King	Response Test	Analysis Date: 8/23/2018
Aquifer Thickness: 0.25 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW16-111	$6.20 \times 10^{-3}$	



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10160-112 Street  
Edmonton AB T5K 2L6

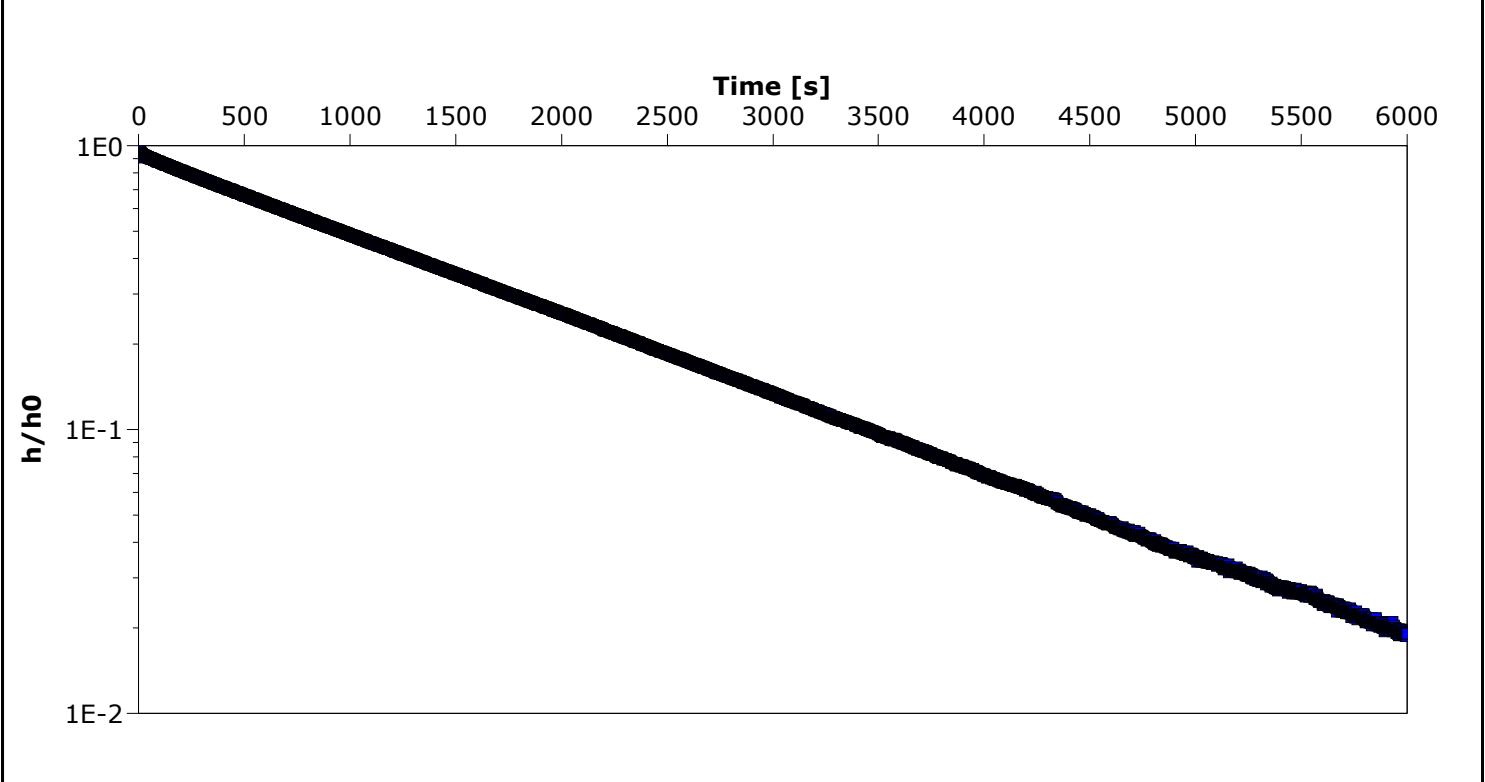
### Slug Test Analysis Report

Project: 5th Avenue Phase II ESA

Number: 123221121

Client: Yukon Government

Location:	Slug Test: Response Test	Test Well: MW17-15
Test Conducted by: M. Deane		Test Date: 7/31/2018
Analysis Performed by: D. King	Response Test	Analysis Date: 8/23/2018
Aquifer Thickness: 10.30 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW17-15	$5.87 \times 10^{-7}$	



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10160-112 Street  
Edmonton AB T5K 2L6

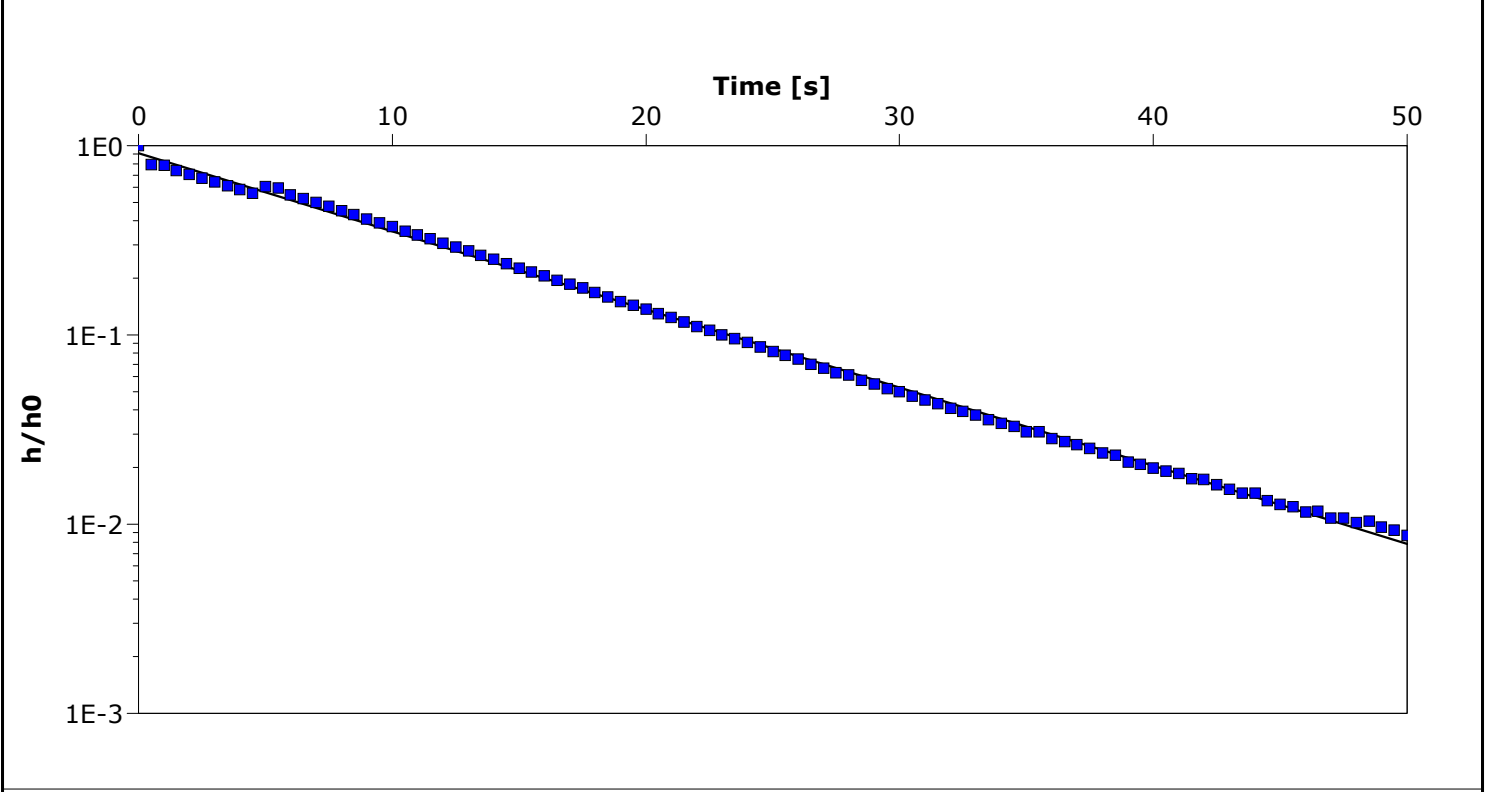
### Slug Test Analysis Report

Project: 5th Avenue Phase II ESA

Number: 123221121

Client: Yukon Government

Location:	Slug Test: Response Test	Test Well: MW18-35
Test Conducted by: M. Deane		Test Date: 7/29/2018
Analysis Performed by: D. King	Response Test	Analysis Date: 8/23/2018
Aquifer Thickness: 1.20 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW18-35	$6.51 \times 10^{-5}$	





Stantec Consulting Ltd.  
10160-112 Street  
Edmonton AB T5K 2L6

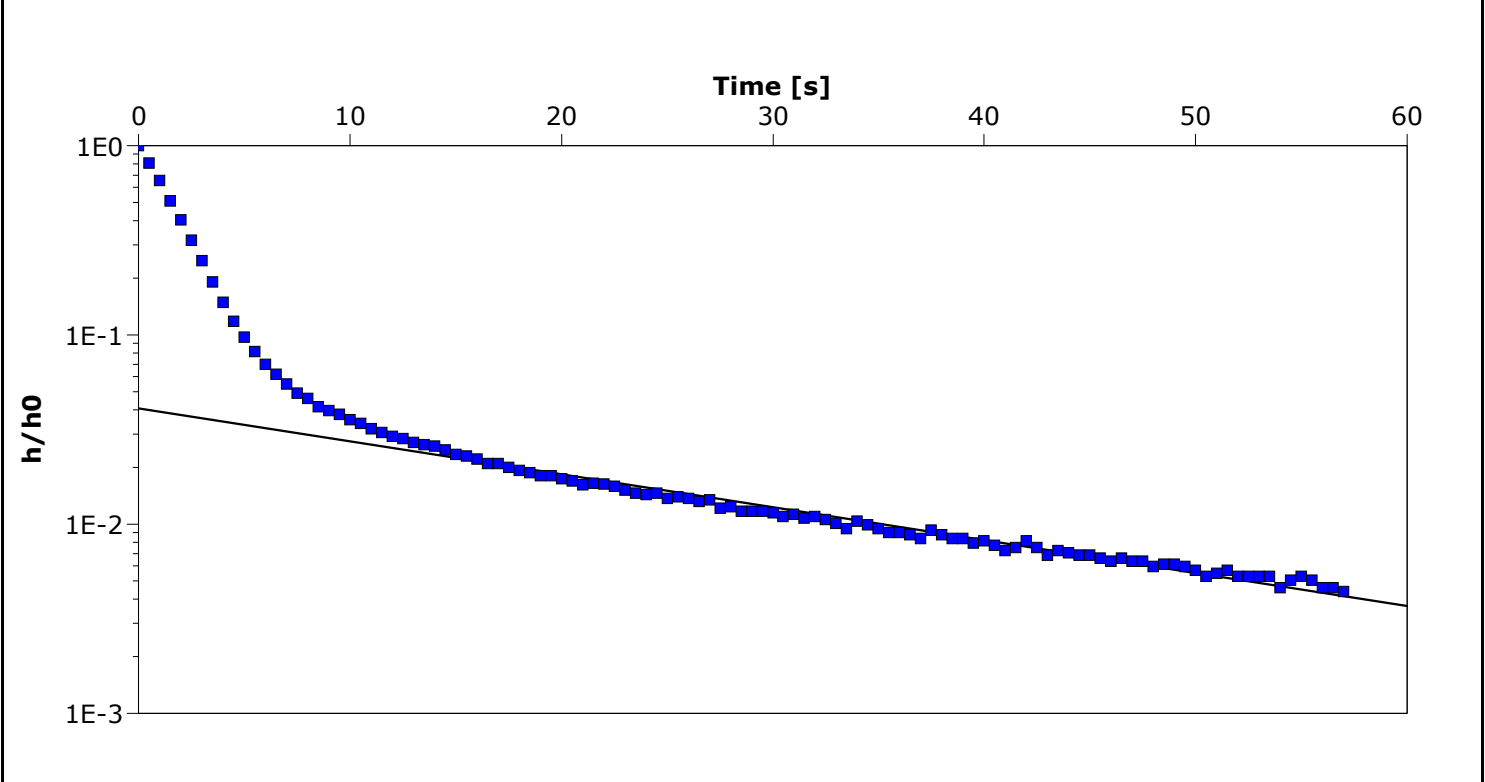
### Slug Test Analysis Report

Project: 5th Avenue Phase II ESA

Number: 123221121

Client: Yukon Government

Location:	Slug Test: Response Test	Test Well: MW18-44
Test Conducted by: M. Deane		Test Date: 7/29/2018
Analysis Performed by: D. King	Response Test	Analysis Date: 8/23/2018
Aquifer Thickness: 0.45 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW18-44	$6.87 \times 10^{-5}$	

PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

C.2 LEVEL LOGGER DATA (RAW – UNPROCESSED)

C.2.1 October 29, 2018

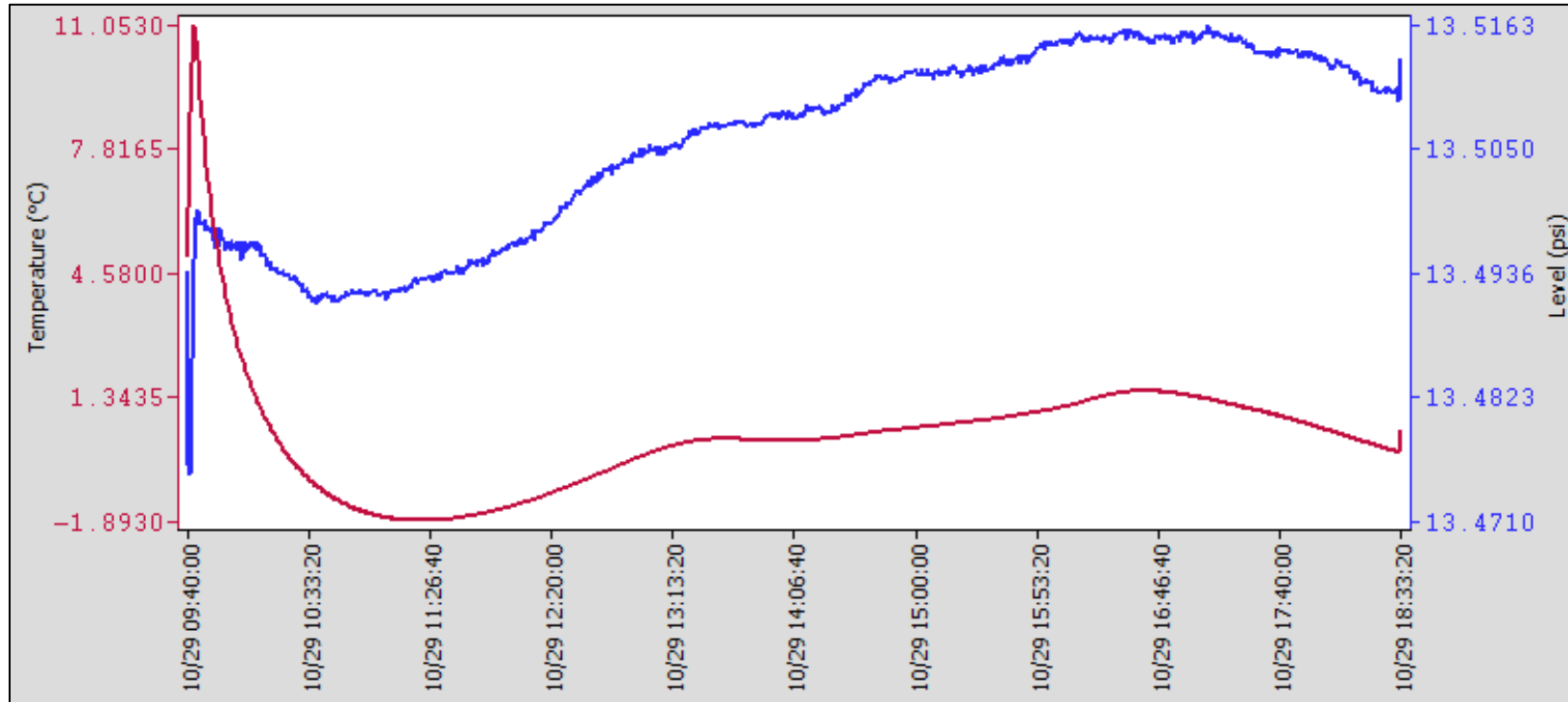


Figure C 1 BaroLogger\_MW18-36\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

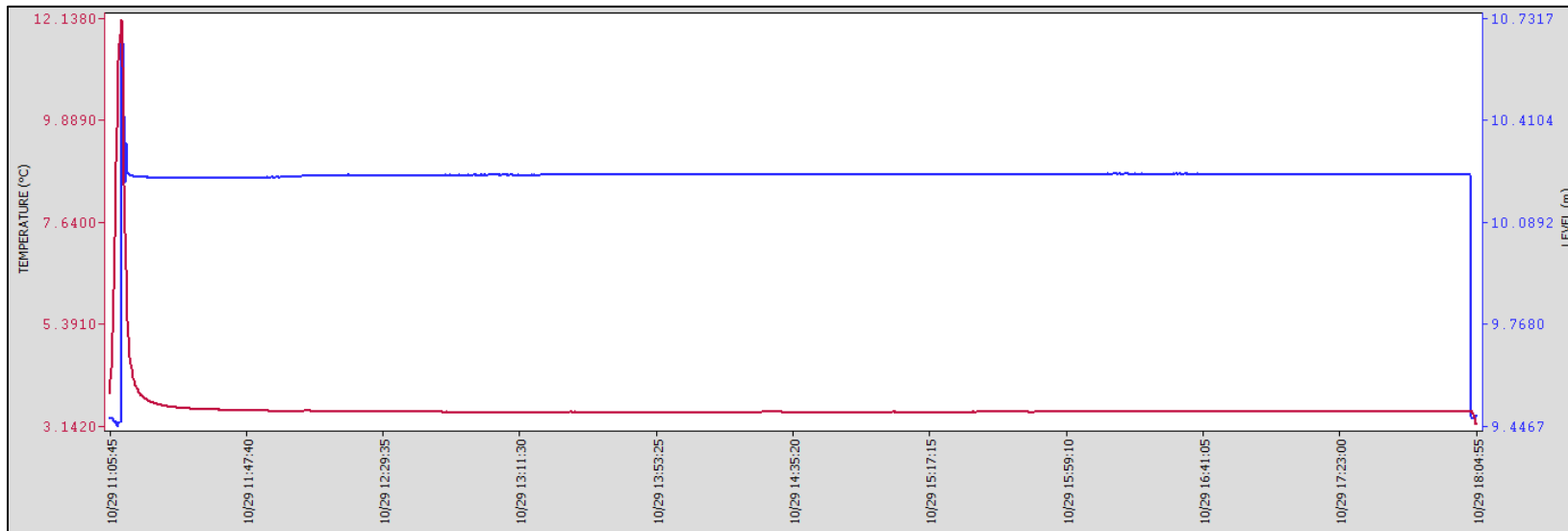


Figure C 2 MW 16-02\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

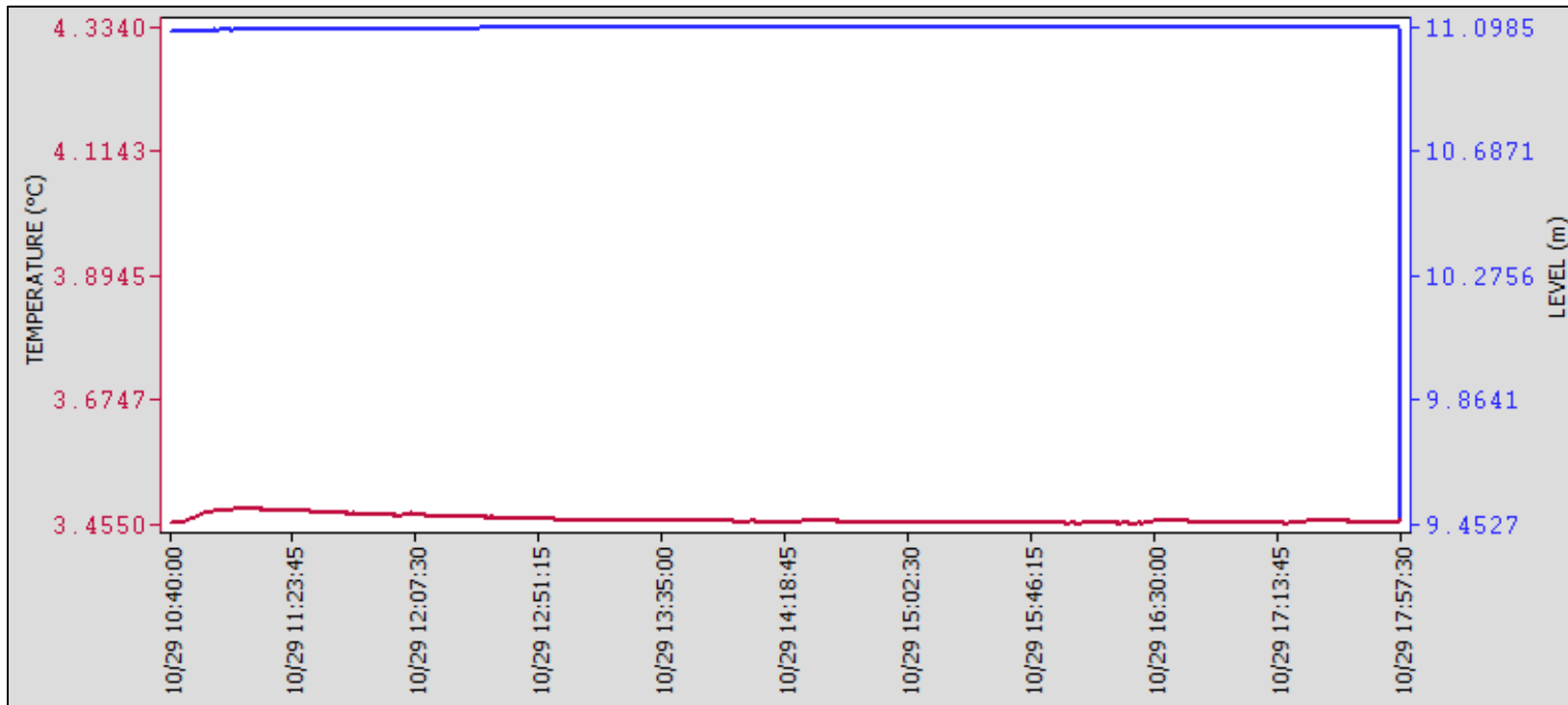


Figure C 3MW16-12\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

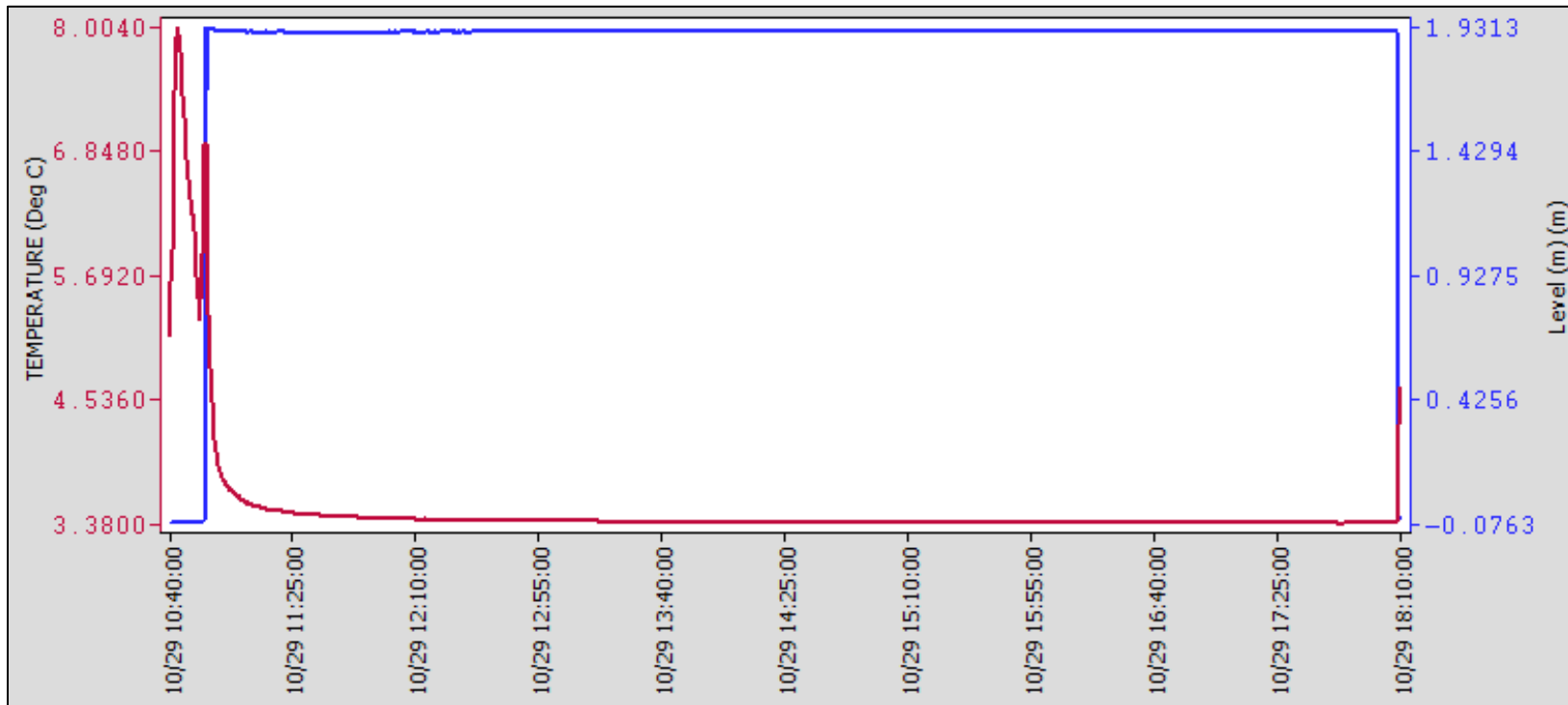


Figure C 4 MW18-34\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

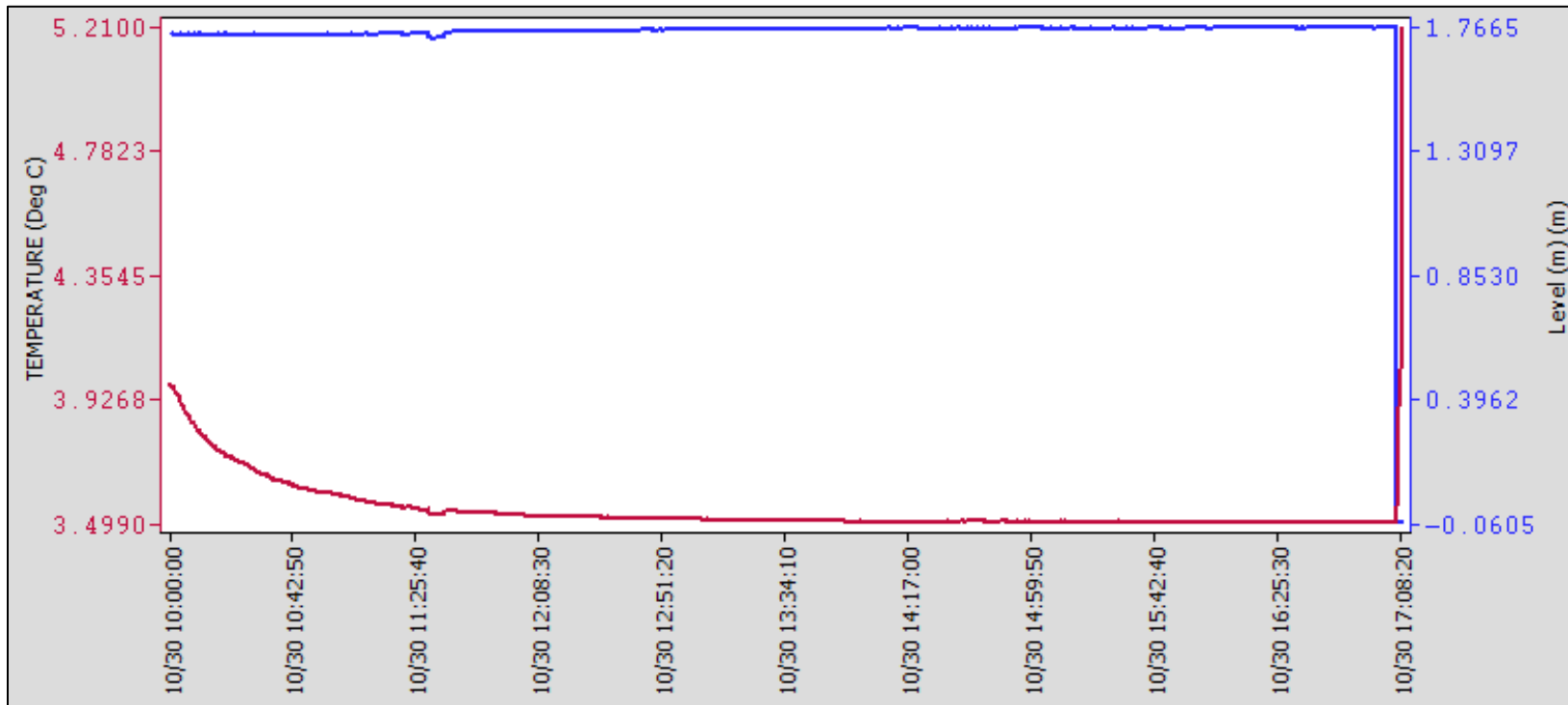


Figure C 5 MW18-51\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

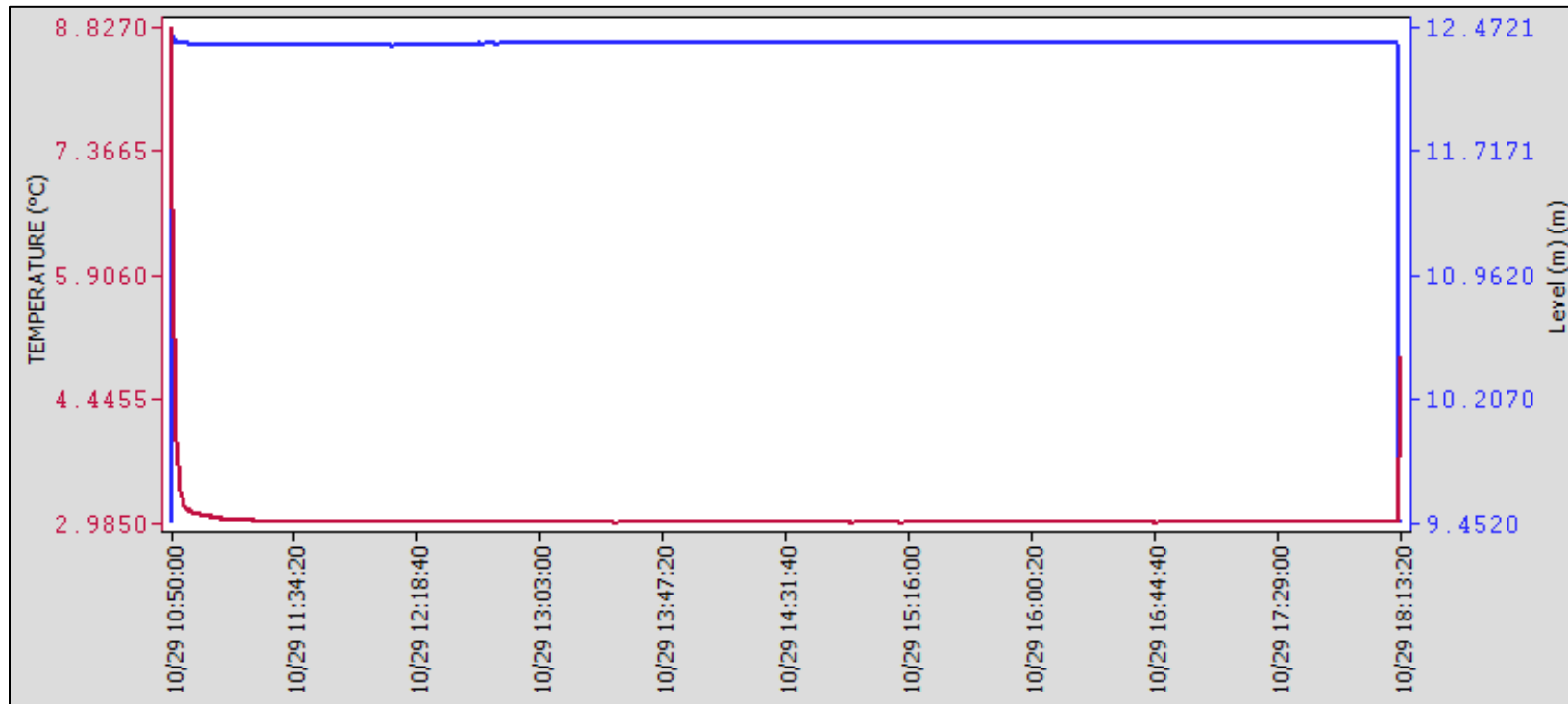


Figure C 6 MW18-56\_Whitehorse Pump Test\_2018\_10\_29



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

C.2.2 October 30, 2018

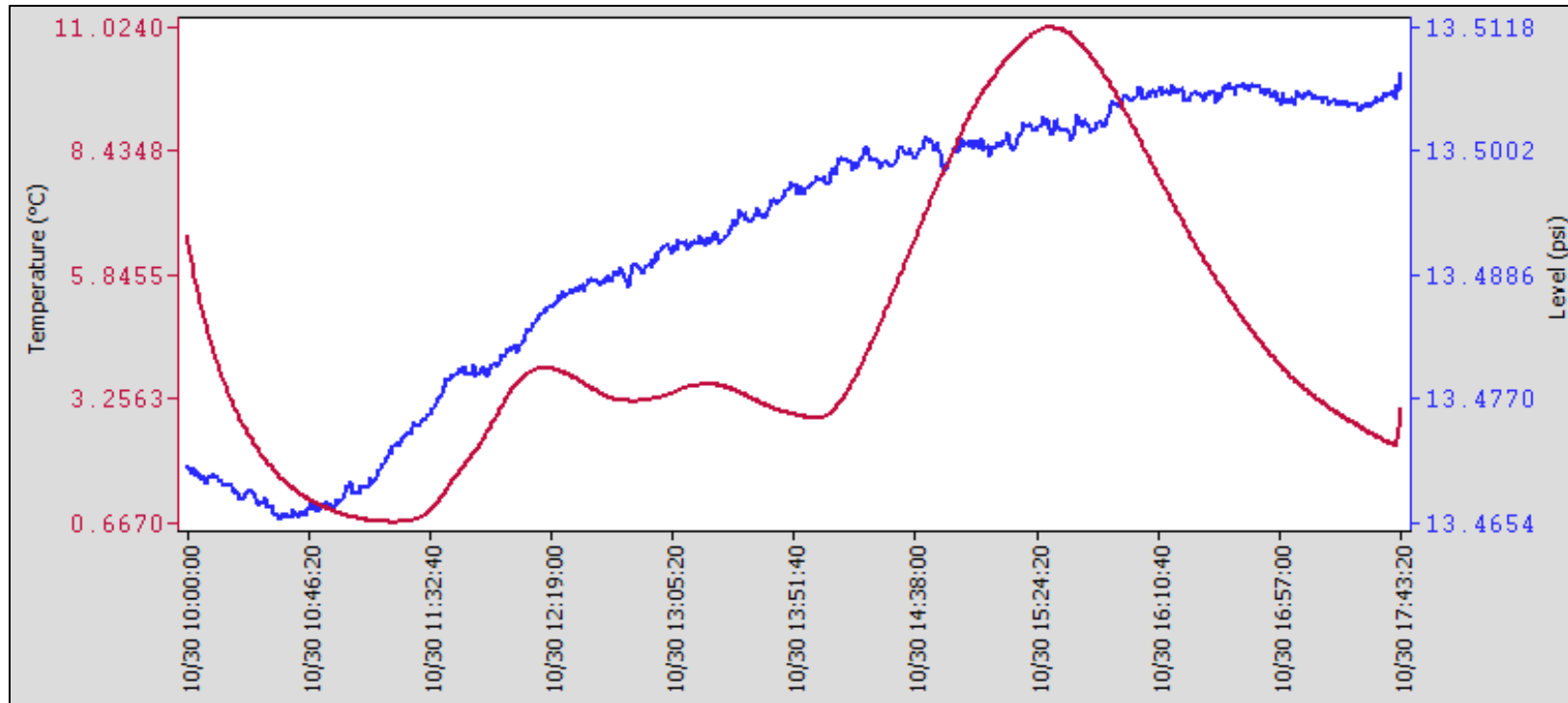


Figure C 7 Baro-MW18-53\_Whitehorse Pump Test\_2018\_10\_30





PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

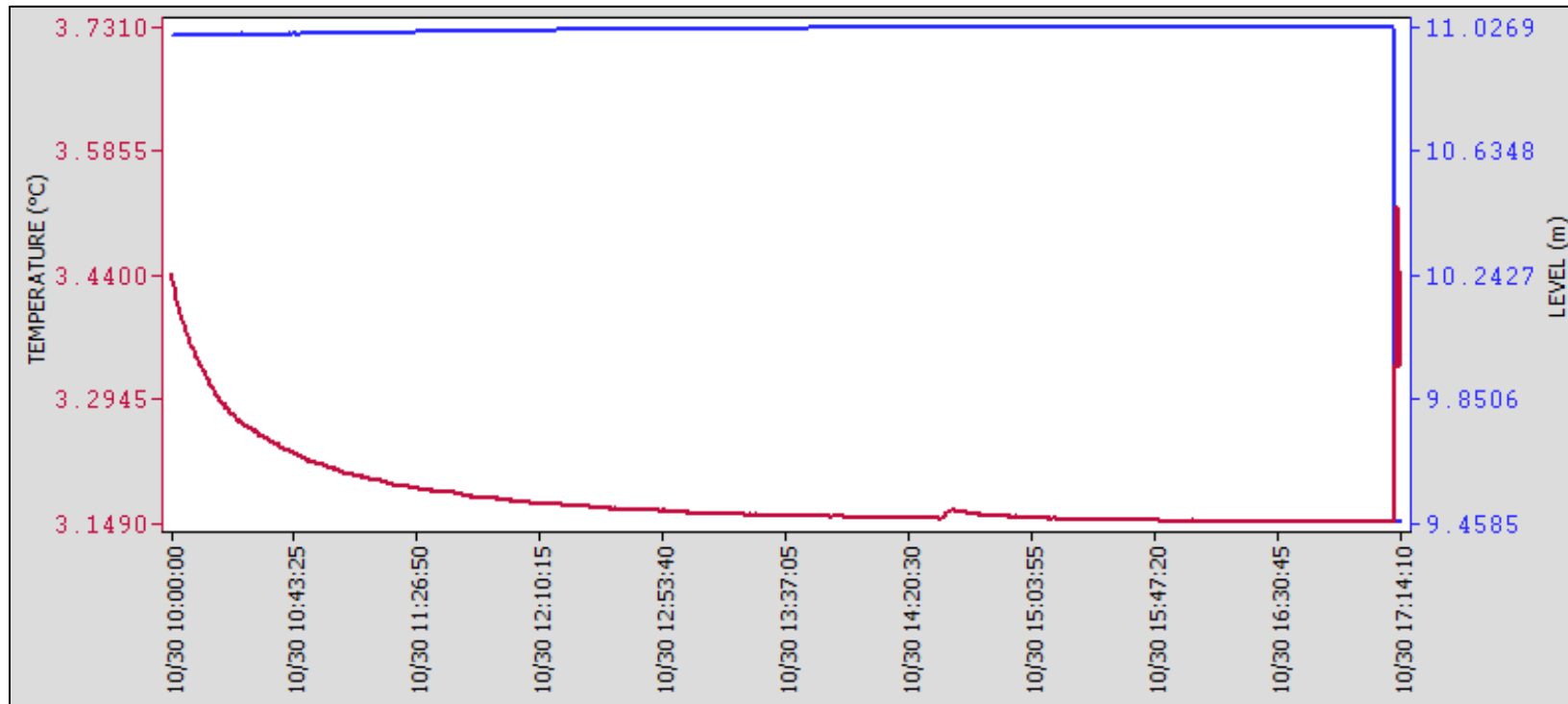


Figure C 8 MW16-12\_Whitehorse Pump Test\_2018\_10\_30



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

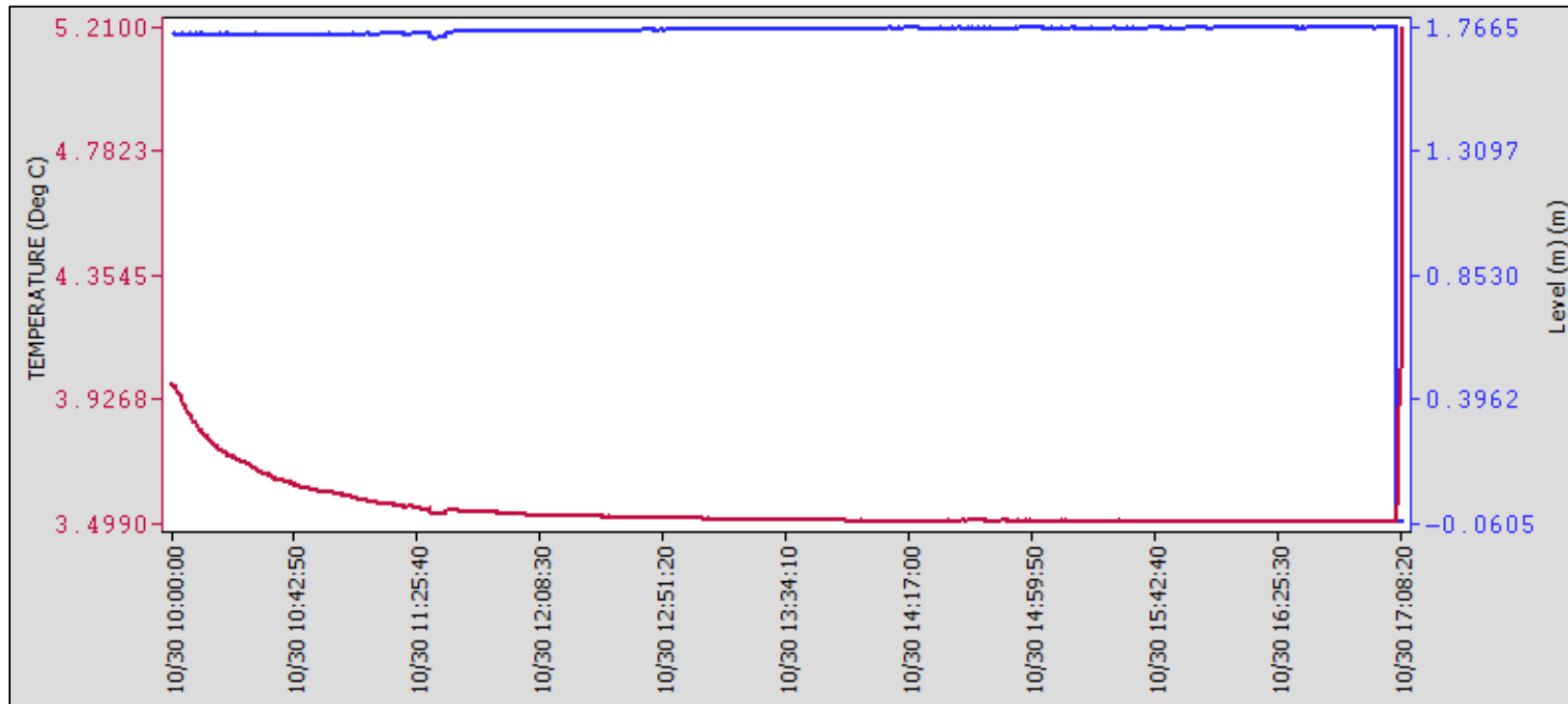


Figure C 9 MW18-51\_Whitehorse Pump Test\_2018\_10\_30



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

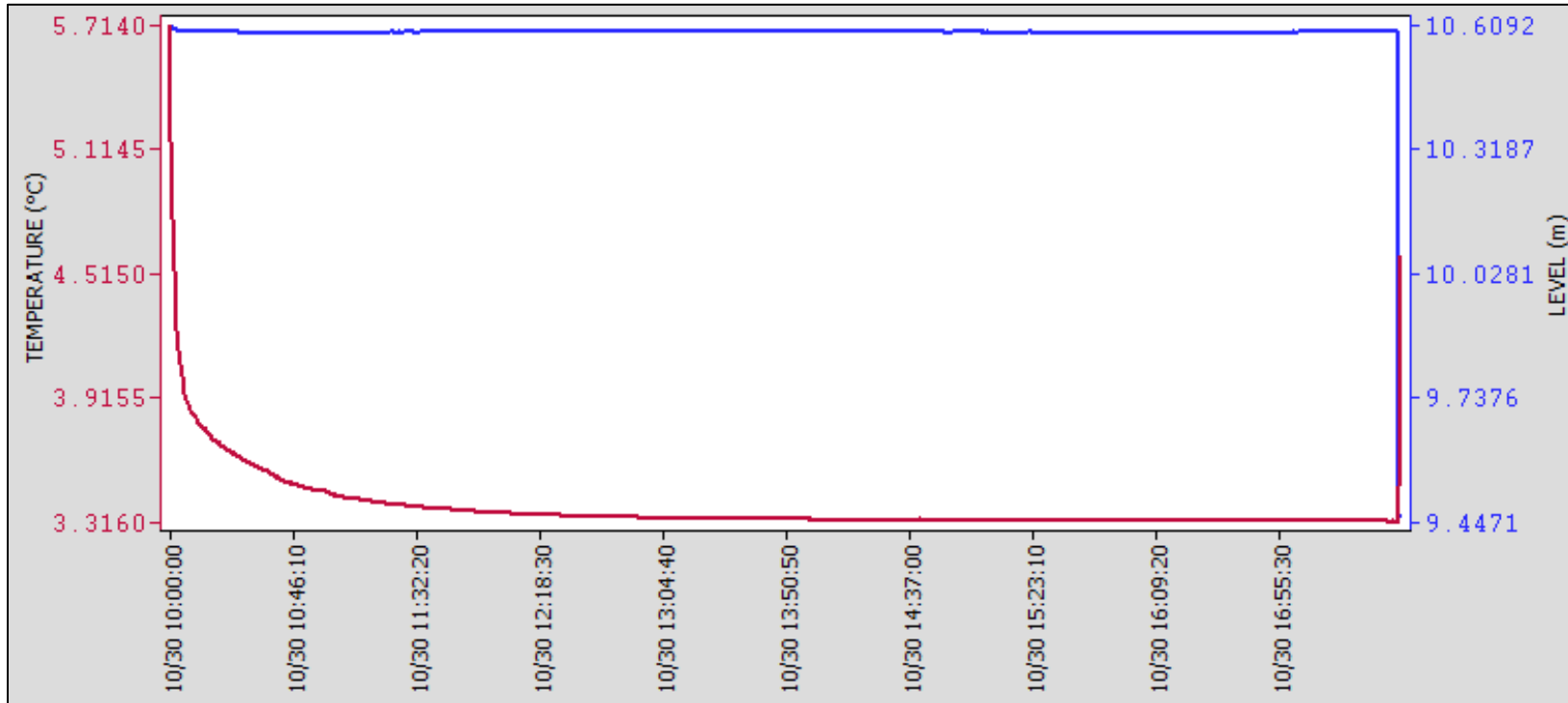


Figure C 10 MW18-52\_Whitehorse Pump Test\_2018\_10\_30



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

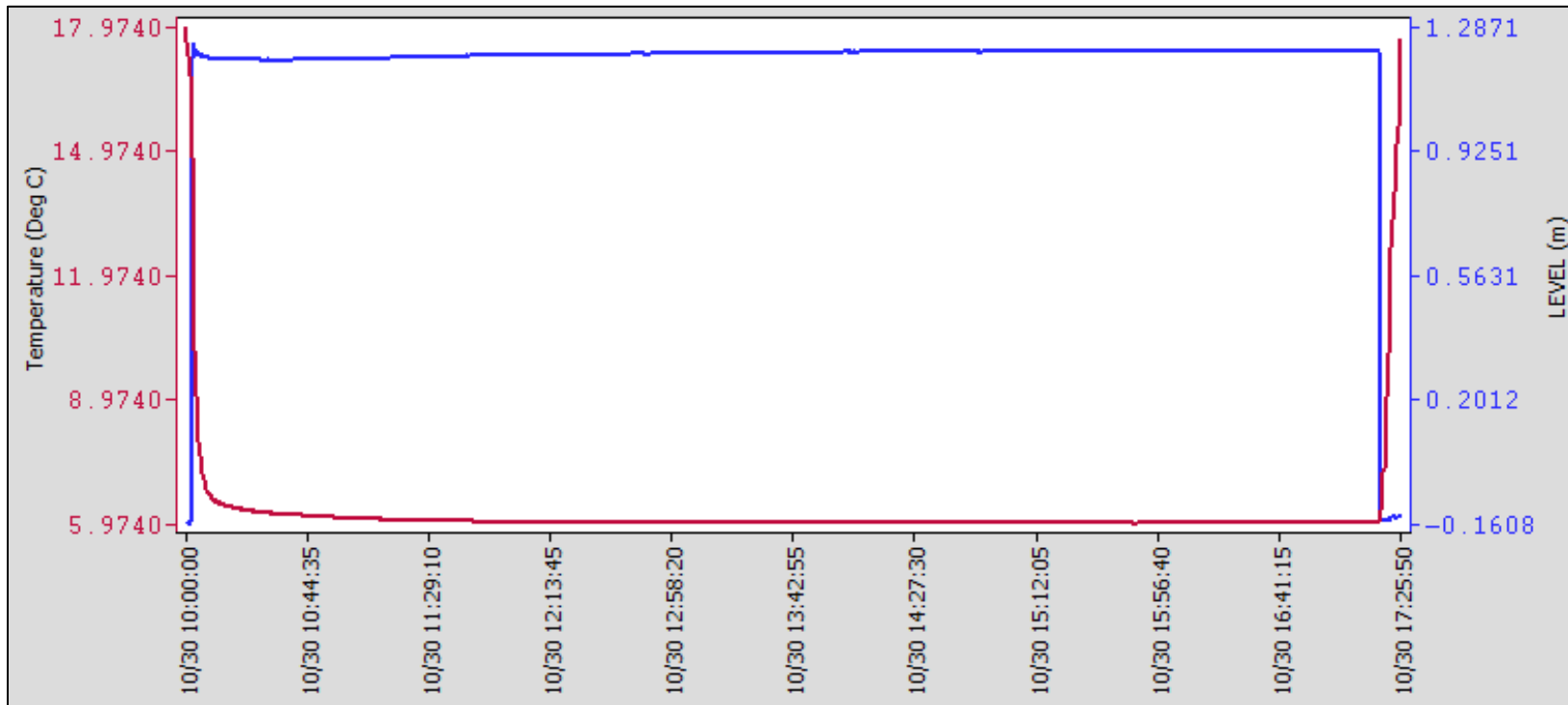


Figure C 11 MW18-54\_Whitehorse Pump Test\_2018\_10\_30



PHASE II ENVIRONMENTAL SITE ASSESSMENT

Appendix C Hydrogeology  
November 23, 2018

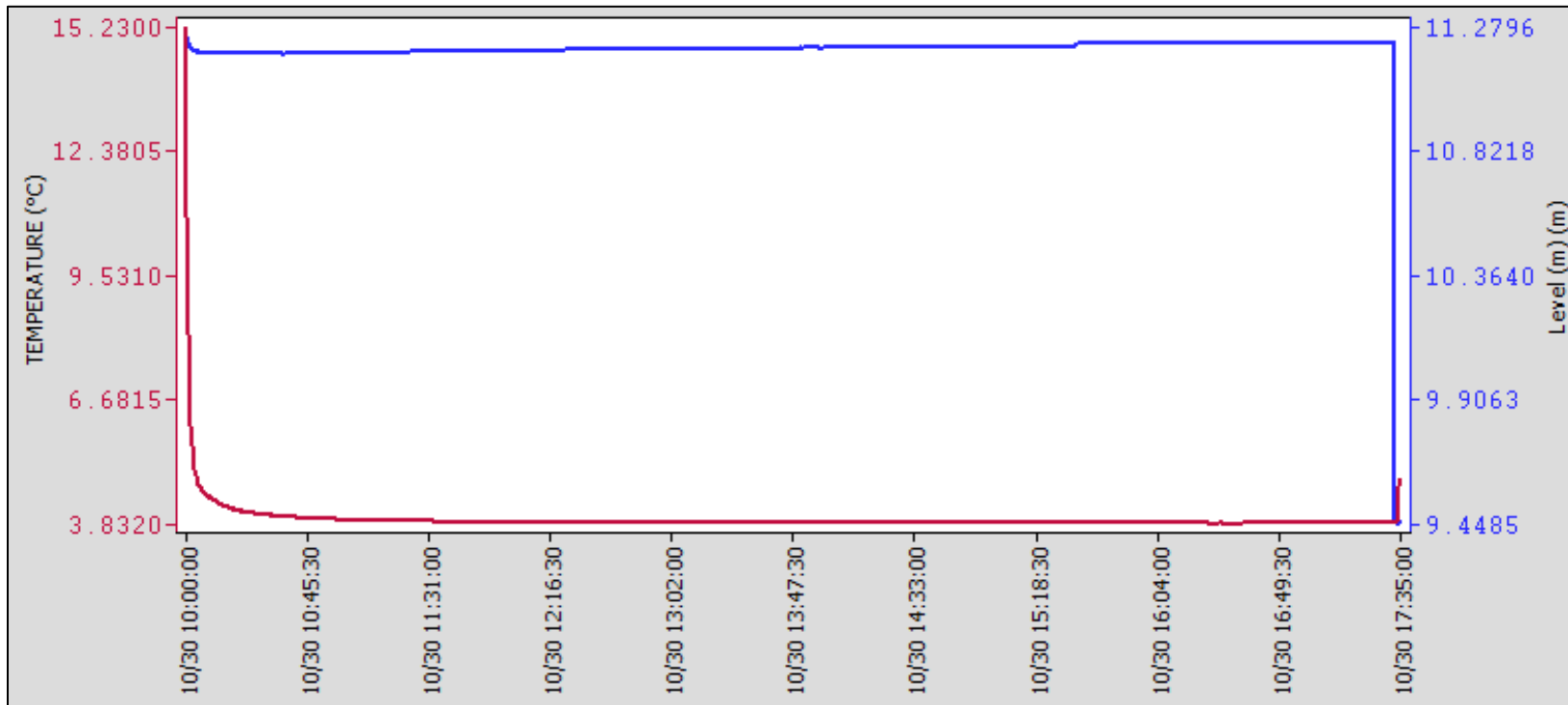


Figure C 12 MW18-55\_Whitehorse Pump Test\_2018\_10\_30



\* Pump Test Well \*

FIELD DATA SHEET

20

DATE : Oct 29/18  
 PROJECT:  
 WELL ID: MW16-09  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL:

	Easting	Northing
Gps Location:		
Zone:		
reading error (± m):		

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments		
10:06	-	4.194	DTB=5.246	Prior to start up		
11:55	→ Pump	started		pH	EC	Temp(°C)
11:55:30	30sec	4.682		8.1	223mS	3.7 <sup>an</sup>
11:56	1m	4.893		<del>8.3</del>	<del>221mS</del>	-
11:57	2m	5.198				-
11:58	3m	5.201				-
11:59	4m	5.203				-
12:12	17m	5.205				-
12:25	30m	5.206		8.3	2.24	-
13:33	98m	5.214				-
13:55	120m	5.217		7.5	2.27	3.7
14:55	180m	5.221		<del>8.7.9</del>	2.26	3.6
15:05	190m	→ Adjusted	Pump (a little too high → dropped flow slightly)			
15:55	240m	5.197		7.6	2.27	3.7
16:55	300m	5.198		8.0	2.26	3.8
17:55	360m	5.196		7.7	2.28	3.8

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE: Oct 29/18  
 PROJECT:  
 WELL ID: MW16-12  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL:

Gps Location:  
 Zone:  
 reading error (± m):

Easting	Northing

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
10:09	0	3.823	DTB=5.482	Prior to Startup
12:00		3.823		
12:17		3.823		
13:22		3.823		
14:20		3.823		
15:26		3.823		
16:26		3.826		
17:21		3.832		
17:56		3.833		





FIELD DATA SHEET

DATE : Oct 29  
 PROJECT: MW16-02  
 WELL ID:  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL:

Easting	Northing
Gps Location:	
Zone:	
reading error (± m):	

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
11:06	∅	4.683	DTB 5:902	prior to setup
12:03		4.675		
12:19		4.675		
13:23		4.675		
14:22		4.677		
15:28		4.683		
16:28		4.684		
17:23		4.683		
18:02		4.684		

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE : Oct 29/18  
PROJECT:  
WELL ID: MW18-34  
STATIC WATER LEVEL (m BTOC):  
WELL DEPTH (m BTOC):  
STICK UP (m):  
WATER PURGE METHOD:  
VOLUME REMOVED:  
FIELD PERSONNEL:

Easting  
Gps Location:  
Zone:  
reading error ( $\pm$  m):

Easting	Northing

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
10:19	$\emptyset$	4.134	DTB = 6.101	Prior to Startup
12:05		4.134		
12:20		4.134		
13:25		4.134		
14:24		4.134		
15:31		4.135		
16:30		4.133		
17:25		4.134		
18:07		4.135		

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE: Oct 29/18  
 PROJECT:  
 WELL ID: MW18-56  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL:

Easting Gps Location: Zone: reading error ( $\pm$ m):	Northing
--	----------

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
<del>10:22</del>	<del>10:22</del>	<del>7.092</del>	<del>DTB = 6.957</del>	
10:22	<del>10:22</del>	7.092	<sup>DTB =</sup> <del>10.400</del> 042	Prior to startup
12:10		7.084		
12:22		7.084		
13:27		7.084		
14:27		7.082		
15:34		7.079		
16:33		7.078		
17:27		7.079		
18:11		7.082		

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE : Oct 29/18  
 PROJECT:  
 WELL ID: MW18-51  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL:

	Easting	Northing
Gps Location:		
Zone:		
reading error ( $\pm$ m):		

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
10:28	Ø	3.676	DTB=5.654	Prior to Startup
12:08		3.674		
12:24		3.673		
13:29		3.673		
14:24		3.671		
15:36		3.671		
16:35		3.672		
17:29		3.671		
18:15		3.672		



Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE: Oct 30/18  
 PROJECT: 123221161  
 WELL ID: MW18-31  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD: Pump  
 VOLUME REMOVED:  
 FIELD PERSONNEL: BCS

Easting	Northing
Gps Location:	
Zone:	
reading error ( $\pm$ m):	

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments		
8:56	—	4.737	DTB = 5.745	Prior to startup		
				pH	EC	Temp(°C)
10:15	∅	Pump Test	Started	—	—	—
10:15:30	30s	4.949	→ Sampled	7.8	1865µS	4.3°C
10:16	1m	5.135		—	—	—
10:17	2m	5.138		—	—	—
10:18	3m	5.142		→ Flow adjusted (Higher)		
10:20	5m	5.326				
10:22	7m	5.351		→ Flow adjusted (Higher)		
10:25	10m	5.368				
10:28	13m	5.376				
10:30	15m	5.389				
10:42	27m	5.412				
10:55	40m	5.413		pH	EC	Temp(°C)
11:15	60m	5.415	<del>sampled</del>	7.3	1878µS	4.2
11:20	* Flow Adjusted (Highest it will go) *					
<del>12:45</del>	<del>120m</del>					
11:42	87m	5.581		pH	EC	Temp(°C)
12:15	120m	5.583	→ Sampled *	7.8	1897µS	4.4
13:15	180m	5.582		7.3	1899µS	4.3

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments		
				pH	EC	Temp (°C)
14:15	240m	5.582	→ Sampled *	7.7	1882µS	4.1
15:15	300m	5.582		7.3	1895µS	3.9
16:15	360m	5.582		7.6	1893µS	3.9
16:45	390m	5.584	→ sampled *	7.2	1906µS	4.0
16:45	→ Pump Shut off (pump test complete)					
	↳ ran out of room in totes					

FIELD DATA SHEET

DATE: Oct 30/18  
 PROJECT: 123221161  
 WELL ID: MW18-51  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL: BCS

	Easting	Northing
Gps Location:		
Zone:		
reading error ( $\pm$ m):		

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
9:04	-	3.669	DTB = 5.609	Prior to Startup
10:15	0			Pump Test started
10:31	16m	3.670		
10:50	35m	3.672		
11:32	77m	3.673		
12:24	134m	3.674		
13:28	193m	3.675		
14:30	255m	3.674		
15:26	311m	3.674		

Sheet2

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE: Oct 30/18  
 PROJECT: 123221161  
 WELL ID: MW16-12  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL: BCS

	Easting	Northing
Gps Location:		
Zone:		
reading error (± m):		

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
9:01	-	3.827	DTB=5.478	Prior to startup
10:15	∅	3.827	Pump Test started	
10:33	18m	3.827		
10:52	37m	3.827		
11:34	79m	3.827		
12:30	136m	3.827		
13:30	195m	3.827		
14:32	257m	3.827		
15:29	314m	3.827		

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE : Oct 30/18  
 PROJECT: 123221161  
 WELL ID: MW18-52  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL: BCS

Gps Location:  
 Zone:  
 reading error ( $\pm$  m):

Easting	Northing

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
9:08	-	5.609	D/B = 6.828	Prior to Startup
10:15	∅	Pump Test Started		
10:36	21m	5.611		
10:56	41m	5.614		
11:37	82m	5.623		
12:34	139m	5.626		
13:33	198m	5.631		
14:34	259m	5.635		
15:32	317m	5.639		



Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments

FIELD DATA SHEET

DATE : Oct 30/18  
 PROJECT: 123221161  
 WELL ID: MW18-55  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL: BCS

Gps Location:  
 Zone:  
 reading error ( $\pm$  m):

Easting	Northing

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
9:11	-	3.978	DTB=5.746	Prior to Startup
10:15	∅	3.976		Pump Test started
10:38	23m	3.976		
10:57	42m	3.980		
11:38	83m	3.981		
12:36	141m	3.980		
13:35	200m	3.980		
14:36	261m	3.980		
15:33	318m	3.980		



FIELD DATA SHEET

DATE: Oct 30/18  
 PROJECT: 123221611  
 WELL ID: MW18-54  
 STATIC WATER LEVEL (m BTOC):  
 WELL DEPTH (m BTOC):  
 STICK UP (m):  
 WATER PURGE METHOD:  
 VOLUME REMOVED:  
 FIELD PERSONNEL: HCS

Gps Location: Zone: reading error (± m):	Easting	Northing

NOTE: Time zero is when the water level is the lowest as this is a recovery test.

Time	Reading (minutes)	Water Level (mBTOC)	Drawdown/Recovery	Comments
9:15	-	3.838	DTB = 5.245	Prior to startup
10:15	Ø			Pump Test started
10:39	24m	3.836		
10:59	44m	3.839		
11:39	84m	3.838		
12:37	142m	3.838		
13:36	201m	3.834		
14:37	262m	3.839		
15:35	320m	3.839		

Time	Reading (minutes)	Water Level (mBTC)	Drawdown/Recovery	Comments

**CHAIN OF CUSTODY RECORD**

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: <u>Stantec</u>	Company: _____	Quotation: <u>Stantec Regular</u>	<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)
Contact Name: <u>Carey Sibald</u>	Contact Name: _____	P.O. #/AFE#: _____	<b>PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS</b>
Address: <u>202-107 Main St. Whitehorse YT PC: <del>JA</del></u>	Address: _____	Project #: <u>123221161</u>	<b>Rush TAT (Surcharges will be applied)</b>
Phone/Fax: <u>867 446 7644 571A 2A7</u>	Phone/Fax: _____	Site Location: <u>Whitehorse</u>	<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days
Email: <u>Carey.Sibald@stantec.com</u>	Email: _____	Site #: _____	<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days
Copies: <u>Joseph.Riddelle@stantec.com</u>	Copies: <u>Brad.Suley@stantec.com</u>	Sampled By: <u>BCS</u>	Date Required: _____
			Rush Confirmation #: _____

Laboratory Use Only				Analysis Requested															Regulatory Criteria																	
YES	NO	Cooler ID	Depot Reception	# of Containers	BTEXS / VPH	BTEX / VPH	VOC / BTEXS / VPH	VOC / BTEX / F1	LEPH / HEPH / PAH	F2 - F4	Preserved?	Preserved?	Preserved?	Total Metals	Total Mercury	Chloride	Sulphate	Fluoride	F2S	BOD	COD	pH	Conductivity	Alkalinity	Nitrite	Nitrate	Ammonia	BC CSR	YK CSR	CCME	Drinking Water	BC Water Quality	Other			
Sample Identification				Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix																Special Instructions														
1																																				
2																																				
3																																				
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				

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

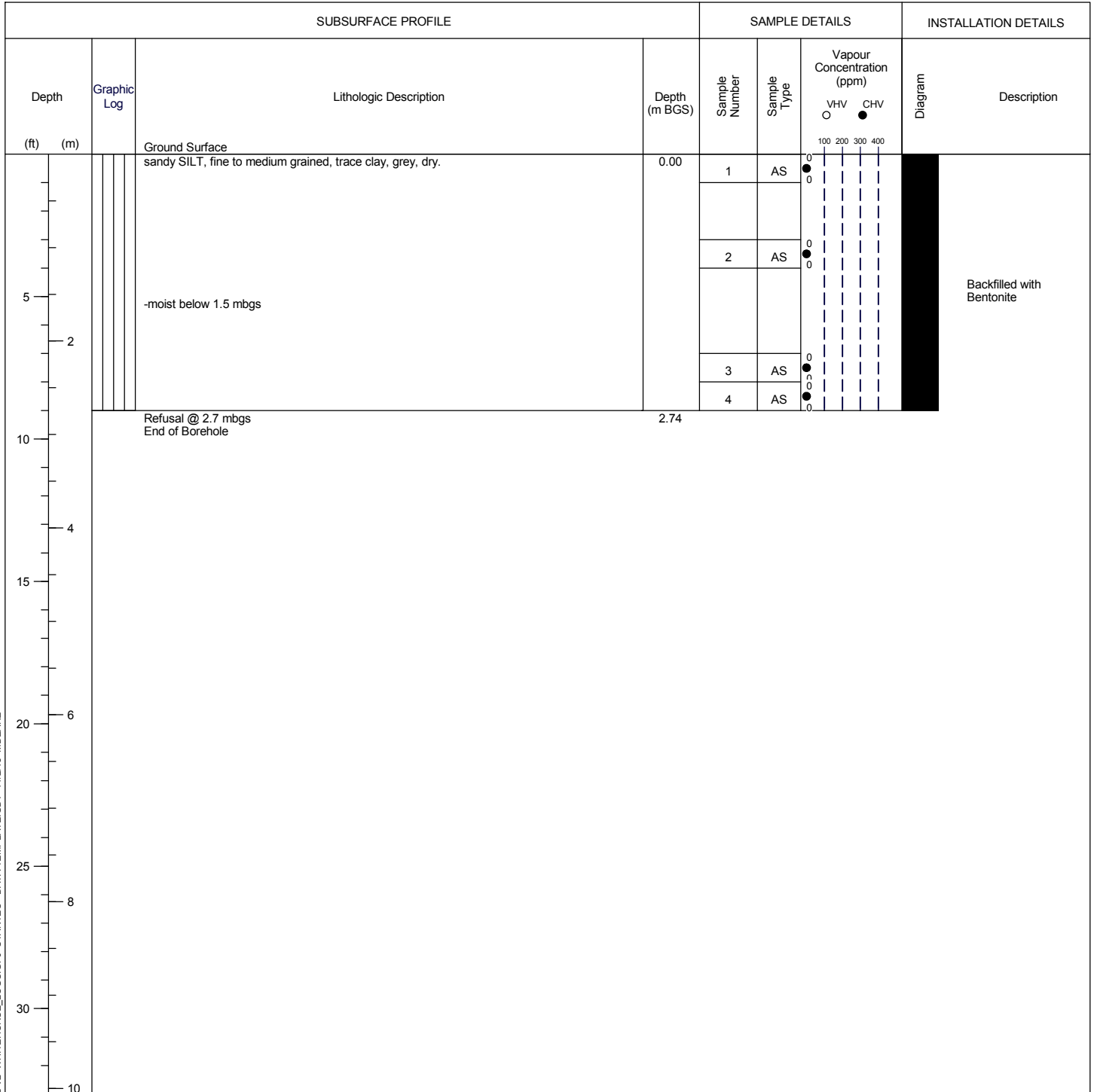
Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Maxxam Job #
<u>Brad Suley</u>	<u>2018/10/31</u>	<u>9:16</u>				

# **APPENDIX D BOREHOLE LOGS**

# Borehole: BH18-46

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 26-Jul-2018  
**Ground surface elevation:** n/a  
**Top of casing elevation:** n/a  
**Easting:** n/a  
**Northing:** n/a



STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available





# Borehole: BH18-47

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 642.05 m AMSL  
**Top of casing elevation:** n/a  
**Easting:** 496888.334  
**Northing:** 6730855.876

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS				
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description		
							VHV ○	CHV ●				
		Ground Surface	642.05				100	200	300	400		
		sandy SILT, trace clay, grey, moist.	0.00	1	CC		0	0				
5				2	CC		0	0				
2		CONCRETE	639.91	3	CC		5	0				
		SAND, some silt, grey, noticeable PHC odour.	2.13 639.61				0	0				
			2.44 639.30	4	CC	LEPH, HEPH, EPH, PAH	0	1				
10		sandy SILT, trace clay, grey, moist.	2.74				0	0				
4				5	CC	EPH	0	0				
15				6	CC		0	0				
20		End of Borehole	635.95									
			6.10									Backfilled with Bentonite

STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

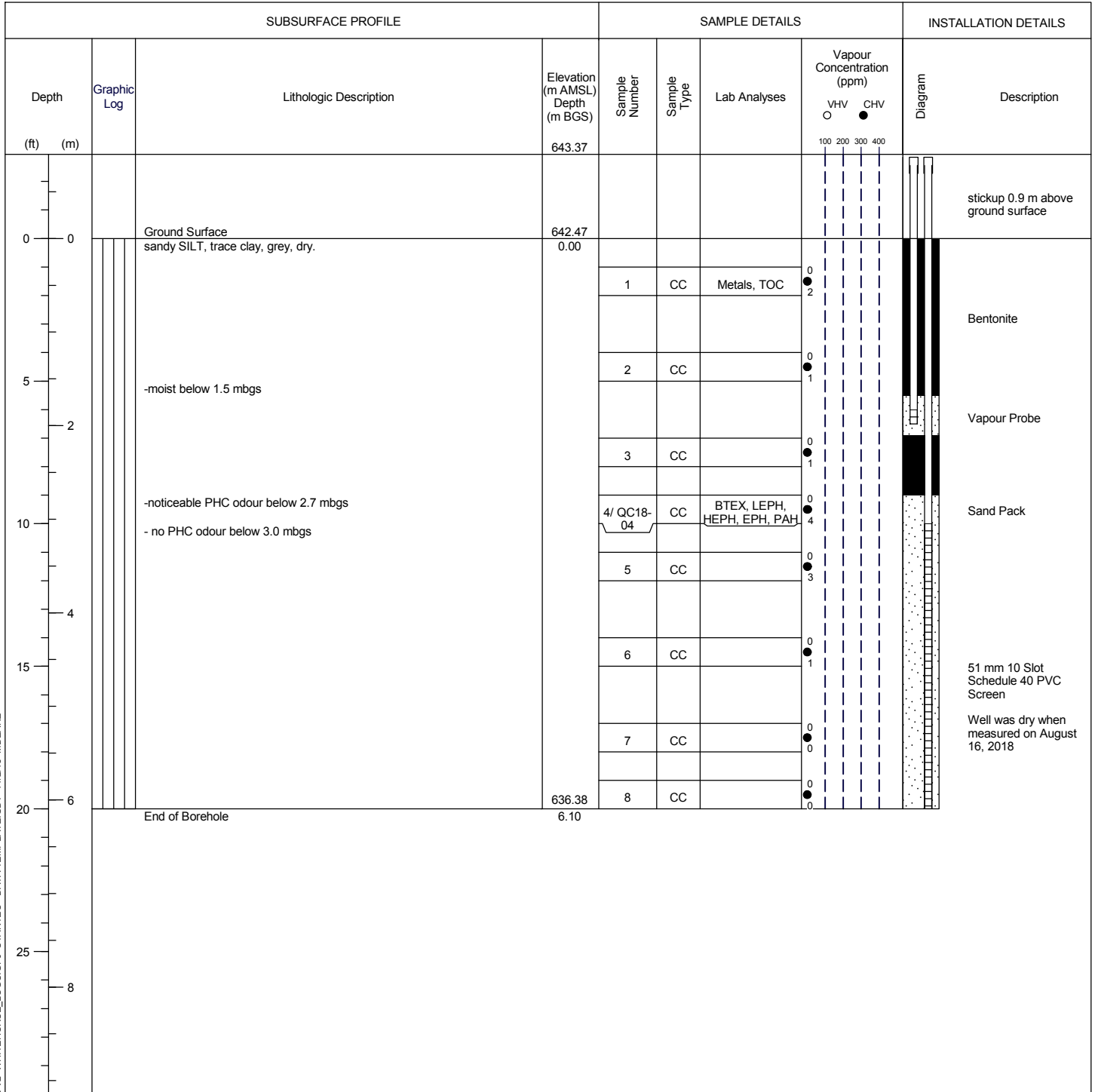
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-30

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 642.47 m AMSL  
**Top of casing elevation:** 643.37 m AMSL  
**Easting:** 496881.3913  
**Northing:** 6730942.5



Screen Interval: 1.83 - 1.98; 3.05 - 6.10 m BGS  
 Sand Pack Interval: 1.68 - 1.98; 2.74 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 1.68; 2.10 - 2.74 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-31

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 638.90 m AMSL  
**Top of casing elevation:** 639.75 m AMSL  
**Easting:** 496912.1718  
**Northing:** 6730967.307

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface sandy SILT, trace clay, brown, moist.	638.90 0.00							stickup 0.85 m above ground surface
5		-dry below 1.8 mbgs		1	CC	Metals, TOC	0	0		Bentonite
2				2	CC		0	0		
10		-moist below 2.7 mbgs		3	CC		0	0		
4				4	CC		0	0		
15		-wet below 4.3 mbgs	634.33	5	CC		0	0		Sand Pack Groundwater elevation 638.34 masl on August 21, 2018
		SAND AND GRAVEL, grey, wet, noticeable PHC odour.	4.57	6	CC	BTEX, LEPH, HEPH, PAH, TOC	90	170		
		SAND, some gravel, wet, noticeable PHC odour.	4.88	7	CC	EPH, grain size	0	0		51 mm 10 Slot Schedule 40 PVC Screen
20		sandy SILT, trace clay.	633.11 5.79 632.81	8	CC	EPH	0	0		Slough
		End of Borehole	6.10							

Screen Interval: 3.96 - 5.79 m BGS  
 Sand Pack Interval: 3.66 - 5.79 m BGS  
 Well Seal Interval: 0.00 - 3.66 m BGS

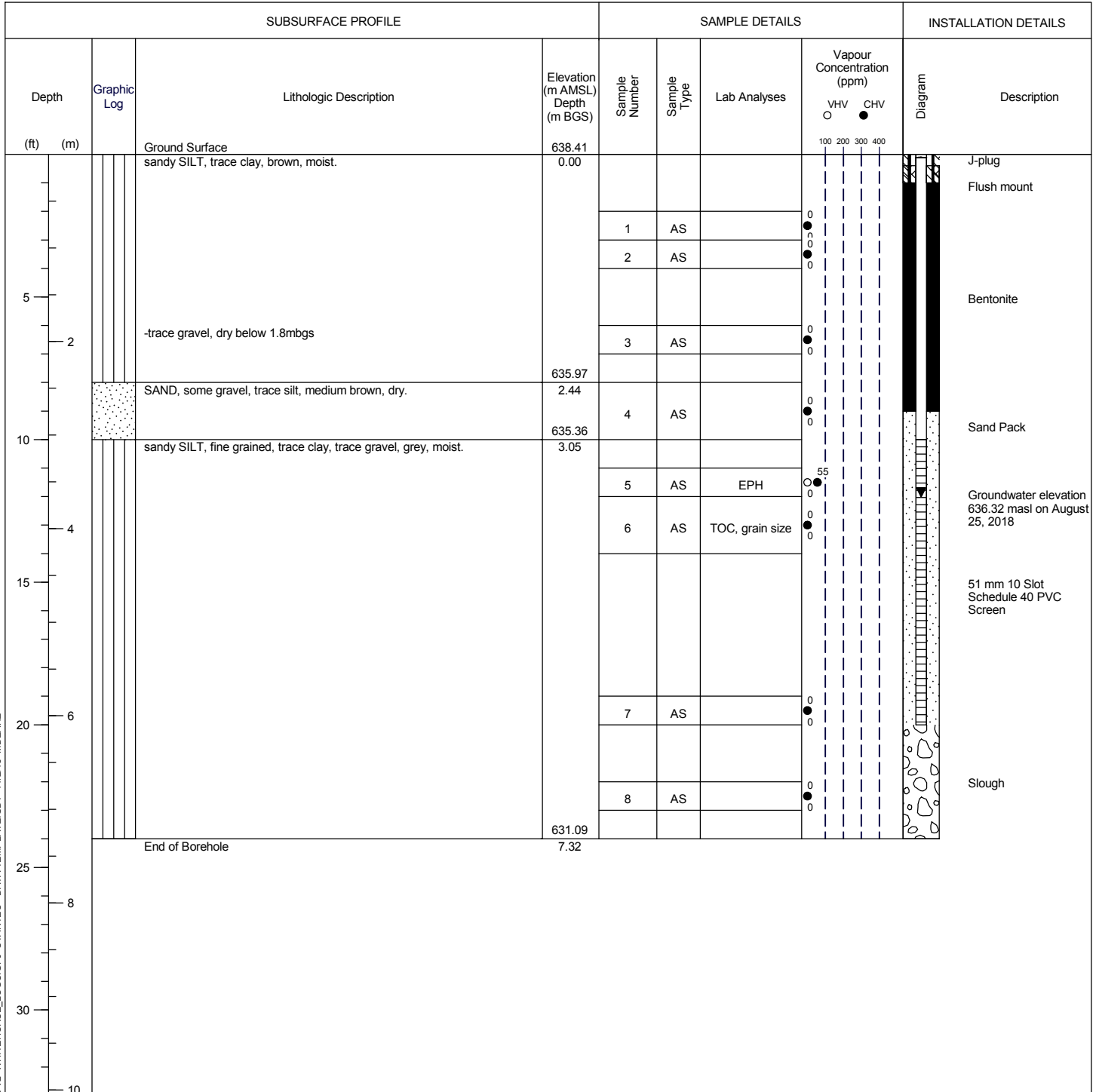
Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-33

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 24-Jul-2018  
**Ground surface elevation:** 638.41 m AMSL  
**Top of casing elevation:** 638.24 m AMSL  
**Easting:** 496931.482  
**Northing:** 6730922.915



Screen Interval: 3.05 - 6.10 m BGS  
 Sand Pack Interval: 2.74 - 6.10 m BGS  
 Well Seal Interval: 0.30 - 2.74 m BGS

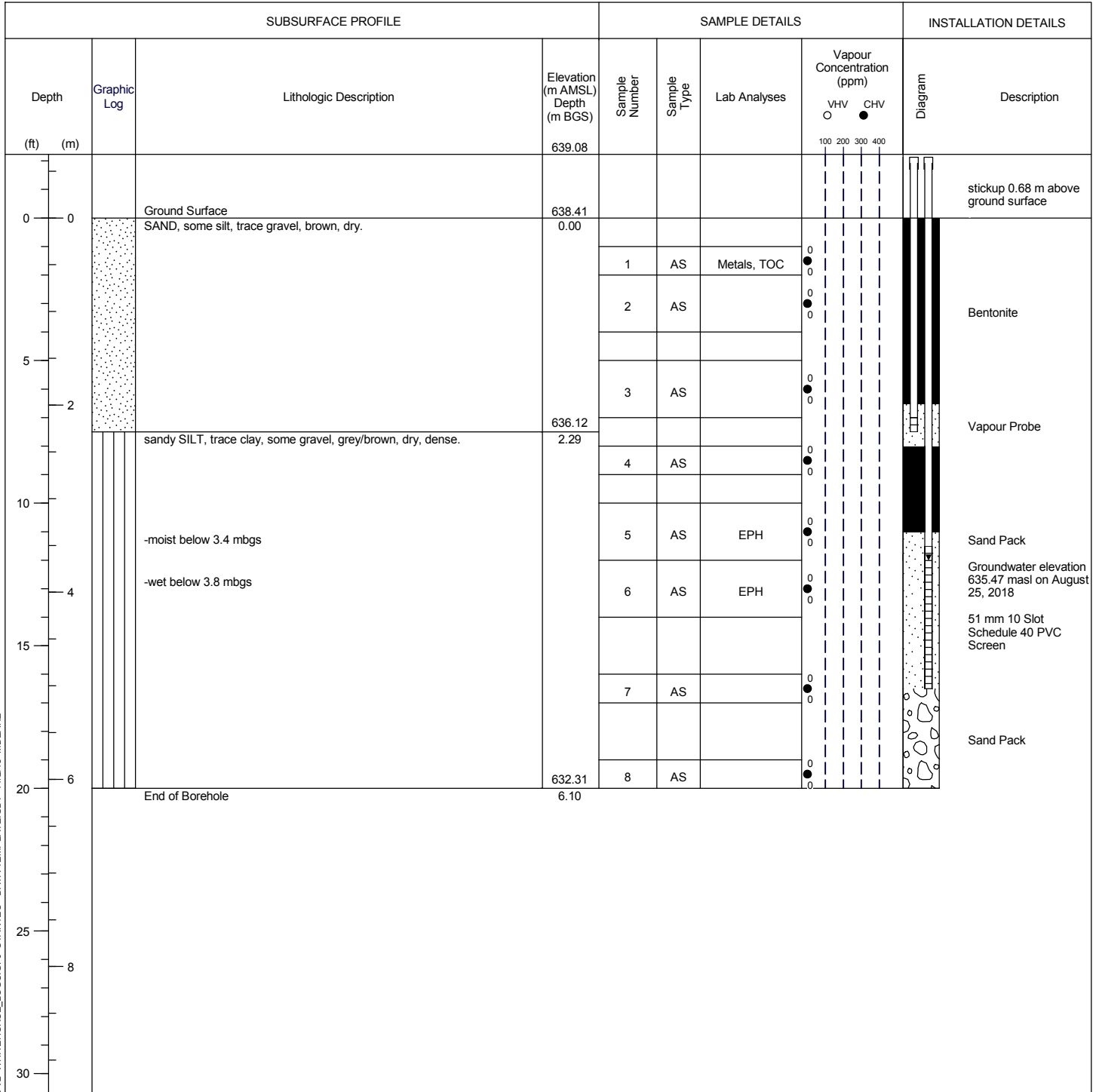
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-34

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 24-Jul-2018  
**Ground surface elevation:** 638.41 m AMSL  
**Top of casing elevation:** 639.08 m AMSL  
**Easting:** 496940.8164  
**Northing:** 6730896.408



Screen Interval: 2.13 - 2.29; 3.51 - 5.03 m BGS  
 Sand Pack Interval: 1.98 - 2.29; 3.35 - 5.03 m BGS  
 Well Seal Interval: 0.00 - 1.98; 2.44 - 3.35 m BGS

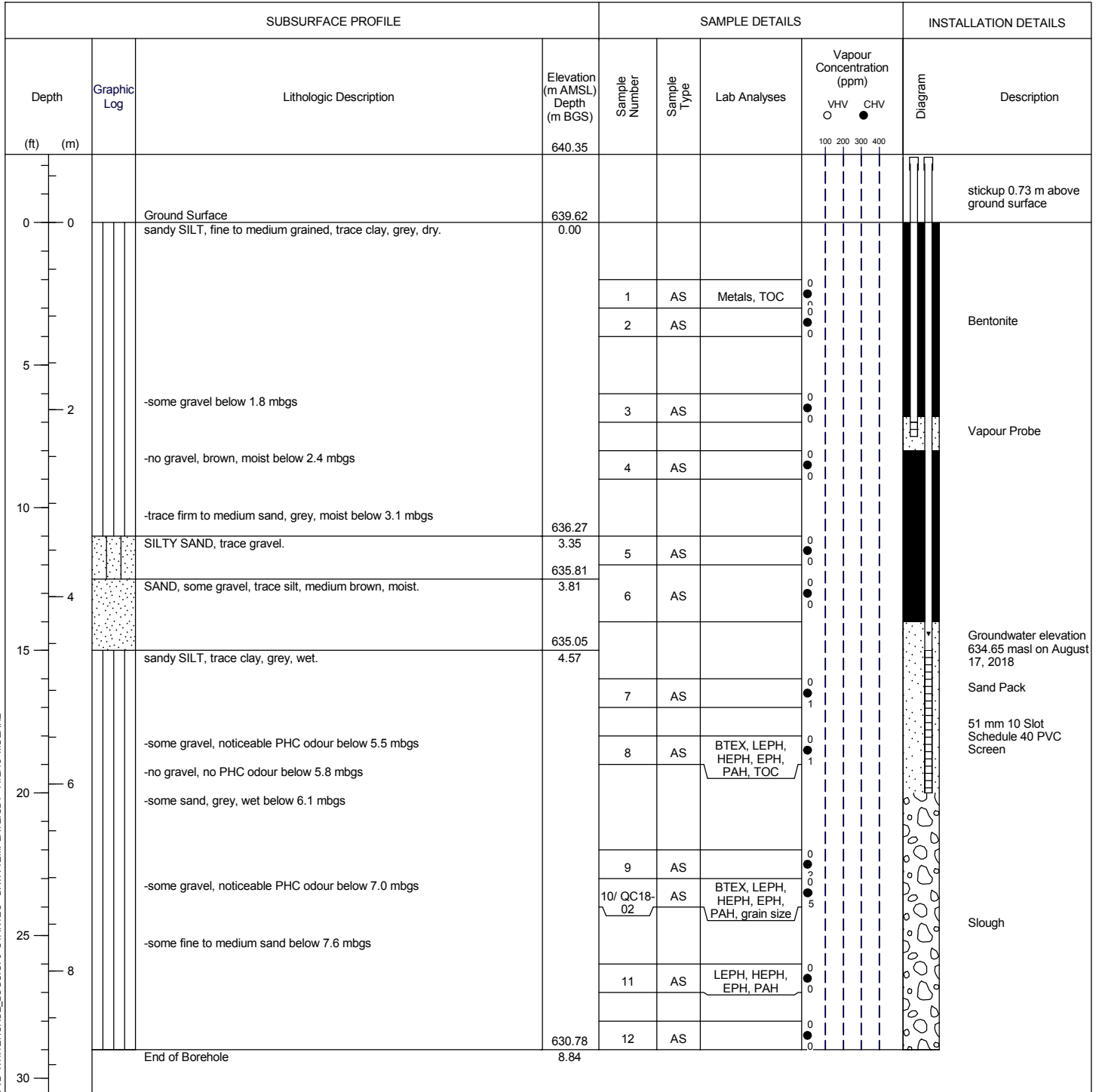
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-35

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 26-Jul-2018  
**Ground surface elevation:** 639.62 m AMSL  
**Top of casing elevation:** 640.34 m AMSL  
**Easting:** 496921.2924  
**Northing:** 6730881.872



Screen Interval: 2.13 - 2.29; 4.57 - 6.10 m BGS  
 Sand Pack Interval: 2.07 - 2.29; 4.27 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 2.07; 2.44 - 4.27 m BGS

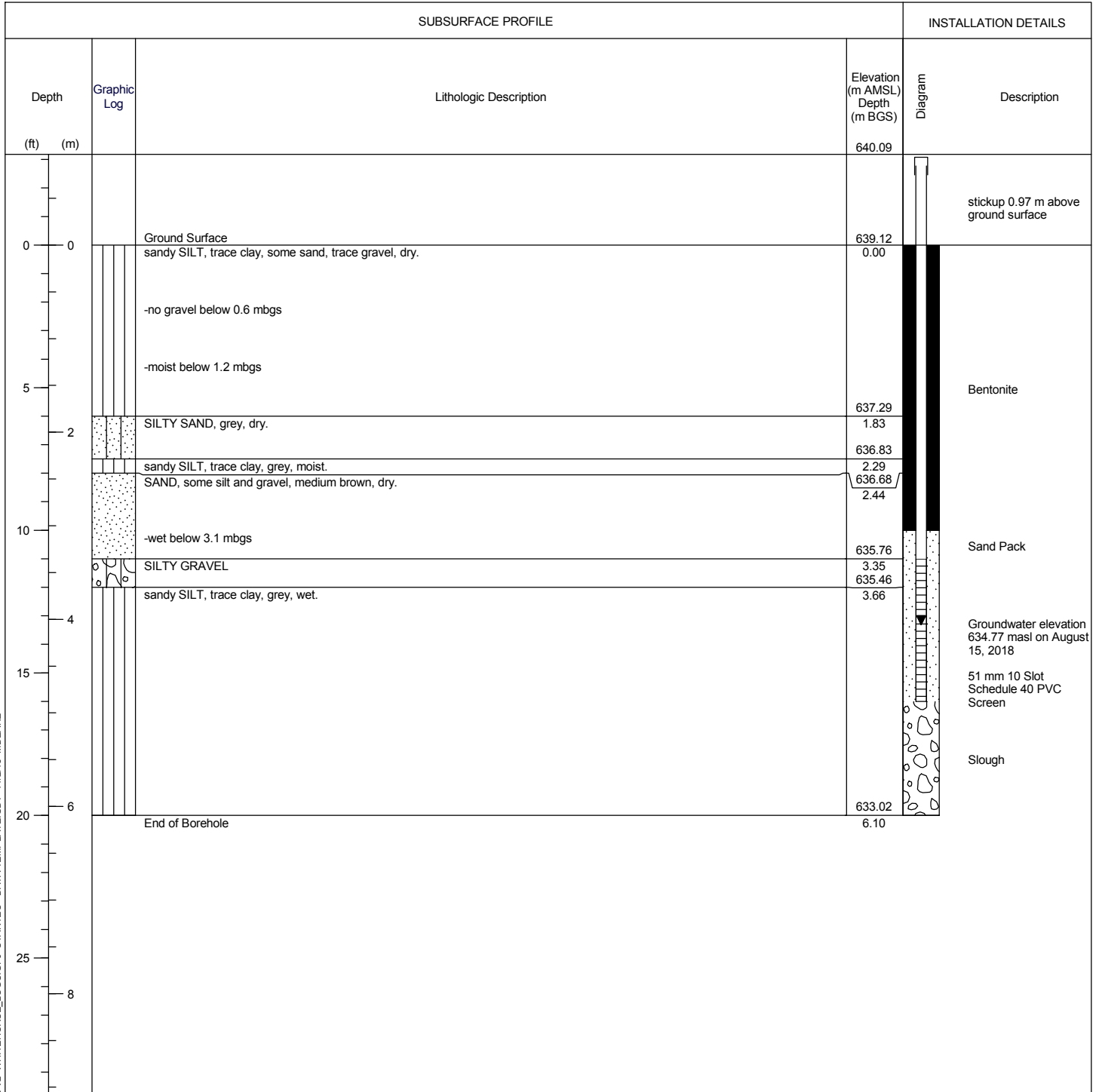
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-36

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 639.12 m AMSL  
**Top of casing elevation:** 640.09 m AMSL  
**Easting:** 496931.9094  
**Northing:** 6730873.749



Screen Interval: 3.35 - 4.88 m BGS  
 Sand Pack Interval: 3.05 - 4.88 m BGS  
 Well Seal Interval: 0.00 - 3.05 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 n/a - not available



# Monitoring Well: MW18-37

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 639.04 m AMSL  
**Top of casing elevation:** 639.84 m AMSL  
**Easting:** 496930.2706  
**Northing:** 6730870.614

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
			639.86				100 200 300 400			
0	0	Ground Surface sandy SILT, trace clay, trace gravel, dry.	639.04 0.00	1	CC		○	●	○	○
		-no gravel below 0.6 mbgs					○	●	○	○
		-moist below 1.2 mbgs		2	CC		○	●	○	○
5			637.21	3	CC		○	●	○	○
2		SILTY SAND, grey, dry.	1.83	4	CC		○	●	○	○
		sandy SILT, trace clay, grey, moist.	2.29	5	CC		○	●	○	○
		SAND, some silt and gravel, medium brown, dry.	636.60 2.44	6	CC	EPH	○	●	○	○
10		-wet below 3.1 mbgs		7/ QC18-03	CC	EPH	○	●	○	○
		SILTY GRAVEL	635.69				○	●	○	○
		sandy SILT, trace clay, grey, wet.	3.35 635.38 3.66	8	CC		○	●	○	○
4				9	CC		○	●	○	○
15				10	CC		○	●	○	○
20	6			11	CC		○	●	○	○
25				12	CC		○	●	○	○
8							○	●	○	○
30							○	●	○	○

stickup 0.82 m above ground surface

Groundwater elevation 635.35 masl on August 15, 2018

Bentonite

Screen Interval: 13.72 - 15.24 m BGS  
 Sand Pack Interval: 13.41 - 15.24 m BGS  
 Well Seal Interval: 0.00 - 13.41 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available







# Monitoring Well: MW18-37

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 639.04 m AMSL  
**Top of casing elevation:** 639.84 m AMSL  
**Easting:** 496930.2706  
**Northing:** 6730870.614

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
10		sandy SILT, trace clay, grey, wet.								
35			628.07							
		SAND, some silt, grey, wet.	10.97							
			627.61							
12		sandy SILT, trace clay, grey, wet.	11.43							
40										
45										
14										Sand Pack
50			623.80							51 mm 10 Slot Schedule 40 PVC Screen
		End of Borehole	15.24							
16										
55										
18										
60										

Screen Interval: 13.72 - 15.24 m BGS  
 Sand Pack Interval: 13.41 - 15.24 m BGS  
 Well Seal Interval: 0.00 - 13.41 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-38

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 640.48 m AMSL  
**Top of casing elevation:** 641.47 m AMSL  
**Easting:** 496893.4321  
**Northing:** 6730881.373

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface sandy SILT, trace clay, grey, dry.	640.48 0.00							stickup 0.99 m above ground surface
5		-brown below 1.5 mbgs -grey, moist below 1.8 mbgs		1	CC		●	○		Bentonite
2				2	CC		●	○		
				3	CC		●	○		
10				4	CC		●	○		
				5	CC		●	○		
15				6	CC		●	○		
				7	CC	LEPH, HEPH, EPH, PAH	●	○		
20		-wet below 4.9 mbgs	634.38 6.10	8	CC		●	○	Sand Pack	
25		End of Borehole								Groundwater elevation 633.71 masl on August 15, 2018
8										51 mm 10 Slot Schedule 40 PVC Screen

Screen Interval: 4.57 - 6.10 m BGS  
 Sand Pack Interval: 4.27 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 4.27 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-39

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 638.72 m AMSL  
**Top of casing elevation:** 639.51 m AMSL  
**Easting:** 496920.6513  
**Northing:** 6730957.047

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface sandy SILT, trace clay, brown, dry.	638.72 0.00							stickup 0.79 m above ground surface
0				1	CC	Metals, TOC	0	1		
5		-moist below 1.5 mbgs		2	CC		0	0		Bentonite
2				3	CC		0	0		Vapour Probe
10				4	CC		0	0		Sand Pack
4				5	CC		0	2		
15		SAND AND GRAVEL, brown, moist. -some silt, noticeable PHC odour below 4.6 mbgs	634.45 4.27	6	CC		0	1		Groundwater elevation 635.26 masl on August 17, 2018
				7	CC	EPH	0	35		51 mm 10 Slot Schedule 40 PVC Screen
20		sandy SILT, trace clay, some gravel, grey, noticeable PHC odour.	633.39 5.33	8/ QC18-05	CC	BTEX, LEPH, HEPH, EPH, PAH, TOC	0	35		Sand Pack
6				9	CC	EPH, grain size	0	6		
25		-wet, no PHC odour below 7.0 mbgs		10	CC	EPH	0	0		
8				11	CC		0	0		Backfilled with Bentonite
30				12	CC		0	0		
		End of Borehole	629.58 9.14							

Screen Interval: 1.83 - 1.98; 3.05 - 6.10 m BGS  
 Sand Pack Interval: 6.10 - 6.40; 2.74 - 6.40 m BGS  
 Well Seal Interval: 0.00 - 1.68; 2.07 - 2.74 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-40

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 641.21 m AMSL  
**Top of casing elevation:** 642.09 m AMSL  
**Easting:** 496907.1839  
**Northing:** 6730850.805

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
			642.07							
0		Ground Surface sandy SILT, trace clay, brown, moist.	641.21 0.00							stickup 0.86 m above ground surface
		SAND, some silt, medium coarse.	640.60	1	CC		0	0		
		sandy SILT, trace clay, grey, moist.	0.61 640.29	2	CC		0	0		
5			0.91							
			638.47							
		SAND AND GRAVEL, dry.	2.74 638.16	4	CC		0	0		
		SILTY SAND, trace gravel, moist.	3.05							
10										
			635.11							
		GRAVEL, wet, rounded.	6.10 634.81	5	CC		0	0		
		sandy SILT, trace clay, firm to medium, grey, wet.	6.40	6	CC		0	0		
				7	CC		0	0		
				8	CC		0	0		
30										

Groundwater elevation  
634.02 masl on August  
15, 2018

Bentonite

Screen Interval: 13.72 - 15.24 m BGS  
 Sand Pack Interval: 13.41 - 15.24 m BGS  
 Well Seal Interval: 0.00 - 13.41 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-40

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 641.21 m AMSL  
**Top of casing elevation:** 642.09 m AMSL  
**Easting:** 496907.1839  
**Northing:** 6730850.805

SUBSURFACE PROFILE					SAMPLE DETAILS				INSTALLATION DETAILS	
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
10		sandy SILT, trace clay, firm to medium, grey, wet.								Sand Pack  51 mm 10 Slot Schedule 40 PVC Screen
35										
40										
45				627.49						
14		SAND, trace silt, wet.	13.72							
14		SILT, some sand, grey, wet.	627.19							
50		End of Borehole	14.02							
16			625.97							
55			15.24							
18										
60										

Screen Interval: 13.72 - 15.24 m BGS  
 Sand Pack Interval: 13.41 - 15.24 m BGS  
 Well Seal Interval: 0.00 - 13.41 m BGS

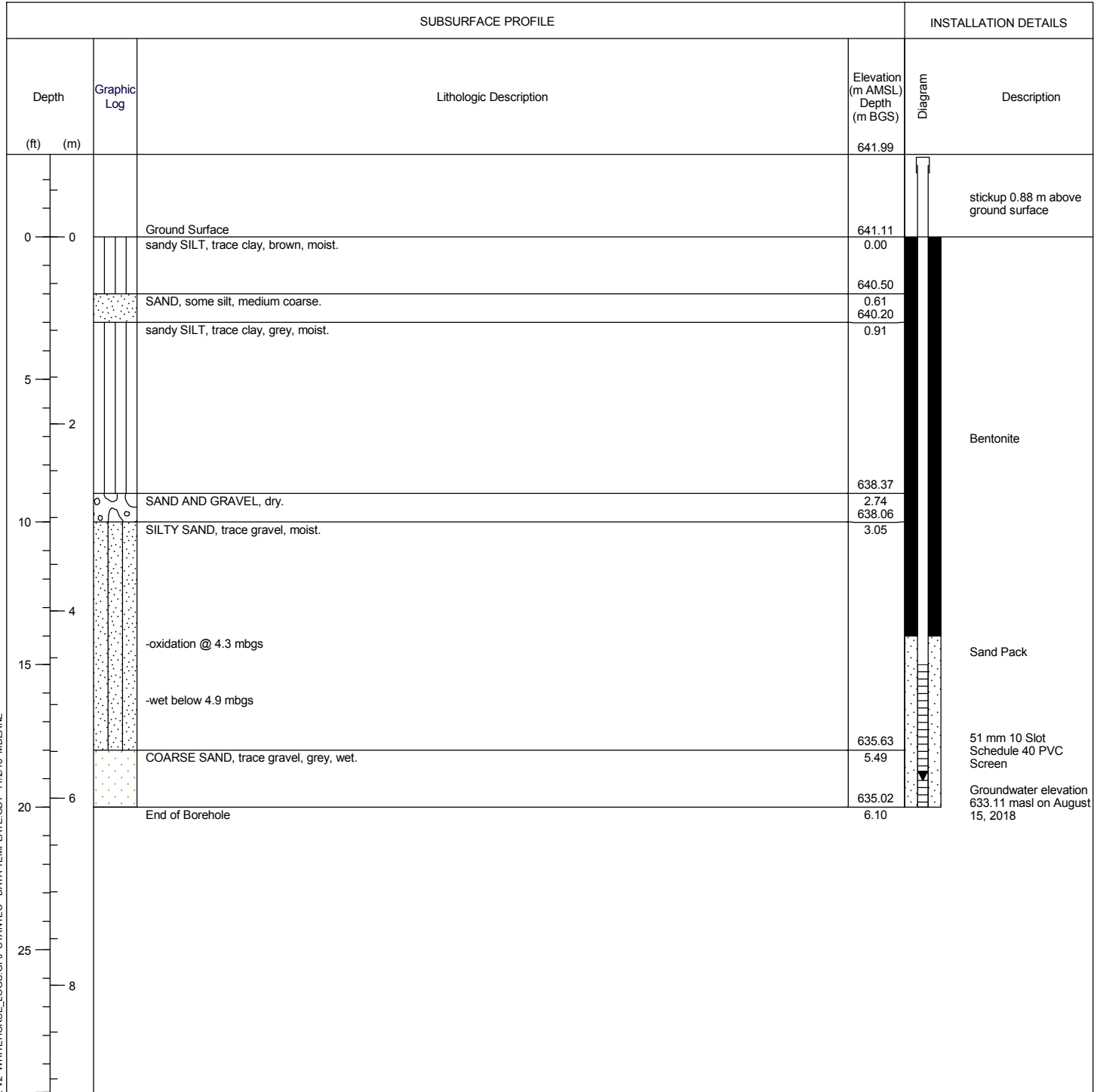
Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-41

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 27-Jul-2018  
**Ground surface elevation:** 641.11 m AMSL  
**Top of casing elevation:** 641.99 m AMSL  
**Easting:** 496910.3904  
**Northing:** 6730851.375



Screen Interval: 4.57 - 6.10 m BGS  
 Sand Pack Interval: 4.27 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 4.27 m BGS

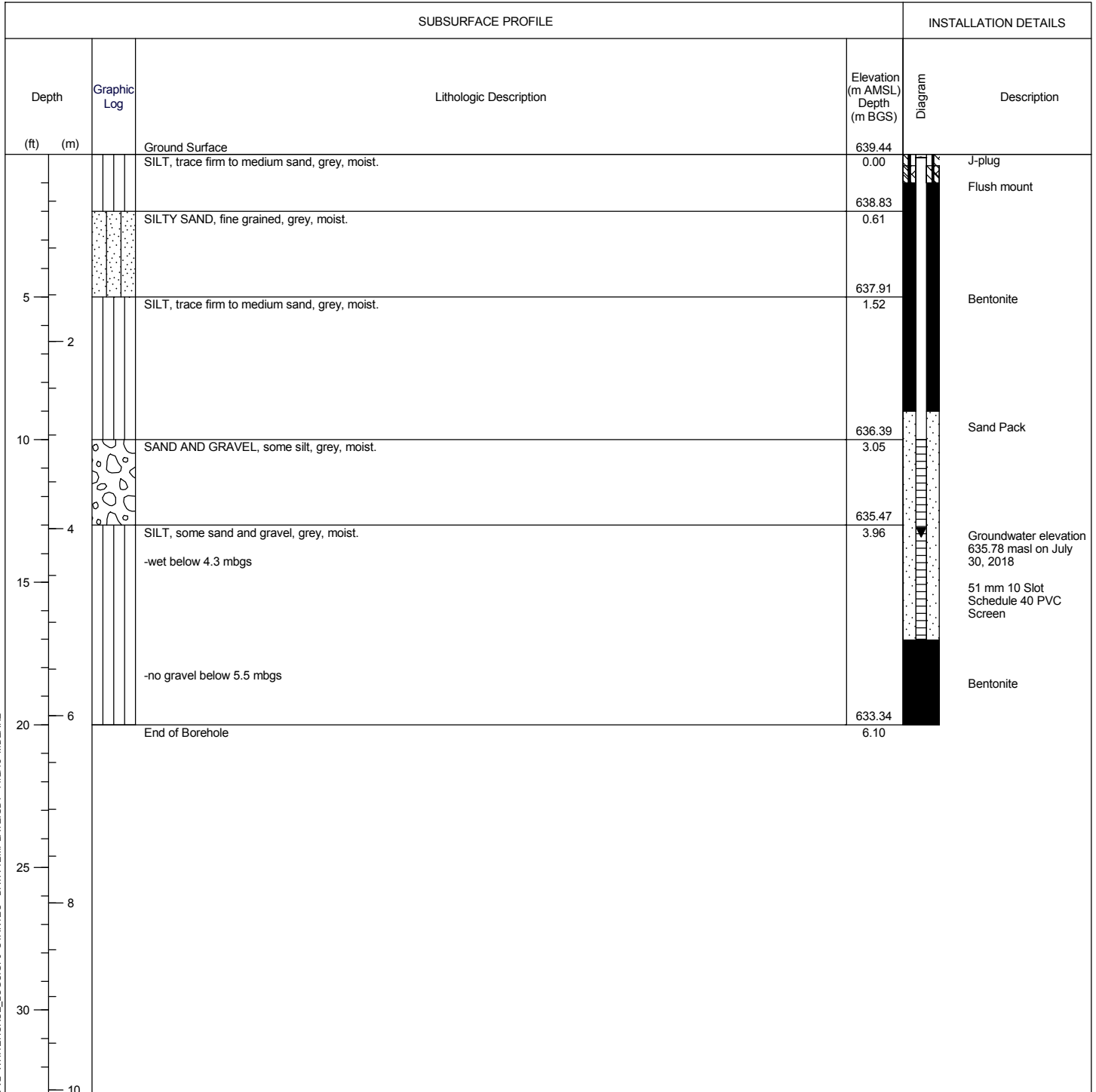
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 n/a - not available



# Monitoring Well: MW18-42

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 26-Jul-2018  
**Ground surface elevation:** 639.44 m AMSL  
**Top of casing elevation:** 639.37 m AMSL  
**Easting:** 496944.7534  
**Northing:** 6730780.993



Screen Interval: 3.05 - 5.18 m BGS  
 Sand Pack Interval: 2.74 - 5.18 m BGS  
 Well Seal Interval: 0.30 - 2.74 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 n/a - not available



# Monitoring Well: MW18-43

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 25-Jul-2018  
**Ground surface elevation:** 639.57 m AMSL  
**Top of casing elevation:** 639.53 m AMSL  
**Easting:** 496937.381  
**Northing:** 6730782.632

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
		Ground Surface	639.57				100 200 300 400			
		sandy SILT, trace clay, medium grained, grey, firm, moist.	0.00							
		SILTY SAND, fine grained, grey, moist.	0.61	1	AS	Metals	0	0		Bentonite
5			638.96				0	0		
		sandy SILT, trace clay, medium grained, grey, firm moist.	1.52	2	AS		0	0		Vapour Probe
2			638.05				0	0		
		SAND AND GRAVEL, some silt, grey, moist.	3.05	4	AS		0	0		
10			636.53				0	0		
		sandy SILT, trace clay, some gravel, grey, moist.	3.96	5	AS		0	0		Groundwater elevation 635.35 masl on July 30, 2018
4			635.61				0	0		
		-wet below 4.3 mbgs		6/ QC18-01	AS	BTEX, EPH	0	175		
15							0	0		
		-no gravel below 5.5 mbgs		7	AS		0	0		
				8	AS		0	0		
20							0	0		
							0	0		
25							0	0		
							0	0		
30							0	0		
10							0	0		

Screen Interval: 2.13 - 2.29; 13.41 - 14.94 m BGS  
 Sand Pack Interval: 2.07 - 2.29; 13.11 - 14.94 m BGS  
 Well Seal Interval: 0.30 - 2.10; 2.50 - 13.11 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available

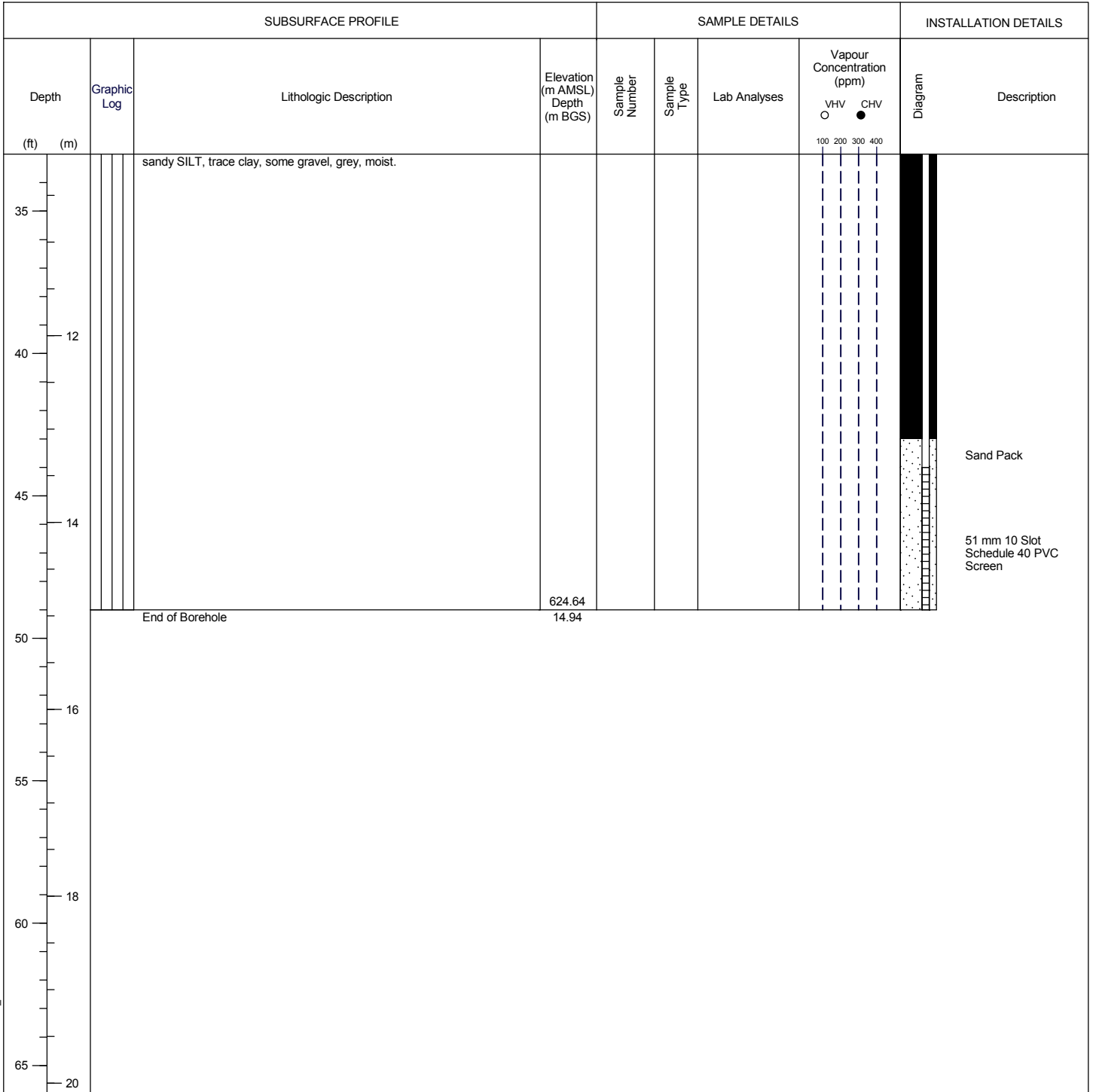




# Monitoring Well: MW18-43

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 25-Jul-2018  
**Ground surface elevation:** 639.57 m AMSL  
**Top of casing elevation:** 639.53 m AMSL  
**Easting:** 496937.381  
**Northing:** 6730782.632



Screen Interval: 2.13 - 2.29; 13.41 - 14.94 m BGS  
 Sand Pack Interval: 2.07 - 2.29; 13.11 - 14.94 m BGS  
 Well Seal Interval: 0.30 - 2.10; 2.50 - 13.11 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-44

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Auger  
**Date started/completed:** 24-Jul-2018  
**Ground surface elevation:** 637.70 m AMSL  
**Top of casing elevation:** 638.32 m AMSL  
**Easting:** 496949  
**Northing:** 6730989

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface	637.70							stickup 0.62 m above ground surface
0		SAND, some silt, some gravel, brown, dry.	0.00	1	AS		0	0		Bentonite
				2	AS		0	0		
5		sandy SILT, trace clay, some gravel, brown, dry.	636.17							Sand Pack
2			635.56	3	AS		0	0		
		SAND and GRAVEL, medium coarse, trace silt, brown, dry.	2.13	4	AS		0	0		Groundwater elevation 635.76 masl on July 30, 2018
10		-moist below 2.9 mbgs		5	AS	EPH	0	0		
				6	AS	TOC, grain size	0	0		51 mm 10 Slot Schedule 40 PVC Screen
4		-wet below 4.3 mbgs					0	0		
15		CLAY, grey wet.	632.82							Slough
6			4.88	7	AS		0	0		
20										
25		End of Borehole	630.08							
8			7.62							
30										

Screen Interval: 2.90 - 4.57 m BGS  
 Sand Pack Interval: 2.59 - 4.57 m BGS  
 Well Seal Interval: 0.00 - 2.59 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-45

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 25-Jul-2018  
**Ground surface elevation:** 639.19 m AMSL  
**Top of casing elevation:** 639.82 m AMSL  
**Easting:** 496912.528  
**Northing:** 6730885.934

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface	639.19							stickup 0.63 m above ground surface
0		SAND, some silt trace gravel, grey, dry (fill).	0.00							
		sandy SILT, trace clay, fine to medium grained, grey.	0.30	1	AS	Metals	0	0		Bentonite
		-trace gravel, brown below 0.9 mbgs		2	AS		0	0		
5		-some gravel below 1.5 mbgs	637.36							
2		SAND, fine to medium, some silt, trace gravel, brown, dry.	1.83	3	AS		0	0		Sand Pack
				4	AS		0	0		
10		sandy SILT, trace clay, grey, moist.	636.14							Groundwater elevation 635.83 mast on August 16, 2018
4		-increasing moisture below 4.0 mbgs	3.05	5	AS	BTEX/EPH	0	0		
15				6	AS		0	0		51 mm 10 Slot Schedule 40 PVC Screen
				7	AS		0	0		
20				8	AS		0	0		Slough
6			633.09				0	0		
		End of Borehole	6.10							

Screen Interval: 3.35 - 5.03 m BGS  
 Sand Pack Interval: 3.05 - 5.03 m BGS  
 Well Seal Interval: 0.00 - 3.05 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 AS - auger sample  
 ppm - parts per million by volume  
 n/a - not available

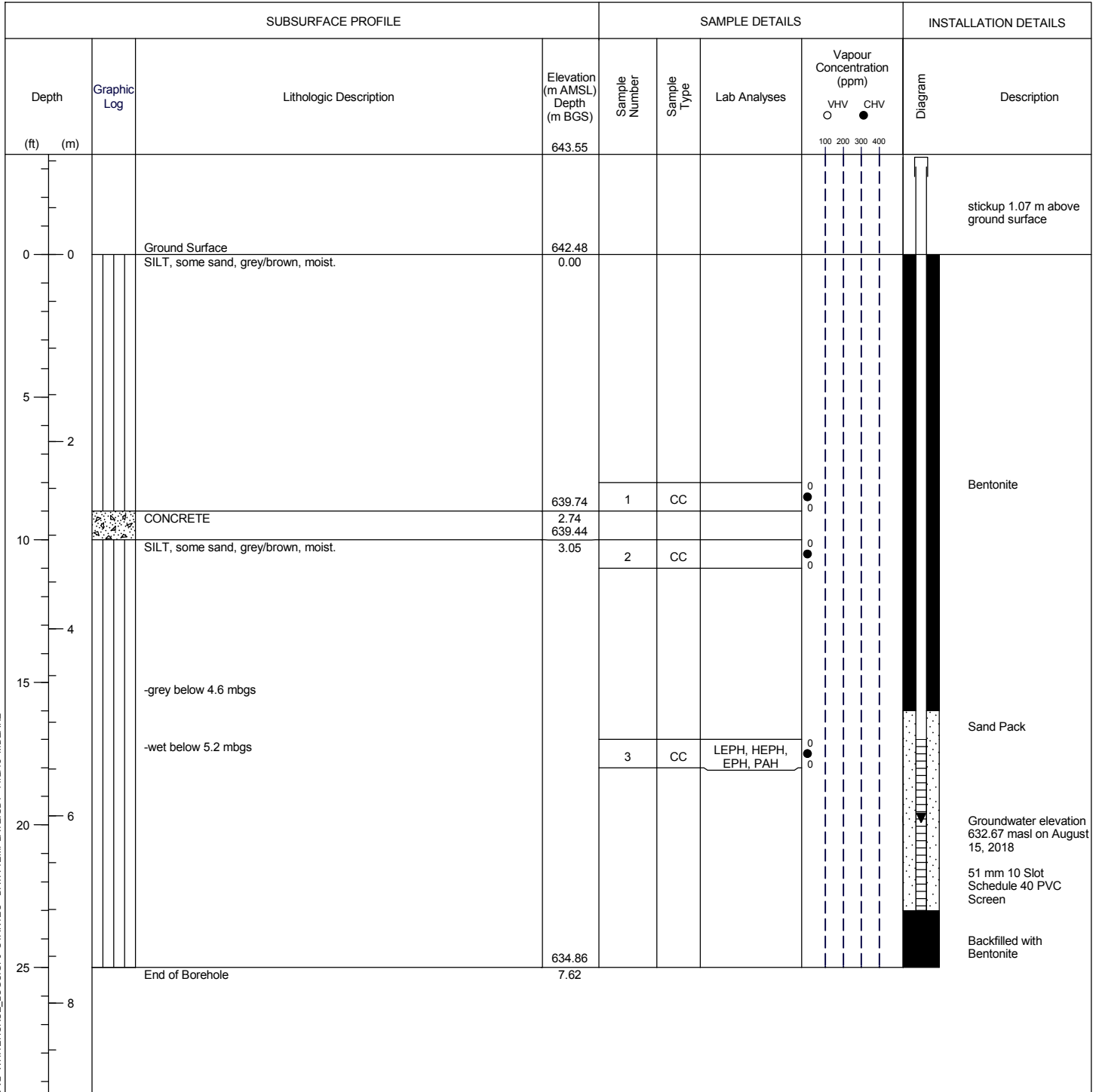


STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

# Monitoring Well: MW18-48

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 28-Jul-2018  
**Ground surface elevation:** 642.48 m AMSL  
**Top of casing elevation:** 643.55 m AMSL  
**Easting:** 496884.123  
**Northing:** 6730853.228



Screen Interval: 5.18 - 7.01 m BGS  
 Sand Pack Interval: 4.88 - 7.01 m BGS  
 Well Seal Interval: 0.00 - 4.88 m BGS

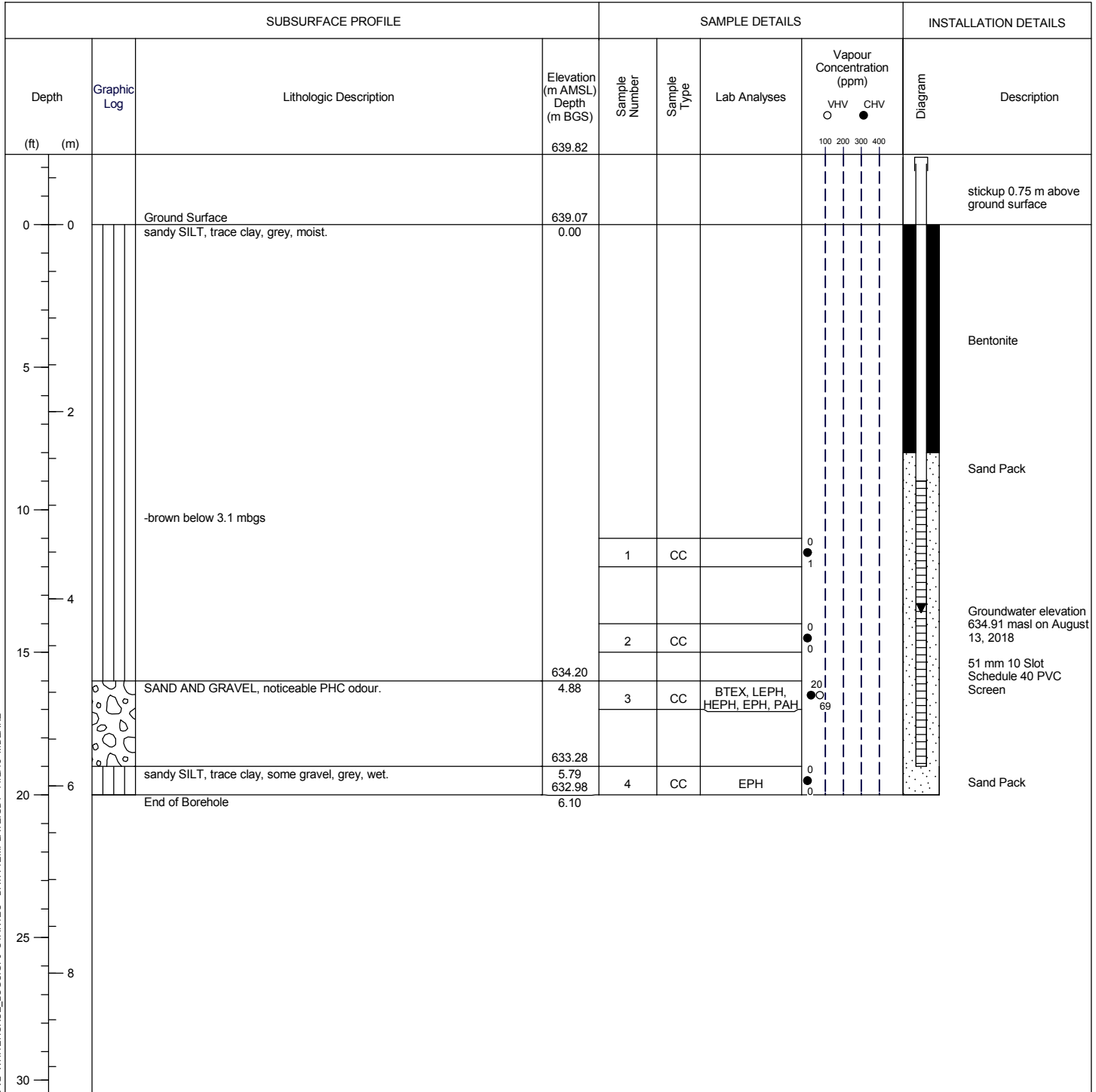
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-49

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 639.07 m AMSL  
**Top of casing elevation:** 639.83 m AMSL  
**Easting:** 496907.716  
**Northing:** 6730979.923



STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

Screen Interval: 2.74 - 5.79 m BGS  
 Sand Pack Interval: 2.44 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 2.44 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-50

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 638.22 m AMSL  
**Top of casing elevation:** 638.94 m AMSL  
**Easting:** 496927.377  
**Northing:** 6730973.781

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
		Ground Surface	638.94							
0	0	sandy SILT, trace clay, some gravel, grey, moist.	638.22 0.00							stickup 0.72 m above ground surface
5		-fine to medium sand, some gravel, dry below 1.5 mbgs								Bentonite
2		-dark brown below 1.8 mbgs								
		-grey below 2.1 mbgs								
		-light brown below 2.4 mbgs								
10		-moist below 3.1 mbgs		1	CC		0	0		
		-some sand below 3.4 mbgs					0	0		
4		-some gravel, grey, wet below 3.7 mbgs		2	CC		0	0		Groundwater elevation 635.41 masl on August 14, 2018
		-sand below 3.8 mbgs		3	CC	LEPH, HEPH, EPH, PAH	0	0		51 mm 10 Slot Schedule 40 PVC Screen
15							0	0		
20	6	End of Borehole	632.12 6.10	4	CC		0	0		Sand
25										
8										
30										

Screen Interval: 2.74 - 5.79 m BGS  
 Sand Pack Interval: 2.44 - 6.10 m BGS  
 Well Seal Interval: 0.00 - 2.44 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-51

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 637.46 m AMSL  
**Top of casing elevation:** 638.17 m AMSL  
**Easting:** 496934.558  
**Northing:** 6730960.592

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0	0	Ground Surface sandy SILT, trace clay, grey, dry.	637.46 0.00							stickup 0.72 m above ground surface
5	2	-gravel below 1.5 mbgs								Bentonite
		-brown below 2.1 mbgs								
		-grey/brown below 2.4 mbgs								
10				1	CC		0	0		Groundwater elevation 636.1 masl on August 14, 2018
				2	CC		0	0		Sand Pack
15	4	-wet below 3.8 mbgs								51 mm 10 Slot Schedule 40 PVC Screen
				3	CC	LEPH, HEPH, EPH, PAH	0	0		
				4	CC		0	0		Sand Pack
20	6	End of Borehole	631.36 6.10							Backfilled with Bentonite
25	8									
30										

Screen Interval: 3.35 - 5.03 m BGS  
 Sand Pack Interval: 2.74 - 5.33 m BGS  
 Well Seal Interval: 0.00 - 2.74 m BGS

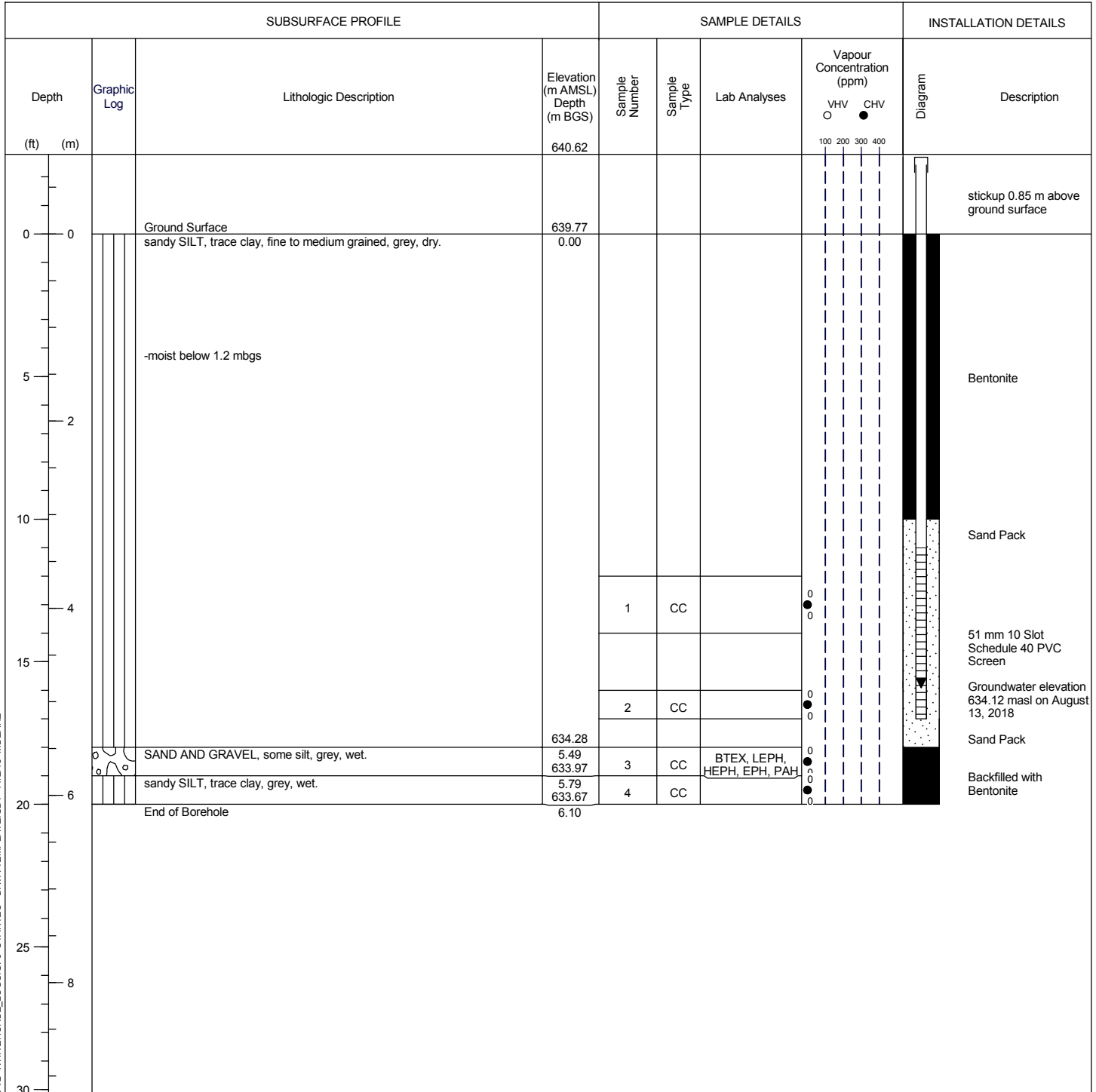
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-52

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 639.77 m AMSL  
**Top of casing elevation:** 640.61 m AMSL  
**Easting:** 496896.375  
**Northing:** 6730992.693



Screen Interval: 3.35 - 5.18 m BGS  
 Sand Pack Interval: 3.05 - 5.49 m BGS  
 Well Seal Interval: 0.00 - 3.05 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available





# Monitoring Well: MW18-53

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 638.14 m AMSL  
**Top of casing elevation:** 638.77 m AMSL  
**Easting:** 496922.643  
**Northing:** 6731001.777

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface sandy SILT, trace clay, grey, wet.	638.14 0.00				100	200		stickup 0.64 m above ground surface
5		-gravel below 1.5 mbgs								Bentonite
10		SAND, some gravel, trace silt, grey, moist.	635.09 3.05	1	CC		0	0		Sand Pack
15		-wet below 3.7 mbgs								
20		sandy SILT, trace clay, grey, wet.	634.17 3.96	2	CC	LEPH, HEPH, EPH, PAH	0	0		51 mm 10 Slot Schedule 40 PVC Screen
25										Groundwater elevation 634.91 masl on August 13, 2018
30				4	CC		0	0		Sand Pack
6		End of Borehole	632.04 6.10							Backfilled with Bentonite

Screen Interval: 3.05 - 4.57 m BGS  
 Sand Pack Interval: 2.74 - 4.88 m BGS  
 Well Seal Interval: 0.00 - 2.74 m BGS

Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-54

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 637.64 m AMSL  
**Top of casing elevation:** 638.16 m AMSL  
**Easting:** 496955.17  
**Northing:** 6731009.249

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS		
Depth (ft) (m)	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Lab Analyses	Vapour Concentration (ppm)		Diagram	Description
							VHV ○	CHV ●		
0		Ground Surface sandy SILT, trace clay, some gravel.	637.64 0.00							stickup 0.52 m above ground surface
5										Bentonite
10		SAND AND GRAVEL -wet below 3.4 mbgs	634.59 3.05	1	CC					Sand Pack
4				2	CC	LEPH, HEPH, EPH, PAH				Groundwater elevation 635.99 masl on August 14, 2018
15										51 mm 10 Slot Schedule 40 PVC Screen
			632.61							Sand Pack
		sandy SILT, trace clay.	5.03 632.31	3	CC					
		SAND and GRAVEL	5.33	4	CC					
20		End of Borehole	631.54 6.10							Backfilled with Bentonite

STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

Screen Interval: 3.05 - 4.57 m BGS  
 Sand Pack Interval: 2.74 - 4.88 m BGS  
 Well Seal Interval: 0.00 - 2.74 m BGS

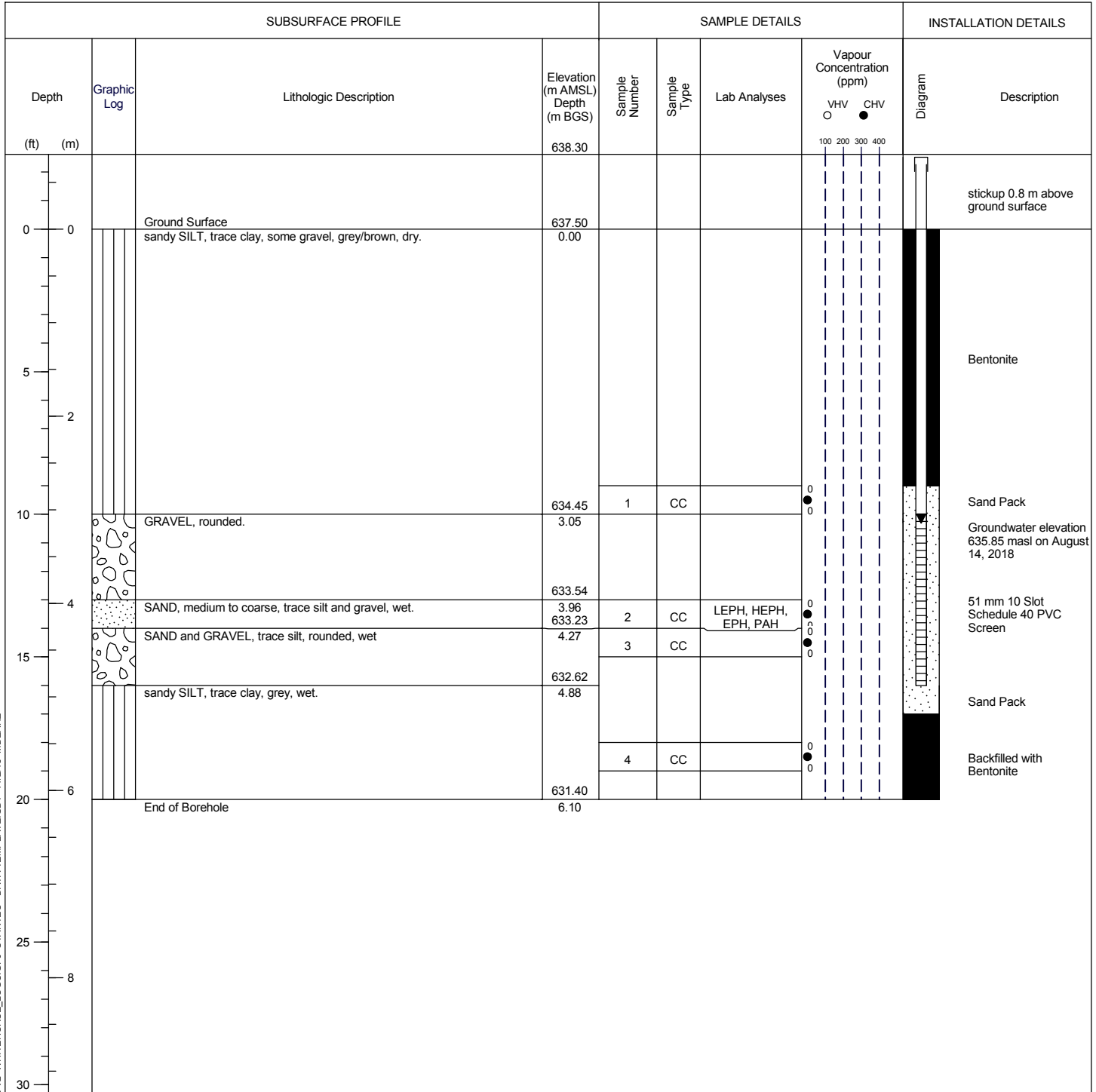
**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-55

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 637.50 m AMSL  
**Top of casing elevation:** 638.30 m AMSL  
**Easting:** 496934.132  
**Northing:** 6731013.12



STANTEC BOREHOLE AND WELL V2 WHITEHORSE\_LOGS.GPJ STANTEC - DATA TEMPLATE.GDT 11/2/18 MDEANE

Screen Interval: 3.05 - 4.88 m BGS  
 Sand Pack Interval: 2.74 - 5.18 m BGS  
 Well Seal Interval: 0.00 - 2.74 m BGS

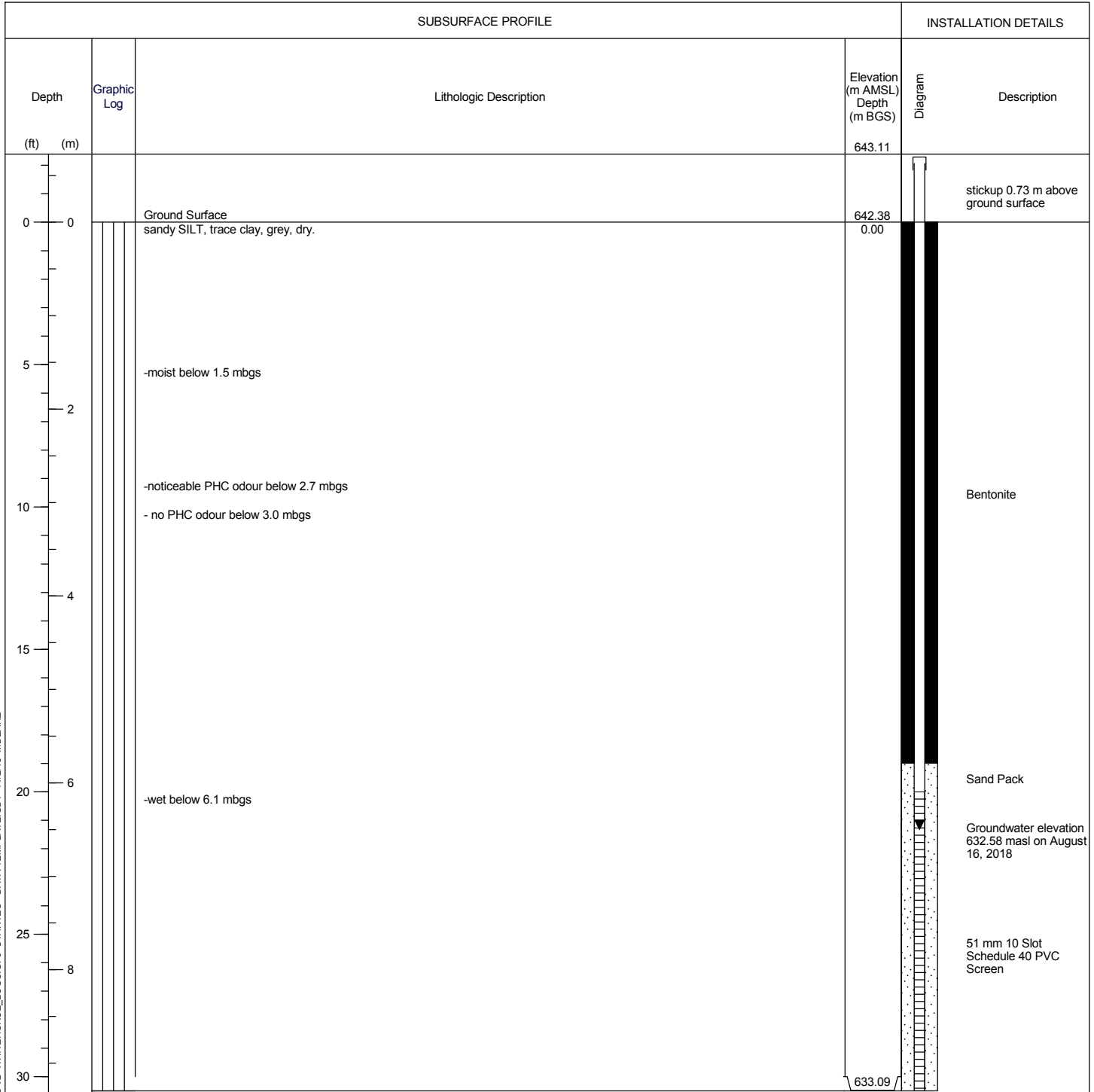
Notes:  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 CC - continuous core sample  
 ppm - parts per million by volume  
 n/a - not available



# Monitoring Well: MW18-56

**Project:** 5th Avenue Phase II ESA (2018-2019)  
**Client:** Government of Yukon  
**Location:** Whitehorse, Yukon  
**Number:** 123221161  
**Field investigator:** MD  
**Contractor:** Midnight Sun Drilling

**Drilling method:** Sonic  
**Date started/completed:** 01-Aug-2018  
**Ground surface elevation:** 642.38 m AMSL  
**Top of casing elevation:** 643.11 m AMSL  
**Easting:** 496886.992  
**Northing:** 6730935.32



Screen Interval: 6.10 - 9.30 m BGS  
 Sand Pack Interval: 5.79 - 9.30 m BGS  
 Well Seal Interval: 0.00 - 5.79 m BGS

**Notes:**  
 m AMSL - metres above mean sea level  
 m BGS - metres below ground surface  
 n/a - not available



# **APPENDIX E**

## **ANALYTICAL TABLES**

**Table I - Summary of Groundwater Field Observations**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Monitoring Well ID	Easting	Northing	Date	HC Wellspace Vapour Level (ppmv)	IBL Wellspace Vapour Level (ppmv)	Top of Screened Interval (mbg)	Bottom of Screened Interval (mbg)	Centre of Screened Interval (mbg)	Screen Length (m)	Elevation <sup>1</sup> of T.O.P. (m)	Elevation <sup>1</sup> at Grade (m)	Elevation of Bottom of Screened Interval	Depth to Water from T.O.P. (m)	Apparent NAPL Thickness (mm)	Depth to Water below Grade (m)	Groundwater Elevation (m)
BH18-47	496888.33	6730855.88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	642.013	642.046	N/A	N/A	N/A	N/A	N/A
MW16-01	496908.00	6730899.00	15-Aug-18	LTDL	3	4.20	6.00	5.10	1.80	639.3	639.41	633.41	4.371	nil	4.48	637.64
MW16-02	496921.00	6730854.00	21-Aug-18	LTDL	LTDL	4.60	6.00	5.30	1.40	639.94	640.03	634.03	4.672	nil	4.76	637.34
MW16-03	496942.00	6730764.00	16-Aug-18	n.m.	n.m.	3.30	4.80	4.05	1.50	640.06	640.06	635.26	n.m.	nil	n.m.	n.m.
MW16-04	496932.00	6730784.00	15-Aug-18	n.m.	n.m.	6.20	9.20	7.70	3.00	641.16	641.16	631.96	n.m.	nil	n.m.	n.m.
MW16-05	496930.22	6730778.88	30-Jul-18	LTDL	LTDL	5.20	7.00	6.10	1.80	641.93	641.93	634.93	6.553	nil	6.55	635.46
MW16-05	496930.22	6730778.88	15-Aug-18	n.m.	n.m.	5.20	7.00	6.10	1.80	641.93	641.93	634.93	n.m.	nil	n.m.	n.m.
MW16-08	496915.53	6730829.24	30-Jul-18	LTDL	LTDL	4.20	5.70	4.95	1.50	640.46	641.01	635.31	5.203	nil	5.75	636.81
MW16-08	496915.53	6730829.24	15-Aug-18	LTDL	1	4.20	5.70	4.95	1.50	640.46	641.01	635.31	5.229	nil	5.78	635.23
MW16-09	496912.95	6730891.80	30-Jul-18	LTDL	3	3.80	5.20	4.50	1.40	639.32	639.962	634.76	4.349	nil	4.99	636.11
MW16-09	496912.95	6730891.80	21-Aug-18	n.m.	n.m.	3.80	5.20	4.50	1.40	639.32	639.962	634.76	4.201	nil	4.84	636.26
MW16-10	496931.00	6730844.00	21-Aug-18	n.m.	n.m.	5.00	6.50	5.75	1.50	639.77	639.84	633.34	4.374	nil	4.44	636.09
MW16-11	496902.25	6730912.00	30-Jul-18	LTDL	47	4.50	6.10	5.30	1.60	639.85	640.01	633.91	4.898	nil	5.06	635.56
MW16-11	496902.25	6730912.00	17-Aug-18	LTDL	LTDL	4.50	6.10	5.30	1.60	639.85	640.01	633.91	4.92	nil	5.08	635.54
MW16-12	496923.78	6730898.85	30-Jul-18	LTDL	LTDL	4.00	5.50	4.75	1.50	638.8	638.94	633.44	3.834	nil	3.97	636.02
MW16-12	496923.78	6730898.85	21-Aug-18	LTDL	LTDL	4.00	5.50	4.75	1.50	638.8	638.94	633.44	3.851	nil	3.99	636.00
MW16-13	496909.00	6730952.00	15-Aug-18	LTDL	36	4.80	6.20	5.50	1.40	639.54	639.61	633.41	4.596	nil	4.67	635.25
MW17-15	496918.00	6730954.00	14-Aug-18	LTDL	LTDL	12.20	13.80	13.00	1.60	640.62	639.63	625.83	4.656	nil	3.67	635.19
MW17-15	496918.00	6730954.00	30-Jul-18	LTDL	LTDL	12.20	13.80	13.00	1.60	640.62	639.63	625.83	4.68	nil	3.69	635.17
MW17-16	496907.00	6730952.00	16-Aug-18	LTDL	1	4.00	5.50	4.75	1.50	639.54	639.65	634.15	4.633	nil	4.74	635.22
MW17-17	496901.80	6730864.50	30-Jul-18	LTDL	31	7.90	8.20	8.05	0.30	643.08	641.98	633.78	6.641	nil	5.54	633.21
MW17-17	496901.80	6730864.50	15-Aug-18	LTDL	53	7.90	8.20	8.05	0.30	643.08	641.98	633.78	6.653	nil	5.55	633.20
MW17-19	496891.90	6730910.60	30-Jul-18	LTDL	2	7.90	9.40	8.65	1.50	642.87	641.84	632.44	5.604	nil	4.57	634.25
MW17-19	496891.90	6730910.60	17-Aug-18	LTDL	LTDL	7.90	9.40	8.65	1.50	642.87	641.84	632.44	5.613	nil	4.58	637.47
MW17-20	496916.40	6730916.10	30-Jul-18	LTDL	33	3.30	4.90	4.10	1.60	639.21	639.31	634.41	4.213	nil	4.31	638.87
MW17-20	496916.40	6730916.10	17-Aug-18	LTDL	16	3.30	4.90	4.10	1.60	639.21	639.31	634.41	4.233	nil	4.33	638.85
MW18-30	496886.12	6730936.84	16-Aug-18	LTDL	19	4.60	6.10	5.35	1.50	643.369	642.471	636.37	DRY	nil	DRY	DRY
MW18-31	496910.44	6730970.19	30-Jul-18	35	LTDL	4.60	6.10	5.35	1.50	639.751	638.904	632.80	4.743	nil	3.90	638.34
MW18-31	496910.44	6730970.19	21-Aug-18	LTDL	LTDL	3.05	6.10	4.58	3.05	639.751	638.904	632.80	4.754	nil	3.91	638.33
MW18-33	496936.34	6730918.21	30-Jul-18	LTDL	1	3.05	6.10	4.58	3.05	638.241	638.405	632.31	3.476	nil	3.64	639.60
MW18-33	496936.34	6730918.21	25-Aug-18	LTDL	LTDL	3.05	6.10	4.58	3.05	638.241	638.405	632.31	3.432	nil	3.60	636.32
MW18-34	496949.62	6730896.75	30-Jul-18	LTDL	1	3.50	5.00	4.25	1.50	639.08	638.405	633.41	4.372	nil	3.70	635.38
MW18-34	496949.62	6730896.75	25-Aug-18	LTDL	LTDL	3.50	5.00	4.25	1.50	639.08	638.405	633.41	4.282	nil	3.61	635.47

**Table I - Summary of Groundwater Field Observations**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Monitoring Well ID	Easting	Northing	Date	HC Wellspace Vapour Level (ppmv)	IBL Wellspace Vapour Level (ppmv)	Top of Screened Interval (mbg)	Bottom of Screened Interval (mbg)	Centre of Screened Interval (mbg)	Screen Length (m)	Elevation <sup>1</sup> of T.O.P. (m)	Elevation <sup>1</sup> at Grade (m)	Elevation of Bottom of Screened Interval	Depth to Water from T.O.P. (m)	Apparent NAPL Thickness (mm)	Depth to Water below Grade (m)	Groundwater Elevation (m)
MW18-35	496918.62	6730874.45	30-Jul-18	LTDL	5	4.60	6.10	5.35	1.50	640.345	639.618	633.52	5.092	nil	4.37	634.66
MW18-35	496918.62	6730874.45	17-Aug-18	LTDL	5	4.60	6.10	5.35	1.50	640.345	639.618	633.52	5.104	nil	4.38	634.65
MW18-36	496934.45	6730875.00	30-Jul-18	LTDL	LTDL	3.35	4.90	4.13	1.55	640.089	639.117	634.22	5.028	nil	4.06	634.72
MW18-36	496934.45	6730875.00	15-Aug-18	LTDL	LTDL	3.35	4.90	4.13	1.55	640.089	639.117	634.22	4.981	nil	4.01	634.77
MW18-37	496934.43	6730876.93	15-Aug-18	LTDL	LTDL	13.70	15.25	14.48	1.55	639.844	639.024	623.77	4.397	nil	3.58	635.35
MW18-38	496893.43	6730881.37	30-Jul-18	LTDL	LTDL	4.60	6.10	5.35	1.50	641.465	640.478	634.38	6.232	nil	5.24	633.52
MW18-38	496893.43	6730881.37	15-Aug-18	LTDL	LTDL	4.60	6.10	5.35	1.50	641.465	640.478	634.38	6.046	nil	5.06	633.71
MW18-39	496920.65	6730957.05	30-Jul-18	LTDL	19	3.05	6.10	4.58	3.05	639.509	638.721	632.62	4.476	nil	3.69	635.28
MW18-39	496920.65	6730957.05	17-Aug-18	LTDL	34	3.05	6.10	4.58	3.05	639.509	638.721	632.62	4.494	nil	3.71	635.26
MW18-40	496906.92	6730845.11	15-Aug-18	LTDL	LTDL	13.70	15.25	14.48	1.55	642.087	641.223	625.97	5.727	nil	4.86	634.02
MW18-41	496910.39	6730851.37	30-Jul-18	55	LTDL	4.60	6.10	5.35	1.50	641.993	641.113	635.01	6.636	nil	5.76	633.12
MW18-41	496910.39	6730851.37	15-Aug-18	LTDL	LTDL	4.60	6.10	5.35	1.50	641.993	641.113	635.01	6.646	nil	5.77	633.11
MW18-42	496944.75	6730780.99	30-Jul-18	LTDL	LTDL	3.50	5.05	4.28	1.55	639.373	639.435	634.39	3.972	nil	4.03	635.78
MW18-43	496937.38	6730782.63	30-Jul-18	LTDL	LTDL	13.40	14.95	14.18	1.55	639.527	639.589	624.64	4.4	nil	4.46	635.35
MW18-44	496949.00	6730989.00	30-Jul-18	LTDL	LTDL	2.90	4.40	3.65	1.50	638.321	637.697	633.30	3.989	nil	3.36	635.76
MW18-44	496949.00	6730989.00	25-Jul-18	LTDL	4	2.90	4.40	3.65	1.50	638.321	637.697	633.30	3.978	nil	3.35	635.77
MW18-45	496912.53	6730885.93	30-Jul-18	LTDL	LTDL	3.50	5.00	4.25	1.50	639.824	639.189	634.19	3.951	nil	3.32	635.80
MW18-45	496912.53	6730885.93	16-Aug-18	LTDL	LTDL	3.50	5.00	4.25	1.50	639.824	639.189	634.19	3.918	nil	3.28	635.83
MW18-48	496884.12	6730853.23	30-Jul-18	LTDL	LTDL	5.20	6.70	5.95	1.50	643.552	642.484	635.78	7.292	nil	6.22	632.46
MW18-48	496884.12	6730853.23	15-Aug-18	LTDL	1	5.20	6.70	5.95	1.50	643.552	642.484	635.78	7.081	nil	6.01	632.67
MW18-49	496907.72	6730979.92	2-Aug-18	550	3	2.75	5.80	4.28	3.05	639.826	639.073	633.27	4.831	nil	4.08	634.92
MW18-49	496907.72	6730979.92	13-Aug-18	LTDL	3	2.75	5.80	4.28	3.05	639.826	639.073	633.27	4.844	nil	4.09	634.91
MW18-50	496927.38	6730973.78	2-Aug-18	LTDL	LTDL	2.75	5.80	4.28	3.05	638.936	638.219	632.42	4.34	nil	3.62	635.41
MW18-50	496927.38	6730973.78	14-Aug-18	LTDL	LTDL	2.75	5.80	4.28	3.05	638.936	638.219	632.42	4.339	nil	3.62	635.41
MW18-51	496934.56	6730960.59	2-Aug-18	LTDL	LTDL	3.50	5.05	4.28	1.55	638.172	637.456	632.41	3.691	nil	2.97	636.06
MW18-51	496934.56	6730960.59	14-Aug-18	LTDL	2	3.50	5.05	4.28	1.55	638.172	637.456	632.41	3.647	nil	2.93	636.10
MW18-52	496896.38	6730992.69	2-Aug-18	25	LTDL	3.50	5.05	4.28	1.55	640.611	639.765	634.72	5.621	nil	4.78	634.13
MW18-52	496896.38	6730992.69	13-Aug-18	25	1	3.50	5.05	4.28	1.55	640.611	639.765	634.72	5.629	nil	4.78	634.12
MW18-53	496922.64	6731001.78	2-Aug-18	65	1	3.05	4.60	3.83	1.55	638.773	638.136	633.54	4.445	nil	3.81	635.31
MW18-53	496922.64	6731001.78	13-Aug-18	LTDL	3	3.05	4.60	3.83	1.55	638.773	638.136	633.54	4.844	nil	4.21	634.91
MW18-54	496955.17	6731009.25	2-Aug-18	LTDL	4	3.05	4.60	3.83	1.55	638.158	637.639	633.04	3.837	nil	3.32	635.91
MW18-54	496955.17	6731009.25	14-Aug-18	LTDL	1	3.05	4.60	3.83	1.55	638.158	637.639	633.04	3.76	nil	3.24	635.99
MW18-55	496934.13	6731013.12	2-Aug-18	10	7	3.05	4.60	3.83	1.55	638.299	637.499	632.90	3.979	nil	3.18	635.77
MW18-55	496934.13	6731013.12	14-Aug-18	LTDL	LTDL	3.05	4.60	3.83	1.55	638.299	637.499	632.90	3.898	nil	3.10	635.85
MW18-56	496886.99	6730935.32	2-Aug-18	120	152	6.10	9.15	7.63	3.05	643.113	642.384	633.23	6.995	nil	6.27	632.76
MW18-56	496886.99	6730935.32	16-Aug-18	LTDL	8	6.10	9.15	7.63	3.05	643.113	642.384	633.23	7.167	nil	6.44	632.58

Notes

- N/A not applicable
- n.m. not measured
- LTDL less than detectable limits
- HC hydrocarbon
- IBL isobutylene
- mbg metres below ground surface
- ppmv parts per million by volume
- T.O.P. top of pipe
- <sup>1</sup> geodetic elevation
- NAPL non-aqueous phase liquid

**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location	Sample Date	Sample ID	Sample Depth	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	MW18-30		MW18-31		MW18-33		MW18-34		MW18-35		MW18-37		MW18-38		
									28-Jul-18 MW18-30 SA04	28-Jul-18 QC18-04	28-Jul-18 MW18-31 SA06	28-Jul-18 MW18-31 SA07	28-Jul-18 MW18-31 SA08	24-Jul-18 MW18-33 SA05	25-Jul-18 MW18-34 SA05	25-Jul-18 MW18-34 SA06	26-Jul-18 MW18-35 SA08	26-Jul-18 MW18-35 SA10	26-Jul-18 QC18-02	26-Jul-18 MW18-35 SA11	27-Jul-18 MW18-37 SA06	27-Jul-18 MW18-37 SA07	28-Jul-18 MW18-38 SA07
									2.74 - 3.05	4.27 - 4.57	5.18 - 5.49	5.79 - 6.1	3.35 - 3.66	3.05 - 3.66	3.66 - 4.27	5.49 - 5.79	7.01 - 7.32	7.93 - 8.23	2.74 - 3.05	3.35 - 3.81	4.88 - 5.18		
									MAXX B863863 TZ2554	MAXX B863863 TZ2579	MAXX B863863 TZ2564	MAXX B863863 TZ2565	MAXX B863863 TZ2566	MAXX B862213 TY2774	MAXX B862213 TY2789	MAXX B862213 TY2790	MAXX B862770 TY5396	MAXX B862770 TY5398	MAXX B862770 TY5405	MAXX B862770 TY5399	MAXX B863859 TZ2465	MAXX B863859 TZ2466	MAXX B863863 TZ2549
									A B YUKON-CSR Schedule 1	C D E F G H YUKON-CSR Schedule 2													
<b>General Parameters</b>																							
Moisture Content	%	n/v	n/v	18	18	7.5	20	20	13	15	18	14	19	19	18	2.8	19	18					
Soluble (2:1) pH	S.U.	n/v	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Petroleum Hydrocarbons</b>																							
EPH C10-C19	mg/kg	n/v	n/v	<100	<100	1,400	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
LEPH (C10-C19 less PAH)	mg/kg	1,000 <sup>A</sup> 2,000 <sup>B</sup>	n/v	<100	<100	1400 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
EPH C19-C32	mg/kg	n/v	n/v	<100	<100	160	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	
HEPH (C19-C32 less PAH)	mg/kg	1,000 <sup>A</sup> 5,000 <sup>B</sup>	n/v	<100	<100	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VH (C6-C10)	mg/kg	n/v	n/v	<10	<10	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VPH (C6-C10 Minus BTEX)	mg/kg	200 <sup>A</sup> 5 <sup>B</sup>	n/v	<10	<10	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>BTEX</b>																							
Benzene	mg/kg	n/v	1,000 <sup>C</sup> 70 <sup>D</sup> 10 <sup>EH</sup> 4,000 <sup>F</sup> 150 <sup>G</sup>	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	0.036	-	-	-	-	
Ethylbenzene	mg/kg	n/v	3,500 <sup>C</sup> 1 <sup>D</sup> 6,000 <sup>EH</sup> 10,000 <sup>F</sup> 20 <sup>G</sup>	0.013	<0.010	<0.010	-	-	-	-	-	-	-	-	-	<0.010	<0.010	0.05	-	-	-	-	
Methyl tert-butyl ether (MTBE)	mg/kg	n/v	n/v	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	<0.10	<0.10	<0.10	-	-	-	-	
Styrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	<0.030	<0.030	<0.030	-	-	-	-	-	-	-	-	-	<0.030	<0.030	<0.030	-	-	-	-	
Toluene	mg/kg	n/v	40,000 <sup>C</sup> 1.5 <sup>D</sup> 40 <sup>EH</sup> 100,000 <sup>F</sup> 25 <sup>G</sup>	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	0.049	-	-	-	-	
Xylene, m & p-	mg/kg	n/v	n/v	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	<0.040	<0.040	0.047	-	-	-	-	
Xylene, o-	mg/kg	n/v	n/v	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	<0.040	<0.040	0.048	-	-	-	-	
Xylenes, Total	mg/kg	n/v	65,000 <sup>C</sup> 5 <sup>D</sup> 200,000 <sup>F</sup> 50 <sup>G</sup>	<0.040	<0.040	<0.040	-	-	-	-	-	-	-	-	-	<0.040	<0.040	0.095	-	-	-	-	
<b>Polycyclic Aromatic Hydrocarbons</b>																							
Acenaphthene	mg/kg	n/v	n/v	<0.0050	<0.0050	0.24	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	
Acenaphthylene	mg/kg	n/v	n/v	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	<0.0050	<0.0050	<0.0050	<0.0050	-	-	<0.0050	
Acridine	mg/kg	n/v	n/v	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	
Anthracene	mg/kg	n/v	n/v	<0.0040	<0.0040	0.012	-	-	-	-	-	-	-	-	-	<0.0040	<0.0040	<0.0040	<0.0040	-	-	<0.0040	
Benzo(a)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Benzo(a)pyrene	mg/kg	n/v	5 <sup>C</sup> 1 <sup>D</sup> 15 <sup>F</sup> 10 <sup>G</sup>	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Benzo(b)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Benzo(b)fluoranthene	mg/kg	n/v	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Benzo(g,h,i)perylene	mg/kg	n/v	n/v	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	
Benzo(k)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Chrysene	mg/kg	n/v	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Dibenzo(a,h)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Fluoranthene	mg/kg	n/v	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Fluorene	mg/kg	n/v	n/v	<0.020	<0.020	0.28	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Indeno(1,2,3-cd)pyrene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Methylnaphthalene, 1-	mg/kg	n/v	n/v	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	
Methylnaphthalene, 2-	mg/kg	n/v	n/v	<0.020	<0.020	0.041	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
Naphthalene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	<0.010	<0.010	0.012	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	
Phenanthrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	<0.010	<0.010	0.29	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	-	-	<0.010	
Pyrene	mg/kg	10 <sup>A</sup> 100 <sup>B</sup>	n/v	<0.020	<0.020	<0.020	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	-	-	<0.020	
High Molecular Weight PAHs	mg/kg	n/v	n/v	<0.050	<0.050	<0.050	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	
Low Molecular Weight PAHs	mg/kg	n/v	n/v	<0.050	<0.050	0.88	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	
Total PAH	mg/kg	n/v	n/v	<0.050	<0.050	0.88	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	<0.050	



**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location				MW18-39					MW18-40	MW18-43			MW18-44	MW18-45	BH18-47		MW18-48	
Sample Date				28-Jul-18	28-Jul-18	28-Jul-18	28-Jul-18	28-Jul-18	27-Jul-18	25-Jul-18	25-Jul-18	25-Jul-18	24-Jul-18	25-Jul-18	28-Jul-18	28-Jul-18	28-Jul-18	
Sample ID				MW18-39 SA07	MW18-39 SA08	QC18-05	MW18-39 SA09	MW18-39 SA10	MW18-40 SA03	MW18-43 SA05	MW18-43 SA06	QC18-01	MW18-44 SA05	MW18-45 SA05	MW18-47 SA04	MW18-47 SA05	MW18-48 SA03	
Sample Depth				4.57 - 4.88	5.79 - 6.1		6.4 - 6.71	7.01 - 7.62	1.52 - 1.83	3.66 - 3.96	4.27 - 4.57		3.05 - 3.35	3.35 - 3.96	2.44 - 2.74	3.35 - 3.66	5.18 - 5.49	
Laboratory				MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	
Laboratory Work Order				B863863	B863863	B863863	B863863	B863863	B863859	B862756	B862756	B862756	B862213	B862756	B863863	B863863	B863863	
Laboratory Sample ID				TZ2573	TZ2574	TZ2580	TZ2575	TZ2576	TZ2480	TY5296	TY5297	TY5302	TY2768	TY5286	TZ2540	TZ2541	TZ2536	
Sample Type	Units	A B	C D E F G H	YUKON-CSR Schedule 1				YUKON-CSR Schedule 2										
<b>General Parameters</b>																		
Moisture Content	%	n/v	n/v	7.6	18	19	20	20	4.1	2.1	15	12	11	19	15	15	20	
Soluble (2:1) pH	S.U.	n/v	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Petroleum Hydrocarbons</b>																		
EPH C10-C19	mg/kg	n/v	n/v	960	780	530	170	<100	<100	<100	<100	<100	<100	<100	990	<100	<100	
LEPH (C10-C19 less PAH)	mg/kg	1,000 <sup>A</sup> 2,000 <sup>B</sup>	n/v	-	780	530	-	-	<100	-	-	-	-	-	990	-	<100	
EPH C19-C32	mg/kg	n/v	n/v	110	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	510	<100	<100	
HEPH (C19-C32 less PAH)	mg/kg	1,000 <sup>A</sup> 5,000 <sup>B</sup>	n/v	-	<100	<100	-	-	<100	-	-	-	-	-	510	-	<100	
VH (C6-C10)	mg/kg	n/v	n/v	-	27	28	-	-	<10	-	<10	<10	-	<10	-	-	-	
VPH (C6-C10 Minus BTEX)	mg/kg	200 <sup>A,B</sup>	n/v	-	27	28	-	-	<10	-	<10	<10	-	<10	-	-	-	
<b>BTEX</b>																		
Benzene	mg/kg	n/v	1,000 <sup>C</sup> 70 <sup>D</sup> 10 <sup>EH</sup> 4,000 <sup>F</sup> 150 <sup>G</sup>	-	<0.0050	<0.0050	-	-	<0.0050	-	<0.0050	<0.0050	-	<0.0050	-	-	-	
Ethylbenzene	mg/kg	n/v	3,500 <sup>C</sup> 1 <sup>D</sup> 6,000 <sup>EH</sup> 10,000 <sup>F</sup> 20 <sup>G</sup>	-	<0.010	<0.010	-	-	<0.010	-	<0.010	<0.010	-	<0.010	-	-	-	
Methyl tert-butyl ether (MTBE)	mg/kg	n/v	n/v	-	<0.10	<0.10	-	-	<0.10	-	<0.10	<0.10	-	<0.10	-	-	-	
Styrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	-	<0.030	<0.030	-	-	<0.030	-	<0.030	<0.030	-	<0.030	-	-	-	
Toluene	mg/kg	n/v	40,000 <sup>C</sup> 1.5 <sup>D</sup> 40 <sup>EH</sup> 100,000 <sup>F</sup> 25 <sup>G</sup>	-	<0.020	<0.020	-	-	<0.020	-	<0.020	<0.020	-	<0.020	-	-	-	
Xylene, m & p-	mg/kg	n/v	n/v	-	<0.040	<0.040	-	-	<0.040	-	<0.040	<0.040	-	<0.040	-	-	-	
Xylene, o-	mg/kg	n/v	n/v	-	<0.040	<0.040	-	-	<0.040	-	<0.040	<0.040	-	<0.040	-	-	-	
Xylenes, Total	mg/kg	n/v	65,000 <sup>C</sup> 5 <sup>D</sup> 200,000 <sup>F</sup> 50 <sup>G</sup>	-	<0.040	<0.040	-	-	<0.040	-	<0.040	<0.040	-	<0.040	-	-	-	
<b>Polycyclic Aromatic Hydrocarbons</b>																		
Acenaphthene	mg/kg	n/v	n/v	-	0.079	0.06	-	-	<0.0050	-	-	-	-	-	0.033	-	<0.0050	
Acenaphthylene	mg/kg	n/v	n/v	-	<0.0050	<0.0050	-	-	<0.0050	-	-	-	-	-	0.0088	-	<0.0050	
Acridine	mg/kg	n/v	n/v	-	<0.050	<0.050	-	-	<0.050	-	-	-	-	-	<0.050	-	<0.050	
Anthracene	mg/kg	n/v	n/v	-	0.0049	<0.0040	-	-	<0.0040	-	-	-	-	-	0.049	-	<0.0040	
Benzo(a)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	0.038	-	<0.020	
Benzo(a)pyrene	mg/kg	n/v	5 <sup>C</sup> 1 <sup>D</sup> 15 <sup>F</sup> 10 <sup>G</sup>	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	0.034	-	<0.020	
Benzo(b)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	<0.020	-	<0.020	
Benzo(b)fluoranthene	mg/kg	n/v	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	<0.020	-	<0.020	
Benzo(g,h,i)perylene	mg/kg	n/v	n/v	-	<0.050	<0.050	-	-	<0.050	-	-	-	-	-	<0.050	-	<0.050	
Benzo(k)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	<0.020	-	<0.020	
Chrysene	mg/kg	n/v	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	0.049	-	<0.020	
Dibenzo(a,h)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	<0.020	-	<0.020	
Fluoranthene	mg/kg	n/v	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	0.11	-	<0.020	
Fluorene	mg/kg	n/v	n/v	-	0.091	0.076	-	-	<0.020	-	-	-	-	-	0.04	-	<0.020	
Indeno(1,2,3-cd)pyrene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	<0.020	-	<0.020	
Methylnaphthalene, 1-	mg/kg	n/v	n/v	-	0.087	0.084	-	-	<0.050	-	-	-	-	-	0.42	-	<0.050	
Methylnaphthalene, 2-	mg/kg	n/v	n/v	-	0.044	0.082	-	-	<0.020	-	-	-	-	-	0.34	-	<0.020	
Naphthalene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	-	0.022	0.055	-	-	<0.010	-	-	-	-	-	0.057	-	<0.010	
Phenanthrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	-	0.037	0.028	-	-	<0.010	-	-	-	-	-	0.3	-	<0.010	
Pyrene	mg/kg	10 <sup>A</sup> 100 <sup>B</sup>	n/v	-	<0.020	<0.020	-	-	<0.020	-	-	-	-	-	0.14	-	<0.020	
High Molecular Weight PAHs	mg/kg	n/v	n/v	-	<0.050	<0.050	-	-	<0.050	-	-	-	-	-	0.37	-	<0.050	
Low Molecular Weight PAHs	mg/kg	n/v	n/v	-	0.36	0.38	-	-	<0.050	-	-	-	-	-	1.3	-	<0.050	
Total PAH	mg/kg	n/v	n/v	-	0.36	0.38	-	-	<0.050	-	-	-	-	-	1.6	-	<0.050	

**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location	Sample Date	Sample ID	Sample Depth	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	MW18-49		MW18-50	MW18-51	MW18-52	MW18-53	MW18-54	MW18-55
								1-Aug-18 MW18-49 SA03	1-Aug-18 MW18-49 SA04	1-Aug-18 MW18-50 SA03	1-Aug-18 MW18-51 SA03	1-Aug-18 MW18-52 SA03	1-Aug-18 MW18-53 SA03	1-Aug-18 MW18-54 SA02	1-Aug-18 MW18-55 SA02
								4.88 - 5.18	5.79 - 6.1	3.96 - 4.27	4.27 - 4.57	5.49 - 5.79	3.66 - 3.96	3.35 - 3.66	3.96 - 4.27
								MAXX B865299 UA0241	MAXX B865299 UA0242	MAXX B865299 UA0245	MAXX B865299 UA0222	MAXX B865299 UA0226	MAXX B865299 UA0230	MAXX B865299 UA0250	MAXX B865299 UA0254
	Units	A B	C D E F G H												
		YUKON-CSR Schedule 1	YUKON-CSR Schedule 2												
<b>General Parameters</b>															
Moisture Content	%	n/v	n/v	6.5	15	19	23	11	9.9	6.6	12				
Soluble (2:1) pH	S.U.	n/v	n/v	-	-	-	-	-	-	-	-				
<b>Petroleum Hydrocarbons</b>															
EPH C10-C19	mg/kg	n/v	n/v	1,800	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
LEPH (C10-C19 less PAH)	mg/kg	1,000 <sup>A</sup> 2,000 <sup>B</sup>	n/v	1,800 <sup>A</sup>	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
EPH C19-C32	mg/kg	n/v	n/v	170	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
HEPH (C19-C32 less PAH)	mg/kg	1,000 <sup>A</sup> 5,000 <sup>B</sup>	n/v	170	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
VH (C6-C10)	mg/kg	n/v	n/v	68	-	-	-	-	<10	-	-	-	-	-	-
VPH (C6-C10 Minus BTEX)	mg/kg	200 <sup>A</sup> 7 <sup>B</sup>	n/v	68	-	-	-	-	<10	-	-	-	-	-	-
<b>BTEX</b>															
Benzene	mg/kg	n/v	1,000 <sup>C</sup> 70 <sup>D</sup> 10 <sup>EH</sup> 4,000 <sup>F</sup> 150 <sup>G</sup>	<0.0050	-	-	-	-	<0.0050	-	-	-	-	-	-
Ethylbenzene	mg/kg	n/v	3,500 <sup>C</sup> 1 <sup>D</sup> 6,000 <sup>EH</sup> 10,000 <sup>F</sup> 20 <sup>G</sup>	<0.010	-	-	-	-	<0.010	-	-	-	-	-	-
Methyl tert-butyl ether (MTBE)	mg/kg	n/v	n/v	<0.10	-	-	-	-	<0.10	-	-	-	-	-	-
Styrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	<0.030	-	-	-	-	<0.030	-	-	-	-	-	-
Toluene	mg/kg	n/v	40,000 <sup>C</sup> 1.5 <sup>D</sup> 40 <sup>EH</sup> 100,000 <sup>F</sup> 25 <sup>G</sup>	<0.020	-	-	-	-	<0.020	-	-	-	-	-	-
Xylene, m & p-	mg/kg	n/v	n/v	<0.040	-	-	-	-	<0.040	-	-	-	-	-	-
Xylene, o-	mg/kg	n/v	n/v	<0.040	-	-	-	-	<0.040	-	-	-	-	-	-
Xylenes, Total	mg/kg	n/v	65,000 <sup>C</sup> 5 <sup>D</sup> 200,000 <sup>F</sup> 50 <sup>G</sup>	<0.040	-	-	-	-	<0.040	-	-	-	-	-	-
<b>Polycyclic Aromatic Hydrocarbons</b>															
Acenaphthene	mg/kg	n/v	n/v	0.074	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	n/v	n/v	0.025	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acridine	mg/kg	n/v	n/v	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	mg/kg	n/v	n/v	0.009	-	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benzo(a)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(a)pyrene	mg/kg	n/v	5 <sup>C</sup> 1 <sup>D</sup> 15 <sup>F</sup> 10 <sup>G</sup>	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	mg/kg	n/v	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(g,h,i)perylene	mg/kg	n/v	n/v	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Chrysene	mg/kg	n/v	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenzo(a,h)anthracene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluoranthene	mg/kg	n/v	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	mg/kg	n/v	n/v	0.27	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Indeno(1,2,3-cd)pyrene	mg/kg	1 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Methylnaphthalene, 1-	mg/kg	n/v	n/v	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene, 2-	mg/kg	n/v	n/v	0.037	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Naphthalene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	0.053	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg	5 <sup>A</sup> 50 <sup>B</sup>	n/v	0.3	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg	10 <sup>A</sup> 100 <sup>B</sup>	n/v	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
High Molecular Weight PAHs	mg/kg	n/v	n/v	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Low Molecular Weight PAHs	mg/kg	n/v	n/v	0.77	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total PAH	mg/kg	n/v	n/v	0.77	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location				MW18-30	MW18-31	MW18-34	MW18-35	MW18-39	MW18-43	MW18-45
Sample Date				28-Jul-18	28-Jul-18	25-Jul-18	26-Jul-18	28-Jul-18	25-Jul-18	25-Jul-18
Sample ID				MW18-30 SA01	MW18-31 SA01	MW18-34 SA01	MW18-35 SA01	MW18-39 SA01	MW18-43 SA01	MW18-45 SA01
Sample Depth (m)				0.30 - 0.60	0.00 - 0.30	0.30 - 0.60	0.60 - 0.90	0.30 - 0.60	0.60 - 0.90	0.30 - 0.60
Laboratory				MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX
Laboratory Work Order				B863863	B863863	B862213	B862770	B863863	B862756	B862756
Laboratory Sample ID				TZ2551	TZ2559	TY2785	TY5389	TZ2567	TY5290	TY5282
Sample Type	Units	A B	C D E F G H							
		YUKON-CSR Schedule 1	YUKON-CSR Schedule 2							
<b>General Parameters</b>										
Moisture Content	%	n/v	n/v			-	-		-	-
Soluble (2:1) pH	S.U.	n/v	n/v	8.47	8.43	8.79	8.52	8.1	8.52	8.08
<b>Metals</b>										
Aluminum	mg/kg	n/v	n/v	10,400	15,900	12,600	13,400	15,200	9,890	16,300
Antimony	mg/kg	20 <sup>A</sup> 40 <sup>B</sup>	n/v	0.61	1	1.16	1.11	0.91	0.54	1.15
Arsenic	mg/kg	n/v	100 <sup>CG</sup> 50 <sup>D</sup> 20 <sup>EH</sup> 300 <sup>F</sup>	7.17	10.9	9.64	9.46	10.3	6.76	11.3
Barium	mg/kg	500 <sup>A</sup> 2,000 <sup>B</sup>	n/v	154	249	167	198	240	138	252
Beryllium	mg/kg	4 <sup>A</sup> 8 <sup>B</sup>	n/v	0.33	0.46	0.38	0.4	0.48	0.3	0.5
Bismuth	mg/kg	n/v	n/v	0.11	0.17	0.14	0.16	0.18	0.11	0.18
Boron	mg/kg	n/v	n/v	2.2	2.5	2.3	2.1	3.9	1.5	2.9
Cadmium	mg/kg	n/v	3-35 <sup>N6</sup> 70 <sup>D</sup> 150 <sup>PH2</sup> 100 <sup>F</sup> 500 <sup>G</sup>	0.213	0.343	0.918	0.82	0.324	0.184	0.761
Calcium	mg/kg	n/v	n/v	21,700	31,600	22,200	28,200	44,800	20,900	33,100
Chromium	mg/kg	n/v	60 <sup>EH</sup> 300 <sup>NZ</sup> 700 <sup>NZ</sup> 500 <sup>G</sup>	48.2	52.4	40	42.3	49.5	30.9	52.5
Cobalt	mg/kg	50 <sup>A</sup> 300 <sup>B</sup>	n/v	8.11	12.1	9.61	9.93	11.3	7.26	12.3
Copper	mg/kg	n/v	15,000 <sup>C</sup> 150 <sup>D</sup> 30,000 <sup>PH7</sup> 50,000 <sup>F</sup> 250 <sup>G</sup>	21.7	36.4	29.4	29.9	31.3	20.5	36.9
Iron	mg/kg	n/v	n/v	20,400	29,100	23,800	24,300	26,900	19,300	29,800
Lead	mg/kg	n/v	500 <sup>C</sup> 1,000 <sup>DF</sup> 40,000 <sup>PH12</sup> 2,000 <sup>G</sup>	7.27	10.6	47.5	39.8	9.81	6.22	24.8
Lithium	mg/kg	n/v	n/v	9.1	13	10.2	10.6	12.6	9.2	13.3
Magnesium	mg/kg	n/v	n/v	8,170	10,700	8,600	9,420	11,000	7,050	11,200
Manganese	mg/kg	n/v	n/v	370	529	436	454	512	353	549
Mercury	mg/kg	n/v	15 <sup>C</sup> 100 <sup>D</sup> 40 <sup>F</sup> 150 <sup>G</sup>	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.059
Molybdenum	mg/kg	10 <sup>A</sup> 40 <sup>B</sup>	n/v	0.67	0.75	1.07	0.74	0.84	0.53	0.79
Nickel	mg/kg	100 <sup>A</sup> 500 <sup>B</sup>	n/v	35.7	44.7	33.1	36.1	41	25	45
Phosphorus	mg/kg	n/v	n/v	808	955	830	909	975	650	1030
Potassium	mg/kg	n/v	n/v	1,110	1,770	1,320	1,320	1,610	846	1,710
Selenium	mg/kg	3 <sup>A</sup> 10 <sup>B</sup>	n/v	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	mg/kg	20 <sup>A</sup> 40 <sup>B</sup>	n/v	0.082	0.137	0.57	0.45	0.152	0.073	0.292
Sodium	mg/kg	n/v	n/v	239	314	314	355	591	227	604
Strontium	mg/kg	n/v	n/v	59.3	83.4	67.7	78.6	145	53.4	92.4
Thallium	mg/kg	n/v	n/v	0.082	0.127	0.104	0.11	0.128	0.073	0.133
Tin	mg/kg	50 <sup>A</sup> 300 <sup>B</sup>	n/v	0.37	0.53	0.63	0.51	0.48	0.32	0.75
Titanium	mg/kg	n/v	n/v	741	1070	839	889	1150	639	1180
Tungsten	mg/kg	n/v	n/v	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	mg/kg	n/v	n/v	0.858	1.15	1.25	1.2	1.8	0.878	1.63
Vanadium	mg/kg	200 <sup>A</sup>	n/v	41.8	59.3	49.3	49.6	56.1	38.5	61.1
Zinc	mg/kg	n/v	10,000 <sup>C</sup> 450 <sup>D</sup> 3,000 <sup>PH21</sup> 30,000 <sup>F</sup> 600 <sup>G</sup>	44.4	65.3	92.4	86.9	56.8	41.9	92.9
Zirconium	mg/kg	n/v	n/v	5.99	8.71	5.52	7.1	8.1	4.85	9.58

**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location		MW18-30		MW18-31		MW18-33		MW18-34		MW18-35		MW18-39		
Sample Date		28-Jul-18	28-Jul-18	28-Jul-18	28-Jul-18	24-Jul-18	25-Jul-18	26-Jul-18	26-Jul-18	26-Jul-18	28-Jul-18	28-Jul-18	28-Jul-18	24-Jul-18
Sample ID		MW18-30 SA01	MW18-31 SA01	TZ2564-MW18-31 SA06	MW18-31 SA07	MW18-33 SA06	MW18-34 SA01	MW18-35 SA01	TY5396-MW18-35 SA08	MW18-35 SA10	MW18-39 SA01	TZ2574-MW18-39 SA08	MW18-39 SA09	MW18-44 SA06
Sample Depth		0.30 - 0.61	0 - 0.30	4.57 - 4.88	4.88 - 5.18	3.66 - 4.27	0.30 - 0.61	0.61 - 0.91	5.49 - 5.79	7.01 - 7.32	0.3 - 0.61	5.79 - 6.1	6.4 - 6.71	3.66 - 4.27
Laboratory		MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX
Laboratory Work Order		B8M0232	B8M0232	B8K5403	B863863	B862213	B8M0219	B8M0223	B8K5409	B862770	B8M0232	B8K5403	B863863	B862213
Laboratory Sample ID		HOP857	HOP858	HLM634	TZ2565	TY2775	HOP709	HOP728	HLM657	TY5398	HOP859	HLM635	TZ2575	TY2769
Sample Type	Units													
<b>Total Organic Carbon</b>														
Total Organic Carbon	mg/kg	1,000	4,500	1,500	-	<500	4,800	1,800	<500	-	16,000	<500	-	1,200
<b>Grain Size</b>														
Gravel	%	-	-	-	14	<2.0	-	-	-	27	-	-	9.7	49
Percent Clay	%	-	-	-	2	12	-	-	-	7	-	-	8	2.1
Percent Sand	%	-	-	-	84	36	-	-	-	25	-	-	31	46
Percent Silt	%	-	-	-	<2.0	51	-	-	-	41	-	-	51	3

**Table II - Soil Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

**Notes:**

YUKON-CSR Schedule 1 Contaminated Sites Regulation Yukon O.I.C. 2002/171, effective August 5, 2002.

- A Schedule 1 - Generic Numerical Soil Standards - Residential
- B Schedule 1 - Generic Numerical Soil Standards - Commercial

YUKON-CSR Schedule 2 Contaminated Sites Regulation Yukon O.I.C. 2002/171, effective August 5, 2002.

- C Schedule 2 - Matrix Numerical Soil Standards - Human Health Protection - Residential (RL) - Intake of contaminated soil (applicable to all sites)
- D Schedule 2 - Matrix Numerical Soil Standards - Environmental Protection - Residential (RL) - Toxicity to soil invertebrates and plants (applicable to all sites)
- E Schedule 2 - Matrix Numerical Soil Standards - Environmental Protection - Residential (RL) - Groundwater flow to surface water used by aquatic life (freshwater)
- F Schedule 2 - Matrix Numerical Soil Standards - Human Health Protection - Commercial (CL) - Intake of contaminated soil (applicable to all sites)
- G Schedule 2 - Matrix Numerical Soil Standards - Environmental Protection - Commercial (CL) - Toxicity to soil invertebrates and plants (applicable to all sites)
- H Schedule 2 - Matrix Numerical Soil Standards - Environmental Protection - Commercial (CL) - Groundwater flow to surface water used by aquatic life (freshwater)

6.5 <sup>A</sup>	Concentration exceeds the indicated standard.
6.5 <sup>A</sup>	Concentration exceeds the indicated RL standard; however, the sample is below 3.0 mbgs, therefore only the CL standard is applicable.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
<sup>DG</sup> N2	Standard is for chromium (total).
N6	If land is used to grow produce for human consumption, the standard is 3 ug/g; if not, the standard is 35 ug/g.
<sup>EH</sup> PH2	Cadmium standards vary with soil pH from 2-150 ug/g for groundwater flow to surface water used by aquatic life (freshwater) for all land use types. For pH <7.0 standard = 2 ug/g; For pH 7.0-<7.5 standard = 2.5 ug/g; For pH 7.5-<8.0 standard = 25 ug/g; For
<sup>EH</sup> PH7	Copper standards vary with soil pH from 90-30,000 ug/g for groundwater flow to surface water used by aquatic life (freshwater) for all land use types. For pH < 5.0 standard = 90 ug/g; For pH 5.0-<5.5 standard = 100 ug/g; For pH 5.5 -<6.0 standard = 200 u
<sup>EH</sup> PH12	Lead standards vary with soil pH from 150-40,000 ug/g for groundwater flow to surface water used by aquatic life (freshwater) for all land use types. For pH < 5.5 standard = 150 ug/g; For pH 5.5 -<6.0 standard = 250 ug/g; For pH 6.0-<6.5 standard = 2000;
<sup>EH</sup> PH21	Zinc standards vary with soil pH from 150-3,000 ug/g for groundwater flow to surface water used by aquatic life (freshwater) for all land use types. For pH < 6.0 standard = 150 ug/g; For pH 6.0 -<6.5 standard = 300 ug/g; For pH 6.5-<7.0 standard = 1500 u
<sup>AB</sup> s7	VPHs include: Volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes.
<sup>AB</sup> s8	LEPHs include: Light extractable petroleum hydrocarbons with the exception of benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno [1,2,3-cd] pyrene, naphthalene, phenanthrene and pyrene.
<sup>AB</sup> s9	HEPHs include heavy extractable petroleum hydrocarbons with the exception of: benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.

**Table III - Groundwater Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location			MW16-01	MW16-02		MW16-09	MW16-10	MW16-11	MW16-12	MW16-13	MW17-15	MW17-16	MW17-17	MW17-19	MW17-20
Sample Date			15-Aug-18	21-Aug-18	21-Aug-18	21-Aug-18	21-Aug-18	17-Aug-18	21-Aug-18	16-Aug-18	16-Aug-18	16-Aug-18	15-Aug-18	17-Aug-18	17-Aug-18
Sample ID			MW16-01	MW16-02	MW16-02A	MW16-09	MW16-10	MW16-11	MW16-12	MW16-13-RW	MW17-15	MW17-16	MW17-17	MW17-19	MW17-20
Laboratory			MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX
Laboratory Work Order			B869306	B871282	B871282	B871282	B871282	B870078	B871282	B870078	B869782	B870078	B869782	B870078	B870078
Laboratory Sample ID			UC1862	UD3683	UD3684	UD3685	UD3686	UC6886	UD3681	UC6883	UC4772	UC6884	UC4770	UC6891	UC6887
Sample Type	Units	A	YUKON-CSR Schedule 3												
Sample Location															
<b>General Parameters</b>															
Filter and HNO3 Preservation	none	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness (as CaCO3)	mg/L	n/v	1,030	-	-	-	-	-	828	-	695	-	784	-	-
<b>Petroleum Hydrocarbons</b>															
LEPH (C10-C19 less PAH)	mg/L	0.5 <sub>N21</sub> <sup>A</sup>	0.62 <sup>A</sup>	<0.20	<0.20	0.55 <sup>A</sup>	<0.20	0.23	<0.20	0.96 <sup>A</sup>	<0.20	0.54 <sup>A</sup>	3.2 <sup>A</sup>	<0.20	1.8 <sup>A</sup>
EPH C10-C19	mg/L	5 <sub>N23, N24</sub> <sup>A</sup>	0.62	<0.20	<0.20	0.55	<0.20	0.23	<0.20	0.97	<0.20	0.54	3.3	<0.20	1.9
HEPH (C19-C32 less PAH)	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.3
EPH C19-C32	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.3
VH (C6-C10)	µg/L	15,000 <sub>N22, N24</sub> <sup>A</sup>	<300	-	-	-	-	<300	-	<300	-	<300	-	-	-
VPH (C6-C10 Minus BTEX)	µg/L	1,500 <sub>N20</sub> <sup>A</sup>	<300	-	-	-	-	<300	-	<300	-	<300	-	-	-
<b>Dissolved metals</b>															
Aluminum	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	200 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	50 <sup>A</sup>	29	-	-	-	-	11.8	-	4.76	-	9.72	-	-	-
Barium	µg/L	10,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	53 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	µg/L	50,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	0.1-0.6 <sub>H11</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	10 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	9 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	20-90 <sub>H4</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	µg/L	n/v	1700	-	-	-	-	1570	-	2690	-	3970	-	-	-
Lead	µg/L	40-160 <sub>H16</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	µg/L	n/v	410	-	-	-	-	90.2	-	385	-	263	-	-	-
Mercury	µg/L	1 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	µg/L	10,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	250-1,500 <sub>H7</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	10 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	0.5-15 <sub>H2</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	3 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	µg/L	1,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	µg/L	3,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	75-2,400 <sub>H3</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	µg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	n/v	140	-	-	-	-	110	-	93	-	103	-	-	-
Potassium	mg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfur	mg/L	n/v	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>BTEX</b>															
Benzene	µg/L	4,000 <sup>A</sup>	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Ethylbenzene	µg/L	2,000 <sup>A</sup>	0.44	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Methyl tert-butyl ether (MTBE)	µg/L	n/v	<4.0	-	-	-	-	<4.0	-	<4.0	-	<4.0	-	-	-
Styrene	µg/L	720 <sup>A</sup>	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Toluene	µg/L	390 <sup>A</sup>	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Xylene, m & p-	µg/L	n/v	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Xylene, o-	µg/L	n/v	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
Xylenes, Total	µg/L	n/v	<0.40	-	-	-	-	<0.40	-	<0.40	-	<0.40	-	-	-
<b>Polycyclic Aromatic Hydrocarbons</b>															
Acenaphthene	µg/L	60 <sup>A</sup>	0.34	<0.050	<0.050	0.42	<0.050	0.09	<0.050	0.92	<0.050	0.42	0.57	<0.050	0.21
Acenaphthylene	µg/L	n/v	0.054	<0.050	<0.050	0.33	<0.050	<0.050	<0.050	0.055	<0.050	<0.050	<0.050	<0.050	<0.050
Acridine	µg/L	0.5 <sup>A</sup>	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	µg/L	1 <sup>A</sup>	0.02	<0.010	<0.010	0.018	<0.010	<0.010	<0.010	0.029	<0.010	0.018	0.011	<0.010	<0.010
Benzo(a)anthracene	µg/L	1 <sup>A</sup>	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	µg/L	0.1 <sup>A</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b)pyridine (Quinoline)	µg/L	34 <sup>A</sup>	<0.064	<0.020	<0.020	<0.040	<0.020	<0.062	<0.020	<0.11	<0.020	<0.065	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	µg/L	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Benzo(g,h,i)perylene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	µg/L	1 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenzo(a,h)anthracene	µg/L	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Fluoranthene	µg/L	2 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	µg/L	120 <sup>A</sup>	1.4	<0.050	<0.050	1.3	<0.050	0.41	<0.050	3.3	<0.050	1.5	2	<0.050	0.59
Indeno(1,2,3-cd)pyrene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene, 1-	µg/L	n/v	-	<0.050	<0.050	7.7	<0.050	1.3	<0.050	7.2	<0.050	4.7	83	<0.050	4.3
Methylnaphthalene, 2-	µg/L	n/v	6.8	<0.10	<0.10	5.9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	100	<0.10	2
Naphthalene	µg/L	10 <sup>A</sup>	2.5	<0.10	<0.10	3	<0.10	0.32	<0.10	0.86	<0.10	0.65	97 <sup>A</sup>	<0.10	0.76
Phenanthrene	µg/L	3 <sup>A</sup>	0.62	<0.050	<0.050	0.68	<0.050	0.22	<0.050	1.2	<0.050	0.61	0.93	<0.050	0.18
Pyrene	µg/L	0.2 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
High Molecular Weight PAHs	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Low Molecular Weight PAHs	µg/L	n/v	26	<0.10	<0.10	19	<0.10	2.3	<0.10	14	<0.10	7.9	290	<0.10	8
Total PAH	µg/L	n/v	26	<0.10	<0.10	19	<0.10	2.3	<0.10	14	<0.10	7.9	290	<0.10	8

Table III - Groundwater Analytical Results  
 5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon  
 Phase II ESA (2018 - 2019)  
 Yukon Government

Sample Location			MW18-31	MW18-33	MW18-34	MW18-35	MW18-37		MW18-39		MW18-40	MW18-41	MW18-42	MW18-43	MW18-44	MW18-45	
Sample Date			21-Aug-18	26-Jul-18	26-Jul-18	17-Aug-18	15-Aug-18	15-Aug-18	17-Aug-18	17-Aug-18	15-Aug-18	15-Aug-18	30-Jul-18	30-Jul-18	26-Jul-18	16-Aug-18	
Sample ID			MW18-31	MW18-33	MW18-34	MW18-35	MW18-37	MW18-37A	MW18-39	MW18-39A	MW18-40	MW18-41	MW18-42	MW18-43	MW18-44	MW18-45	
Laboratory			MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	
Laboratory Work Order			B871282	B862272	B862272	B870078	B869306	B869306	B870078	B870078	B869306	B869782	B863767	B863767	B862272	B869782	
Laboratory Sample ID			UD3682	TY3072	TY3073	UC6888	UC1860	UC1861	UC6889	UC6889	UC1863	UC4769	TZ1833	TZ1834	TY3071	UC4771	
Sample Type	Units	A	YUKON-CSR Schedule 3														
<b>General Parameters</b>																	
Filter and HNO3 Preservation	none	n/v	-	FIELD	FIELD	-	-	-	-	-	-	-	-	FIELD	FIELD	FIELD	-
Hardness (as CaCO3)	mg/L	n/v	-	575	307	-	89.8	-	763	762	-	-	-	221	142	776	308
<b>Petroleum Hydrocarbons</b>																	
LEPH (C10-C19 less PAH)	mg/L	0.5 <sub>NZ1</sub> <sup>A</sup>	0.58 <sup>A</sup>	<0.20	<0.20	<0.20	<0.20	<0.20	0.53 <sup>A</sup>	0.54 <sup>A</sup>	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
EPH C10-C19	mg/L	5 <sub>NZ3, NZ4</sub> <sup>A</sup>	0.58	<0.20	<0.20	<0.20	<0.20	<0.20	0.53	0.54	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
HEPH (C19-C32 less PAH)	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
EPH C19-C32	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
VH (C6-C10)	µg/L	15,000 <sub>NZ2, NZ4</sub> <sup>A</sup>	-	<300	<300	-	<300	-	<300	-	<300	-	-	<300	<300	<300	<300
VPH (C6-C10 Minus BTEX)	µg/L	1,500 <sub>NZ2</sub> <sup>A</sup>	-	<300	<300	-	<300	-	<300	-	<300	-	-	<300	<300	<300	<300
<b>Dissolved metals</b>																	
Aluminum	µg/L	n/v	-	5	570	-	-	-	-	-	-	-	3.1	4.1	6.6	-	-
Antimony	µg/L	200 <sup>A</sup>	-	0.64	<0.50	-	-	-	-	-	-	-	0.88	<0.50	<0.50	-	-
Arsenic	µg/L	50 <sup>A</sup>	-	3.51	9.08	-	17.5	-	15.7	15.9	-	-	11.2	15.7	2.89	1.09	-
Barium	µg/L	10,000 <sup>A</sup>	-	33.1	52.2	-	-	-	-	-	-	-	56.6	70.6	98.6	-	-
Beryllium	µg/L	53 <sup>A</sup>	-	<0.10	<0.10	-	-	-	-	-	-	-	<0.10	<0.10	<0.10	-	-
Bismuth	µg/L	n/v	-	<1.0	<1.0	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	-	-
Boron	µg/L	50,000 <sup>A</sup>	-	<50	<50	-	-	-	-	-	-	-	51	<50	<50	-	-
Cadmium	µg/L	0.1-0.6 <sub>H11</sub> <sup>A</sup>	-	0.098	0.054	-	-	-	-	-	-	-	<0.010	<0.010	0.174	-	-
Chromium	µg/L	10 <sup>A</sup>	-	<1.0	1.1	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	-	-
Cobalt	µg/L	9 <sup>A</sup>	-	4.2	2.14	-	-	-	-	-	-	-	<0.20	<0.20	7.34	-	-
Copper	µg/L	20-90 <sub>H4</sub> <sup>A</sup>	-	1.43	3.21	-	-	-	-	-	-	-	0.55	0.51	3.37	-	-
Iron	µg/L	n/v	-	8.4	671	-	<5.0	-	1580	1580	-	-	12.1	<5.0	306	<5.0	-
Lead	µg/L	40-160 <sub>H6</sub> <sup>A</sup>	-	<0.20	0.62	-	-	-	-	-	-	-	<0.20	<0.20	<0.20	-	-
Lithium	µg/L	n/v	-	3.6	2.5	-	-	-	-	-	-	-	3	<2.0	2.1	-	-
Manganese	µg/L	n/v	-	566	322	-	13.6	-	173	170	-	-	72.3	38.1	2050	112	-
Mercury	µg/L	1 <sup>A</sup>	-	0.0023	0.0025	-	-	-	-	-	-	-	<0.0020	<0.0020	<0.0020	-	-
Molybdenum	µg/L	10,000 <sup>A</sup>	-	4.2	4.9	-	-	-	-	-	-	-	6.7	7.9	3.3	-	-
Nickel	µg/L	250-1,500 <sub>H7</sub> <sup>A</sup>	-	11.2	7.5	-	-	-	-	-	-	-	<1.0	<1.0	12.7	-	-
Selenium	µg/L	10 <sup>A</sup>	-	0.33	0.24	-	-	-	-	-	-	-	0.69	0.19	0.18	-	-
Silicon	µg/L	n/v	-	6,430	7,210	-	-	-	-	-	-	-	5,370	4,830	7,870	-	-
Silver	µg/L	0.5-15 <sub>H2</sub> <sup>A</sup>	-	<0.020	<0.020	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	-	-
Strontium	µg/L	n/v	-	638	432	-	-	-	-	-	-	-	424	312	1,090	-	-
Thallium	µg/L	3 <sup>A</sup>	-	0.032	0.023	-	-	-	-	-	-	-	<0.010	<0.010	0.028	-	-
Tin	µg/L	n/v	-	<5.0	<5.0	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-
Titanium	µg/L	1,000 <sup>A</sup>	-	<5.0	23	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-
Uranium	µg/L	3,000 <sup>A</sup>	-	12.4	5.72	-	-	-	-	-	-	-	5.41	3.95	15.1	-	-
Vanadium	µg/L	n/v	-	<5.0	<5.0	-	-	-	-	-	-	-	<5.0	<5.0	<5.0	-	-
Zinc	µg/L	75-2,400 <sub>H3</sub> <sup>A</sup>	-	<5.0	<5.0	-	-	-	-	-	-	-	<5.0	<5.0	5.7	-	-
Zirconium	µg/L	n/v	-	0.41	0.66	-	-	-	-	-	-	-	<0.10	<0.10	0.29	-	-
Calcium	mg/L	n/v	-	120	65	-	-	-	-	-	-	-	55.6	24.5	164	-	-
Magnesium	mg/L	n/v	-	66.9	35.1	-	13	-	101	101	-	-	20	19.6	89.2	25	-
Potassium	mg/L	n/v	-	4.87	3.27	-	-	-	-	-	-	-	2.71	2.41	3.73	-	-
Sodium	mg/L	n/v	-	20.6	18.3	-	-	-	-	-	-	-	16.9	19.8	26	-	-
Sulfur	mg/L	n/v	-	106	36.4	-	-	-	-	-	-	-	32.9	15.8	154	-	-
<b>BTEX</b>																	
Benzene	µg/L	4,000 <sup>A</sup>	-	<0.40	<0.40	-	<0.40	-	-	<0.40	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	2,000 <sup>A</sup>	-	<0.40	<0.40	-	<0.40	-	-	<0.40	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
Methyl tert-butyl ether (MTBE)	µg/L	n/v	-	<4.0	<4.0	-	<4.0	-	-	<4.0	-	-	<4.0	<4.0	<4.0	<4.0	<4.0
Styrene	µg/L	720 <sup>A</sup>	-	<0.40	<0.40	-	<0.40	-	-	<0.40	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
Toluene	µg/L	390 <sup>A</sup>	-	<0.40	<0.40	-	<0.40	-	-	<0.40	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, m & p-	µg/L	n/v	-	<0.40	<0.40	-	<0.40	-	-	0.89	-	-	<0.40	0.76	0.4	<0.40	<0.40
Xylene, o-	µg/L	n/v	-	<0.40	<0.40	-	<0.40	-	-	<0.40	-	-	<0.40	0.41	<0.40	<0.40	<0.40
Xylenes, Total	µg/L	n/v	-	<0.40	<0.40	-	<0.40	-	-	0.89	-	-	<0.40	1.2	0.4	<0.40	<0.40
<b>Polycyclic Aromatic Hydrocarbon</b>																	
Acenaphthene	µg/L	60 <sup>A</sup>	0.66	<0.050	<0.050	<0.050	<0.050	<0.050	0.35	0.34	<0.050	<0.050	<0.050	<0.050	0.42	<0.050	<0.050
Acenaphthylene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acridine	µg/L	0.5 <sup>A</sup>	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	µg/L	1 <sup>A</sup>	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	µg/L	1 <sup>A</sup>	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	µg/L	0.1 <sup>A</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b)pyridine (Quinoline)	µg/L	34 <sup>A</sup>	<0.050	<0.020	<0.020	<0.079	<0.020	<0.020	<0.087	<0.041	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	µg/L	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Benzo(g,h,i)perylene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	µg/L	1 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenzo(a,h)anthracene	µg/L	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Fluoranthene	µg/L	2 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020											

**Table III - Groundwater Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location			MW18-48	MW18-49	MW18-50	MW18-51	MW18-52	MW18-53	MW18-54	MW18-55	MW18-56
Sample Date			15-Aug-18	13-Aug-18	14-Aug-18	14-Aug-18	13-Aug-18	14-Aug-18	14-Aug-18	14-Aug-18	16-Aug-18
Sample ID			MW18-48	MW18-49	MW18-50	MW18-51	MW18-52	MW18-53	MW18-54	MW18-55	MW18-56
Laboratory			MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX
Laboratory Work Order			B869306	B868151	B869556	B869556	B868151	B869556	B869556	B869556	B870078
Laboratory Sample ID			UC1864	UB6393	UC3162	UC3161	UB6392	UC3158	UC3160	UC3159	UC6885
Sample Type	Units	A									
		YUKON-CSR Schedule 3									
<b>General Parameters</b>											
Filter and HNO3 Preservation	none	n/v	-	-	-	-	-	-	-	-	-
Hardness (as CaCO3)	mg/L	n/v	-	-	-	-	-	-	-	-	804
<b>Petroleum Hydrocarbons</b>											
LEPH (C10-C19 less PAH)	mg/L	0.5 <sub>N21</sub> <sup>A</sup>	<0.20	0.59 <sup>A</sup>	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
EPH C10-C19	mg/L	5 <sub>N23, N24</sub> <sup>A</sup>	<0.20	0.59	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
HEPH (C19-C32 less PAH)	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
EPH C19-C32	mg/L	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
VH (C6-C10)	µg/L	15,000 <sub>N22, N24</sub> <sup>A</sup>	-	<300	-	<300	<300	<300	<300	-	<300
VPH (C6-C10 Minus BTEX)	µg/L	1,500 <sub>N20</sub> <sup>A</sup>	-	<300	-	<300	<300	-	<300	-	<300
<b>Dissolved metals</b>											
Aluminum	µg/L	n/v	-	-	-	-	-	-	-	-	-
Antimony	µg/L	200 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	50 <sup>A</sup>	-	-	-	-	-	-	-	-	1.48
Barium	µg/L	10,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	53 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Bismuth	µg/L	n/v	-	-	-	-	-	-	-	-	-
Boron	µg/L	50,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	0.1-0.6 <sub>H11</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Chromium	µg/L	10 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	9 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Copper	µg/L	20-90 <sub>H4</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Iron	µg/L	n/v	-	-	-	-	-	-	-	-	<10
Lead	µg/L	40-160 <sub>H6</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Lithium	µg/L	n/v	-	-	-	-	-	-	-	-	-
Manganese	µg/L	n/v	-	-	-	-	-	-	-	-	180
Mercury	µg/L	1 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Molybdenum	µg/L	10,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Nickel	µg/L	250-1,500 <sub>H7</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Selenium	µg/L	10 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Silicon	µg/L	n/v	-	-	-	-	-	-	-	-	-
Silver	µg/L	0.5-15 <sub>H2</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Strontium	µg/L	n/v	-	-	-	-	-	-	-	-	-
Thallium	µg/L	3 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Tin	µg/L	n/v	-	-	-	-	-	-	-	-	-
Titanium	µg/L	1,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Uranium	µg/L	3,000 <sup>A</sup>	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	n/v	-	-	-	-	-	-	-	-	-
Zinc	µg/L	75-2,400 <sub>H3</sub> <sup>A</sup>	-	-	-	-	-	-	-	-	-
Zirconium	µg/L	n/v	-	-	-	-	-	-	-	-	-
Calcium	mg/L	n/v	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	n/v	-	-	-	-	-	-	-	-	100
Potassium	mg/L	n/v	-	-	-	-	-	-	-	-	-
Sodium	mg/L	n/v	-	-	-	-	-	-	-	-	-
Sulfur	mg/L	n/v	-	-	-	-	-	-	-	-	-
<b>BTEX</b>											
Benzene	µg/L	4,000 <sup>A</sup>	-	<0.40	-	<0.40	<0.40	-	<0.40	-	<0.40
Ethylbenzene	µg/L	2,000 <sup>A</sup>	-	<0.40	-	<0.40	<0.40	-	<0.40	-	<0.40
Methyl tert-butyl ether (MTBE)	µg/L	n/v	-	<4.0	-	<4.0	<4.0	-	<4.0	-	<4.0
Styrene	µg/L	720 <sup>A</sup>	-	<0.40	-	<0.40	<0.40	-	<0.40	-	<0.40
Toluene	µg/L	390 <sup>A</sup>	-	1.5	-	<0.40	0.92	-	1.2	-	0.43
Xylene, m & p-	µg/L	n/v	-	1.9	-	<0.40	1	-	1.9	-	<0.40
Xylene, o-	µg/L	n/v	-	0.92	-	<0.40	<0.40	-	0.73	-	<0.40
Xylenes, Total	µg/L	n/v	-	2.8	-	<0.40	1	-	2.6	-	<0.40
<b>Polycyclic Aromatic Hydrocarbons</b>											
Acenaphthene	µg/L	60 <sup>A</sup>	<0.050	0.58	<0.050	<0.050	<0.050	<0.050	<0.050	0.14	<0.050
Acenaphthylene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acridine	µg/L	0.5 <sup>A</sup>	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	µg/L	1 <sup>A</sup>	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	µg/L	1 <sup>A</sup>	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	µg/L	0.1 <sup>A</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b)pyridine (Quinoline)	µg/L	34 <sup>A</sup>	<0.020	<0.085	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	µg/L	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Benzo(g,h,i)perylene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	µg/L	1 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Dibenzo(a,h)anthracene	µg/L	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Fluoranthene	µg/L	2 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	µg/L	120 <sup>A</sup>	<0.050	1.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene, 1-	µg/L	n/v	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene, 2-	µg/L	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Naphthalene	µg/L	10 <sup>A</sup>	<0.10	0.47	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	µg/L	3 <sup>A</sup>	<0.050	0.47	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Pyrene	µg/L	0.2 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
High Molecular Weight PAHs	µg/L	n/v	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Low Molecular Weight PAHs	µg/L	n/v	<0.10	2.9	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10
Total PAH	µg/L	n/v	<0.10	2.9	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10



**Table III - Groundwater Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location			MW16-01	MW16-11	MW16-13	MW17-16	MW18-33	MW18-34	MW18-37	MW18-39		MW18-44	MW18-45	MW18-56
Sample Date			15-Aug-18	17-Aug-18	16-Aug-18	16-Aug-18	26-Jul-18	26-Jul-18	15-Aug-18	17-Aug-18	17-Aug-18	26-Jul-18	16-Aug-18	16-Aug-18
Sample ID			MW16-01	MW16-11	MW16-13-RW	MW17-16	MW18-33	MW18-34	MW18-37	MW18-39	MW18-39A	MW18-44	MW18-45	MW18-56
Laboratory			MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX	MAXX
Laboratory Work Order			B869306	B870078	B870078	B870078	B862272	B862272	B869306	B870078	B870078	B862272	B869782	B870078
Laboratory Sample ID			UC1862	UC6886	UC6883	UC6884	TY3072	TY3073	UC1860	UC6889	UC6890	TY3071	UC4771	UC6885
Sample Type	Units	A	YUKON-CSR Schedule 3											
<b>Physical Parameters</b>														
Hardness (as CaCO3)	mg/L	n/v	1,030	828	695	784	575	307	89.8	763	762	776	308	804
<b>Anions</b>														
Nitrate	mg/L	400 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.111	<0.020
Nitrate + Nitrite (as N)	mg/L	400 <sup>A</sup>	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.123	<0.020
Nitrite (as N)	mg/L	0.2-2 <sub>cl1</sub> <sup>A</sup>	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0115	<0.0050
Total Kjeldahl Nitrogen	mg/L	n/v	0.225	0.107	0.137	0.151	0.362	0.32	0.12	0.149	0.127	0.382	0.265	0.228
Sulfate	mg/L	1,000 <sup>A</sup>	781	579	480	556	315	128	33.8	552	548	431	164	814
Chloride	mg/L	n/v	8.1	6.8	5.1	5.9	7	4.1	<1.0	5.7	5.8	41	3.6	2.2
Fluoride	mg/L	2-3 <sub>H5</sub> <sup>A</sup>	0.26	0.26	0.25	0.25	0.26	0.3	0.42	0.28	0.27	0.19	0.32	0.29
Nitrogen	mg/L	n/v	0.225	0.107	0.137	0.151	0.362	0.32	0.12	0.149	0.127	0.382	0.388	0.228
Ammonia (as N)	mg/L	n/v	0.17	0.022	<0.020	<0.020	0.14	0.15	<0.020	<0.020	<0.020	0.18	<0.020	0.25
Orthophosphate(as P)	mg/L	n/v	0.0057	<0.0050	<0.0050	<0.0050	0.0123	0.0192	0.024	<0.0050	<0.0050	<0.0050	0.0167	0.0134
Phosphorus	mg/L	n/v	0.068	0.0247	0.0483	0.0443	0.0446	0.322	0.0457	0.0674	0.0681	0.0242	0.0211	0.0359
Dissolved Organic Carbon (DOC)	mg/L	n/v	3.87	2.54	1.82	2.66	4.9	4.2	0.8	1.99	2.87	5.3	5.41	1.96

**Table III - Groundwater Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

**Notes:**

YUKON-CSR Schedule 3 Contaminated Sites Regulation Yukon O.I.C. 2002/171, effective August 5, 2002.

A	Schedule 3-Generic Standard-Aquatic (Freshwater)
6.5 <sup>A</sup>	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
d1	Nitrite standard varies with chloride concentration for freshwater aquatic life. For Cl<2 mg/l, standard = 200 ug/l; for Cl=2-<4 mg/l, standard = 400 ug/l; for Cl=4-<6 mg/l, standard = 600 ug/l; for Cl=6-<8, standard = 800 ug/l; for Cl=8-<10, standard = 1000 ug/l; for Cl>10 mg/l, standard = 2000 ug/l. Consult director for further advice.
H1	Cadmium standard varies with hardness for freshwater aquatic life. For H<=30, standard = 0.1; for H=30-<90, standard = 0.3; for H=90-<150, standard = 0.5; for H=150-<210, standard = 0.6 where H means water hardness in mg/L CaCO3.
H2	Silver standard varies with hardness for freshwater aquatic life. For H<= 100, standard = 0.5 ug/l; for H>100, standard = 15 ug/l where H means water hardness in mg/L CaCO3.
H3	Zinc standard varies with hardness for freshwater aquatic life. For H<=90, standard = 75 ug/l; for H=90-<100, standard = 150 ug/l; for H=100-<200, standard = 900 ug/l; for H=200-<300, standard = 1650 ug/l; for H=300-<400, standard = 2400 ug/l where H means water hardness in mg/L CaCO3.
H4	Copper standard varies with hardness for freshwater aquatic life. For H <50, standard = 20 ug/l; for H=50-<75, standard = 30ug/l; for H=75-<100, standard = 40ug/l; for H=100-<125, standard = 50 ug/l; For H=125-<150, standard = 60ug/l; for H=150-<175, standard = 70 ug/l; for H=175-<200, standard = 80 ug/l; for H>=200, standard = 90 ug/l where H means water hardness in mg/L CaCO3.
H5	Fluoride standard varies with hardness for freshwater aquatic life. For H<50, standard = 2000 ug/l; for H>=50, standard = 3000 ug/l where H means water hardness in mg/L CaCO3.
H6	Lead standard varies with hardness for freshwater aquatic life. For H<50, standard = 40 ug/l; for H=50-<100, standard = 50 ug/l; for H=100-<200, standard = 60 ug/l; for H=200-<300, standard = 110 ug/l; for H>=300, standard = 160 ug/l. H means water hardness in mg/L CaCO3.
H7	Nickel standard varies with hardness for freshwater aquatic life. For H< 60, standard = 250 ug/l; for H=60-<120, standard = 650 ug/l; for H=120-<180, standard = 1100 ug/l; for H>=180, standard = 1500 where H means water hardness in mg/L CaCO3.
N6	Where nitrate and nitrite are present, total nitrate plus nitrite-nitrogen should not exceed this value.
N20	VPHw includes volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes.
N21	LEPHw includes light extractable petroleum hydrocarbons with the exception of acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene.
N22, N24 <sup>AB</sup>	VH6-10 includes volatile petroleum hydrocarbons. Standard is applicable at all sites, irrespective of water use.
N23, N24 <sup>AB</sup>	EH10-19 includes light extractable hydrocarbons. Standard is applicable at all sites, irrespective of water use.

**Table IIIa - Pump Test Water Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location	Units	A YUKON-CSR Schedule 3	MW16-09				MW18-31			
			29-Oct-18 MW16-09@11:55 Stantec MAXX B896179 UR6313	29-Oct-18 MW16-09@13:55 Stantec MAXX B896179 UR6312	29-Oct-18 MW16-09@15:55 Stantec MAXX B896179 UR6311	29-Oct-18 MW16-09@17:55 Stantec MAXX B896179 UR6310	30-Oct-18 MW18-31@10:15 Stantec MAXX B896179 UR6307	30-Oct-18 MW18-31@12:15 Stantec MAXX B896179 UR6308	30-Oct-18 MW18-31@14:15 Stantec MAXX B896179 UR6309	30-Oct-18 MW18-31@16:45 Stantec MAXX B896179 UR6306
<b>GENERATED - BCCSR_M4</b>										
EPH C10-C19	mg/L	5 <sub>N23, N24</sub> <sup>A</sup>	4.8	0.32	0.31	0.31	0.51	0.55	0.56	0.56
EPH C19-C32	mg/L	n/v	0.60	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
<b>GENERATED - CALC</b>										
LEPH (C10-C19 less PAH)	mg/L	0.5 <sub>N21</sub> <sup>A</sup>	<b>4.8<sup>A</sup></b>	0.32	0.31	0.31	<b>0.51<sup>A</sup></b>	<b>0.55<sup>A</sup></b>	<b>0.56<sup>A</sup></b>	<b>0.56<sup>A</sup></b>
<b>GENERATED - SW8270</b>										
Acenaphthene	µg/L	60 <sup>A</sup>	0.27	0.17	0.17	0.23	0.50	0.62	0.62	0.63
Acridine	µg/L	0.5 <sup>A</sup>	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	1 <sup>A</sup>	0.063	<0.020	<0.020	<0.020	0.024	0.027	0.024	0.026
Fluorene	µg/L	120 <sup>A</sup>	1.4	0.75	0.71	0.75	1.6	1.9	1.9	2.0
Naphthalene	µg/L	10 <sup>A</sup>	2.0	1.1	0.95	1.1	0.50	0.54	0.54	0.57
Phenanthrene	µg/L	3 <sup>A</sup>	0.90	0.40	0.35	0.36	0.70	0.87	0.84	0.89
Low Molecular Weight PAHs	µg/L	n/v	15	7.8	7.0	7.9	3.3	4.0	3.9	4.2
High Molecular Weight PAHs	µg/L	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAH	µg/L	n/v	15	7.8	7.0	7.9	3.3	4.0	3.9	4.2

**Notes:**

- YUKON-CSR Schedule 3 Contaminated Sites Regulation Yukon O.I.C. 2002/171, effective August 5, 2002.
- <sup>A</sup> Schedule 3-Generic Standard-Aquatic (FW)
- 6.5<sup>A</sup>** Concentration exceeds the indicated standard.
- 15.2 Measured concentration did not exceed the indicated standard.
- <0.50** Laboratory reporting limit was greater than the applicable standard.
- <0.03 Analyte was not detected at a concentration greater than the laboratory reporting limit.
- n/v No standard/guideline value.
- Parameter not analyzed / not available.
- N21 LEPHw includes light extractable petroleum hydrocarbons with the exception of acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene.
- N23, N24 EPH10-19 includes light extractable hydrocarbons. Standard is applicable at all sites, irrespective of water use.

**Table IV - Soil Vapour Analytical Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location	Units	BC CSR Schedule 3.3 A	BC CSR Schedule 3.3 B	VP18-30		VP18-34		VP18-35		VP18-39		VP18-43	
				Lab Reported Concentration	Predicted Indoor Concentration <sup>1</sup> (Attenuation Factor 2.3 x 10 <sup>-3</sup> )	Lab Reported Concentration	Predicted Indoor Concentration <sup>1</sup> (Attenuation Factor 2.3 x 10 <sup>-3</sup> )	Lab Reported Concentration	Predicted Indoor Concentration <sup>1</sup> (Attenuation Factor 2.0 x 10 <sup>-3</sup> )	Lab Reported Concentration	Predicted Indoor Concentration <sup>1</sup> (Attenuation Factor 2.3 x 10 <sup>-3</sup> )	Lab Reported Concentration	Predicted Indoor Concentration <sup>1</sup> (Attenuation Factor 2.0 x 10 <sup>-3</sup> )
Sample Date				7/31/2018		7/31/2018		7/31/2018		7/31/2018		7/30/2018	
Sample ID				VP18-30/1205		VP18-34/1412		VP18-35/1012		VP18-39/1473		VP18-43/1775	
Sampling Company				STANTEC		STANTEC		STANTEC		STANTEC		STANTEC	
Laboratory				MAXX		MAXX		MAXX		MAXX		MAXX	
Laboratory Work Order				33897		33897		33897		33897		33897	
Laboratory Sample ID				HLC292		HLC289		HLC290		HLC291		HLC293	
Depth of Vapour Probe				1.60		1.98		2.10		1.60		2.10	
<b>General Chemistry</b>													
Pressure on Receipt	psi	n/v	n/v	(-2.3)		(-2.5)		(-2.9)		(-2.2)		(-2.2)	
<b>Volatile Organic Compounds</b>													
1,3-Butadiene	µg/m <sup>3</sup>	2 <sup>A</sup>	2 <sup>B</sup>	<1.1	<0.00253	<1.1	<0.00253	<1.1	<0.0022	3.9	0.01	<1.1	<0.0022
1,2,4-Trimethylbenzene	µg/m <sup>3</sup>	7 <sup>A</sup>	20 <sup>B</sup>	17.4	0.04	247	0.57	12.4	0.02	48.7	0.11	49.2	0.10
1,2-dibromoethane	µg/m <sup>3</sup>	0.5 <sup>A</sup>	0.5 <sup>B</sup>	<0.38	<0.000874	<0.38	<0.000874	<0.38	<0.00076	<0.38	<0.000874	<0.38	<0.00076
1,2-Dichloroethane	µg/m <sup>3</sup>	7 <sup>A</sup>	20 <sup>B</sup>	<0.40	<0.00092	<0.40	<0.00092	<0.40	<0.0008	<0.40	<0.00092	<0.40	<0.0008
1,3,5-Trimethylbenzene	µg/m <sup>3</sup>	3.5 <sup>A</sup>	10 <sup>B</sup>	7.6	0.02	69.5	0.16	5.6	0.01	11.5	0.03	15.9	0.03
Benzene	µg/m <sup>3</sup>	1.5 <sup>A</sup>	4 <sup>B</sup>	1.03	0.002	4.05	0.01	4.94	0.01	2.54	0.01	1.66	0.003
Cumene (Isopropylbenzene)	µg/m <sup>3</sup>	400 <sup>A</sup>	1,000 <sup>B</sup>	<2.5	<0.00575	<190	<0.437	<2.5	<0.005	<59	<0.1357	2.5	0.01
Decane	µg/m <sup>3</sup>	2,500 <sup>A</sup>	8,000 <sup>B</sup>	<29	<0.0667	449	1.03	<220	<0.44	<220	<0.506	82.4	0.16
Ethylbenzene	µg/m <sup>3</sup>	1,000 <sup>A</sup>	3,000 <sup>B</sup>	6.4	0.01	34	0.08	8.65	0.02	<22	<0.0506	13.6	0.03
Hexane	µg/m <sup>3</sup>	700 <sup>A</sup>	2,000 <sup>B</sup>	4	0.01	16.6	0.04	5.8	0.01	22.2	0.05	7.7	0.02
Methyl t-butyl ether (MTBE)	µg/m <sup>3</sup>	3,000 <sup>A</sup>	9,000 <sup>B</sup>	<0.72	<0.001656	<0.72	<0.001656	<0.72	<0.00144	<0.72	<0.001656	<0.72	<0.00144
Methylcyclohexane	µg/m <sup>3</sup>	1,500 <sup>A</sup>	5,000 <sup>B</sup>	260	0.60	7.9	0.02	<8.0	<0.016	1550	3.57	7.2	0.01
Naphthalene	µg/m <sup>3</sup>	3 <sup>A</sup>	9 <sup>B</sup>	<2.6	<0.00598	12.4	0.03	<2.6	<0.0052	<2.6	<0.00598	<2.6	<0.0052
Styrene	µg/m <sup>3</sup>	1,000 <sup>A</sup>	3,000 <sup>B</sup>	<0.85	<0.001955	<3.4	<0.00782	<0.85	<0.0017	<0.85	<0.001955	<1.3	<0.0026
Toluene	µg/m <sup>3</sup>	5,000 <sup>A</sup>	15,000 <sup>B</sup>	9.65	0.02	65.6	0.15	12.8	0.03	65.1	0.15	15.7	0.03
o-Xylene	µg/m <sup>3</sup>	n/v	n/v	16.6	0.04	71.9	0.17	13.4	0.03	32.7	0.08	28.7	0.06
p+m-Xylene	µg/m <sup>3</sup>	n/v	n/v	25.9	0.06	153	0.35	28.3	0.06	65	0.15	66.1	0.13
Total Xylenes	µg/m <sup>3</sup>	100 <sup>A</sup>	300 <sup>B</sup>	42.5	0.10	225	0.52	41.8	0.08	97.7	0.22	94.8	0.19
VPH	µg/m <sup>3</sup>	1,000 <sup>A</sup>	3,000 <sup>B</sup>	12400	28.52	18200	41.86	73300	146.60	733000	<b>1685.9<sup>A</sup></b>	2240	4.48

**Notes:**

CSR-Schedule 3.3 Ministry of Environment British Columbia - Environmental Management Act -Contaminated Sites Regulations B.C. Reg. 375/96 Effective April 1, 1997 [includes amendments up to B.C. Reg. 196/2017, October 31, 2017]

A Schedule 3.3 - Generic Numerical Vapour Standards - Residential Land Use Standard

B Schedule 3.3 - Generic Numerical Vapour Standards - Commercial Land Use Standard

**6.5<sup>A</sup>** Concentration exceeds the indicated standard.

15.2 Concentration was detected but did not exceed applicable standards.

< 0.50 Laboratory estimated quantitation limit exceeded standard.

< 0.03 The analyte was not detected above the laboratory estimated quantitation limit.

n/v No standard/guideline value.

- Parameter not analyzed / not available.

<sup>1</sup> Default vapour attenuation factor for subslab indoor exposure, from *Protocol 22: Application of Vapour Attenuation Factors to Characterize Vapour Contamination* (BC MOECCS, Nov. 2017).

**Table V - Soil QAQC Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location			25-Jul-18 MW18-43 SA06	25-Jul-18 QC18-01		26-Jul-18 MW18-35 SA10	26-Jul-18 QC18-02		28-Jul-18 MW18-30 SA04	28-Jul-18 QC18-04		28-Jul-18 MW18-39 SA08	28-Jul-18 QC18-05	
Sample Date			4.27 - 4.57			7.01 - 7.32			1.22 - 1.52			5.79 - 6.1		
Sample ID			MAXX B862756	MAXX B862756	RPD %	MAXX B862770	MAXX B862770	RPD %	MAXX B863863	MAXX B863863	RPD %	MAXX B863863	MAXX B863863	RPD %
Sample Depth			TY5297	TY5302		TY5398	TY5405		TZ2554	TZ2579		TZ2574	TZ2580	
Laboratory														
Laboratory Work Order														
Laboratory Sample ID														
Sample Type	Units	RDL												
<b>GENERATED - CALC</b>														
EPH C10-C19	mg/kg	100	<100	<100	nc	<100	<100	nc	<100	<100	nc	780	530	38%
LEPH (C10-C19 less PAH)	mg/kg	100	-	-	nc	<100	<100	nc	<100	<100	nc	780	530	38%
EPH C19-C32	mg/kg	100	<100	<100	nc	<100	<100	nc	<100	<100	nc	<100	<100	nc
HEPH (C19-C32 less PAH)	mg/kg	100	-	-	nc	<100	<100	nc	<100	<100	nc	<100	<100	nc
VPH (C6-C10 Minus BTEX)	mg/kg	10	<10	<10	nc	<10	<10	nc	<10	<10	nc	27	28	nc
<b>GENERATED - EPA 8260C</b>														
Benzene	mg/kg	0.005	<0.0050	<0.0050	nc	<0.0050	0.036	nc	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc
Ethylbenzene	mg/kg	0.01	<0.010	<0.010	nc	<0.010	0.05	nc	0.013	<0.010	nc	<0.010	<0.010	nc
Methyl tert-butyl ether (MTBE)	mg/kg	0.1	<0.10	<0.10	nc	<0.10	<0.10	nc	<0.10	<0.10	nc	<0.10	<0.10	nc
Styrene	mg/kg	0.03	<0.030	<0.030	nc	<0.030	<0.030	nc	<0.030	<0.030	nc	<0.030	<0.030	nc
Toluene	mg/kg	0.02	<0.020	<0.020	nc	<0.020	0.049	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
VH (C6-C10)	mg/kg	10	<10	<10	nc	<10	<10	nc	<10	<10	nc	27	28	nc
Xylene, m & p-	mg/kg	0.04	<0.040	<0.040	nc	<0.040	0.047	nc	<0.040	<0.040	nc	<0.040	<0.040	nc
Xylene, o-	mg/kg	0.04	<0.040	<0.040	nc	<0.040	0.048	nc	<0.040	<0.040	nc	<0.040	<0.040	nc
Xylenes, Total	mg/kg	0.04	<0.040	<0.040	nc	<0.040	0.095	nc	<0.040	<0.040	nc	<0.040	<0.040	nc
<b>GENERATED - SW8270</b>														
Acenaphthene	mg/kg	0.005	-	-	nc	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	0.079	0.06	27%
Acenaphthylene	mg/kg	0.005	-	-	nc	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc
Acridine	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Anthracene	mg/kg	0.004	-	-	nc	<0.0040	<0.0040	nc	<0.0040	<0.0040	nc	0.0049	<0.0040	nc
Benzo(a)anthracene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Benzo(a)pyrene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Benzo(b)fluoranthene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Benzo(b)fluoranthene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Benzo(g,h,i)perylene	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Benzo(k)fluoranthene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Chrysene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Dibenzo(a,h)anthracene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Fluoranthene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Fluorene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	0.091	0.076	nc
Indeno(1,2,3-cd)pyrene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Methylnaphthalene, 1-	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	0.087	0.084	nc
Methylnaphthalene, 2-	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	0.044	0.082	nc
Naphthalene	mg/kg	0.01	-	-	nc	<0.010	<0.010	nc	<0.010	<0.010	nc	0.022	0.055	nc
Phenanthrene	mg/kg	0.01	-	-	nc	<0.010	<0.010	nc	<0.010	<0.010	nc	0.037	0.028	nc
Pyrene	mg/kg	0.02	-	-	nc	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
High Molecular Weight PAHs	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Low Molecular Weight PAHs	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	0.36	0.38	5%
Total PAH	mg/kg	0.05	-	-	nc	<0.050	<0.050	nc	<0.050	<0.050	nc	0.36	0.38	5%

**Notes**

RPD Relative Percent Difference  
RDL reportable detection limit  
nc Not Calculated - RPD values are not used to evaluate those compounds that are present at concentrations less than 5 times the reportable detection limit (RDL)

### RPD exceeds the recommended acceptance limits  
### RPD exceeds the recommended acceptance limits, however the concentrations did not exceed 5 times the reported detection limit.

Field Duplicate acceptance limits are typically +/- 60% for volatile organics (including BTEX, EPH and VH) in soils.  
Field Duplicate acceptance limits are typically +/- 75% for PAHs in soils.

**Table VI - Groundwater QAQC Results**  
**5th Avenue (Rogers Street to Jeckell Street), Whitehorse Yukon**  
**Phase II ESA (2018 - 2019)**  
**Yukon Government**

Sample Location Sample Date Sample ID Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	RDL	MW16-02		RPD %	MW18-37		RPD %	MW18-39		RPD %
			21-Aug-18 MW16-02 MAXX B871282 UD3683	21-Aug-18 MW16-02A MAXX B871282 UD3684 Field Duplicate		15-Aug-18 MW18-37 MAXX B869306 UC1860	15-Aug-18 MW18-37A MAXX B869306 UC1861 Field Duplicate		17-Aug-18 MW18-39 MAXX B870078 UC6889	17-Aug-18 MW18-39A MAXX B870078 UC6890 Field Duplicate	
<b>Petroleum Hydrocarbons</b>											
LEPH (C10-C19 less PAH)	mg/L	0.2	<0.20	<0.20	nc	<0.20	<0.20	nc	0.53	0.54	1%
EPH C10-C19	mg/L	0.2	<0.20	<0.20	nc	<0.20	<0.20	nc	0.53	0.54	1%
HEPH (C19-C32 less PAH)	mg/L	0.2	<0.20	<0.20	nc	<0.20	<0.20	nc	<0.20	<0.20	nc
EPH C19-C32	mg/L	0.2	<0.20	<0.20	nc	<0.20	<0.20	nc	<0.20	<0.20	nc
VH (C6-C10)	µg/L	300	-	-	nc	<300	-	nc	-	<300	nc
VPH (C6-C10 Minus BTEX)	µg/L	300	-	-	nc	<300	-	nc	-	<300	nc
<b>Dissolved metals</b>											
Arsenic	µg/L	0.1	-	-	nc	17.5	-	nc	15.7	15.9	1%
Iron	µg/L	5	-	-	nc	<5.0	-	nc	1580	1580	0%
Manganese	µg/L	1	-	-	nc	13.6	-	nc	173	170	1%
Magnesium	mg/L	0.05	-	-	nc	13	-	nc	101	101	0%
<b>BTEX</b>											
Benzene	µg/L	0.4	-	-	nc	<0.40	-	nc	-	<0.40	nc
Ethylbenzene	µg/L	0.4	-	-	nc	<0.40	-	nc	-	<0.40	nc
Methyl tert-butyl ether (MTBE)	µg/L	4	-	-	nc	<4.0	-	nc	-	<4.0	nc
Styrene	µg/L	0.4	-	-	nc	<0.40	-	nc	-	<0.40	nc
Toluene	µg/L	0.4	-	-	nc	<0.40	-	nc	-	<0.40	nc
Xylene, m & p-	µg/L	0.4	-	-	nc	<0.40	-	nc	-	0.89	nc
Xylene, o-	µg/L	0.4	-	-	nc	<0.40	-	nc	-	<0.40	nc
Xylenes, Total	µg/L	0.4	-	-	nc	<0.40	-	nc	-	0.89	nc
<b>Anions</b>											
Nitrate	mg/L	0.02	-	-	nc	-	-	nc	<0.020	<0.020	nc
Nitrate + Nitrite (as N)	mg/L	0.02	-	-	nc	-	-	nc	<0.020	<0.020	nc
Nitrite (as N)	mg/L	0.005	-	-	nc	-	-	nc	<0.0050	<0.0050	nc
Total Kjeldahl Nitrogen	mg/L	0.2	-	-	nc	-	-	nc	0.149	0.127	8%
Sulfate	mg/L	10	-	-	nc	-	-	nc	552	548	0%
Chloride	mg/L	1	-	-	nc	-	-	nc	5.7	5.8	1%
Fluoride	mg/L	0.02	-	-	nc	-	-	nc	0.28	0.27	2%
Nitrogen	mg/L	0.2	-	-	nc	-	-	nc	0.149	0.127	8%
Ammonia (as N)	mg/L	0.02	-	-	nc	-	-	nc	<0.020	<0.020	nc
Orthophosphate(as P)	mg/L	0.005	-	-	nc	-	-	nc	<0.0050	<0.0050	nc
Phosphorus	mg/L	0.68	-	-	nc	-	-	nc	0.0674	0.0681	nc
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	nc	-	-	nc	1.99	2.87	18%
<b>Polycyclic Aromatic Hydrocarbl</b>											
Acenaphthene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	0.35	0.34	1%
Acenaphthylene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Acridine	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Anthracene	µg/L	0.01	<0.010	<0.010	nc	<0.010	<0.010	nc	0.014	0.013	4%
Benzo(a)anthracene	µg/L	0.01	<0.010	<0.010	nc	<0.010	<0.010	nc	<0.010	<0.010	nc
Benzo(a)pyrene	µg/L	0	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc	<0.0050	<0.0050	nc
Benzo(b)pyridine (Quinoline)	µg/L	0.02	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.087	<0.041	nc
Benzo(b,j)fluoranthene	µg/L	0.03	<0.030	<0.030	nc	<0.030	<0.030	nc	<0.030	<0.030	nc
Benzo(g,h,i)perylene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Benzo(k)fluoranthene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Chrysene	µg/L	0.02	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Dibenzo(a,h)anthracene	µg/L	0	<0.0030	<0.0030	nc	<0.0030	<0.0030	nc	<0.0030	<0.0030	nc
Fluoranthene	µg/L	0.02	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
Fluorene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	1	0.99	1%
Indeno(1,2,3-cd)pyrene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Methylnaphthalene, 1-	µg/L	0.05	<0.050	<0.050	nc	-	-	nc	6.1	5.9	2%
Methylnaphthalene, 2-	µg/L	0.1	<0.10	<0.10	nc	<0.10	<0.10	nc	<0.10	<0.10	nc
Naphthalene	µg/L	0.1	<0.10	<0.10	nc	<0.10	<0.10	nc	0.45	0.44	1%
Phenanthrene	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	0.25	0.24	2%
Pyrene	µg/L	0.02	<0.020	<0.020	nc	<0.020	<0.020	nc	<0.020	<0.020	nc
High Molecular Weight PAHs	µg/L	0.05	<0.050	<0.050	nc	<0.050	<0.050	nc	<0.050	<0.050	nc
Low Molecular Weight PAHs	µg/L	0.1	<0.10	<0.10	nc	<0.10	<0.10	nc	8.1	7.9	1%
Total PAH	µg/L	0.1	<0.10	<0.10	nc	<0.10	<0.10	nc	8.1	7.9	1%

**Notes:**

RPD Relative Percent Difference  
RDL reportable detection limit  
nc Not Calculated - RPD values are not used to evaluate those compounds that are present at concentrations less than 5 times the reportable detection limit (RDL)

### RPD exceeds the recommended acceptance limits  
### RPD exceeds the recommended acceptance limits, however the concentrations did not exceed 5 times the reported detection limit.

Field Duplicate acceptance limits are typically +/- 45% for volatile organics (including BTEX and VH) in water

Field Duplicate acceptance limits are typically +/- 30% for metals in water

Field Duplicate acceptance limits are typically +/- 45% for organics in water

**APPENDIX F**  
**LABORATORY CERTIFICATES**

Your Project #: 123221161  
Your C.O.C. #: 560386-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/02**  
Report #: R2599016  
Version: 3 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B862272**

**Received: 2018/07/26, 14:04**

Sample Matrix: Water  
# Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	3	N/A	2018/07/27	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Chloride by Automated Colourimetry	3	N/A	2018/07/27	BBY6SOP-00011	SM 22 4500-Cl- E m
Carbon (DOC) (1, 2)	3	N/A	2018/07/30	CAL SOP-00077	MMCW 119 1996 m
Fluoride	3	N/A	2018/07/27	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO3)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	3	N/A	2018/07/27	BBY7SOP-00015	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	3	2018/07/27	2018/07/27	BBY8SOP-00029	BCMOE BCLM Mar 2017
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	3	N/A	2018/07/27	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	3	N/A	2018/07/31	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	3	N/A	2018/07/27	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	3	N/A	2018/07/27	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	3	N/A	2018/07/27	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	3	2018/07/27	2018/07/27	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (3)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	3	N/A	2018/07/27	BBY7 WI-00004	BCMOE Reqs 08/14
Orthophosphate by Konelab	3	N/A	2018/07/27	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	3	N/A	2018/07/27	BBY6SOP-00017	SM 22 4500-SO42- E m
EPH less PAH in Water by GC/FID (4)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	2	N/A	2018/07/31	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	1	N/A	2018/08/02	BBY WI-00033	Auto Calc
Total Phosphorus	3	2018/07/28	2018/07/28	BBY6SOP-00013	SM 22 4500-P E m
Volatile HC-BTEX (5)	3	N/A	2018/07/27	BBY WI-00033	Auto Calc

**Remarks:**

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using



Your Project #: 123221161  
Your C.O.C. #: 560386-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/02**  
Report #: R2599016  
Version: 3 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B862272**

**Received: 2018/07/26, 14:04**

accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

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

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

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) This test was performed by Maxxam Calgary Environmental

(2) DOC present in the sample should be considered as non-purgeable DOC. Dissolved > Total Imbalance: Whenever applicable, Dissolved >Total for any parameter that falls within method uncertainty for duplicates is likely equivalent. If RPD is >20% samples were reanalyzed and confirmed.

(3) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		TY3071	TY3072			TY3072		
Sampling Date		2018/07/26 11:35	2018/07/26 13:30			2018/07/26 13:30		
COC Number		560386-01-01	560386-01-01			560386-01-01		
	UNITS	MW18-44	MW18-33	RDL	QC Batch	MW18-33 Lab-Dup	RDL	QC Batch
<b>ANIONS</b>								
Nitrite (N)	mg/L	<0.0050	<0.0050	0.0050	9081443			
<b>Calculated Parameters</b>								
Nitrate (N)	mg/L	<0.020	<0.020	0.020	9081019			
<b>Misc. Inorganics</b>								
Fluoride (F)	mg/L	0.190	0.260	0.020	9081524			
Dissolved Organic Carbon (C)	mg/L	5.3	4.9	0.50	9083309			
<b>Anions</b>								
Dissolved Sulphate (SO4)	mg/L	431 (1)	315 (1)	10	9081593			
Dissolved Chloride (Cl)	mg/L	41	7.0	1.0	9081562			
<b>Nutrients</b>								
Orthophosphate (P)	mg/L	<0.0050	0.0123	0.0050	9082528			
Total Ammonia (N)	mg/L	0.18	0.14	0.020	9082265	0.13	0.020	9082265
Total Phosphorus (P)	mg/L	0.0242	0.0446	0.0050	9082549	0.0444	0.0050	9082549
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.								

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		TY3073			TY3073		
Sampling Date		2018/07/26 13:25			2018/07/26 13:25		
COC Number		560386-01-01			560386-01-01		
	UNITS	MW18-34	RDL	QC Batch	MW18-34 Lab-Dup	RDL	QC Batch
<b>ANIONS</b>							
Nitrite (N)	mg/L	<0.0050	0.0050	9081443	<0.0050	0.0050	9081443
<b>Calculated Parameters</b>							
Nitrate (N)	mg/L	<0.020	0.020	9081019			
<b>Misc. Inorganics</b>							
Fluoride (F)	mg/L	0.300	0.020	9081524			
Dissolved Organic Carbon (C)	mg/L	4.2	0.50	9083309	4.7	0.50	9083309
<b>Anions</b>							
Dissolved Sulphate (SO4)	mg/L	128	1.0	9081593	129	1.0	9081593
Dissolved Chloride (Cl)	mg/L	4.1	1.0	9081562	4.0	1.0	9081562
<b>Nutrients</b>							
Orthophosphate (P)	mg/L	0.0192	0.0050	9082528	0.0173	0.0050	9082528
Total Ammonia (N)	mg/L	0.15	0.020	9082265			
Total Phosphorus (P)	mg/L	0.322	0.0050	9082549			
RDL = Reportable Detection Limit							
Lab-Dup = Laboratory Initiated Duplicate							

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**CSR BTEX/VPH IN WATER (WATER)**

Maxxam ID		TY3071	TY3072	TY3073		
Sampling Date		2018/07/26 11:35	2018/07/26 13:30	2018/07/26 13:25		
COC Number		560386-01-01	560386-01-01	560386-01-01		
	<b>UNITS</b>	<b>MW18-44</b>	<b>MW18-33</b>	<b>MW18-34</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>						
VPH (VH6 to 10 - BTEX)	ug/L	<300	<300	<300	300	9081032
<b>Volatiles</b>						
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	4.0	9081436
Benzene	ug/L	<0.40	<0.40	<0.40	0.40	9081436
Toluene	ug/L	<0.40	<0.40	<0.40	0.40	9081436
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	0.40	9081436
m & p-Xylene	ug/L	0.40	<0.40	<0.40	0.40	9081436
o-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	9081436
Styrene	ug/L	<0.40	<0.40	<0.40	0.40	9081436
Xylenes (Total)	ug/L	0.40	<0.40	<0.40	0.40	9081436
VH C6-C10	ug/L	<300	<300	<300	300	9081436
<b>Surrogate Recovery (%)</b>						
1,4-Difluorobenzene (sur.)	%	102	101	102		9081436
4-Bromofluorobenzene (sur.)	%	94	94	94		9081436
D4-1,2-Dichloroethane (sur.)	%	97	103	99		9081436
RDL = Reportable Detection Limit						

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		TY3071	TY3072	TY3073		
Sampling Date		2018/07/26 11:35	2018/07/26 13:30	2018/07/26 13:25		
COC Number		560386-01-01	560386-01-01	560386-01-01		
	<b>UNITS</b>	<b>MW18-44</b>	<b>MW18-33</b>	<b>MW18-34</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>						
Low Molecular Weight PAH's	ug/L	0.88	<0.10	<0.10	0.10	9081021
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	0.050	9081021
Total PAH	ug/L	0.88	<0.10	<0.10	0.10	9081021
<b>Polycyclic Aromatics</b>						
Quinoline	ug/L	<0.020	<0.020	<0.020	0.020	9081255
Naphthalene	ug/L	0.14	<0.10	<0.10	0.10	9081255
1-Methylnaphthalene	ug/L	0.14	0.054	<0.050	0.050	9081255
2-Methylnaphthalene	ug/L	0.19	<0.10	<0.10	0.10	9081255
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Acenaphthene	ug/L	0.42	<0.050	<0.050	0.050	9081255
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Phenanthrene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	9081255
Acridine	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	9081255
Pyrene	ug/L	<0.020	<0.020	<0.020	0.020	9081255
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	9081255
Chrysene	ug/L	<0.020	<0.020	<0.020	0.020	9081255
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	<0.030	0.030	9081255
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	0.0050	9081255
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	0.0030	9081255
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	0.050	9081255
<b>Calculated Parameters</b>						
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	9081025
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	0.20	9081025
<b>Ext. Pet. Hydrocarbon</b>						
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	0.20	9081276
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	0.20	9081276
<b>Surrogate Recovery (%)</b>						
O-TERPHENYL (sur.)	%	73	93	97		9081276
D10-ANTHRACENE (sur.)	%	76	86	91		9081255
RDL = Reportable Detection Limit						

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		TY3071	TY3072	TY3073		
Sampling Date		2018/07/26 11:35	2018/07/26 13:30	2018/07/26 13:25		
COC Number		560386-01-01	560386-01-01	560386-01-01		
	UNITS	MW18-44	MW18-33	MW18-34	RDL	QC Batch
D8-ACENAPHTHYLENE (sur.)	%	88	90	95		9081255
D8-NAPHTHALENE (sur.)	%	77	77	78		9081255
TERPHENYL-D14 (sur.)	%	68	86	92		9081255
RDL = Reportable Detection Limit						

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

<b>Maxxam ID</b>		TY3071			TY3071			TY3072		
<b>Sampling Date</b>		2018/07/26 11:35			2018/07/26 11:35			2018/07/26 13:30		
<b>COC Number</b>		560386-01-01			560386-01-01			560386-01-01		
	<b>UNITS</b>	<b>MW18-44</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW18-44 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW18-33</b>	<b>RDL</b>	<b>QC Batch</b>

**Calculated Parameters**

Filter and HNO3 Preservation	N/A	FIELD		ONSITE				FIELD		ONSITE
Dissolved Hardness (CaCO3)	mg/L	776	0.50	9081011				575	0.50	9081011

**Elements**

Dissolved Mercury (Hg)	ug/L	<0.0020	0.0020	9081162				0.0023	0.0020	9081162
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**Dissolved Metals by ICPMS**

Dissolved Aluminum (Al)	ug/L	6.6	3.0	9081279	5.8	3.0	9081279	5.0	3.0	9081279
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	9081279	<0.50	0.50	9081279	0.64	0.50	9081279
Dissolved Arsenic (As)	ug/L	2.89	0.10	9081279	2.86	0.10	9081279	3.51	0.10	9081279
Dissolved Barium (Ba)	ug/L	98.6	1.0	9081279	96.9	1.0	9081279	33.1	1.0	9081279
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	9081279	<0.10	0.10	9081279	<0.10	0.10	9081279
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	9081279	<1.0	1.0	9081279	<1.0	1.0	9081279
Dissolved Boron (B)	ug/L	<50	50	9081279	<50	50	9081279	<50	50	9081279
Dissolved Cadmium (Cd)	ug/L	0.174	0.010	9081279	0.166	0.010	9081279	0.098	0.010	9081279
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	9081279	<1.0	1.0	9081279	<1.0	1.0	9081279
Dissolved Cobalt (Co)	ug/L	7.34	0.20	9081279	7.20	0.20	9081279	4.20	0.20	9081279
Dissolved Copper (Cu)	ug/L	3.37	0.20	9081279	3.32	0.20	9081279	1.43	0.20	9081279
Dissolved Iron (Fe)	ug/L	306	5.0	9081279	307	5.0	9081279	8.4	5.0	9081279
Dissolved Lead (Pb)	ug/L	<0.20	0.20	9081279	<0.20	0.20	9081279	<0.20	0.20	9081279
Dissolved Lithium (Li)	ug/L	2.1	2.0	9081279	2.1	2.0	9081279	3.6	2.0	9081279
Dissolved Manganese (Mn)	ug/L	2050	1.0	9081279	2010	1.0	9081279	566	1.0	9081279
Dissolved Molybdenum (Mo)	ug/L	3.3	1.0	9081279	3.3	1.0	9081279	4.2	1.0	9081279
Dissolved Nickel (Ni)	ug/L	12.7	1.0	9081279	12.3	1.0	9081279	11.2	1.0	9081279
Dissolved Selenium (Se)	ug/L	0.18	0.10	9081279	0.16	0.10	9081279	0.33	0.10	9081279
Dissolved Silicon (Si)	ug/L	7870	100	9081279	7800	100	9081279	6430	100	9081279
Dissolved Silver (Ag)	ug/L	<0.020	0.020	9081279	<0.020	0.020	9081279	<0.020	0.020	9081279
Dissolved Strontium (Sr)	ug/L	1090	1.0	9081279	1090	1.0	9081279	638	1.0	9081279
Dissolved Thallium (Tl)	ug/L	0.028	0.010	9081279	0.026	0.010	9081279	0.032	0.010	9081279
Dissolved Tin (Sn)	ug/L	<5.0	5.0	9081279	<5.0	5.0	9081279	<5.0	5.0	9081279
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	9081279	<5.0	5.0	9081279	<5.0	5.0	9081279
Dissolved Uranium (U)	ug/L	15.1	0.10	9081279	15.1	0.10	9081279	12.4	0.10	9081279
Dissolved Vanadium (V)	ug/L	<5.0	5.0	9081279	<5.0	5.0	9081279	<5.0	5.0	9081279
Dissolved Zinc (Zn)	ug/L	5.7	5.0	9081279	5.4	5.0	9081279	<5.0	5.0	9081279

RDL = Reportable Detection Limit  
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

Maxxam ID		TY3071			TY3071			TY3072		
Sampling Date		2018/07/26 11:35			2018/07/26 11:35			2018/07/26 13:30		
COC Number		560386-01-01			560386-01-01			560386-01-01		
	UNITS	MW18-44	RDL	QC Batch	MW18-44 Lab-Dup	RDL	QC Batch	MW18-33	RDL	QC Batch
Dissolved Zirconium (Zr)	ug/L	0.29	0.10	9081279	0.30	0.10	9081279	0.41	0.10	9081279
Dissolved Calcium (Ca)	mg/L	164	0.050	9081013				120	0.050	9081013
Dissolved Magnesium (Mg)	mg/L	89.2	0.050	9081013				66.9	0.050	9081013
Dissolved Potassium (K)	mg/L	3.73	0.050	9081013				4.87	0.050	9081013
Dissolved Sodium (Na)	mg/L	26.0	0.050	9081013				20.6	0.050	9081013
Dissolved Sulphur (S)	mg/L	154	3.0	9081013				106	3.0	9081013
RDL = Reportable Detection Limit										
Lab-Dup = Laboratory Initiated Duplicate										



Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

<b>Maxxam ID</b>		TY3073		
<b>Sampling Date</b>		2018/07/26 13:25		
<b>COC Number</b>		560386-01-01		
	<b>UNITS</b>	<b>MW18-34</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Filter and HNO <sub>3</sub> Preservation	N/A	FIELD		ONSITE
Dissolved Hardness (CaCO <sub>3</sub> )	mg/L	307	0.50	9081011
<b>Elements</b>				
Dissolved Mercury (Hg)	ug/L	0.0025	0.0020	9081162
<b>Dissolved Metals by ICPMS</b>				
Dissolved Aluminum (Al)	ug/L	570	3.0	9081279
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	9081279
Dissolved Arsenic (As)	ug/L	9.08	0.10	9081279
Dissolved Barium (Ba)	ug/L	52.2	1.0	9081279
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	9081279
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	9081279
Dissolved Boron (B)	ug/L	<50	50	9081279
Dissolved Cadmium (Cd)	ug/L	0.054	0.010	9081279
Dissolved Chromium (Cr)	ug/L	1.1	1.0	9081279
Dissolved Cobalt (Co)	ug/L	2.14	0.20	9081279
Dissolved Copper (Cu)	ug/L	3.21	0.20	9081279
Dissolved Iron (Fe)	ug/L	671	5.0	9081279
Dissolved Lead (Pb)	ug/L	0.62	0.20	9081279
Dissolved Lithium (Li)	ug/L	2.5	2.0	9081279
Dissolved Manganese (Mn)	ug/L	322	1.0	9081279
Dissolved Molybdenum (Mo)	ug/L	4.9	1.0	9081279
Dissolved Nickel (Ni)	ug/L	7.5	1.0	9081279
Dissolved Selenium (Se)	ug/L	0.24	0.10	9081279
Dissolved Silicon (Si)	ug/L	7210	100	9081279
Dissolved Silver (Ag)	ug/L	<0.020	0.020	9081279
Dissolved Strontium (Sr)	ug/L	432	1.0	9081279
Dissolved Thallium (Tl)	ug/L	0.023	0.010	9081279
Dissolved Tin (Sn)	ug/L	<5.0	5.0	9081279
Dissolved Titanium (Ti)	ug/L	23.0	5.0	9081279
Dissolved Uranium (U)	ug/L	5.72	0.10	9081279
Dissolved Vanadium (V)	ug/L	<5.0	5.0	9081279
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	9081279
Dissolved Zirconium (Zr)	ug/L	0.66	0.10	9081279
RDL = Reportable Detection Limit				

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

<b>Maxxam ID</b>		TY3073		
<b>Sampling Date</b>		2018/07/26 13:25		
<b>COC Number</b>		560386-01-01		
	<b>UNITS</b>	<b>MW18-34</b>	<b>RDL</b>	<b>QC Batch</b>
Dissolved Calcium (Ca)	mg/L	65.0	0.050	9081013
Dissolved Magnesium (Mg)	mg/L	35.1	0.050	9081013
Dissolved Potassium (K)	mg/L	3.27	0.050	9081013
Dissolved Sodium (Na)	mg/L	18.3	0.050	9081013
Dissolved Sulphur (S)	mg/L	36.4	3.0	9081013
RDL = Reportable Detection Limit				

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

**TOTAL TKN IN WATER (WATER)**

<b>Maxxam ID</b>		TY3071	TY3072		TY3073			TY3073		
<b>Sampling Date</b>		2018/07/26 11:35	2018/07/26 13:30		2018/07/26 13:25			2018/07/26 13:25		
<b>COC Number</b>		560386-01-01	560386-01-01		560386-01-01			560386-01-01		
	<b>UNITS</b>	<b>MW18-44</b>	<b>MW18-33</b>	<b>RDL</b>	<b>MW18-34</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW18-34 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>										
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.382	0.362	0.020	0.32	0.20	9081029			
<b>Nutrients</b>										
Nitrate plus Nitrite (N)	mg/L	<0.020	<0.020	0.020	<0.020	0.020	9081439	<0.020	0.020	9081439
Total Nitrogen (N)	mg/L	0.382	0.362	0.020	0.32 (1)	0.20	9085012			
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate (1) RDL raised due to sample matrix interference.										

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

### GENERAL COMMENTS

**Results relate only to the items tested.**

Maxxam Job #: B862272  
Report Date: 2018/08/02

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9081255	D10-ANTHRACENE (sur.)	2018/07/27	80	50 - 140	85	50 - 140	86	%		
9081255	D8-ACENAPHTHYLENE (sur.)	2018/07/27	89	50 - 140	94	50 - 140	92	%		
9081255	D8-NAPHTHALENE (sur.)	2018/07/27	67	50 - 140	67	50 - 140	63	%		
9081255	TERPHENYL-D14 (sur.)	2018/07/27	87	50 - 140	92	50 - 140	90	%		
9081276	O-TERPHENYL (sur.)	2018/07/27	96	60 - 140	97	60 - 140	96	%		
9081436	1,4-Difluorobenzene (sur.)	2018/07/27	101	70 - 130	104	70 - 130	104	%		
9081436	4-Bromofluorobenzene (sur.)	2018/07/27	93	70 - 130	94	70 - 130	92	%		
9081436	D4-1,2-Dichloroethane (sur.)	2018/07/27	92	70 - 130	93	70 - 130	97	%		
9081162	Dissolved Mercury (Hg)	2018/07/27	95	80 - 120	98	80 - 120	<0.0020	ug/L	NC	20
9081255	1-Methylnaphthalene	2018/07/27	83	50 - 140	80	50 - 140	<0.050	ug/L	2.8	40
9081255	2-Methylnaphthalene	2018/07/27	78	50 - 140	75	50 - 140	<0.10	ug/L	5.4	40
9081255	Acenaphthene	2018/07/27	89	50 - 140	86	50 - 140	<0.050	ug/L	6.1	40
9081255	Acenaphthylene	2018/07/27	89	50 - 140	86	50 - 140	<0.050	ug/L	NC	40
9081255	Acridine	2018/07/27	100	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9081255	Anthracene	2018/07/27	88	50 - 140	87	50 - 140	<0.010	ug/L	NC	40
9081255	Benzo(a)anthracene	2018/07/27	82	50 - 140	79	50 - 140	<0.010	ug/L	NC	40
9081255	Benzo(a)pyrene	2018/07/27	87	50 - 140	84	50 - 140	<0.0050	ug/L	NC	40
9081255	Benzo(b&j)fluoranthene	2018/07/27	89	50 - 140	88	50 - 140	<0.030	ug/L	NC	40
9081255	Benzo(g,h,i)perylene	2018/07/27	79	50 - 140	79	50 - 140	<0.050	ug/L	NC	40
9081255	Benzo(k)fluoranthene	2018/07/27	88	50 - 140	83	50 - 140	<0.050	ug/L	NC	40
9081255	Chrysene	2018/07/27	87	50 - 140	84	50 - 140	<0.020	ug/L	NC	40
9081255	Dibenz(a,h)anthracene	2018/07/27	83	50 - 140	82	50 - 140	<0.0030	ug/L	NC	40
9081255	Fluoranthene	2018/07/27	81	50 - 140	79	50 - 140	<0.020	ug/L	NC	40
9081255	Fluorene	2018/07/27	82	50 - 140	81	50 - 140	<0.050	ug/L	NC	40
9081255	Indeno(1,2,3-cd)pyrene	2018/07/27	81	50 - 140	81	50 - 140	<0.050	ug/L	NC	40
9081255	Naphthalene	2018/07/27	76	50 - 140	74	50 - 140	<0.10	ug/L	3.8	40
9081255	Phenanthrene	2018/07/27	79	50 - 140	76	50 - 140	<0.050	ug/L	NC	40
9081255	Pyrene	2018/07/27	86	50 - 140	84	50 - 140	<0.020	ug/L	NC	40
9081255	Quinoline	2018/07/27	110	50 - 140	101	50 - 140	<0.020	ug/L	NC	40
9081276	EPH (C10-C19)	2018/07/27	88	60 - 140	85	70 - 130	<0.20	mg/L	NC	30
9081276	EPH (C19-C32)	2018/07/27	90	60 - 140	86	70 - 130	<0.20	mg/L	NC	30
9081279	Dissolved Aluminum (Al)	2018/07/27	103	80 - 120	100	80 - 120	<3.0	ug/L	12	20

Maxxam Job #: B862272  
Report Date: 2018/08/02

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9081279	Dissolved Antimony (Sb)	2018/07/27	102	80 - 120	98	80 - 120	<0.50	ug/L	NC	20
9081279	Dissolved Arsenic (As)	2018/07/27	105	80 - 120	101	80 - 120	<0.10	ug/L	1.1	20
9081279	Dissolved Barium (Ba)	2018/07/27	NC	80 - 120	97	80 - 120	<1.0	ug/L	1.7	20
9081279	Dissolved Beryllium (Be)	2018/07/27	92	80 - 120	99	80 - 120	<0.10	ug/L	NC	20
9081279	Dissolved Bismuth (Bi)	2018/07/27	94	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
9081279	Dissolved Boron (B)	2018/07/27	84	80 - 120	86	80 - 120	<50	ug/L	NC	20
9081279	Dissolved Cadmium (Cd)	2018/07/27	100	80 - 120	100	80 - 120	<0.010	ug/L	5.1	20
9081279	Dissolved Chromium (Cr)	2018/07/27	99	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
9081279	Dissolved Cobalt (Co)	2018/07/27	93	80 - 120	97	80 - 120	<0.20	ug/L	1.9	20
9081279	Dissolved Copper (Cu)	2018/07/27	90	80 - 120	97	80 - 120	<0.20	ug/L	1.5	20
9081279	Dissolved Iron (Fe)	2018/07/27	98	80 - 120	102	80 - 120	<5.0	ug/L	0.33	20
9081279	Dissolved Lead (Pb)	2018/07/27	97	80 - 120	99	80 - 120	<0.20	ug/L	NC	20
9081279	Dissolved Lithium (Li)	2018/07/27	96	80 - 120	94	80 - 120	<2.0	ug/L	0.88	20
9081279	Dissolved Manganese (Mn)	2018/07/27	NC	80 - 120	99	80 - 120	<1.0	ug/L	1.9	20
9081279	Dissolved Molybdenum (Mo)	2018/07/27	109	80 - 120	100	80 - 120	<1.0	ug/L	0.97	20
9081279	Dissolved Nickel (Ni)	2018/07/27	92	80 - 120	98	80 - 120	<1.0	ug/L	2.9	20
9081279	Dissolved Selenium (Se)	2018/07/27	101	80 - 120	98	80 - 120	<0.10	ug/L	9.5	20
9081279	Dissolved Silicon (Si)	2018/07/27	NC	80 - 120	101	80 - 120	<100	ug/L	0.89	20
9081279	Dissolved Silver (Ag)	2018/07/27	98	80 - 120	99	80 - 120	<0.020	ug/L	NC	20
9081279	Dissolved Strontium (Sr)	2018/07/27	NC	80 - 120	98	80 - 120	<1.0	ug/L	0.79	20
9081279	Dissolved Thallium (Tl)	2018/07/27	99	80 - 120	100	80 - 120	<0.010	ug/L	8.5	20
9081279	Dissolved Tin (Sn)	2018/07/27	100	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
9081279	Dissolved Titanium (Ti)	2018/07/27	105	80 - 120	101	80 - 120	<5.0	ug/L	NC	20
9081279	Dissolved Uranium (U)	2018/07/27	106	80 - 120	103	80 - 120	<0.10	ug/L	0.29	20
9081279	Dissolved Vanadium (V)	2018/07/27	101	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
9081279	Dissolved Zinc (Zn)	2018/07/27	93	80 - 120	98	80 - 120	<5.0	ug/L	4.0	20
9081279	Dissolved Zirconium (Zr)	2018/07/27	105	80 - 120	95	80 - 120	<0.10	ug/L	5.0	20
9081436	Benzene	2018/07/27	91	70 - 130	91	70 - 130	<0.40	ug/L	NC	30
9081436	Ethylbenzene	2018/07/27	111	70 - 130	107	70 - 130	<0.40	ug/L	NC	30
9081436	m & p-Xylene	2018/07/27	115	70 - 130	111	70 - 130	<0.40	ug/L	NC	30
9081436	Methyl-tert-butylether (MTBE)	2018/07/27	116	70 - 130	115	70 - 130	<4.0	ug/L	NC	30
9081436	o-Xylene	2018/07/27	117	70 - 130	113	70 - 130	<0.40	ug/L	NC	30

Maxxam Job #: B862272  
Report Date: 2018/08/02

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9081436	Styrene	2018/07/27	98	70 - 130	95	70 - 130	<0.40	ug/L	NC	30
9081436	Toluene	2018/07/27	105	70 - 130	102	70 - 130	<0.40	ug/L	NC	30
9081436	VH C6-C10	2018/07/27			110	70 - 130	<300	ug/L	NC	30
9081436	Xylenes (Total)	2018/07/27					<0.40	ug/L	NC	30
9081439	Nitrate plus Nitrite (N)	2018/07/27	105	80 - 120	110	80 - 120	<0.020	mg/L	NC	25
9081443	Nitrite (N)	2018/07/27	98	80 - 120	106	80 - 120	<0.0050	mg/L	NC	20
9081524	Fluoride (F)	2018/07/27	92	80 - 120	96	80 - 120	<0.020	mg/L	0	20
9081562	Dissolved Chloride (Cl)	2018/07/27	103	80 - 120	103	80 - 120	<1.0	mg/L	1.6	20
9081593	Dissolved Sulphate (SO4)	2018/07/27	NC	80 - 120	104	80 - 120	<1.0	mg/L	1.2	20
9082265	Total Ammonia (N)	2018/07/27	94	80 - 120	95	80 - 120	<0.020	mg/L	7.5	20
9082528	Orthophosphate (P)	2018/07/27	81	80 - 120	96	80 - 120	<0.0050	mg/L	10	20
9082549	Total Phosphorus (P)	2018/07/28	98	80 - 120	101	80 - 120	<0.0050	mg/L	0.46	20
9083309	Dissolved Organic Carbon (C)	2018/07/30	115	80 - 120	101	80 - 120	<0.50	mg/L	9.9	20
9085012	Total Nitrogen (N)	2018/07/31			90	80 - 120	<0.020	mg/L	2.9	20

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

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

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

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

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

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

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

Maxxam Job #: B862272  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161

### VALIDATION SIGNATURE PAGE

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



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



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Rob Reinert, B.Sc., Scientific Specialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.





Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:800-563-4266 Fax:(604) 731 2386 www.maxxam.ca

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Stantec Consulting	Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #	
			Sampled By		



8862272\_COC



Ca560386-01-01

Nahed Amer

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Analysis Requested							# of Bottles	Comments
							LEPH/HEP/PAH	Diss. Metals (with Hg)	BTEX/VPH	Major Ions (Cl, F, NO2, NO3, PO4, SO4)	DOC	Nutrients (TP, NH4, TKN)			
1	MW18-4A	July 26/18	11:35	GW	Y	X	X	X	X	X	X			10	RECEIVED IN WHITEHORSE
2	MW18-33	Jul. 26/18	13:30	GW	Y	X	X	X	X	X	X			10	BY: <u>Slyano @ 1404</u>
3	MW18-34	Jul 26/18	13:25	GW	Y	X	X	X	X	X	X			10	2018-07-26
4															TEMP: 9, 11, 12
5															cooling media present
6															
7															
8															
9															
10															

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

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

**Job Specific Rush TAT (if applies to entire submission)**  
 Date Required: July 27/18 Time Required: 18:00

Rush Confirmation Number \_\_\_\_\_ (call lab for #)

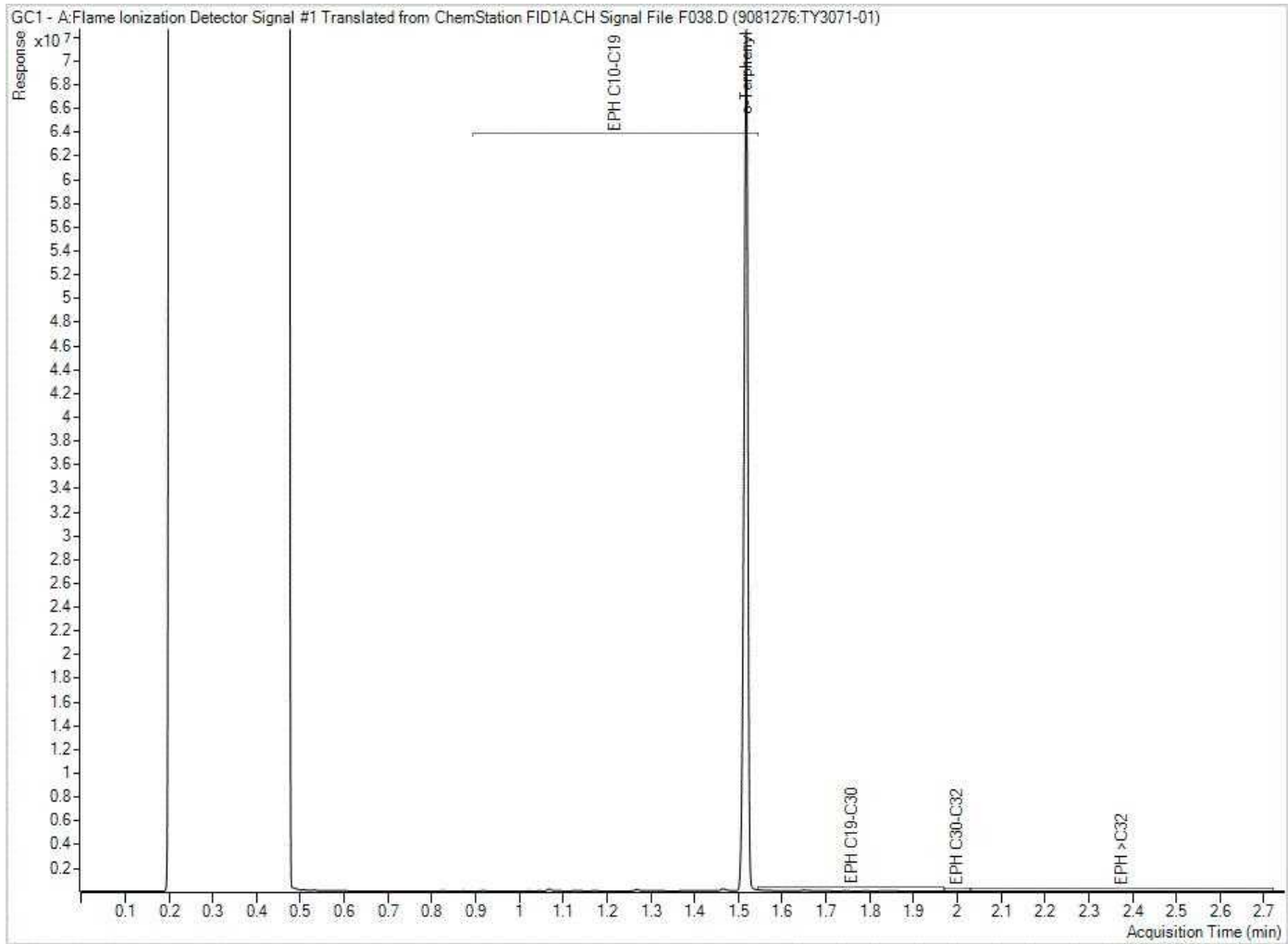
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
<u>(Signature)</u>		18/07/26	14:04	<u>TEJAN SHERA</u>		18/07/27	07:00		Time Sensitive <input type="checkbox"/>	Temperature (°C) on Receipt <u>6.6.6</u>	Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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

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

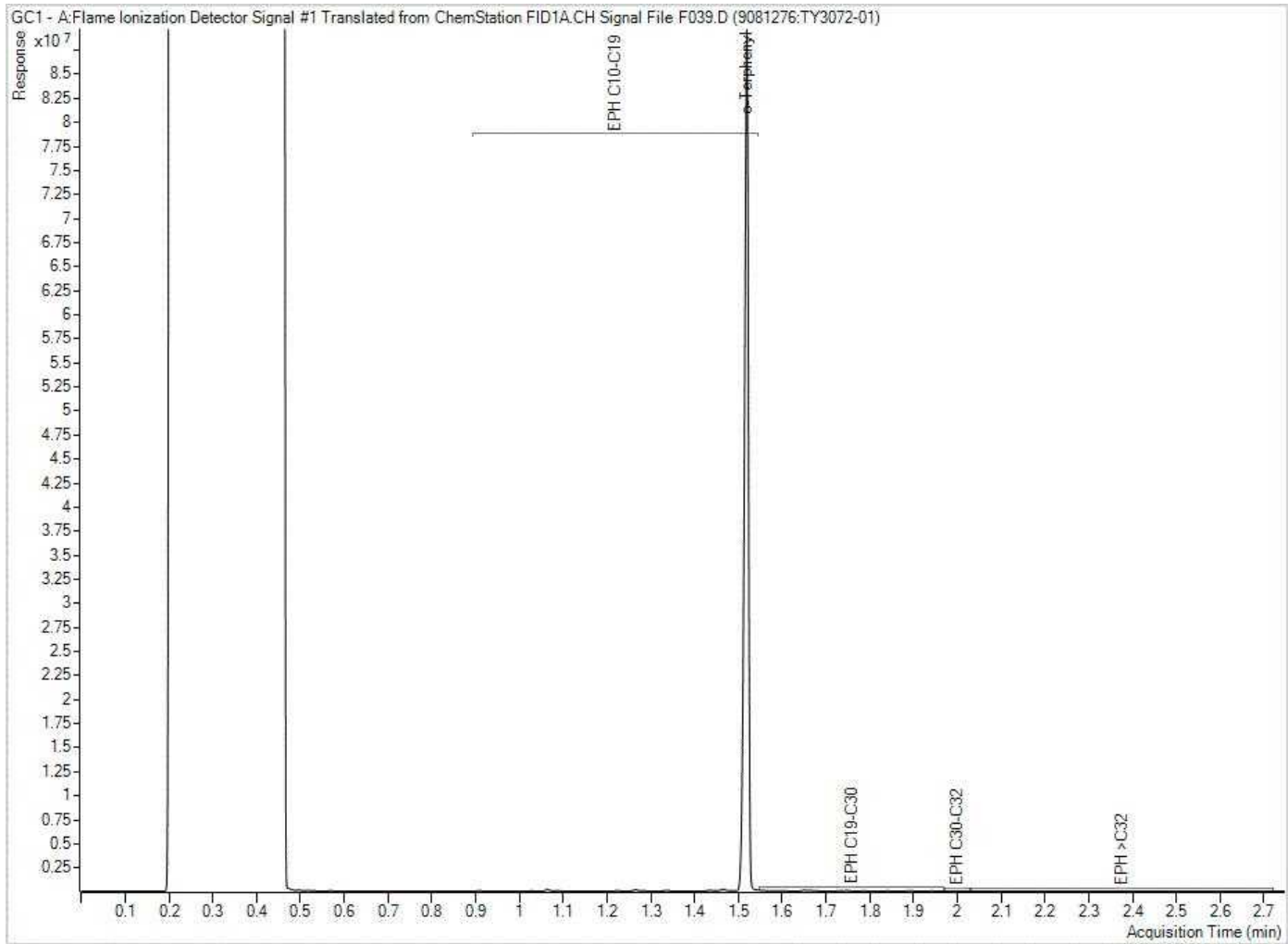
0084

EPH in Water when PAH required Chromatogram



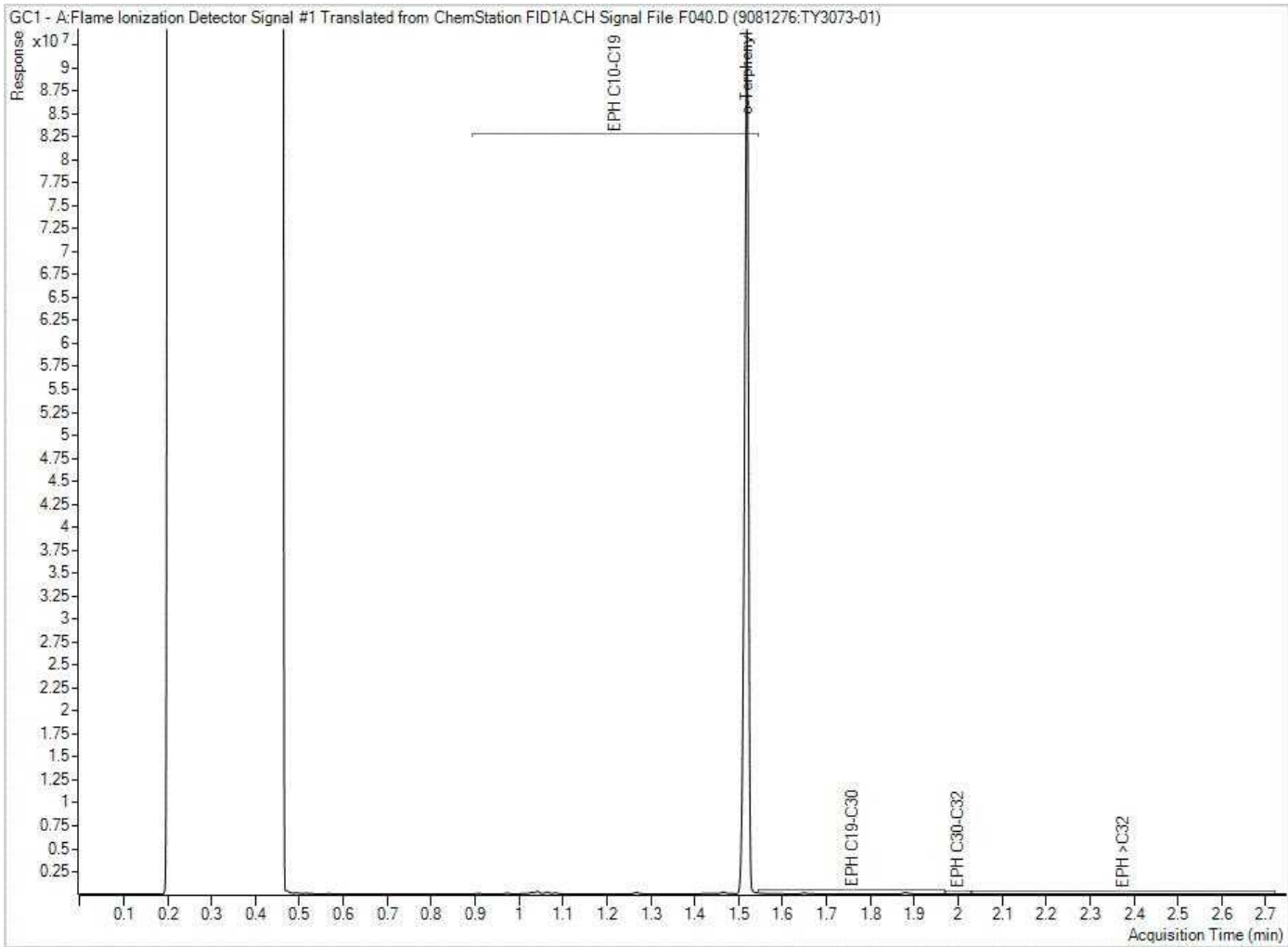
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your Project #: 123221161  
Your C.O.C. #: 560386-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/01**  
Report #: R2598434  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B863767**

**Received: 2018/07/30, 16:05**

Sample Matrix: Water  
# Samples Received: 2

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2018/07/31	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Hardness (calculated as CaCO3)	2	N/A	2018/08/01	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAf	2	N/A	2018/08/01	BBY7SOP-00015	BCMOE BCLM Oct2013 m
EPH in Water when PAH required	2	2018/08/01	2018/08/01	BBY8SOP-00029	BCMOE BCLM Mar 2017
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2018/08/01	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (dissolved)	2	N/A	2018/08/01	BBY7SOP-00002	EPA 6020b R2 m
PAH in Water by GC/MS (SIM)	2	2018/08/01	2018/08/01	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1)	2	N/A	2018/08/01	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	2	N/A	2018/07/31	BBY7 WI-00004	BCMOE Reqs 08/14
EPH less PAH in Water by GC/FID (2)	2	N/A	2018/08/01	BBY WI-00033	Auto Calc
Volatile HC-BTEX (3)	2	N/A	2018/08/01	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Your Project #: 123221161  
Your C.O.C. #: 560386-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/01**  
Report #: R2598434  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B863767**

**Received: 2018/07/30, 16:05**

(1) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(2) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(3) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
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Maxxam Job #: B863767  
Report Date: 2018/08/01

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

<b>Maxxam ID</b>		TZ1833	TZ1834	
<b>Sampling Date</b>		2018/07/30 14:45	2018/07/30 14:30	
<b>COC Number</b>		560386-01-01	560386-01-01	
	<b>UNITS</b>	<b>MW18-42</b>	<b>MW18-43</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE

Maxxam Job #: B863767  
Report Date: 2018/08/01

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN WATER (WATER)**

Maxxam ID		TZ1833	TZ1834		
Sampling Date		2018/07/30 14:45	2018/07/30 14:30		
COC Number		560386-01-01	560386-01-01		
	UNITS	MW18-42	MW18-43	RDL	QC Batch
<b>Calculated Parameters</b>					
VPH (VH6 to 10 - BTEX)	ug/L	<300	<300	300	9085681
<b>Volatiles</b>					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	9085353
Benzene	ug/L	<0.40	<0.40	0.40	9085353
Toluene	ug/L	<0.40	<0.40	0.40	9085353
Ethylbenzene	ug/L	<0.40	<0.40	0.40	9085353
m & p-Xylene	ug/L	<0.40	0.76	0.40	9085353
o-Xylene	ug/L	<0.40	0.41	0.40	9085353
Styrene	ug/L	<0.40	<0.40	0.40	9085353
Xylenes (Total)	ug/L	<0.40	1.2	0.40	9085353
VH C6-C10	ug/L	<300	<300	300	9085353
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene (sur.)	%	96	97		9085353
4-Bromofluorobenzene (sur.)	%	96	95		9085353
D4-1,2-Dichloroethane (sur.)	%	103	104		9085353
RDL = Reportable Detection Limit					



Maxxam Job #: B863767  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		TZ1833	TZ1834		
Sampling Date		2018/07/30 14:45	2018/07/30 14:30		
COC Number		560386-01-01	560386-01-01		
	UNITS	MW18-42	MW18-43	RDL	QC Batch
<b>Calculated Parameters</b>					
Low Molecular Weight PAH's	ug/L	<0.10	<0.10	0.10	9085024
High Molecular Weight PAH's	ug/L	<0.050	<0.050	0.050	9085024
Total PAH	ug/L	<0.10	<0.10	0.10	9085024
<b>Polycyclic Aromatics</b>					
Quinoline	ug/L	<0.020	<0.020	0.020	9086704
Naphthalene	ug/L	<0.10	<0.10	0.10	9086704
1-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	9086704
2-Methylnaphthalene	ug/L	<0.10	<0.10	0.10	9086704
Acenaphthylene	ug/L	<0.050	<0.050	0.050	9086704
Acenaphthene	ug/L	<0.050	<0.050	0.050	9086704
Fluorene	ug/L	<0.050	<0.050	0.050	9086704
Phenanthrene	ug/L	<0.050	<0.050	0.050	9086704
Anthracene	ug/L	<0.010	<0.010	0.010	9086704
Acridine	ug/L	<0.050	<0.050	0.050	9086704
Fluoranthene	ug/L	<0.020	<0.020	0.020	9086704
Pyrene	ug/L	<0.020	<0.020	0.020	9086704
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	9086704
Chrysene	ug/L	<0.020	<0.020	0.020	9086704
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	0.030	9086704
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	0.050	9086704
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	0.0050	9086704
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	0.050	9086704
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	0.0030	9086704
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	0.050	9086704
<b>Calculated Parameters</b>					
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	0.20	9085665
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	0.20	9085665
<b>Ext. Pet. Hydrocarbon</b>					
EPH (C10-C19)	mg/L	<0.20	<0.20	0.20	9086767
EPH (C19-C32)	mg/L	<0.20	<0.20	0.20	9086767
<b>Surrogate Recovery (%)</b>					
O-TERPHENYL (sur.)	%	97	94		9086767
RDL = Reportable Detection Limit					

Maxxam Job #: B863767  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		TZ1833	TZ1834		
Sampling Date		2018/07/30 14:45	2018/07/30 14:30		
COC Number		560386-01-01	560386-01-01		
	UNITS	MW18-42	MW18-43	RDL	QC Batch
D10-ANTHRACENE (sur.)	%	91	88		9086704
D8-ACENAPHTHYLENE (sur.)	%	90	89		9086704
D8-NAPHTHALENE (sur.)	%	86	86		9086704
TERPHENYL-D14 (sur.)	%	89	85		9086704
RDL = Reportable Detection Limit					

Maxxam Job #: B863767  
Report Date: 2018/08/01

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

Maxxam ID		TZ1833	TZ1834		
Sampling Date		2018/07/30 14:45	2018/07/30 14:30		
COC Number		560386-01-01	560386-01-01		
	UNITS	MW18-42	MW18-43	RDL	QC Batch
<b>Calculated Parameters</b>					
Dissolved Hardness (CaCO3)	mg/L	221	142	0.50	9086256
<b>Elements</b>					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9086684
<b>Dissolved Metals by ICPMS</b>					
Dissolved Aluminum (Al)	ug/L	3.1	4.1	3.0	9086604
Dissolved Antimony (Sb)	ug/L	0.88	<0.50	0.50	9086604
Dissolved Arsenic (As)	ug/L	11.2	15.7	0.10	9086604
Dissolved Barium (Ba)	ug/L	56.6	70.6	1.0	9086604
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	9086604
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	9086604
Dissolved Boron (B)	ug/L	51	<50	50	9086604
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	0.010	9086604
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	9086604
Dissolved Cobalt (Co)	ug/L	<0.20	<0.20	0.20	9086604
Dissolved Copper (Cu)	ug/L	0.55	0.51	0.20	9086604
Dissolved Iron (Fe)	ug/L	12.1	<5.0	5.0	9086604
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	9086604
Dissolved Lithium (Li)	ug/L	3.0	<2.0	2.0	9086604
Dissolved Manganese (Mn)	ug/L	72.3	38.1	1.0	9086604
Dissolved Molybdenum (Mo)	ug/L	6.7	7.9	1.0	9086604
Dissolved Nickel (Ni)	ug/L	<1.0	<1.0	1.0	9086604
Dissolved Selenium (Se)	ug/L	0.69	0.19	0.10	9086604
Dissolved Silicon (Si)	ug/L	5370	4830	100	9086604
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	9086604
Dissolved Strontium (Sr)	ug/L	424	312	1.0	9086604
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	0.010	9086604
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	9086604
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	9086604
Dissolved Uranium (U)	ug/L	5.41	3.95	0.10	9086604
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	9086604
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	9086604
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	0.10	9086604
RDL = Reportable Detection Limit					

Maxxam Job #: B863767  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)**

Maxxam ID		TZ1833	TZ1834		
Sampling Date		2018/07/30 14:45	2018/07/30 14:30		
COC Number		560386-01-01	560386-01-01		
	UNITS	MW18-42	MW18-43	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	55.6	24.5	0.050	9085018
Dissolved Magnesium (Mg)	mg/L	20.0	19.6	0.050	9085018
Dissolved Potassium (K)	mg/L	2.71	2.41	0.050	9085018
Dissolved Sodium (Na)	mg/L	16.9	19.8	0.050	9085018
Dissolved Sulphur (S)	mg/L	32.9	15.8	3.0	9085018
RDL = Reportable Detection Limit					

Maxxam Job #: B863767  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**GENERAL COMMENTS**

**Results relate only to the items tested.**

Maxxam Job #: B863767  
Report Date: 2018/08/01

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9085353	1,4-Difluorobenzene (sur.)	2018/07/31	102	70 - 130	101	70 - 130	100	%		
9085353	4-Bromofluorobenzene (sur.)	2018/07/31	93	70 - 130	92	70 - 130	92	%		
9085353	D4-1,2-Dichloroethane (sur.)	2018/07/31	95	70 - 130	95	70 - 130	100	%		
9086704	D10-ANTHRACENE (sur.)	2018/08/01	90	50 - 140	89	50 - 140	89	%		
9086704	D8-ACENAPHTHYLENE (sur.)	2018/08/01	89	50 - 140	86	50 - 140	87	%		
9086704	D8-NAPHTHALENE (sur.)	2018/08/01	83	50 - 140	73	50 - 140	80	%		
9086704	TERPHENYL-D14 (sur.)	2018/08/01	89	50 - 140	88	50 - 140	88	%		
9086767	O-TERPHENYL (sur.)	2018/08/01	96	60 - 140	97	60 - 140	96	%		
9085353	Benzene	2018/07/31	88	70 - 130	87	70 - 130	<0.40	ug/L		
9085353	Ethylbenzene	2018/07/31	103	70 - 130	102	70 - 130	<0.40	ug/L		
9085353	m & p-Xylene	2018/07/31	102	70 - 130	103	70 - 130	<0.40	ug/L		
9085353	Methyl-tert-butylether (MTBE)	2018/07/31	110	70 - 130	108	70 - 130	<4.0	ug/L		
9085353	o-Xylene	2018/07/31	104	70 - 130	107	70 - 130	<0.40	ug/L		
9085353	Styrene	2018/07/31	92	70 - 130	90	70 - 130	<0.40	ug/L		
9085353	Toluene	2018/07/31	98	70 - 130	98	70 - 130	<0.40	ug/L		
9085353	VH C6-C10	2018/07/31			108	70 - 130	<300	ug/L	NC	30
9085353	Xylenes (Total)	2018/07/31					<0.40	ug/L		
9086604	Dissolved Aluminum (Al)	2018/08/01	104	80 - 120	102	80 - 120	<3.0	ug/L	11	20
9086604	Dissolved Antimony (Sb)	2018/08/01	102	80 - 120	100	80 - 120	<0.50	ug/L	NC	20
9086604	Dissolved Arsenic (As)	2018/08/01	106	80 - 120	102	80 - 120	<0.10	ug/L	0.52	20
9086604	Dissolved Barium (Ba)	2018/08/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.66	20
9086604	Dissolved Beryllium (Be)	2018/08/01	99	80 - 120	100	80 - 120	<0.10	ug/L	NC	20
9086604	Dissolved Bismuth (Bi)	2018/08/01	99	80 - 120	102	80 - 120	<1.0	ug/L	NC	20
9086604	Dissolved Boron (B)	2018/08/01	98	80 - 120	98	80 - 120	<50	ug/L	0.51	20
9086604	Dissolved Cadmium (Cd)	2018/08/01	102	80 - 120	101	80 - 120	<0.010	ug/L	4.3	20
9086604	Dissolved Chromium (Cr)	2018/08/01	100	80 - 120	100	80 - 120	<1.0	ug/L	NC	20
9086604	Dissolved Cobalt (Co)	2018/08/01	95	80 - 120	98	80 - 120	<0.20	ug/L	1.7	20
9086604	Dissolved Copper (Cu)	2018/08/01	92	80 - 120	97	80 - 120	<0.20	ug/L	3.1	20
9086604	Dissolved Iron (Fe)	2018/08/01	100	80 - 120	100	80 - 120	<5.0	ug/L	13	20
9086604	Dissolved Lead (Pb)	2018/08/01	101	80 - 120	101	80 - 120	<0.20	ug/L	NC	20
9086604	Dissolved Lithium (Li)	2018/08/01	100	80 - 120	104	80 - 120	<2.0	ug/L	0.36	20

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9086604	Dissolved Manganese (Mn)	2018/08/01	NC	80 - 120	100	80 - 120	<1.0	ug/L	0.73	20
9086604	Dissolved Molybdenum (Mo)	2018/08/01	107	80 - 120	101	80 - 120	<1.0	ug/L	0.25	20
9086604	Dissolved Nickel (Ni)	2018/08/01	95	80 - 120	98	80 - 120	<1.0	ug/L	0.70	20
9086604	Dissolved Selenium (Se)	2018/08/01	100	80 - 120	98	80 - 120	<0.10	ug/L	3.1	20
9086604	Dissolved Silicon (Si)	2018/08/01	NC	80 - 120	101	80 - 120	<100	ug/L	2.0	20
9086604	Dissolved Silver (Ag)	2018/08/01	100	80 - 120	99	80 - 120	<0.020	ug/L	NC	20
9086604	Dissolved Strontium (Sr)	2018/08/01	NC	80 - 120	103	80 - 120	<1.0	ug/L	0.99	20
9086604	Dissolved Thallium (Tl)	2018/08/01	102	80 - 120	102	80 - 120	<0.010	ug/L	1.8	20
9086604	Dissolved Tin (Sn)	2018/08/01	102	80 - 120	100	80 - 120	<5.0	ug/L	NC	20
9086604	Dissolved Titanium (Ti)	2018/08/01	105	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
9086604	Dissolved Uranium (U)	2018/08/01	107	80 - 120	103	80 - 120	<0.10	ug/L	0.53	20
9086604	Dissolved Vanadium (V)	2018/08/01	102	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
9086604	Dissolved Zinc (Zn)	2018/08/01	96	80 - 120	98	80 - 120	<5.0	ug/L	NC	20
9086604	Dissolved Zirconium (Zr)	2018/08/01	107	80 - 120	100	80 - 120	<0.10	ug/L	NC	20
9086684	Dissolved Mercury (Hg)	2018/08/01	107	80 - 120	99	80 - 120	<0.0020	ug/L	NC	20
9086704	1-Methylnaphthalene	2018/08/01	95	50 - 140	86	50 - 140	<0.050	ug/L	NC	40
9086704	2-Methylnaphthalene	2018/08/01	90	50 - 140	81	50 - 140	<0.10	ug/L	NC	40
9086704	Acenaphthene	2018/08/01	91	50 - 140	85	50 - 140	<0.050	ug/L	NC	40
9086704	Acenaphthylene	2018/08/01	90	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9086704	Acridine	2018/08/01	101	50 - 140	97	50 - 140	<0.050	ug/L	NC	40
9086704	Anthracene	2018/08/01	95	50 - 140	86	50 - 140	<0.010	ug/L	NC	40
9086704	Benzo(a)anthracene	2018/08/01	90	50 - 140	84	50 - 140	<0.010	ug/L	NC	40
9086704	Benzo(a)pyrene	2018/08/01	91	50 - 140	85	50 - 140	<0.0050	ug/L	NC	40
9086704	Benzo(b&j)fluoranthene	2018/08/01	94	50 - 140	88	50 - 140	<0.030	ug/L	NC	40
9086704	Benzo(g,h,i)perylene	2018/08/01	85	50 - 140	80	50 - 140	<0.050	ug/L	NC	40
9086704	Benzo(k)fluoranthene	2018/08/01	95	50 - 140	88	50 - 140	<0.050	ug/L	NC	40
9086704	Chrysene	2018/08/01	92	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9086704	Dibenz(a,h)anthracene	2018/08/01	89	50 - 140	83	50 - 140	<0.0030	ug/L	NC	40
9086704	Fluoranthene	2018/08/01	94	50 - 140	88	50 - 140	<0.020	ug/L	NC	40
9086704	Fluorene	2018/08/01	86	50 - 140	80	50 - 140	<0.050	ug/L	NC	40
9086704	Indeno(1,2,3-cd)pyrene	2018/08/01	88	50 - 140	82	50 - 140	<0.050	ug/L	NC	40

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9086704	Naphthalene	2018/08/01	85	50 - 140	78	50 - 140	<0.10	ug/L	NC	40
9086704	Phenanthrene	2018/08/01	91	50 - 140	88	50 - 140	<0.050	ug/L	NC	40
9086704	Pyrene	2018/08/01	96	50 - 140	90	50 - 140	<0.020	ug/L	NC	40
9086704	Quinoline	2018/08/01	114	50 - 140	108	50 - 140	<0.020	ug/L	NC	40
9086767	EPH (C10-C19)	2018/08/01	89	60 - 140	84	70 - 130	<0.20	mg/L	NC	30
9086767	EPH (C19-C32)	2018/08/01	90	60 - 140	87	70 - 130	<0.20	mg/L	NC	30

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

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

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

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

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

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

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



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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



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



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Jose Cueva, Supervisor, Organics-VOC & HC

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics  
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<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MD



Regulatory Criteria	Special Instructions	Analysis Requested	Turnaround Time (TAT) Required
		Regulated Drinking Water? (Y/N) <input type="checkbox"/> Metals Field Filtered? (Y/N) <input type="checkbox"/> LEPH/HEP/HPAH <input type="checkbox"/> Diss. Metals (with Hg) <input type="checkbox"/> BTEX/VPH <input type="checkbox"/> Major Ions (Cl, F, NO2, NO3, PO4, SO4) <input type="checkbox"/> DOC <input type="checkbox"/> Nutrients (TP, NH4, TKN) <input type="checkbox"/>	Please provide advance notice for rush projects <b>Regular (Standard) TAT</b> <input type="checkbox"/> (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: <u>Aug 1</u> Time Required: <u>6pm</u> <input checked="" type="checkbox"/> Rush Confirmation Number _____ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

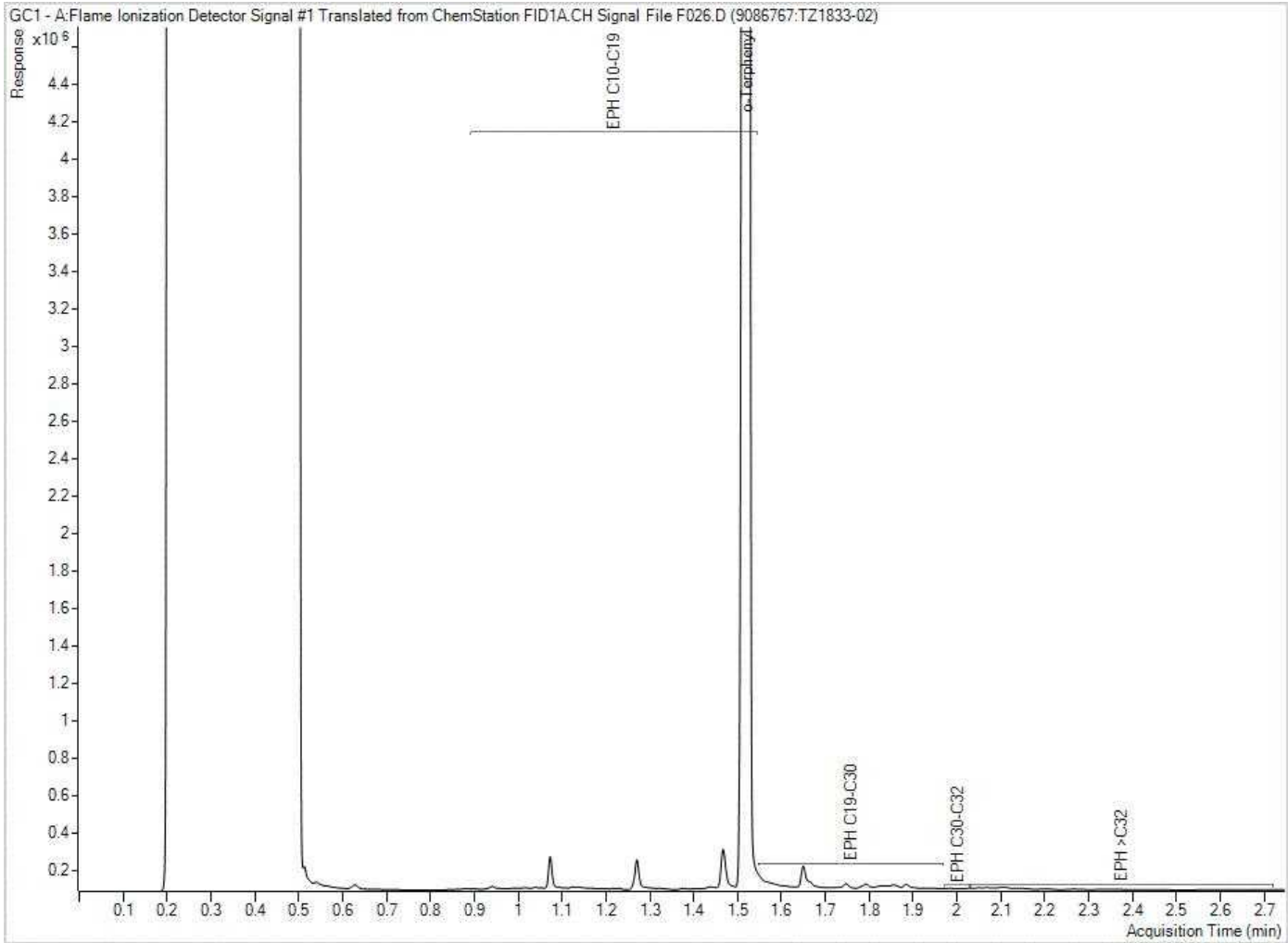
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEP/HPAH	Diss. Metals (with Hg)	BTEX/VPH	Major Ions (Cl, F, NO2, NO3, PO4, SO4)	DOC	Nutrients (TP, NH4, TKN)	# of Bottles	Comments
1	MW18-42	18/07/30	1445	GW	Y	X	X	X					10	HOLD ALL OTHER BOTTLES
2	MW18-43	18/07/30	1430	GW	Y	X	X	X					10	" " " "
3														
4														
5														
6														
7														
8														
9														
10														

RECEIVED IN WHITEHORSE  
 BY: Sydney@1605  
 2018-07-30  
 TEMP: 14 | 12 | 13

RELINQUISHED BY: (Signature/Print)	Date: (YYMM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMM/DD)	Time	# jars used and not submitted	Lab Use Only
<u>M. Deane</u>	18/07/30	1605	<u>KEVIN CHOW</u>	20/07/31	14:35	<u>N/A</u>	Time Sensitive <input checked="" type="checkbox"/> Temperature (°C) on Receipt: <u>8.8</u> Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input type="checkbox"/> No

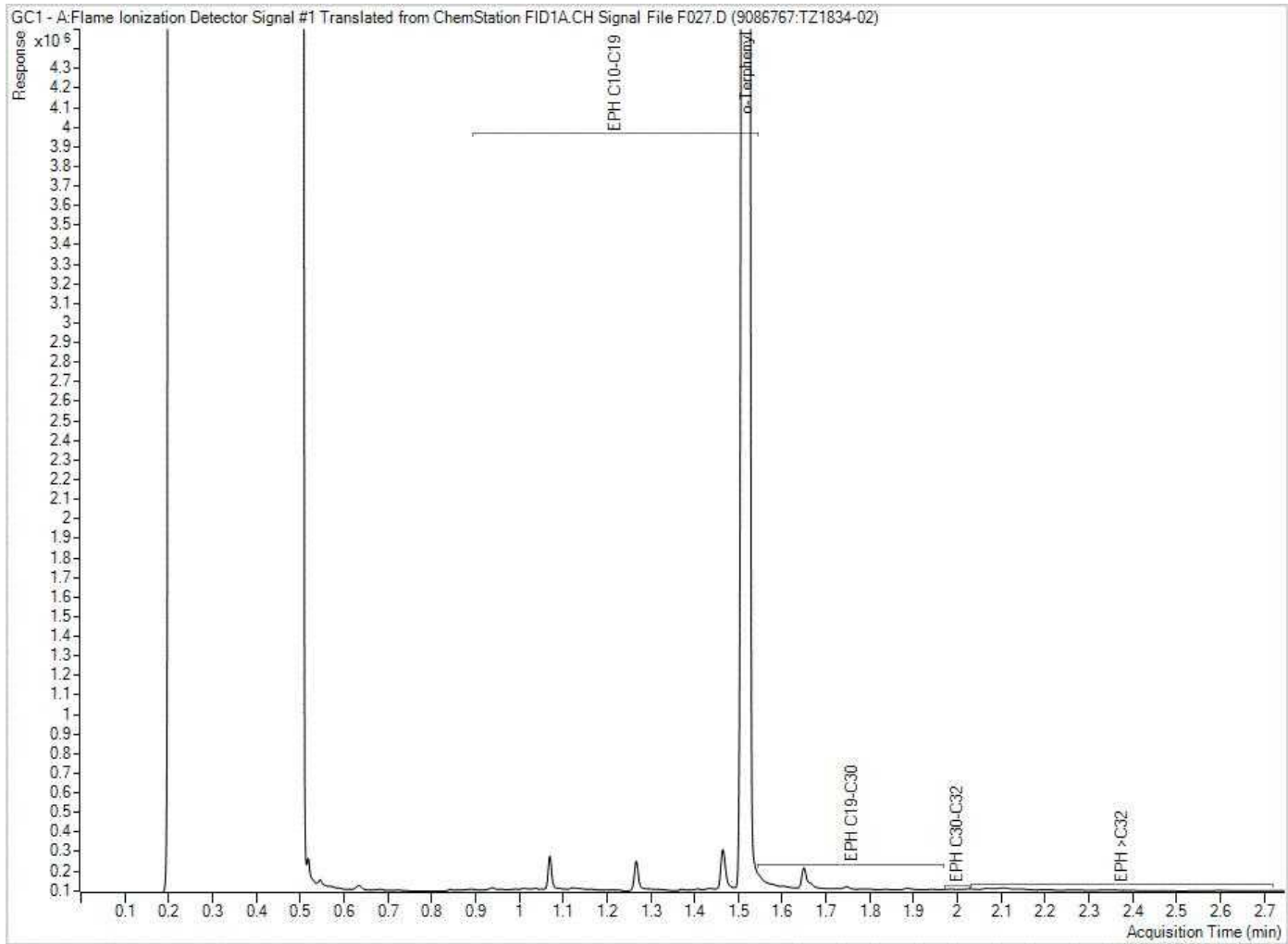
861

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your Project #: 123221161  
 Site Location: 123221161  
 Your C.O.C. #: 560391-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
 Metrotower III  
 Suite 500, 4730 Kingsway  
 BURNABY, BC  
 CANADA V5H 4M1

**Report Date: 2018/08/23**  
 Report #: R2608593  
 Version: 2 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B868151**

**Received: 2018/08/13, 16:50**

Sample Matrix: Water  
 # Samples Received: 2

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2018/08/16	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
EPH in Water when PAH required	2	2018/08/16	2018/08/16	BBY8SOP-00029	BCMOE BCLM Mar 2017
PAH in Water by GC/MS (SIM)	2	2018/08/16	2018/08/16	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1)	2	N/A	2018/08/17	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (2)	2	N/A	2018/08/17	BBY WI-00033	Auto Calc
Volatile HC-BTEX (3)	2	N/A	2018/08/17	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Your Project #: 123221161  
Site Location: 123221161  
Your C.O.C. #: 560391-01-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/23**  
Report #: R2608593  
Version: 2 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B868151**

**Received: 2018/08/13, 16:50**

- (1) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
- (2) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
- HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)
- (3) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B868151  
Report Date: 2018/08/23

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

**CSR BTEX/VPH IN WATER (WATER)**

Maxxam ID		UB6392	UB6393		
Sampling Date		2018/08/13 15:15	2018/08/13 16:15		
COC Number		560391-01-01	560391-01-01		
	UNITS	MW18-52	MW18-49	RDL	QC Batch
<b>Calculated Parameters</b>					
VPH (VH6 to 10 - BTEX)	ug/L	<300	<300	300	9102941
<b>Volatiles</b>					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	9105562
Benzene	ug/L	<0.40	<0.40	0.40	9105562
Toluene	ug/L	0.92	1.5	0.40	9105562
Ethylbenzene	ug/L	<0.40	<0.40	0.40	9105562
m & p-Xylene	ug/L	1.0	1.9	0.40	9105562
o-Xylene	ug/L	<0.40	0.92	0.40	9105562
Styrene	ug/L	<0.40	<0.40	0.40	9105562
Xylenes (Total)	ug/L	1.0	2.8	0.40	9105562
VH C6-C10	ug/L	<300	<300	300	9105562
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene (sur.)	%	101	101		9105562
4-Bromofluorobenzene (sur.)	%	100	100		9105562
D4-1,2-Dichloroethane (sur.)	%	111	111		9105562
RDL = Reportable Detection Limit					

Maxxam Job #: B868151  
Report Date: 2018/08/23

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UB6392		UB6393		
Sampling Date		2018/08/13 15:15		2018/08/13 16:15		
COC Number		560391-01-01		560391-01-01		
	<b>UNITS</b>	<b>MW18-52</b>	<b>RDL</b>	<b>MW18-49</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>						
Low Molecular Weight PAH's	ug/L	<0.10	0.10	2.9	0.10	9102938
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	9102938
Total PAH	ug/L	<0.10	0.10	2.9	0.10	9102938
<b>Polycyclic Aromatics</b>						
Quinoline	ug/L	<0.020	0.020	<0.085 (1)	0.085	9113185
Naphthalene	ug/L	<0.10	0.10	0.47 (2)	0.10	9104762
1-Methylnaphthalene	ug/L	<0.050	0.050	<0.050	0.050	9104762
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	9104762
Acenaphthylene	ug/L	<0.050	0.050	<0.050	0.050	9104762
Acenaphthene	ug/L	<0.050	0.050	0.58	0.050	9104762
Fluorene	ug/L	<0.050	0.050	1.4	0.050	9104762
Phenanthrene	ug/L	<0.050	0.050	0.47	0.050	9104762
Anthracene	ug/L	<0.010	0.010	0.011 (2)	0.010	9104762
Acridine	ug/L	<0.050	0.050	<0.050	0.050	9113185
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	9104762
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	9104762
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	9104762
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	9104762
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	9104762
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	9104762
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	9104762
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	9104762
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	9104762
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	9104762
<b>Calculated Parameters</b>						
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	0.59	0.20	9102939
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	9102939
<b>Ext. Pet. Hydrocarbon</b>						
EPH (C10-C19)	mg/L	<0.20	0.20	0.59	0.20	9104829
RDL = Reportable Detection Limit						
(1) Detection limits raised due to matrix interference.						
(2) Tentatively identified result and may be potentially biased high due to matrix interference.						



Maxxam Job #: B868151  
Report Date: 2018/08/23

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UB6392		UB6393		
Sampling Date		2018/08/13 15:15		2018/08/13 16:15		
COC Number		560391-01-01		560391-01-01		
	UNITS	MW18-52	RDL	MW18-49	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	9104829
<b>Surrogate Recovery (%)</b>						
O-TERPHENYL (sur.)	%	104		104		9104829
D10-ANTHRACENE (sur.)	%	87		84		9104762
D8-ACENAPHTHYLENE (sur.)	%	94		95		9104762
D8-NAPHTHALENE (sur.)	%	94		92		9104762
TERPHENYL-D14 (sur.)	%	94		92		9104762
RDL = Reportable Detection Limit						

Maxxam Job #: B868151  
Report Date: 2018/08/23

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

### GENERAL COMMENTS

Sample UB6392, PAH in Water by GC/MS (SIM): Test repeated.  
Sample UB6393, PAH in Water by GC/MS (SIM): Test repeated.

**Results relate only to the items tested.**

Maxxam Job #: B868151  
Report Date: 2018/08/23

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9104762	D10-ANTHRACENE (sur.)	2018/08/16	85	50 - 140	85	50 - 140	91	%		
9104762	D8-ACENAPHTHYLENE (sur.)	2018/08/16	93	50 - 140	91	50 - 140	98	%		
9104762	D8-NAPHTHALENE (sur.)	2018/08/16	92	50 - 140	83	50 - 140	93	%		
9104762	TERPHENYL-D14 (sur.)	2018/08/16	94	50 - 140	93	50 - 140	101	%		
9104829	O-TERPHENYL (sur.)	2018/08/16	100	60 - 140	103	60 - 140	102	%		
9105562	1,4-Difluorobenzene (sur.)	2018/08/16	99	70 - 130	99	70 - 130	102	%		
9105562	4-Bromofluorobenzene (sur.)	2018/08/16	100	70 - 130	101	70 - 130	99	%		
9105562	D4-1,2-Dichloroethane (sur.)	2018/08/16	103	70 - 130	104	70 - 130	111	%		
9104762	1-Methylnaphthalene	2018/08/16	99	50 - 140	87	50 - 140	<0.050	ug/L	NC	40
9104762	2-Methylnaphthalene	2018/08/16	93	50 - 140	82	50 - 140	<0.10	ug/L	NC	40
9104762	Acenaphthene	2018/08/16	90	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9104762	Acenaphthylene	2018/08/16	91	50 - 140	84	50 - 140	<0.050	ug/L	NC	40
9104762	Anthracene	2018/08/16	83	50 - 140	78	50 - 140	<0.010	ug/L	NC	40
9104762	Benzo(a)anthracene	2018/08/16	85	50 - 140	81	50 - 140	<0.010	ug/L	NC	40
9104762	Benzo(a)pyrene	2018/08/16	90	50 - 140	84	50 - 140	<0.0050	ug/L	NC	40
9104762	Benzo(b&j)fluoranthene	2018/08/16	94	50 - 140	86	50 - 140	<0.030	ug/L	NC	40
9104762	Benzo(g,h,i)perylene	2018/08/16	81	50 - 140	76	50 - 140	<0.050	ug/L	NC	40
9104762	Benzo(k)fluoranthene	2018/08/16	85	50 - 140	85	50 - 140	<0.050	ug/L	NC	40
9104762	Chrysene	2018/08/16	86	50 - 140	82	50 - 140	<0.020	ug/L	NC	40
9104762	Dibenz(a,h)anthracene	2018/08/16	83	50 - 140	78	50 - 140	<0.0030	ug/L	NC	40
9104762	Fluoranthene	2018/08/16	90	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9104762	Fluorene	2018/08/16	85	50 - 140	80	50 - 140	<0.050	ug/L	NC	40
9104762	Indeno(1,2,3-cd)pyrene	2018/08/16	83	50 - 140	79	50 - 140	<0.050	ug/L	NC	40
9104762	Naphthalene	2018/08/16	101	50 - 140	91	50 - 140	<0.10	ug/L	NC	40
9104762	Phenanthrene	2018/08/16	88	50 - 140	83	50 - 140	<0.050	ug/L	NC	40
9104762	Pyrene	2018/08/16	93	50 - 140	88	50 - 140	<0.020	ug/L	NC	40
9104829	EPH (C10-C19)	2018/08/16	94	60 - 140	93	70 - 130	<0.20	mg/L	NC	30
9104829	EPH (C19-C32)	2018/08/16	93	60 - 140	98	70 - 130	<0.20	mg/L	NC	30
9105562	Benzene	2018/08/16	102	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
9105562	Ethylbenzene	2018/08/16	109	70 - 130	111	70 - 130	<0.40	ug/L	NC	30
9105562	m & p-Xylene	2018/08/16	106	70 - 130	108	70 - 130	<0.40	ug/L	NC	30

Maxxam Job #: B868151  
Report Date: 2018/08/23

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9105562	Methyl-tert-butylether (MTBE)	2018/08/16	103	70 - 130	104	70 - 130	<4.0	ug/L	NC	30
9105562	o-Xylene	2018/08/16	107	70 - 130	109	70 - 130	<0.40	ug/L	NC	30
9105562	Styrene	2018/08/16	103	70 - 130	105	70 - 130	<0.40	ug/L	NC	30
9105562	Toluene	2018/08/16	100	70 - 130	102	70 - 130	<0.40	ug/L	NC	30
9105562	VH C6-C10	2018/08/16			101	70 - 130	<300	ug/L	NC	30
9105562	Xylenes (Total)	2018/08/16					<0.40	ug/L	NC	30
9113185	Acridine	2018/08/22	96	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Quinoline	2018/08/22	108	50 - 140	105	50 - 140	<0.020	ug/L	NC	40

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

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

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

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

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

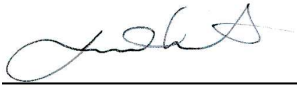
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Maxxam Job #: B868151  
Report Date: 2018/08/23

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: 123221161  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



\_\_\_\_\_  
Jas Khatkar, BBY Organics



\_\_\_\_\_  
Rob Reinert, B.Sc., Scientific Spécialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(804) 734 7276 Toll-free 800-563-6286 Fax:(804) 731 2366 www.maxxam.ca

C

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	12322116 / -250.200
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	12322116
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MVICS



8868151\_COC



CA560391-01-01

Nahed Amer

Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required	
						Please provide advance notice for rush projects	
						Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
						Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____	
						Rush Confirmation Number _____ (call lab for #)	
<p><b>Not: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form</b></p> <p>Samples must be kept cool (&lt; 10°C) from time of sampling until delivery to maxxam</p>							
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	
1	MW18-52	13-Aug-18	15:15	GW	X	X	10
2	MW18-49	13-Aug-18	16:15	GW	X	X	10
3							
4							
5							
6							
7							
8							
9							
10							

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<i>Corey Subram</i>	18/08/18		<i>SHAN JAYOB JOY</i>	2018/08/14	15:10		Time Sensitive <input type="checkbox"/> Temperature (°C) on Receipt 4, 6, 3
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.						Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.						With Maxxam <input checked="" type="checkbox"/> Without Maxxam <input type="checkbox"/> Show Client	

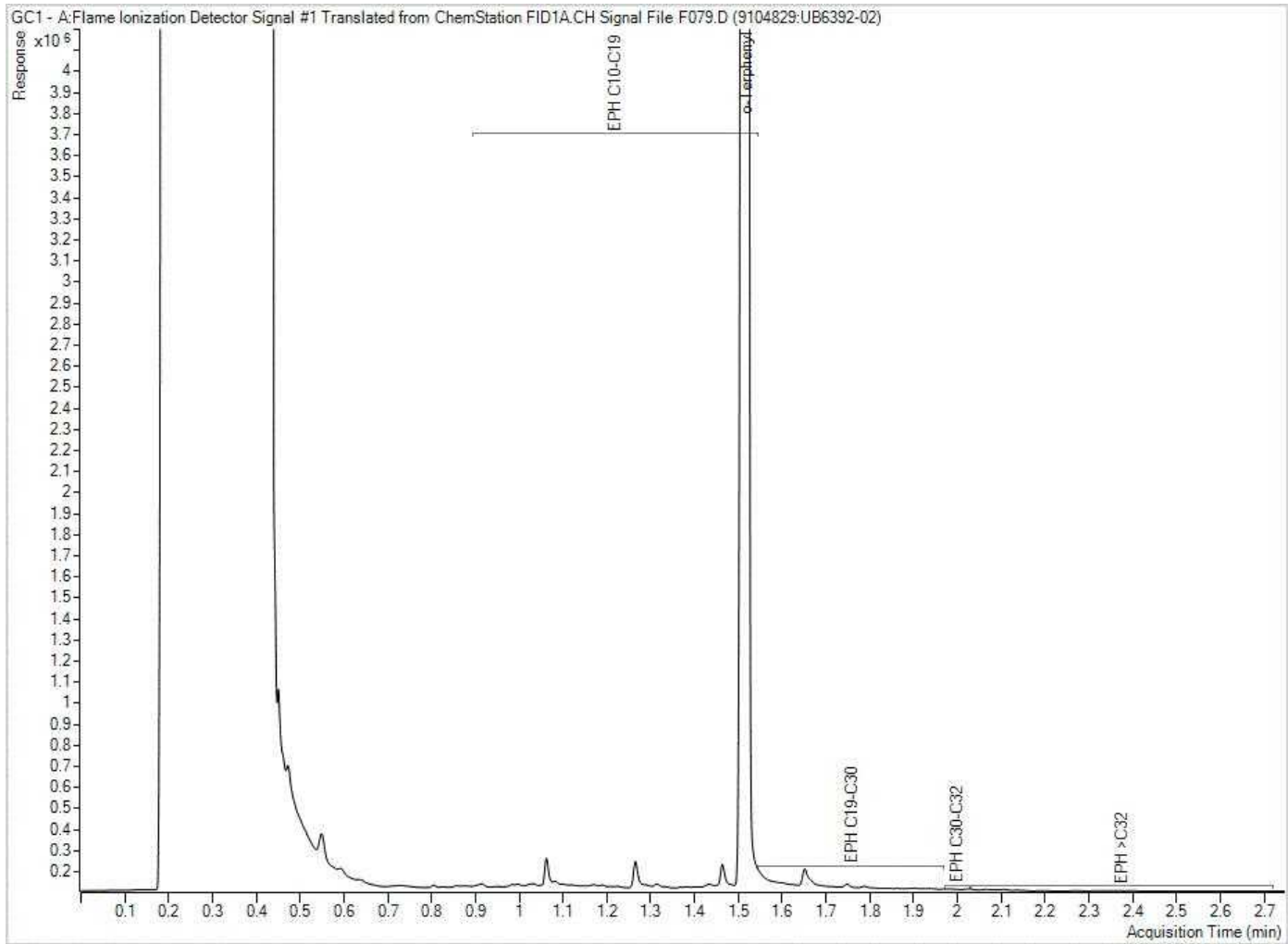
RECEIVED IN WHITEHORSE  
 BY: *K. Mungley* @ 16:50  
 2018-08-13  
 TEMP: 8, 9, 8

1226

\*ICB: PRESENT

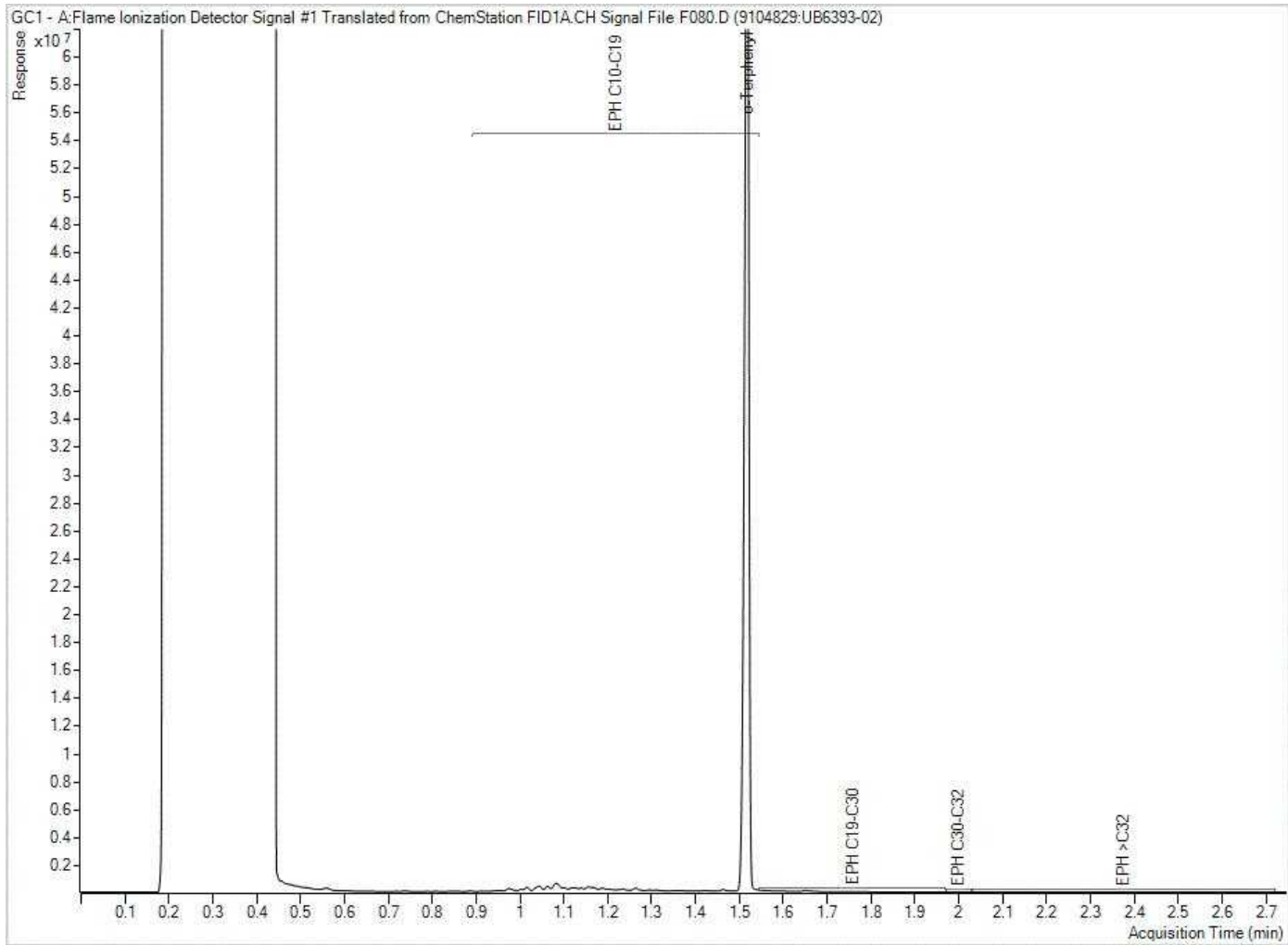
\* Custody seal present and intact

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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



Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7960

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613581  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869306**

**Received: 2018/08/15, 17:10**

Sample Matrix: GROUND WATER  
# Samples Received: 5

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2018/08/30	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Chloride by Automated Colourimetry	2	N/A	2018/08/30	BBY6SOP-00011	SM 22 4500-Cl- E m
Carbon (DOC) - field filtered/preserved (1)	2	N/A	2018/09/04	BBY6SOP-00003	SM 22 5310 C m
Fluoride	2	N/A	2018/08/30	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO <sub>3</sub> )	2	N/A	2018/08/29	BBY WI-00033	Auto Calc
EPH in Water when PAH required	5	2018/08/22	2018/08/22	BBY8SOP-00029	BCMOE BCLM Mar 2017
Elements by CRC ICPMS (dissolved)	2	N/A	2018/08/29	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	2	N/A	2018/08/31	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	2	N/A	2018/09/04	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	2	N/A	2018/08/30	BBY6SOP-00010	SM 23 4500-NO <sub>3</sub> - I m
Nitrite (N) by CFA	2	N/A	2018/08/30	BBY6SOP-00010	SM 22 4500-NO <sub>3</sub> - I m
Nitrogen - Nitrate (as N)	2	N/A	2018/08/30	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	1	2018/08/21	2018/08/22	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	4	2018/08/22	2018/08/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (2)	5	N/A	2018/08/23	BBY WI-00033	Auto Calc
Orthophosphate by Konelab	2	N/A	2018/08/29	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	1	N/A	2018/08/30	BBY6SOP-00017	SM 22 4500-SO <sub>4</sub> 2- E m
Sulphate by Automated Colourimetry	1	N/A	2018/08/31	BBY6SOP-00017	SM 22 4500-SO <sub>4</sub> 2- E m
EPH less PAH in Water by GC/FID (3)	5	N/A	2018/08/23	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	2	N/A	2018/08/31	BBY WI-00033	Auto Calc
Total Phosphorus	2	2018/08/30	2018/08/30	BBY6SOP-00013	SM 22 4500-P E m
Volatile HC-BTEX (4)	2	N/A	2018/08/31	BBY WI-00033	Auto Calc

**Remarks:**

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7960

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613581  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869306**

**Received: 2018/08/15, 17:10**

indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) DOC present in the sample should be considered as non-purgeable DOC.

(2) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(3) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF GROUND WATER**

Maxxam ID		UC1860			UC1862		
Sampling Date		2018/08/15 09:15			2018/08/15 12:15		
COC Number		7960			7960		
	UNITS	MW18-37	RDL	QC Batch	MW16-01	RDL	QC Batch
<b>ANIONS</b>							
Nitrite (N)	mg/L	<0.0050	0.0050	9124590	<0.0050	0.0050	9124590
<b>Calculated Parameters</b>							
Nitrate (N)	mg/L	<0.020	0.020	9120246	<0.020	0.020	9120246
<b>Misc. Inorganics</b>							
Fluoride (F)	mg/L	0.420	0.020	9123672	0.260	0.020	9123672
Dissolved Organic Carbon (C)	mg/L	0.80	0.50	9128765	3.87	0.50	9128765
<b>Anions</b>							
Dissolved Sulphate (SO4)	mg/L	33.8	1.0	9125787	781 (1)	10	9124731
Dissolved Chloride (Cl)	mg/L	<1.0	1.0	9124729	8.1	1.0	9124729
<b>Nutrients</b>							
Orthophosphate (P)	mg/L	0.0240	0.0050	9122939	0.0057	0.0050	9122939
Total Ammonia (N)	mg/L	<0.020	0.020	9128684	0.17	0.020	9128684
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	9124588	<0.020	0.020	9124588
Total Phosphorus (P)	mg/L	0.0457	0.0050	9124816	0.0680	0.0050	9124816
RDL = Reportable Detection Limit							
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.							

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR BTEX/VPH IN WATER (GROUND WATER)**

Maxxam ID		UC1860			UC1860			UC1862		
Sampling Date		2018/08/15 09:15			2018/08/15 09:15			2018/08/15 12:15		
COC Number		7960			7960			7960		
	UNITS	MW18-37	RDL	QC Batch	MW18-37 Lab-Dup	RDL	QC Batch	MW16-01	RDL	QC Batch
<b>Calculated Parameters</b>										
VPH (VH6 to 10 - BTEX)	ug/L	<300	300	9124041				<300	300	9124041
<b>Volatiles</b>										
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	9124534	<4.0	4.0	9124534	<4.0	4.0	9124534
Benzene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
Toluene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
Ethylbenzene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	0.44	0.40	9124534
m & p-Xylene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
o-Xylene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
Styrene	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
Xylenes (Total)	ug/L	<0.40	0.40	9124534	<0.40	0.40	9124534	<0.40	0.40	9124534
VH C6-C10	ug/L	<300	300	9124534	<300	300	9124534	<300	300	9124534
<b>Surrogate Recovery (%)</b>										
1,4-Difluorobenzene (sur.)	%	102		9124534	102		9124534	103		9124534
4-Bromofluorobenzene (sur.)	%	102		9124534	102		9124534	103		9124534
D4-1,2-Dichloroethane (sur.)	%	116		9124534	115		9124534	116		9124534
RDL = Reportable Detection Limit										
Lab-Dup = Laboratory Initiated Duplicate										

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC1860			UC1860			UC1861		
Sampling Date		2018/08/15 09:15			2018/08/15 09:15			2018/08/15 09:35		
COC Number		7960			7960			7960		
	UNITS	MW18-37	RDL	QC Batch	MW18-37 Lab-Dup	RDL	QC Batch	MW18-37A	RDL	QC Batch
<b>Calculated Parameters</b>										
Low Molecular Weight PAH's	ug/L	<0.10	0.10	9106979				<0.10	0.10	9106979
High Molecular Weight PAH's	ug/L	<0.050	0.050	9106979				<0.050	0.050	9106979
Total PAH	ug/L	<0.10	0.10	9106979				<0.10	0.10	9106979
<b>Polycyclic Aromatics</b>										
Quinoline	ug/L	<0.020	0.020	9113185	<0.020	0.020	9113185	<0.020	0.020	9113185
Naphthalene	ug/L	<0.10	0.10	9113185	<0.10	0.10	9113185	<0.10	0.10	9113185
2-Methylnaphthalene	ug/L	<0.10	0.10	9113185	<0.10	0.10	9113185	<0.10	0.10	9113185
Acenaphthylene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Acenaphthene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Fluorene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Phenanthrene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Anthracene	ug/L	<0.010	0.010	9113185	<0.010	0.010	9113185	<0.010	0.010	9113185
Acridine	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Fluoranthene	ug/L	<0.020	0.020	9113185	<0.020	0.020	9113185	<0.020	0.020	9113185
Pyrene	ug/L	<0.020	0.020	9113185	<0.020	0.020	9113185	<0.020	0.020	9113185
Benzo(a)anthracene	ug/L	<0.010	0.010	9113185	<0.010	0.010	9113185	<0.010	0.010	9113185
Chrysene	ug/L	<0.020	0.020	9113185	<0.020	0.020	9113185	<0.020	0.020	9113185
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	9113185	<0.030	0.030	9113185	<0.030	0.030	9113185
Benzo(k)fluoranthene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Benzo(a)pyrene	ug/L	<0.0050	0.0050	9113185	<0.0050	0.0050	9113185	<0.0050	0.0050	9113185
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	9113185	<0.0030	0.0030	9113185	<0.0030	0.0030	9113185
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	9113185	<0.050	0.050	9113185	<0.050	0.050	9113185
<b>Calculated Parameters</b>										
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	9106986				<0.20	0.20	9106986
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	9106986				<0.20	0.20	9106986
<b>Ext. Pet. Hydrocarbon</b>										
EPH (C10-C19)	mg/L	<0.20	0.20	9113190	<0.20	0.20	9113190	<0.20	0.20	9113190
EPH (C19-C32)	mg/L	<0.20	0.20	9113190	<0.20	0.20	9113190	<0.20	0.20	9113190
<b>Surrogate Recovery (%)</b>										
O-TERPHENYL (sur.)	%	96		9113190	96		9113190	96		9113190
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate										

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC1860			UC1860			UC1861		
Sampling Date		2018/08/15 09:15			2018/08/15 09:15			2018/08/15 09:35		
COC Number		7960			7960			7960		
	UNITS	MW18-37	RDL	QC Batch	MW18-37 Lab-Dup	RDL	QC Batch	MW18-37A	RDL	QC Batch
D10-ANTHRACENE (sur.)	%	88		9113185	90		9113185	87		9113185
D8-ACENAPHTHYLENE (sur.)	%	91		9113185	91		9113185	89		9113185
D8-NAPHTHALENE (sur.)	%	88		9113185	89		9113185	87		9113185
TERPHENYL-D14 (sur.)	%	86		9113185	87		9113185	86		9113185

RDL = Reportable Detection Limit  
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC1862		UC1863	UC1864		
Sampling Date		2018/08/15 12:15		2018/08/15 15:10	2018/08/15 16:00		
COC Number		7960		7960	7960		
	<b>UNITS</b>	<b>MW16-01</b>	<b>RDL</b>	<b>MW18-40</b>	<b>MW18-48</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>							
Low Molecular Weight PAH's	ug/L	26	0.25	<0.10	<0.10	0.10	9106979
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	<0.050	0.050	9106979
Total PAH	ug/L	26	0.25	<0.10	<0.10	0.10	9106979
<b>Polycyclic Aromatics</b>							
Quinoline	ug/L	<0.064 (1)	0.064	<0.020	<0.020	0.020	9113185
Naphthalene	ug/L	2.5	0.10	<0.10	<0.10	0.10	9113185
2-Methylnaphthalene	ug/L	6.8	0.10	<0.10	<0.10	0.10	9113185
Acenaphthylene	ug/L	0.054 (2)	0.050	<0.050	<0.050	0.050	9113185
Acenaphthene	ug/L	0.34 (2)	0.050	<0.050	<0.050	0.050	9113185
Fluorene	ug/L	1.4	0.050	<0.050	<0.050	0.050	9113185
Phenanthrene	ug/L	0.62	0.050	<0.050	<0.050	0.050	9113185
Anthracene	ug/L	0.020 (2)	0.010	<0.010	<0.010	0.010	9113185
Acridine	ug/L	<0.050	0.050	<0.050	<0.050	0.050	9113185
Fluoranthene	ug/L	<0.020	0.020	<0.020	<0.020	0.020	9113185
Pyrene	ug/L	<0.020	0.020	<0.020	<0.020	0.020	9113185
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	<0.010	0.010	9113185
Chrysene	ug/L	<0.020	0.020	<0.020	<0.020	0.020	9113185
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	<0.030	0.030	9113185
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	9113185
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	<0.0050	0.0050	9113185
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	9113185
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	<0.0030	0.0030	9113185
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	<0.050	0.050	9113185
<b>Calculated Parameters</b>							
LEPH (C10-C19 less PAH)	mg/L	0.62	0.20	<0.20	<0.20	0.20	9106986
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	<0.20	0.20	9106986
<b>Ext. Pet. Hydrocarbon</b>							
EPH (C10-C19)	mg/L	0.62	0.20	<0.20	<0.20	0.20	9113190
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	<0.20	0.20	9113190
RDL = Reportable Detection Limit							
(1) Detection limits raised due to matrix interference.							
(2) Tentatively identified result and may be potentially biased high due to matrix interference.							

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC1862		UC1863	UC1864		
Sampling Date		2018/08/15 12:15		2018/08/15 15:10	2018/08/15 16:00		
COC Number		7960		7960	7960		
	<b>UNITS</b>	<b>MW16-01</b>	<b>RDL</b>	<b>MW18-40</b>	<b>MW18-48</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Surrogate Recovery (%)</b>							
O-TERPHENYL (sur.)	%	86		93	80		9113190
D10-ANTHRACENE (sur.)	%	87		86	82		9113185
D8-ACENAPHTHYLENE (sur.)	%	93		87	86		9113185
D8-NAPHTHALENE (sur.)	%	84		87	89		9113185
TERPHENYL-D14 (sur.)	%	75		82	72		9113185
RDL = Reportable Detection Limit							



Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR DISSOLVED METALS (NO CV-HG) IN WATER**

Maxxam ID		UC1860			UC1860			UC1862		
Sampling Date		2018/08/15 09:15			2018/08/15 09:15			2018/08/15 12:15		
COC Number		7960			7960			7960		
	UNITS	MW18-37	RDL	QC Batch	MW18-37 Lab-Dup	RDL	QC Batch	MW16-01	RDL	QC Batch
<b>Calculated Parameters</b>										
Dissolved Hardness (CaCO3)	mg/L	89.8	0.50	9119988				1030	0.50	9119988
<b>Dissolved Metals by ICPMS</b>										
Dissolved Arsenic (As)	ug/L	17.5	0.10	9121570	17.4	0.10	9121570	29.0	0.20	9121570
Dissolved Iron (Fe)	ug/L	<5.0	5.0	9121570	<5.0	5.0	9121570	1700	10	9121570
Dissolved Manganese (Mn)	ug/L	13.6	1.0	9121570	13.8	1.0	9121570	410	2.0	9121570
Dissolved Magnesium (Mg)	ug/L	12500	50	9121570	12600	50	9121570	140000	100	9121570
RDL = Reportable Detection Limit										
Lab-Dup = Laboratory Initiated Duplicate										

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**TOTAL TKN IN WATER (GROUND WATER)**

<b>Maxxam ID</b>		UC1860	UC1862		
<b>Sampling Date</b>		2018/08/15 09:15	2018/08/15 12:15		
<b>COC Number</b>		7960	7960		
	<b>UNITS</b>	<b>MW18-37</b>	<b>MW16-01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.120	0.225	0.020	9120647
<b>Nutrients</b>					
Total Nitrogen (N)	mg/L	0.120	0.225	0.020	9123910
RDL = Reportable Detection Limit					

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### GENERAL COMMENTS

Version 2: Report reissued to update Client ID of sample MW16-13 to MW16-01 and to include results for BTEX/VPH as per request from Matthew Deane on 2018/08/30

Samples analyzed past hold time for BTEX/VPH. Analysis performed with client's consent.

Sample UC1860 [MW18-37] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS.

Sample UC1862 [MW16-01] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS.

#### CSR DISSOLVED METALS (NO CV-HG) IN WATER Comments

Sample UC1862 [MW16-01] Elements by CRC ICPMS (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**

Maxxam Job #: B869306  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9113185	D10-ANTHRACENE (sur.)	2018/08/22	80	50 - 140	89	50 - 140	91	%		
9113185	D8-ACENAPHTHYLENE (sur.)	2018/08/22	87	50 - 140	90	50 - 140	94	%		
9113185	D8-NAPHTHALENE (sur.)	2018/08/22	98	50 - 140	84	50 - 140	106	%		
9113185	TERPHENYL-D14 (sur.)	2018/08/22	74	50 - 140	90	50 - 140	88	%		
9113190	O-TERPHENYL (sur.)	2018/08/22	100	60 - 140	99	60 - 140	99	%		
9124534	1,4-Difluorobenzene (sur.)	2018/08/30	98	70 - 130	102	70 - 130	107	%		
9124534	4-Bromofluorobenzene (sur.)	2018/08/30	102	70 - 130	101	70 - 130	101	%		
9124534	D4-1,2-Dichloroethane (sur.)	2018/08/30	109	70 - 130	108	70 - 130	114	%		
9113185	2-Methylnaphthalene	2018/08/22	90	50 - 140	79	50 - 140	<0.10	ug/L	NC	40
9113185	Acenaphthene	2018/08/22	85	50 - 140	85	50 - 140	<0.050	ug/L	NC	40
9113185	Acenaphthylene	2018/08/22	83	50 - 140	83	50 - 140	<0.050	ug/L	NC	40
9113185	Acridine	2018/08/22	96	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Anthracene	2018/08/22	82	50 - 140	87	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)anthracene	2018/08/22	77	50 - 140	77	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)pyrene	2018/08/22	78	50 - 140	85	50 - 140	<0.0050	ug/L	NC	40
9113185	Benzo(b&j)fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.030	ug/L	NC	40
9113185	Benzo(g,h,i)perylene	2018/08/22	79	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Benzo(k)fluoranthene	2018/08/22	82	50 - 140	90	50 - 140	<0.050	ug/L	NC	40
9113185	Chrysene	2018/08/22	79	50 - 140	79	50 - 140	<0.020	ug/L	NC	40
9113185	Dibenz(a,h)anthracene	2018/08/22	81	50 - 140	97	50 - 140	<0.0030	ug/L	NC	40
9113185	Fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.020	ug/L	NC	40
9113185	Fluorene	2018/08/22	81	50 - 140	81	50 - 140	<0.050	ug/L	NC	40
9113185	Indeno(1,2,3-cd)pyrene	2018/08/22	81	50 - 140	94	50 - 140	<0.050	ug/L	NC	40
9113185	Naphthalene	2018/08/22	91	50 - 140	76	50 - 140	<0.10	ug/L	NC	40
9113185	Phenanthrene	2018/08/22	79	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9113185	Pyrene	2018/08/22	79	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9113185	Quinoline	2018/08/22	108	50 - 140	105	50 - 140	<0.020	ug/L	NC	40
9113190	EPH (C10-C19)	2018/08/22	94	60 - 140	92	70 - 130	<0.20	mg/L	NC	30
9113190	EPH (C19-C32)	2018/08/22	95	60 - 140	92	70 - 130	<0.20	mg/L	NC	30
9121570	Dissolved Arsenic (As)	2018/08/29	104	80 - 120	104	80 - 120	<0.10	ug/L	0.55	20

Maxxam Job #: B869306  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9121570	Dissolved Iron (Fe)	2018/08/29	97	80 - 120	93	80 - 120	<5.0	ug/L	NC	20
9121570	Dissolved Magnesium (Mg)	2018/08/29	NC	80 - 120	98	80 - 120	<50	ug/L	0.21	20
9121570	Dissolved Manganese (Mn)	2018/08/29	96	80 - 120	97	80 - 120	<1.0	ug/L	1.7	20
9122939	Orthophosphate (P)	2018/08/29			109	80 - 120	<0.0050	mg/L		
9123672	Fluoride (F)	2018/08/30	104	80 - 120	102	80 - 120	<0.020	mg/L	0	20
9123910	Total Nitrogen (N)	2018/08/31	92	80 - 120	87	80 - 120	<0.020	mg/L	3.5	20
9124534	Benzene	2018/08/30	107	70 - 130	99	70 - 130	<0.40	ug/L	NC	30
9124534	Ethylbenzene	2018/08/30	118	70 - 130	110	70 - 130	<0.40	ug/L	NC	30
9124534	m & p-Xylene	2018/08/30	115	70 - 130	108	70 - 130	<0.40	ug/L	NC	30
9124534	Methyl-tert-butylether (MTBE)	2018/08/30	104	70 - 130	96	70 - 130	<4.0	ug/L	NC	30
9124534	o-Xylene	2018/08/30	115	70 - 130	109	70 - 130	<0.40	ug/L	NC	30
9124534	Styrene	2018/08/30	112	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
9124534	Toluene	2018/08/30	105	70 - 130	98	70 - 130	<0.40	ug/L	NC	30
9124534	VH C6-C10	2018/08/30			105	70 - 130	<300	ug/L	NC	30
9124534	Xylenes (Total)	2018/08/30					<0.40	ug/L	NC	30
9124588	Nitrate plus Nitrite (N)	2018/08/30	NC	80 - 120	107	80 - 120	<0.020	mg/L		
9124590	Nitrite (N)	2018/08/30	NC	80 - 120	103	80 - 120	<0.0050	mg/L		
9124729	Dissolved Chloride (Cl)	2018/08/30	98	80 - 120	97	80 - 120	<1.0	mg/L	NC	20
9124731	Dissolved Sulphate (SO4)	2018/08/30	93	80 - 120	92	80 - 120	<1.0	mg/L	NC	20
9124816	Total Phosphorus (P)	2018/08/30			105	80 - 120	<0.0050	mg/L		
9125787	Dissolved Sulphate (SO4)	2018/08/31			96	80 - 120	<1.0	mg/L		
9128684	Total Ammonia (N)	2018/09/04	94	80 - 120	101	80 - 120	<0.020	mg/L	8.3	20

Maxxam Job #: B869306  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9128765	Dissolved Organic Carbon (C)	2018/09/04	102	80 - 120	111	80 - 120	<0.50	mg/L	1.6	20

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

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

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

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

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

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

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

Maxxam Job #: B869306  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



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



Jas Khatkar, BBY Organics



Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

# Custody Tracking Form

*Aug-15*



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
<i>Carey Sibbald</i> <small>Print</small>	<i>[Signature]</i> <small>Sign</small>	Date	<i>2018/08/14</i>	<i>NIDA 1CA2M1</i> <small>Print</small>	<i>[Signature]</i> <small>Sign</small>	Date	<i>2018/08/16</i>
		Time (24 HR)	<i>17:10</i>			Time (24 HR)	<i>15:50</i>
<small>Print</small>	<small>Sign</small>	Date	<small>YYYY/MM/DD</small>	<small>Print</small>	<small>Sign</small>	Date	<small>YYYY/MM/DD</small>
<small>Print</small>	<small>Sign</small>	Time (24 HR)	<small>HH:MM</small>	<small>Print</small>	<small>Sign</small>	Time (24 HR)	<small>HH:MM</small>

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue

Micro  Food Chemistry

\*\*\* LAB USE ONLY \*\*\*

Received At	<input type="text"/>	Comments: <b>RECEIVED IN WHITEHORSE</b> BY: <i>[Signature]</i> @ 1710 2018-08-15 TEMP: <i>7 19 17</i>	Custody Seal		Cooling Media	Temperature °C		
Labeled By	<input type="text"/>		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By	<input type="text"/>		<i>Y</i>	<i>Y</i>	<i>Y</i>	<i>7</i>	<i>3</i>	<i>9</i>

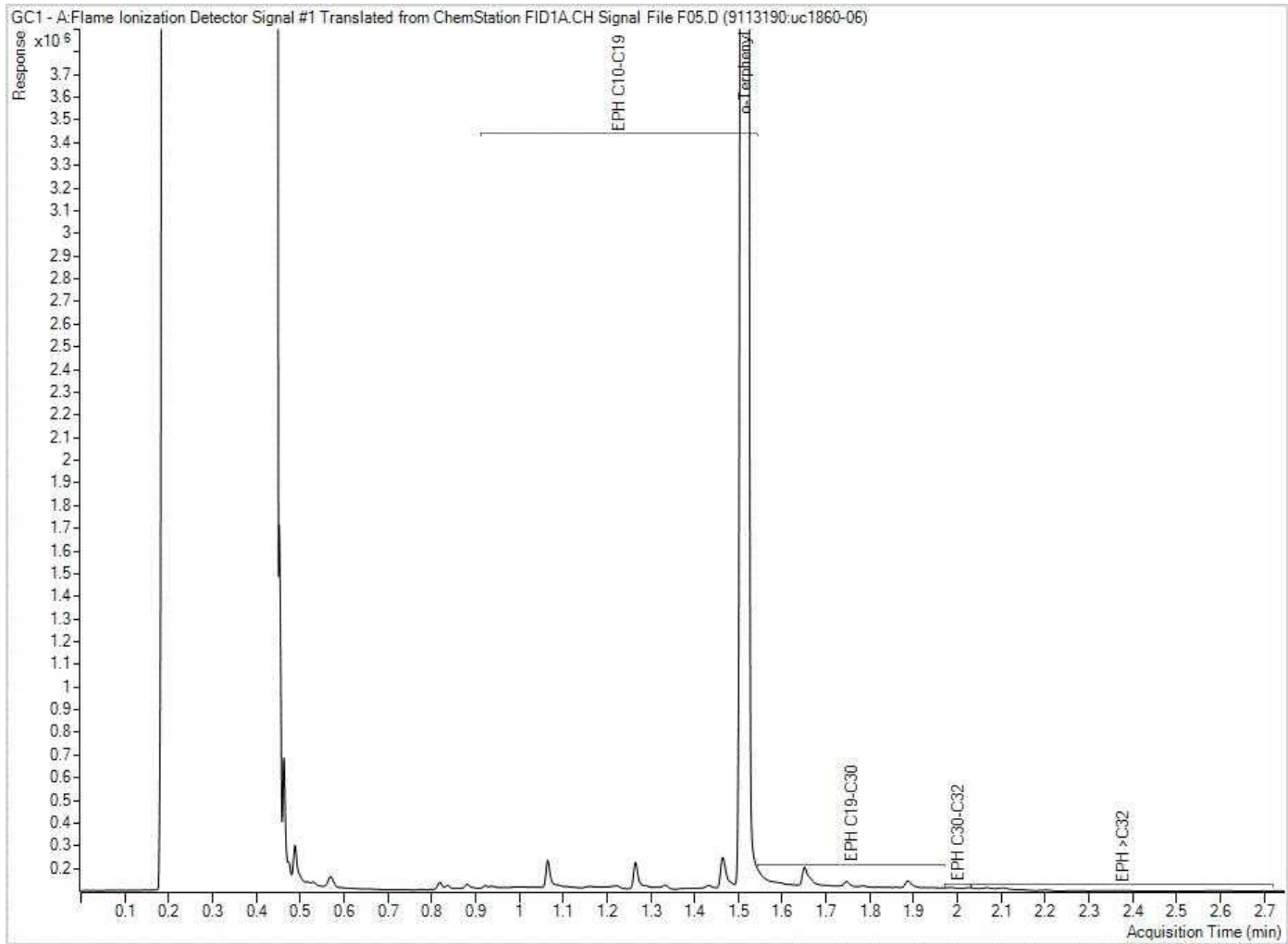
*1465*



B869306\_COC

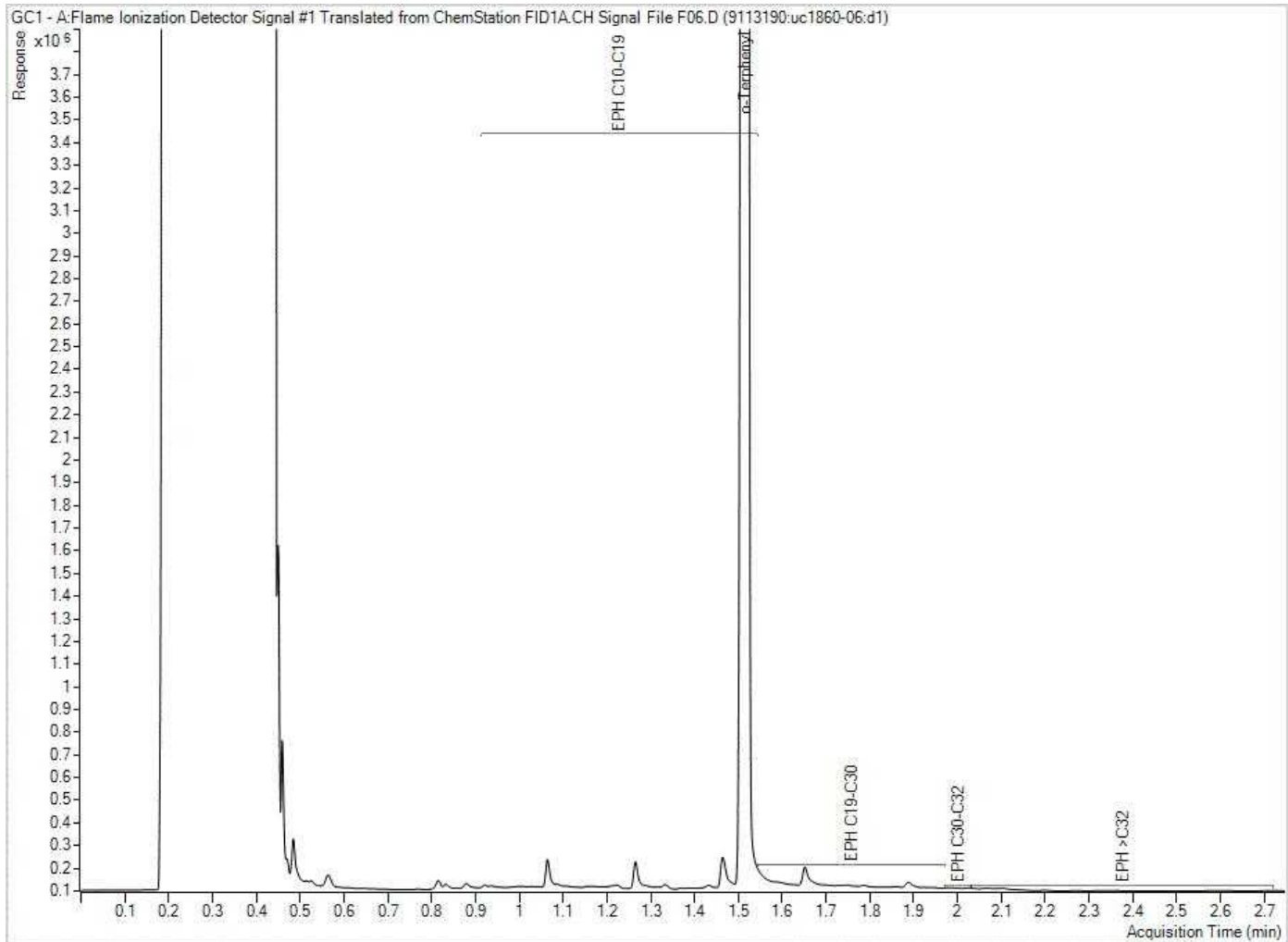


EPH in Water when PAH required Chromatogram



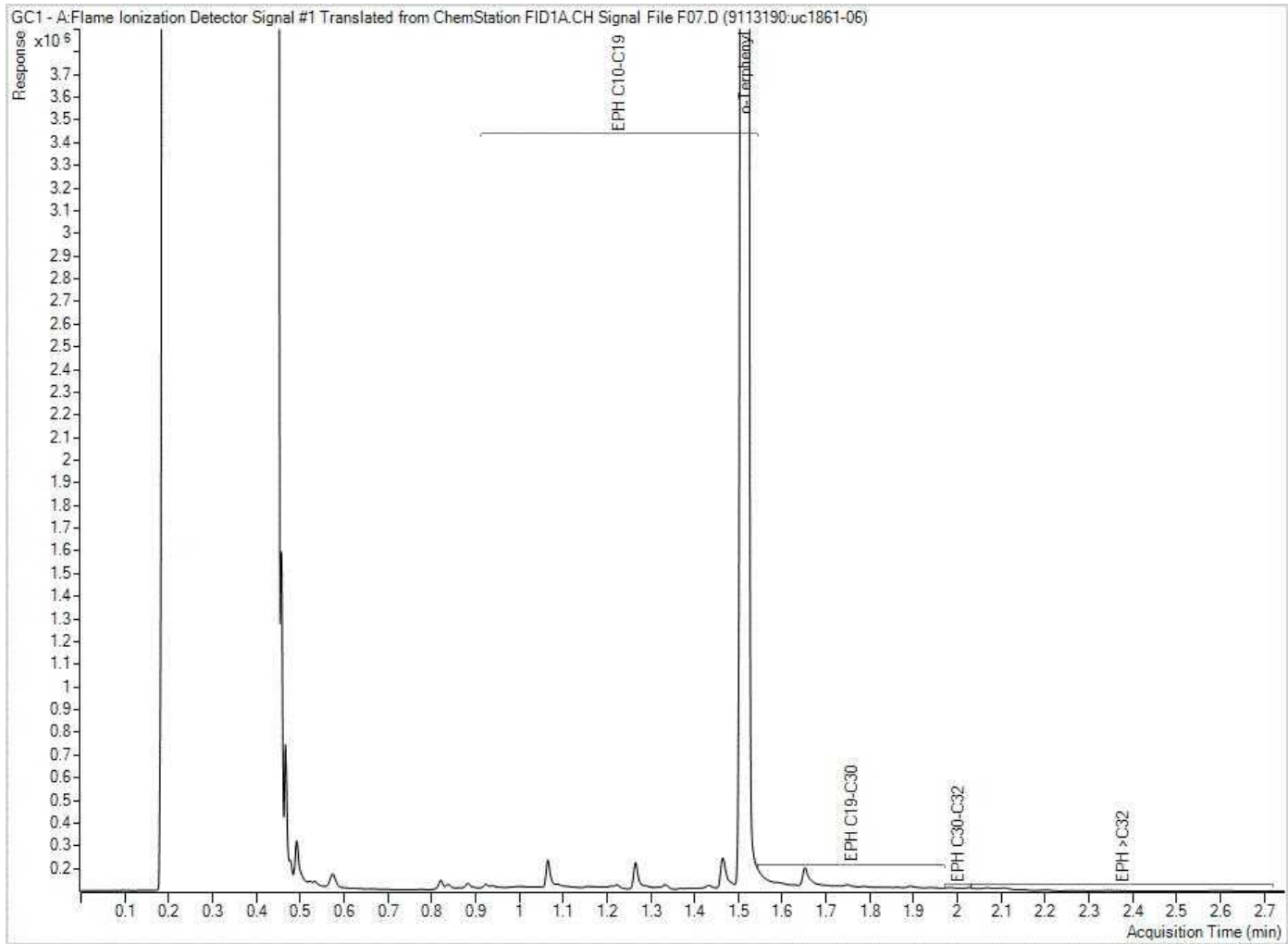
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



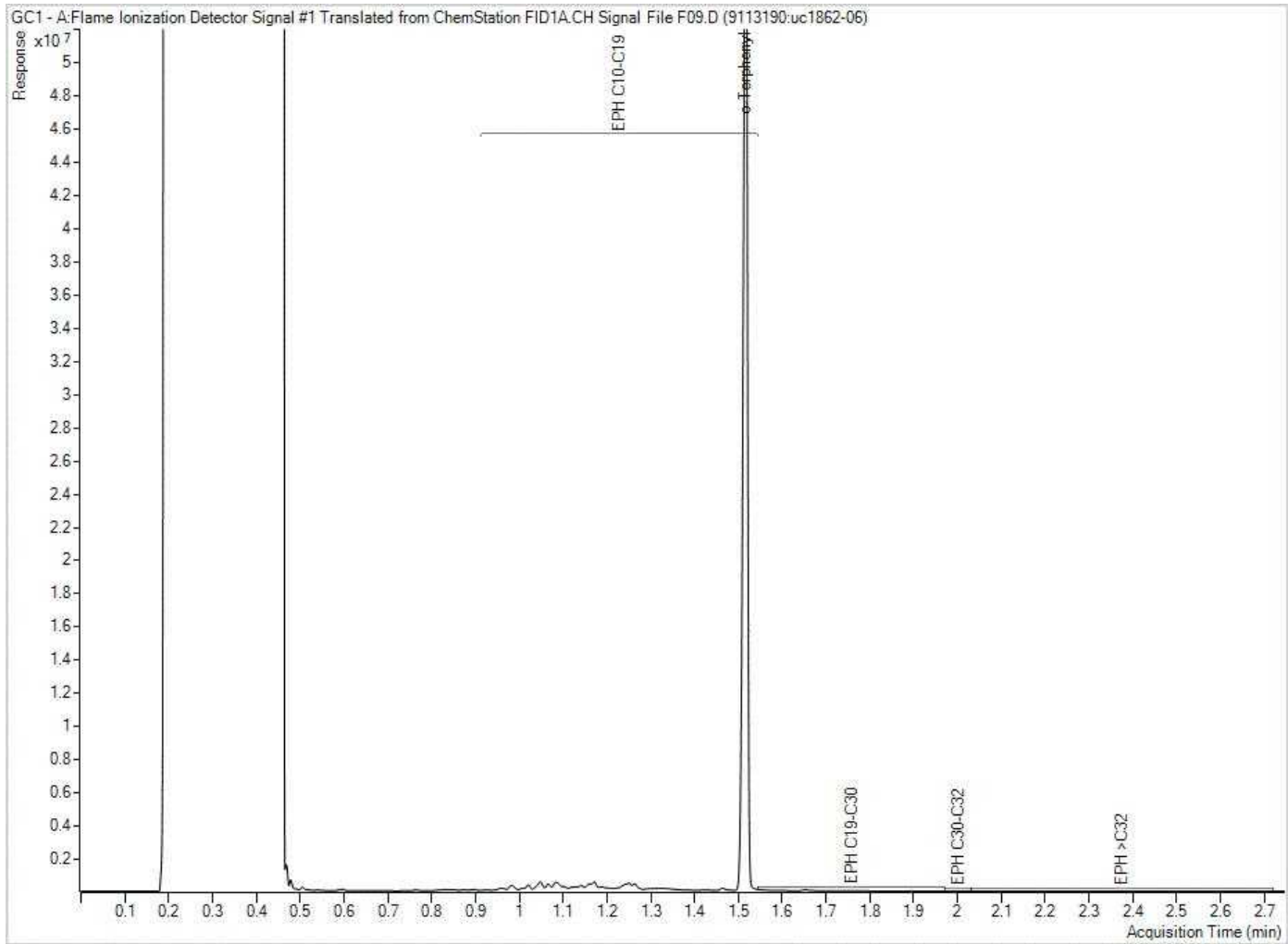
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



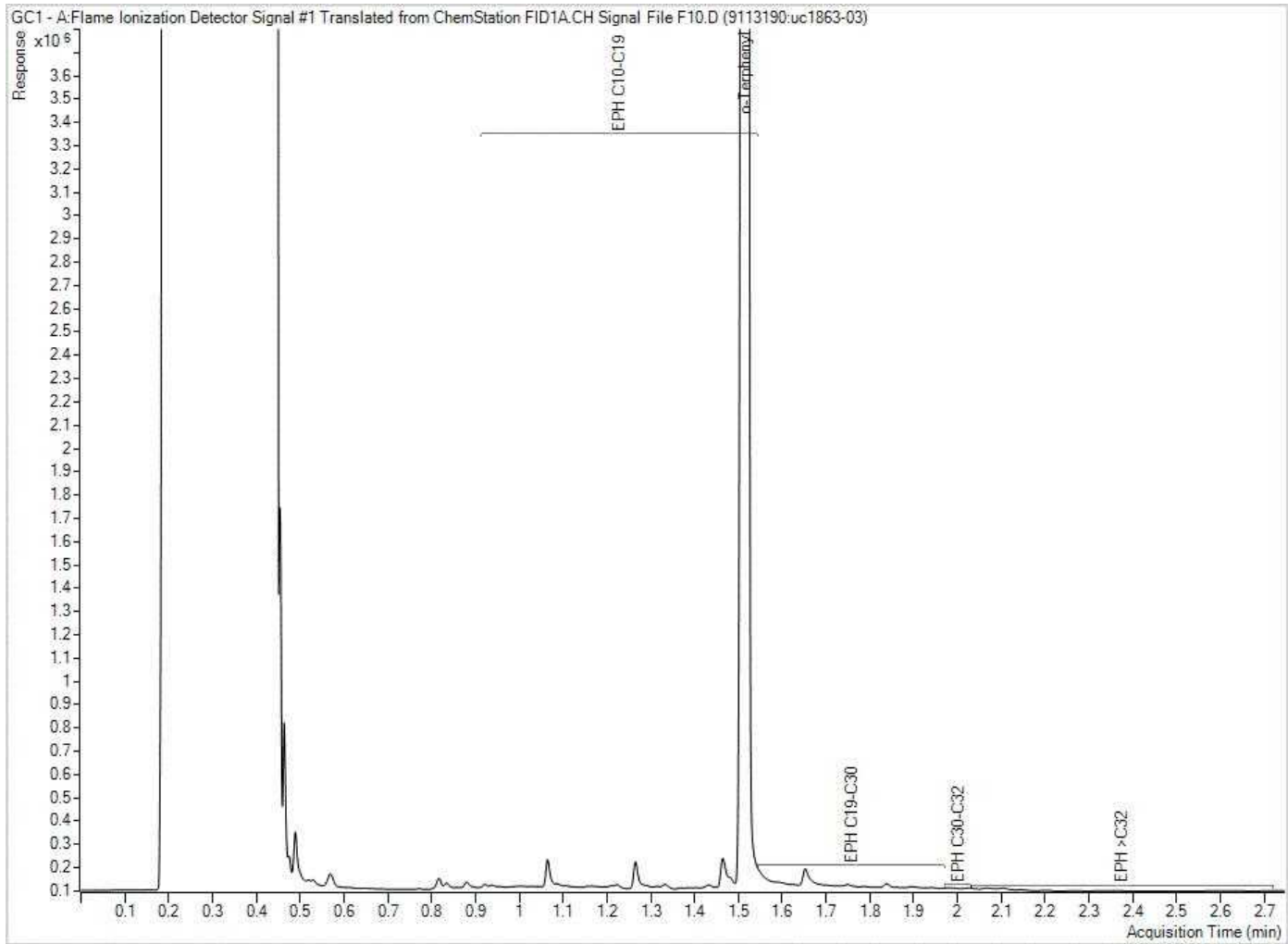
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



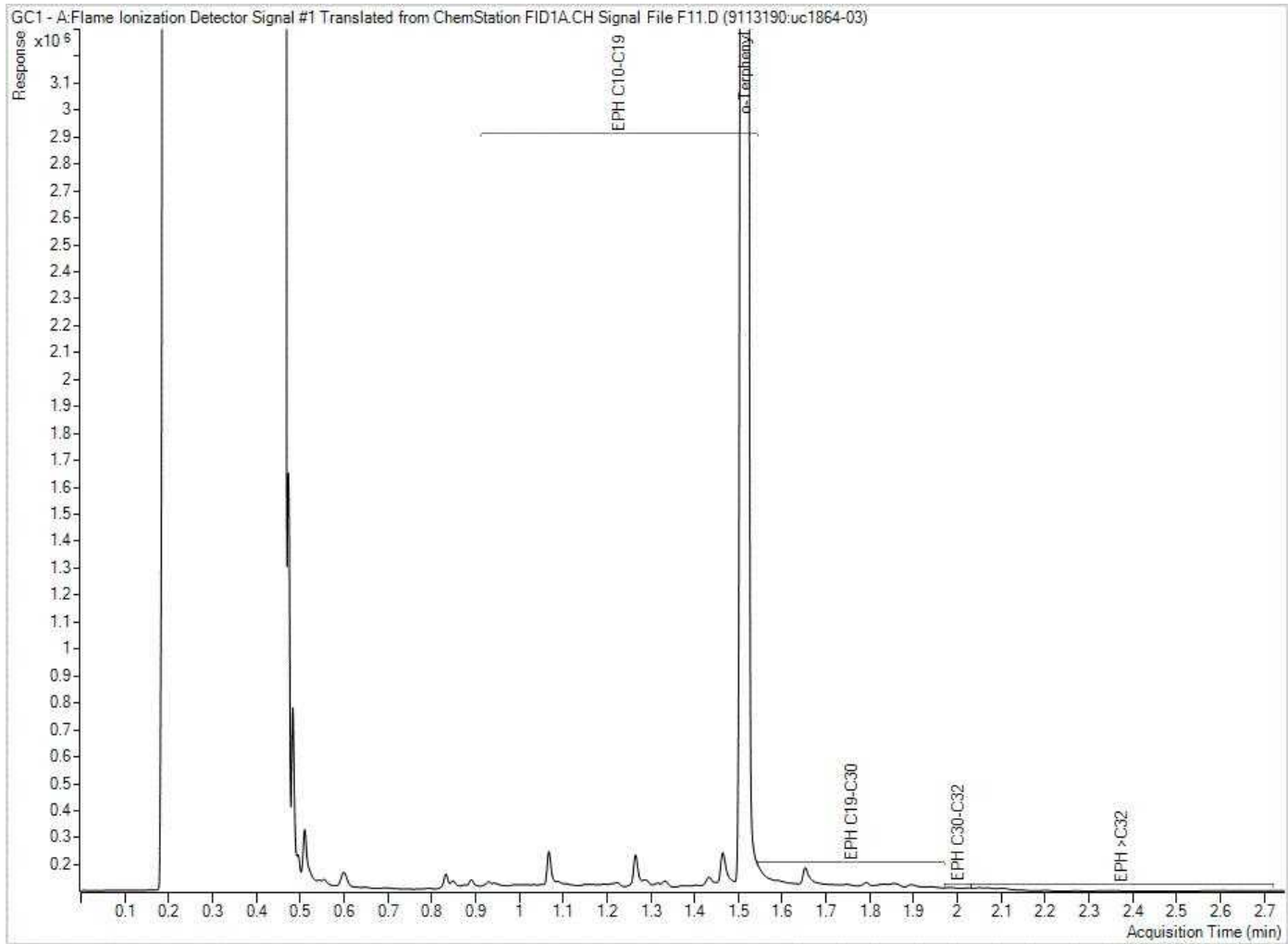
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7959

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613582  
Version: 4 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869556**

**Received: 2018/08/15, 10:00**

Sample Matrix: GROUND WATER  
# Samples Received: 5

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2018/08/30	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Chloride by Automated Colourimetry	2	N/A	2018/08/30	BBY6SOP-00011	SM 22 4500-Cl- E m
Carbon (DOC) - field filtered/preserved (1)	2	N/A	2018/09/04	BBY6SOP-00003	SM 22 5310 C m
Fluoride	2	N/A	2018/08/30	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO3)	2	N/A	2018/08/29	BBY WI-00033	Auto Calc
EPH in Water when PAH required	5	2018/08/22	2018/08/22	BBY8SOP-00029	BCMOE BCLM Mar 2017
Elements by CRC ICPMS (dissolved)	2	N/A	2018/08/29	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	2	N/A	2018/08/31	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	2	N/A	2018/09/04	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	2	N/A	2018/08/30	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	2	N/A	2018/08/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	2	N/A	2018/08/30	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	5	2018/08/22	2018/08/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (2)	5	N/A	2018/08/23	BBY WI-00033	Auto Calc
Orthophosphate by Konelab	2	N/A	2018/08/29	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	2	N/A	2018/08/30	BBY6SOP-00017	SM 22 4500-SO42- E m
EPH less PAH in Water by GC/FID (3)	5	N/A	2018/08/23	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	2	N/A	2018/08/31	BBY WI-00033	Auto Calc
Total Phosphorus	2	2018/08/30	2018/08/30	BBY6SOP-00013	SM 22 4500-P E m
Volatile HC-BTEX (4)	2	N/A	2018/08/31	BBY WI-00033	Auto Calc

**Remarks:**

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

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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7959

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613582  
Version: 4 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869556**

**Received: 2018/08/15, 10:00**

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) DOC present in the sample should be considered as non-purgeable DOC.

(2) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(3) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF GROUND WATER**

Maxxam ID		UC3160	UC3161		
Sampling Date		2018/08/14 14:35	2018/08/14 16:25		
COC Number		7959	7959		
	<b>UNITS</b>	<b>MW18-54</b>	<b>MW18-51</b>	<b>RDL</b>	<b>QC Batch</b>
<b>ANIONS</b>					
Nitrite (N)	mg/L	<0.0050	<0.0050	0.0050	9124590
<b>Calculated Parameters</b>					
Nitrate (N)	mg/L	<0.020	0.056	0.020	9120246
<b>Misc. Inorganics</b>					
Fluoride (F)	mg/L	0.210	0.200	0.020	9123672
Dissolved Organic Carbon (C)	mg/L	3.58	3.49	0.50	9128765
<b>Anions</b>					
Dissolved Sulphate (SO4)	mg/L	294 (1)	392 (1)	10	9124731
Dissolved Chloride (Cl)	mg/L	8.1	5.3	1.0	9124729
<b>Nutrients</b>					
Orthophosphate (P)	mg/L	0.0122	0.0082	0.0050	9122939
Total Ammonia (N)	mg/L	<0.020	0.077	0.020	9128687
Nitrate plus Nitrite (N)	mg/L	<0.020	0.056	0.020	9124588
Total Phosphorus (P)	mg/L	0.0080	0.0191	0.0050	9124824
RDL = Reportable Detection Limit					
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.					

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR BTEX/VPH IN WATER (GROUND WATER)**

Maxxam ID		UC3160	UC3161		
Sampling Date		2018/08/14 14:35	2018/08/14 16:25		
COC Number		7959	7959		
	UNITS	MW18-54	MW18-51	RDL	QC Batch
<b>Calculated Parameters</b>					
VPH (VH6 to 10 - BTEX)	ug/L	<300	<300	300	9124041
<b>Volatiles</b>					
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	4.0	9124534
Benzene	ug/L	<0.40	<0.40	0.40	9124534
Toluene	ug/L	1.2	<0.40	0.40	9124534
Ethylbenzene	ug/L	<0.40	<0.40	0.40	9124534
m & p-Xylene	ug/L	1.9	<0.40	0.40	9124534
o-Xylene	ug/L	0.73	<0.40	0.40	9124534
Styrene	ug/L	<0.40	<0.40	0.40	9124534
Xylenes (Total)	ug/L	2.6	<0.40	0.40	9124534
VH C6-C10	ug/L	<300	<300	300	9124534
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene (sur.)	%	102	103		9124534
4-Bromofluorobenzene (sur.)	%	102	103		9124534
D4-1,2-Dichloroethane (sur.)	%	114	117		9124534
RDL = Reportable Detection Limit					

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC3158	UC3159	UC3160	UC3161	UC3162		
Sampling Date		2018/08/14 10:00	2018/08/14 10:40	2018/08/14 14:35	2018/08/14 16:25	2018/08/14 17:10		
COC Number		7959	7959	7959	7959	7959		
	<b>UNITS</b>	<b>MW18-53</b>	<b>MW18-55</b>	<b>MW18-54</b>	<b>MW18-51</b>	<b>MW18-50</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	ug/L	<0.10	0.14	<0.10	<0.10	<0.10	0.10	9109381
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9109381
Total PAH	ug/L	<0.10	0.14	<0.10	<0.10	<0.10	0.10	9109381
<b>Polycyclic Aromatics</b>								
Quinoline	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9113185
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9113185
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9113185
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Acenaphthene	ug/L	<0.050	0.14	<0.050	<0.050	<0.050	0.050	9113185
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	9113185
Acridine	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9113185
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9113185
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	9113185
Chrysene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9113185
Benzo(b&j)fluoranthene	ug/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	9113185
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Benzo(a)pyrene	ug/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9113185
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
Dibenz(a,h)anthracene	ug/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	9113185
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9113185
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9109382
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9109382
<b>Ext. Pet. Hydrocarbon</b>								
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9113190
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9113190
<b>Surrogate Recovery (%)</b>								
O-TERPHENYL (sur.)	%	90	92	90	91	98		9113190
RDL = Reportable Detection Limit								

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC3158	UC3159	UC3160	UC3161	UC3162		
Sampling Date		2018/08/14 10:00	2018/08/14 10:40	2018/08/14 14:35	2018/08/14 16:25	2018/08/14 17:10		
COC Number		7959	7959	7959	7959	7959		
	UNITS	MW18-53	MW18-55	MW18-54	MW18-51	MW18-50	RDL	QC Batch
D10-ANTHRACENE (sur.)	%	85	86	83	91	85		9113185
D8-ACENAPHTHYLENE (sur.)	%	87	91	90	94	87		9113185
D8-NAPHTHALENE (sur.)	%	87	86	103	93	84		9113185
TERPHENYL-D14 (sur.)	%	80	82	78	85	83		9113185
RDL = Reportable Detection Limit								

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR DISSOLVED METALS (NO CV-HG) IN WATER**

<b>Maxxam ID</b>		UC3160		UC3161		
<b>Sampling Date</b>		2018/08/14 14:35		2018/08/14 16:25		
<b>COC Number</b>		7959		7959		
	<b>UNITS</b>	<b>MW18-54</b>	<b>RDL</b>	<b>MW18-51</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>						
Dissolved Hardness (CaCO3)	mg/L	604	0.50	694	0.50	9121143
<b>Dissolved Metals by ICPMS</b>						
Dissolved Arsenic (As)	ug/L	0.70	0.10	3.59	0.20	9121570
Dissolved Iron (Fe)	ug/L	15.4	5.0	101	10	9121570
Dissolved Manganese (Mn)	ug/L	734	1.0	293	2.0	9121570
Dissolved Magnesium (Mg)	ug/L	70400	50	75200	100	9121570
RDL = Reportable Detection Limit						

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**TOTAL TKN IN WATER (GROUND WATER)**

<b>Maxxam ID</b>		UC3160	UC3161		
<b>Sampling Date</b>		2018/08/14 14:35	2018/08/14 16:25		
<b>COC Number</b>		7959	7959		
	<b>UNITS</b>	<b>MW18-54</b>	<b>MW18-51</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>					
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.108	0.131	0.020	9120647
<b>Nutrients</b>					
Total Nitrogen (N)	mg/L	0.108	0.187	0.020	9123908
RDL = Reportable Detection Limit					

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### GENERAL COMMENTS

Version 2: Report reissued to include results for BTEX/VPH on sample MW18-51 and MW18-54 as per request from Matthew Deane on 2018/08/30  
Samples analyzed past hold time for BTEX/VPH. Analysis performed with client's consent.

Sample UC3160 [MW18-54] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS.

Sample UC3161 [MW18-51] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS.

#### CSR DISSOLVED METALS (NO CV-HG) IN WATER Comments

Sample UC3161 [MW18-51] Elements by CRC ICPMS (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**

Maxxam Job #: B869556  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9113185	D10-ANTHRACENE (sur.)	2018/08/22	80	50 - 140	89	50 - 140	91	%		
9113185	D8-ACENAPHTHYLENE (sur.)	2018/08/22	87	50 - 140	90	50 - 140	94	%		
9113185	D8-NAPHTHALENE (sur.)	2018/08/22	98	50 - 140	84	50 - 140	106	%		
9113185	TERPHENYL-D14 (sur.)	2018/08/22	74	50 - 140	90	50 - 140	88	%		
9113190	O-TERPHENYL (sur.)	2018/08/22	100	60 - 140	99	60 - 140	99	%		
9124534	1,4-Difluorobenzene (sur.)	2018/08/30	98	70 - 130	102	70 - 130	107	%		
9124534	4-Bromofluorobenzene (sur.)	2018/08/30	102	70 - 130	101	70 - 130	101	%		
9124534	D4-1,2-Dichloroethane (sur.)	2018/08/30	109	70 - 130	108	70 - 130	114	%		
9113185	1-Methylnaphthalene	2018/08/22	96	50 - 140	86	50 - 140	<0.050	ug/L		
9113185	2-Methylnaphthalene	2018/08/22	90	50 - 140	79	50 - 140	<0.10	ug/L	NC	40
9113185	Acenaphthene	2018/08/22	85	50 - 140	85	50 - 140	<0.050	ug/L	NC	40
9113185	Acenaphthylene	2018/08/22	83	50 - 140	83	50 - 140	<0.050	ug/L	NC	40
9113185	Acridine	2018/08/22	96	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Anthracene	2018/08/22	82	50 - 140	87	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)anthracene	2018/08/22	77	50 - 140	77	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)pyrene	2018/08/22	78	50 - 140	85	50 - 140	<0.0050	ug/L	NC	40
9113185	Benzo(b&j)fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.030	ug/L	NC	40
9113185	Benzo(g,h,i)perylene	2018/08/22	79	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Benzo(k)fluoranthene	2018/08/22	82	50 - 140	90	50 - 140	<0.050	ug/L	NC	40
9113185	Chrysene	2018/08/22	79	50 - 140	79	50 - 140	<0.020	ug/L	NC	40
9113185	Dibenz(a,h)anthracene	2018/08/22	81	50 - 140	97	50 - 140	<0.0030	ug/L	NC	40
9113185	Fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.020	ug/L	NC	40
9113185	Fluorene	2018/08/22	81	50 - 140	81	50 - 140	<0.050	ug/L	NC	40
9113185	Indeno(1,2,3-cd)pyrene	2018/08/22	81	50 - 140	94	50 - 140	<0.050	ug/L	NC	40
9113185	Naphthalene	2018/08/22	91	50 - 140	76	50 - 140	<0.10	ug/L	NC	40
9113185	Phenanthrene	2018/08/22	79	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9113185	Pyrene	2018/08/22	79	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9113185	Quinoline	2018/08/22	108	50 - 140	105	50 - 140	<0.020	ug/L	NC	40
9113190	EPH (C10-C19)	2018/08/22	94	60 - 140	92	70 - 130	<0.20	mg/L	NC	30
9113190	EPH (C19-C32)	2018/08/22	95	60 - 140	92	70 - 130	<0.20	mg/L	NC	30



Maxxam Job #: B869556  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9121570	Dissolved Arsenic (As)	2018/08/29	104	80 - 120	104	80 - 120	<0.10	ug/L	0.55	20
9121570	Dissolved Iron (Fe)	2018/08/29	97	80 - 120	93	80 - 120	<5.0	ug/L	NC	20
9121570	Dissolved Magnesium (Mg)	2018/08/29	NC	80 - 120	98	80 - 120	<50	ug/L	0.21	20
9121570	Dissolved Manganese (Mn)	2018/08/29	96	80 - 120	97	80 - 120	<1.0	ug/L	1.7	20
9122939	Orthophosphate (P)	2018/08/29			109	80 - 120	<0.0050	mg/L		
9123672	Fluoride (F)	2018/08/30	104	80 - 120	102	80 - 120	<0.020	mg/L	0	20
9123908	Total Nitrogen (N)	2018/08/31	92	80 - 120	90	80 - 120	<0.020	mg/L	NC	20
9124534	Benzene	2018/08/30	107	70 - 130	99	70 - 130	<0.40	ug/L	NC	30
9124534	Ethylbenzene	2018/08/30	118	70 - 130	110	70 - 130	<0.40	ug/L	NC	30
9124534	m & p-Xylene	2018/08/30	115	70 - 130	108	70 - 130	<0.40	ug/L	NC	30
9124534	Methyl-tert-butylether (MTBE)	2018/08/30	104	70 - 130	96	70 - 130	<4.0	ug/L	NC	30
9124534	o-Xylene	2018/08/30	115	70 - 130	109	70 - 130	<0.40	ug/L	NC	30
9124534	Styrene	2018/08/30	112	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
9124534	Toluene	2018/08/30	105	70 - 130	98	70 - 130	<0.40	ug/L	NC	30
9124534	VH C6-C10	2018/08/30			105	70 - 130	<300	ug/L	NC	30
9124534	Xylenes (Total)	2018/08/30					<0.40	ug/L	NC	30
9124588	Nitrate plus Nitrite (N)	2018/08/30	NC	80 - 120	107	80 - 120	<0.020	mg/L		
9124590	Nitrite (N)	2018/08/30	NC	80 - 120	103	80 - 120	<0.0050	mg/L		
9124729	Dissolved Chloride (Cl)	2018/08/30	98	80 - 120	97	80 - 120	<1.0	mg/L	NC	20
9124731	Dissolved Sulphate (SO4)	2018/08/30	93	80 - 120	92	80 - 120	<1.0	mg/L	NC	20
9124824	Total Phosphorus (P)	2018/08/30			98	80 - 120	<0.0050	mg/L		
9128687	Total Ammonia (N)	2018/09/04	93	80 - 120	95	80 - 120	<0.020	mg/L	4.9	20

Maxxam Job #: B869556  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9128765	Dissolved Organic Carbon (C)	2018/09/04	102	80 - 120	111	80 - 120	<0.50	mg/L	1.6	20

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

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

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

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

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

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

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

Maxxam Job #: B869556  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



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



Jas Khatkar, BBY Organics



Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Stantec



### Custody Tracking Form

Ans-14



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
Carey Sbbald <small>Print</small>		Date	2018/08/15	ANDREA WANG <small>Print</small>		Date	2018/08/16
		Time (24 HR)	10:00			Time (24 HR)	10:30
<small>Print</small>	<small>Sign</small>	Date	YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
<small>Print</small>	<small>Sign</small>	Date	YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue   
 Micro  Food Chemistry

**\*\*\* LAB USE ONLY \*\*\***

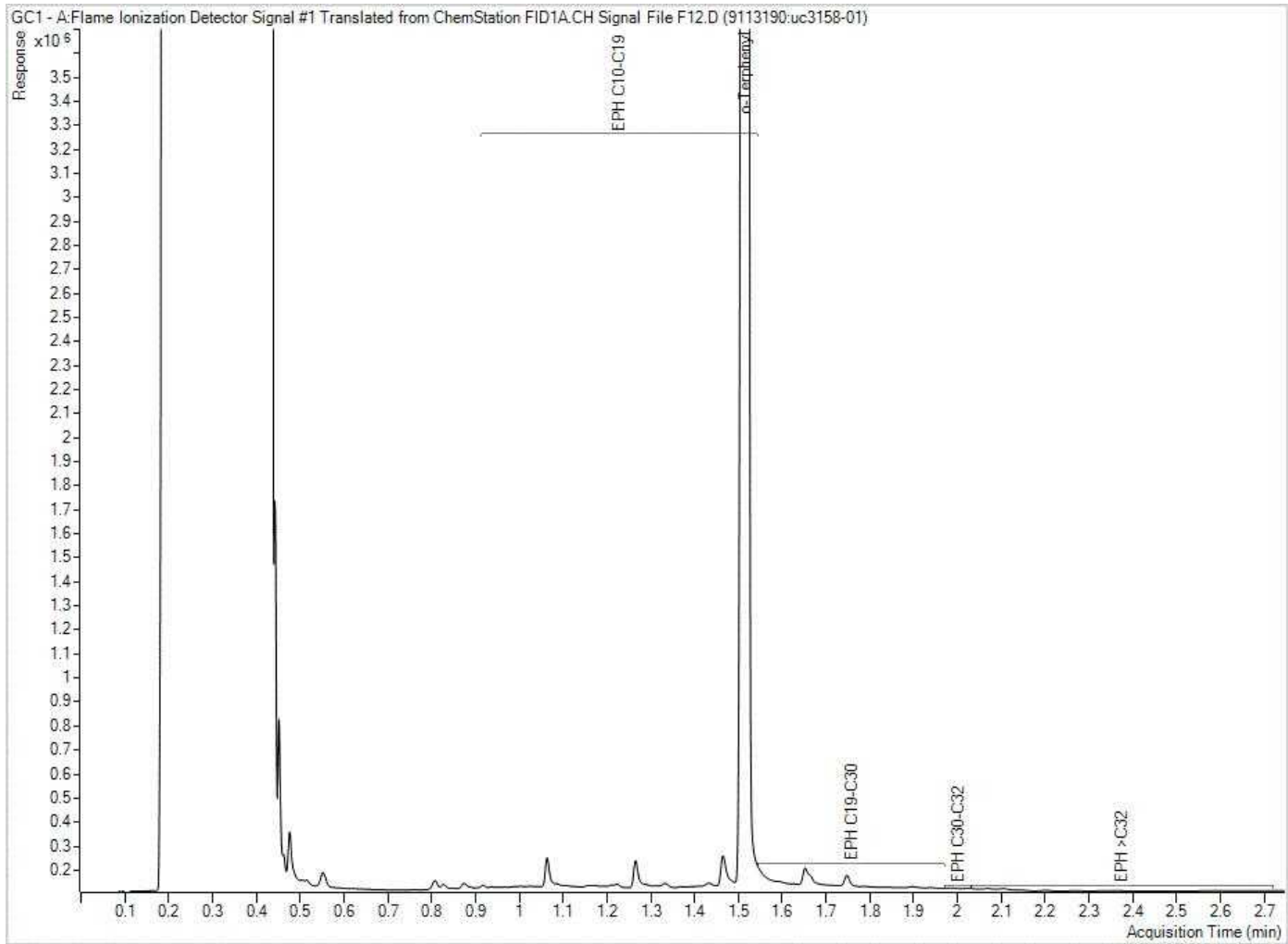
Received At: <input type="text"/>	Comments: <b>RECEIVED IN WHITEHORSE</b> <b>BY: </b> <b>2018-08-15</b>	Custody Seal		Cooling Media	Temperature °C		
Labeled By: <input type="text"/>		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By: <input type="text"/>		Y	Y	Y	5	6	8

TEMP: 8 16 13

146

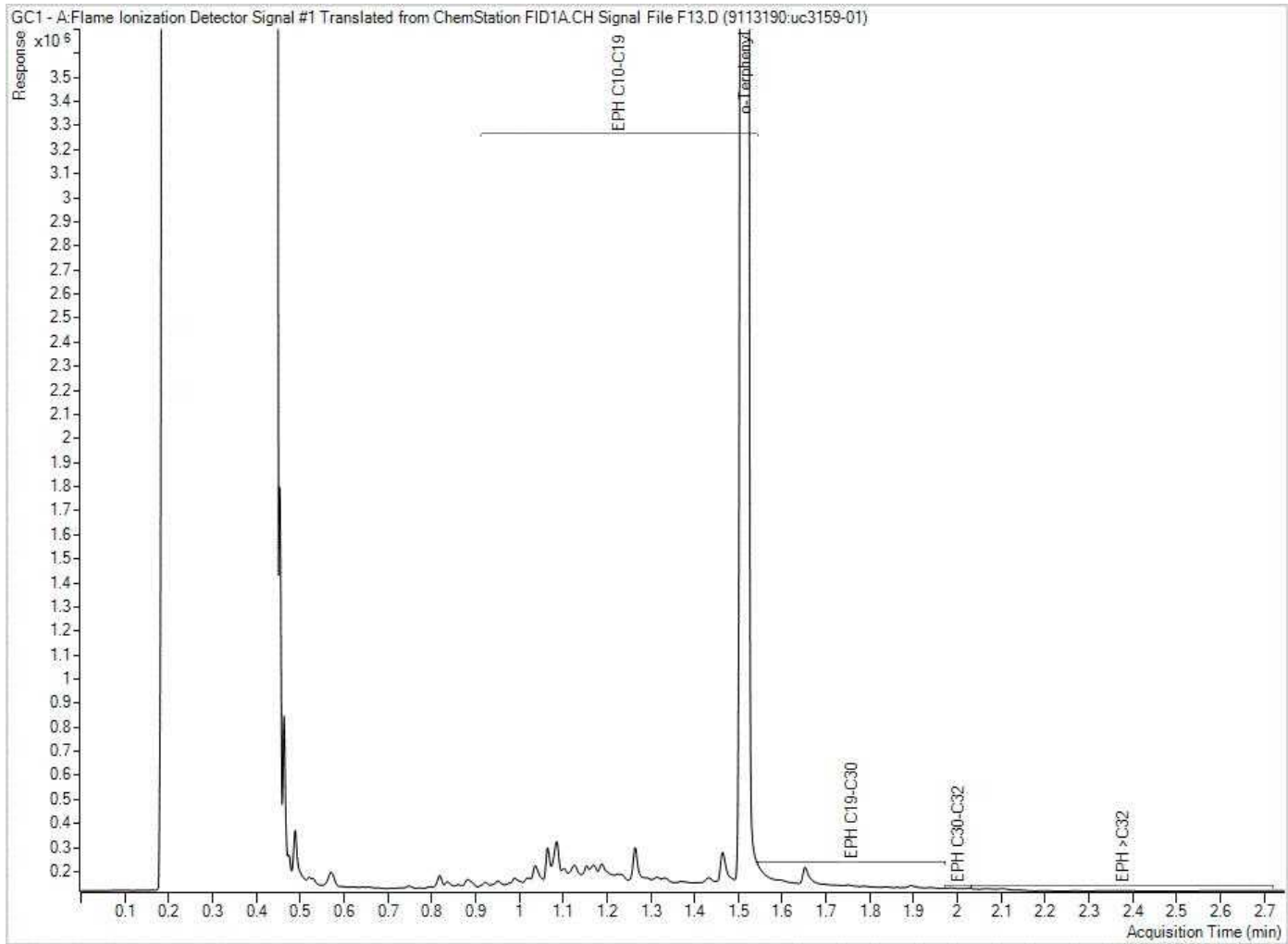


EPH in Water when PAH required Chromatogram



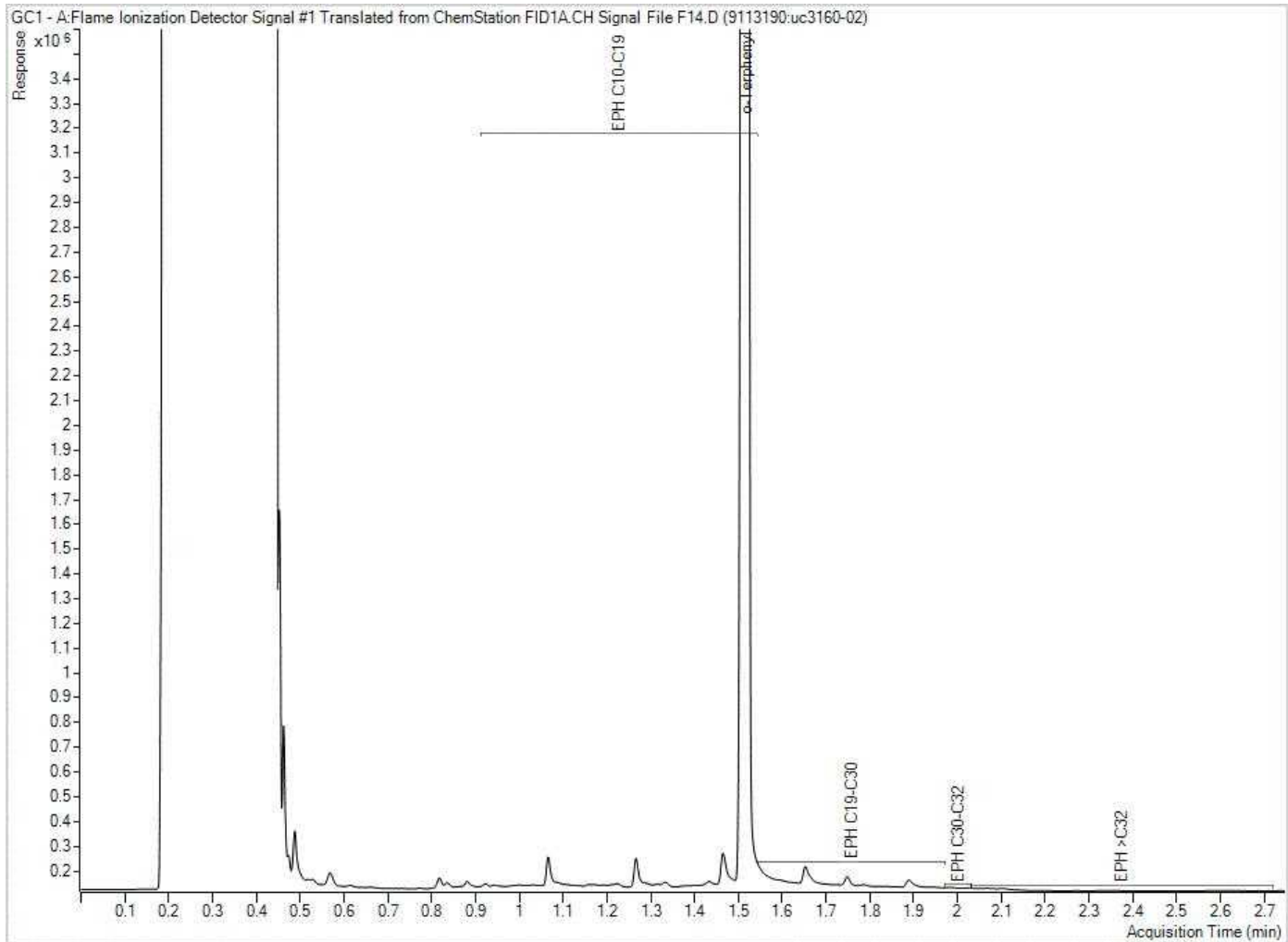
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



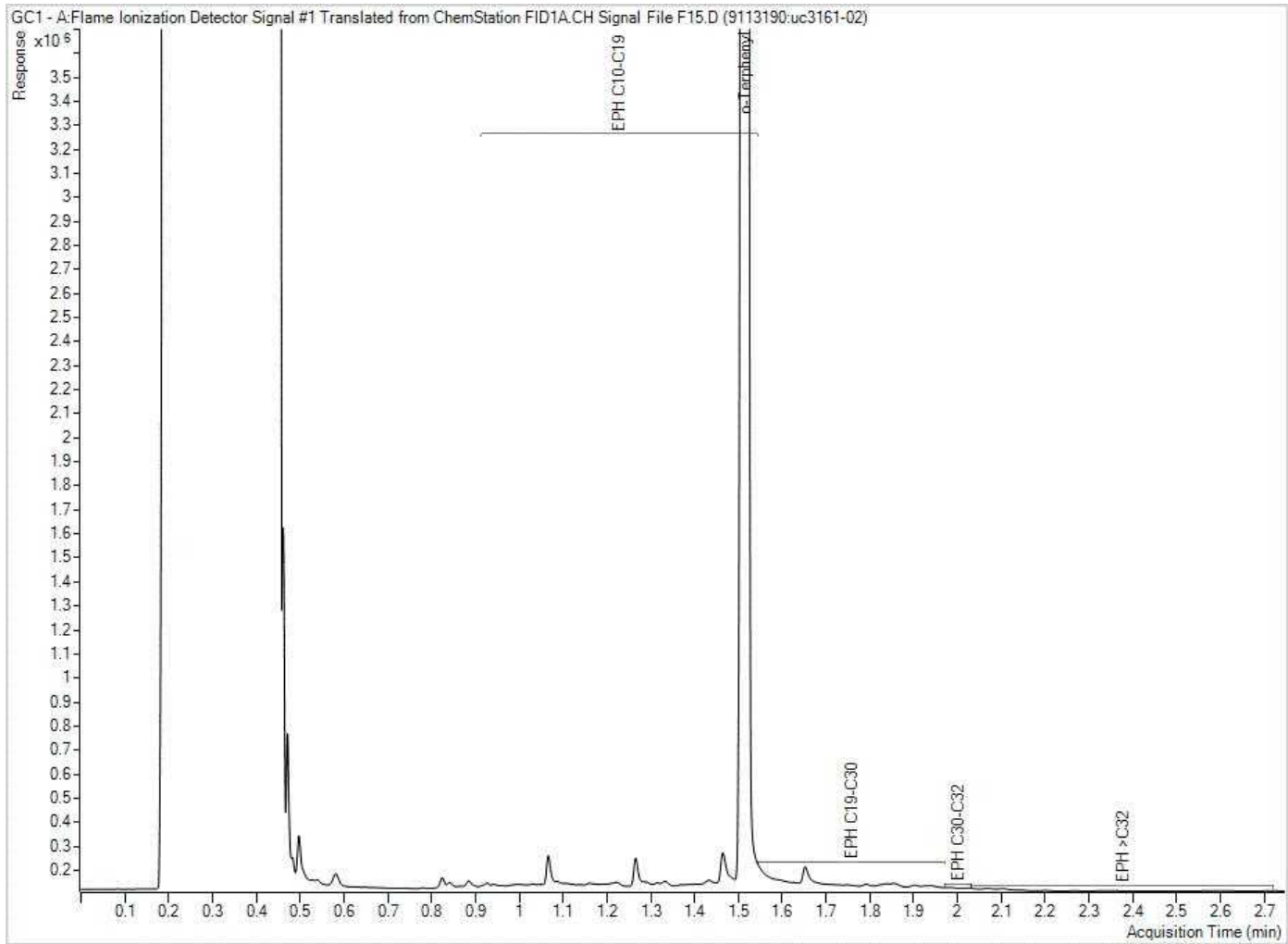
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

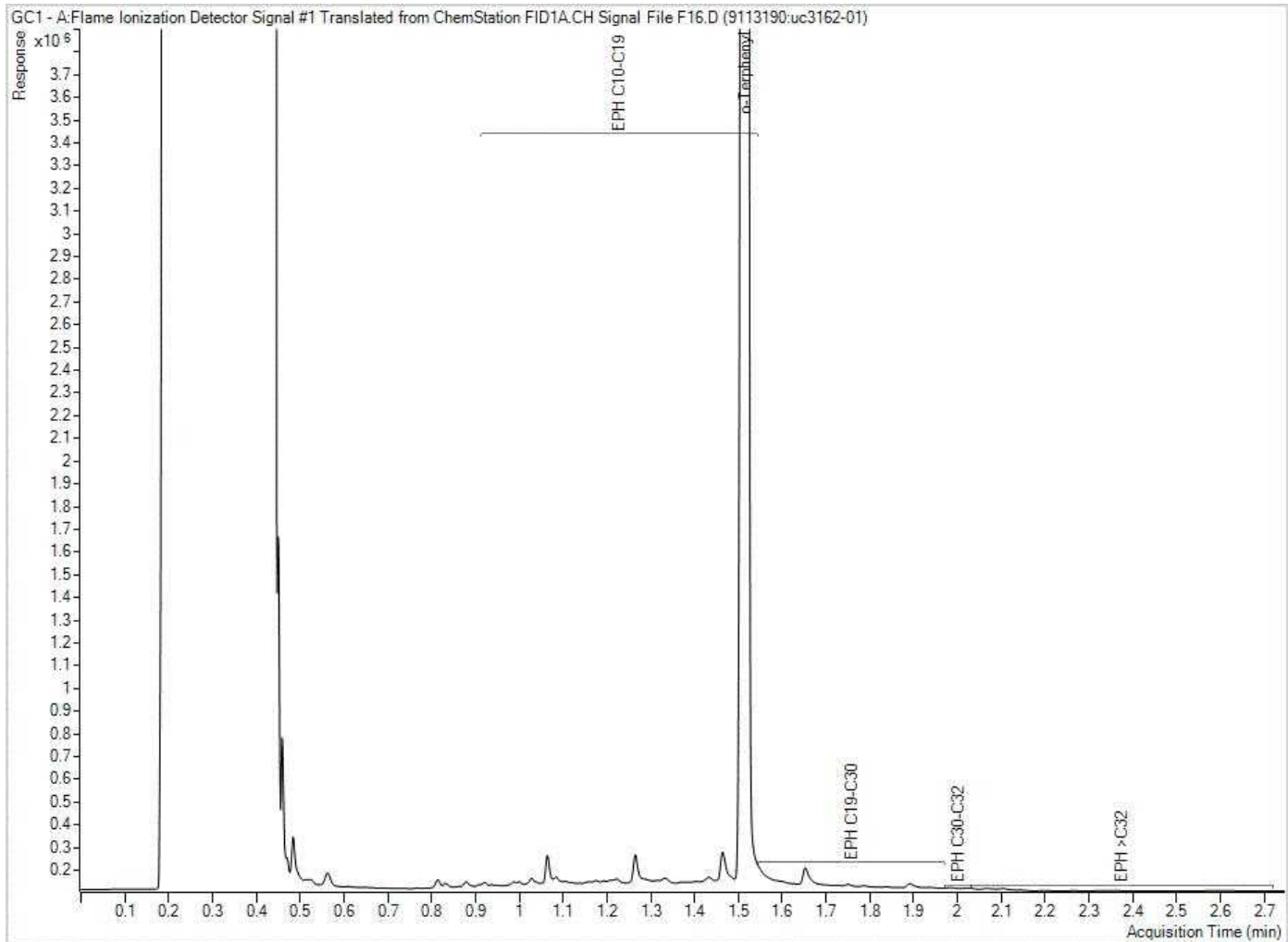
EPH in Water when PAH required Chromatogram



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



EPH in Water when PAH required Chromatogram



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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7961

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613579  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869782**

**Received: 2018/08/16, 16:15**

Sample Matrix: Water  
# Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH, VH, F1 SIM/MS	1	N/A	2018/08/30	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Chloride by Automated Colourimetry	1	N/A	2018/08/30	BBY6SOP-00011	SM 22 4500-Cl- E m
Carbon (DOC) - field filtered/preserved (1)	1	N/A	2018/09/04	BBY6SOP-00003	SM 22 5310 C m
Fluoride	1	N/A	2018/08/30	BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO3)	1	N/A	2018/08/29	BBY WI-00033	Auto Calc
EPH in Water when PAH required	4	2018/08/22	2018/08/22	BBY8SOP-00029	BCMOE BCLM Mar 2017
Elements by CRC ICPMS (dissolved)	1	N/A	2018/08/29	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	1	N/A	2018/08/31	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2018/09/04	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	1	N/A	2018/08/30	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2018/08/30	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2018/08/30	BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	4	2018/08/22	2018/08/23	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (2)	4	N/A	2018/08/23	BBY WI-00033	Auto Calc
Orthophosphate by Konelab	1	N/A	2018/09/04	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	1	N/A	2018/08/31	BBY6SOP-00017	SM 22 4500-SO42- E m
EPH less PAH in Water by GC/FID (3)	4	N/A	2018/08/23	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	1	N/A	2018/08/31	BBY WI-00033	Auto Calc
Total Phosphorus	1	2018/08/30	2018/08/30	BBY6SOP-00013	SM 22 4500-P E m
Volatile HC-BTEX (4)	1	N/A	2018/08/31	BBY WI-00033	Auto Calc

**Remarks:**

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

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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7961

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613579  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B869782**

**Received: 2018/08/16, 16:15**

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) DOC present in the sample should be considered as non-purgeable DOC.

(2) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(3) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF WATER**

<b>Maxxam ID</b>		UC4771			UC4771		
<b>Sampling Date</b>		2018/08/16 12:00			2018/08/16 12:00		
<b>COC Number</b>		7961			7961		
	<b>UNITS</b>	<b>MW18-45</b>	<b>RDL</b>	<b>QC Batch</b>	<b>MW18-45 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>
<b>ANIONS</b>							
Nitrite (N)	mg/L	0.0115	0.0050	9124590			
<b>Calculated Parameters</b>							
Nitrate (N)	mg/L	0.111	0.020	9120246			
<b>Misc. Inorganics</b>							
Fluoride (F)	mg/L	0.320	0.020	9123672			
Dissolved Organic Carbon (C)	mg/L	5.41	0.50	9128765	5.50	0.50	9128765
<b>Anions</b>							
Dissolved Sulphate (SO4)	mg/L	164	1.0	9125787			
Dissolved Chloride (Cl)	mg/L	3.6	1.0	9124729			
<b>Nutrients</b>							
Orthophosphate (P)	mg/L	0.0167	0.0050	9129063			
Total Ammonia (N)	mg/L	<0.020	0.020	9128687			
Nitrate plus Nitrite (N)	mg/L	0.123	0.020	9124588			
Total Phosphorus (P)	mg/L	0.0211	0.0050	9124824			
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate							

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR BTEX/VPH IN WATER (WATER)**

<b>Maxxam ID</b>		UC4771		
<b>Sampling Date</b>		2018/08/16 12:00		
<b>COC Number</b>		7961		
	<b>UNITS</b>	<b>MW18-45</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
VPH (VH6 to 10 - BTEX)	ug/L	<300	300	9124041
<b>Volatiles</b>				
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	9124534
Benzene	ug/L	<0.40	0.40	9124534
Toluene	ug/L	<0.40	0.40	9124534
Ethylbenzene	ug/L	<0.40	0.40	9124534
m & p-Xylene	ug/L	<0.40	0.40	9124534
o-Xylene	ug/L	<0.40	0.40	9124534
Styrene	ug/L	<0.40	0.40	9124534
Xylenes (Total)	ug/L	<0.40	0.40	9124534
VH C6-C10	ug/L	<300	300	9124534
<b>Surrogate Recovery (%)</b>				
1,4-Difluorobenzene (sur.)	%	102		9124534
4-Bromofluorobenzene (sur.)	%	104		9124534
D4-1,2-Dichloroethane (sur.)	%	115		9124534
RDL = Reportable Detection Limit				

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UC4769		UC4770		UC4771	UC4772		
Sampling Date		2018/08/15 18:00		2018/08/15 18:45		2018/08/16 12:00	2018/08/16 15:20		
COC Number		7961		7961		7961	7961		
	UNITS	MW18-41	RDL	MW17-17	RDL	MW18-45	MW17-15	RDL	QC Batch
<b>Calculated Parameters</b>									
Low Molecular Weight PAH's	ug/L	<0.10	0.10	290	0.50	<0.10	<0.10	0.10	9109381
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9109381
Total PAH	ug/L	<0.10	0.10	290	0.50	<0.10	<0.10	0.10	9109381
<b>Polycyclic Aromatics</b>									
Quinoline	ug/L	<0.020	0.020	<0.40 (1)	0.40	<0.020	<0.020	0.020	9113185
Naphthalene	ug/L	<0.10	0.10	97 (2)	0.50	<0.10	<0.10	0.10	9113185
1-Methylnaphthalene	ug/L	<0.050	0.050	83 (2)	0.25	<0.050	<0.050	0.050	9113185
2-Methylnaphthalene	ug/L	<0.10	0.10	100 (2)	0.50	<0.10	<0.10	0.10	9113185
Acenaphthylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9113185
Acenaphthene	ug/L	<0.050	0.050	0.57 (3)	0.050	<0.050	<0.050	0.050	9113185
Fluorene	ug/L	<0.050	0.050	2.0	0.050	<0.050	<0.050	0.050	9113185
Phenanthrene	ug/L	<0.050	0.050	0.93	0.050	<0.050	<0.050	0.050	9113185
Anthracene	ug/L	<0.010	0.010	0.011 (3)	0.010	<0.010	<0.010	0.010	9113185
Acridine	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9113185
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	<0.020	0.020	9113185
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	<0.020	0.020	9113185
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	<0.010	0.010	9113185
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	<0.020	0.020	9113185
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	<0.030	<0.030	0.030	9113185
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9113185
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	<0.0050	<0.0050	0.0050	9113185
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9113185
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	<0.0030	0.0030	9113185
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	9113185
<b>Calculated Parameters</b>									
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	3.2	0.20	<0.20	<0.20	0.20	9109382
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	<0.20	0.20	9109382
<b>Ext. Pet. Hydrocarbon</b>									
EPH (C10-C19)	mg/L	<0.20	0.20	3.3	0.20	<0.20	<0.20	0.20	9113190
RDL = Reportable Detection Limit									
(1) Detection limits raised due to matrix interference.									
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.									
(3) Tentatively identified result and may be potentially biased high due to matrix interference.									

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UC4769		UC4770		UC4771	UC4772		
Sampling Date		2018/08/15 18:00		2018/08/15 18:45		2018/08/16 12:00	2018/08/16 15:20		
COC Number		7961		7961		7961	7961		
	UNITS	MW18-41	RDL	MW17-17	RDL	MW18-45	MW17-15	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	<0.20	0.20	9113190
<b>Surrogate Recovery (%)</b>									
O-TERPHENYL (sur.)	%	92		73		105	98		9113190
D10-ANTHRACENE (sur.)	%	87		81		97	89		9113185
D8-ACENAPHTHYLENE (sur.)	%	91		121		98	90		9113185
D8-NAPHTHALENE (sur.)	%	89		81		94	88		9113185
TERPHENYL-D14 (sur.)	%	84		66		99	85		9113185
RDL = Reportable Detection Limit									

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR DISSOLVED METALS (NO CV-HG) IN WATER**

<b>Maxxam ID</b>		UC4771		
<b>Sampling Date</b>		2018/08/16 12:00		
<b>COC Number</b>		7961		
	<b>UNITS</b>	<b>MW18-45</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Calculated Parameters</b>				
Dissolved Hardness (CaCO3)	mg/L	308	0.50	9121143
<b>Dissolved Metals by ICPMS</b>				
Dissolved Arsenic (As)	ug/L	1.09	0.10	9121570
Dissolved Iron (Fe)	ug/L	<5.0	5.0	9121570
Dissolved Manganese (Mn)	ug/L	112	1.0	9121570
Dissolved Magnesium (Mg)	ug/L	25100	50	9121570
RDL = Reportable Detection Limit				



Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**TOTAL TKN IN WATER (WATER)**

<b>Maxxam ID</b>		UC4771		
<b>Sampling Date</b>		2018/08/16 12:00		
<b>COC Number</b>		7961		
	<b>UNITS</b>	<b>MW18-45</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.265	0.020	9120647
<b>Nutrients</b>				
Total Nitrogen (N)	mg/L	0.388	0.020	9123907
RDL = Reportable Detection Limit				

Maxxam Job #: B869782  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### GENERAL COMMENTS

Version 2: Report reissued to include results for BTEX/VPH on sample MW18-45 as per request from Matthew Deane on 2018/08/30

Sample UC4771 [MW18-45] : Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Sample was analyzed past method specified hold time for Nitrite (N) by CFA.

**Results relate only to the items tested.**

Maxxam Job #: B869782  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9113185	D10-ANTHRACENE (sur.)	2018/08/22	80	50 - 140	89	50 - 140	91	%		
9113185	D8-ACENAPHTHYLENE (sur.)	2018/08/22	87	50 - 140	90	50 - 140	94	%		
9113185	D8-NAPHTHALENE (sur.)	2018/08/22	98	50 - 140	84	50 - 140	106	%		
9113185	TERPHENYL-D14 (sur.)	2018/08/22	74	50 - 140	90	50 - 140	88	%		
9113190	O-TERPHENYL (sur.)	2018/08/22	100	60 - 140	99	60 - 140	99	%		
9124534	1,4-Difluorobenzene (sur.)	2018/08/30	98	70 - 130	102	70 - 130	107	%		
9124534	4-Bromofluorobenzene (sur.)	2018/08/30	102	70 - 130	101	70 - 130	101	%		
9124534	D4-1,2-Dichloroethane (sur.)	2018/08/30	109	70 - 130	108	70 - 130	114	%		
9113185	1-Methylnaphthalene	2018/08/22	96	50 - 140	86	50 - 140	<0.050	ug/L		
9113185	2-Methylnaphthalene	2018/08/22	90	50 - 140	79	50 - 140	<0.10	ug/L	NC	40
9113185	Acenaphthene	2018/08/22	85	50 - 140	85	50 - 140	<0.050	ug/L	NC	40
9113185	Acenaphthylene	2018/08/22	83	50 - 140	83	50 - 140	<0.050	ug/L	NC	40
9113185	Acridine	2018/08/22	96	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Anthracene	2018/08/22	82	50 - 140	87	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)anthracene	2018/08/22	77	50 - 140	77	50 - 140	<0.010	ug/L	NC	40
9113185	Benzo(a)pyrene	2018/08/22	78	50 - 140	85	50 - 140	<0.0050	ug/L	NC	40
9113185	Benzo(b&j)fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.030	ug/L	NC	40
9113185	Benzo(g,h,i)perylene	2018/08/22	79	50 - 140	93	50 - 140	<0.050	ug/L	NC	40
9113185	Benzo(k)fluoranthene	2018/08/22	82	50 - 140	90	50 - 140	<0.050	ug/L	NC	40
9113185	Chrysene	2018/08/22	79	50 - 140	79	50 - 140	<0.020	ug/L	NC	40
9113185	Dibenz(a,h)anthracene	2018/08/22	81	50 - 140	97	50 - 140	<0.0030	ug/L	NC	40
9113185	Fluoranthene	2018/08/22	78	50 - 140	84	50 - 140	<0.020	ug/L	NC	40
9113185	Fluorene	2018/08/22	81	50 - 140	81	50 - 140	<0.050	ug/L	NC	40
9113185	Indeno(1,2,3-cd)pyrene	2018/08/22	81	50 - 140	94	50 - 140	<0.050	ug/L	NC	40
9113185	Naphthalene	2018/08/22	91	50 - 140	76	50 - 140	<0.10	ug/L	NC	40
9113185	Phenanthrene	2018/08/22	79	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9113185	Pyrene	2018/08/22	79	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9113185	Quinoline	2018/08/22	108	50 - 140	105	50 - 140	<0.020	ug/L	NC	40
9113190	EPH (C10-C19)	2018/08/22	94	60 - 140	92	70 - 130	<0.20	mg/L	NC	30
9113190	EPH (C19-C32)	2018/08/22	95	60 - 140	92	70 - 130	<0.20	mg/L	NC	30

Maxxam Job #: B869782  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9121570	Dissolved Arsenic (As)	2018/08/29	104	80 - 120	104	80 - 120	<0.10	ug/L	0.55	20
9121570	Dissolved Iron (Fe)	2018/08/29	97	80 - 120	93	80 - 120	<5.0	ug/L	NC	20
9121570	Dissolved Magnesium (Mg)	2018/08/29	NC	80 - 120	98	80 - 120	<50	ug/L	0.21	20
9121570	Dissolved Manganese (Mn)	2018/08/29	96	80 - 120	97	80 - 120	<1.0	ug/L	1.7	20
9123672	Fluoride (F)	2018/08/30	104	80 - 120	102	80 - 120	<0.020	mg/L	0	20
9123907	Total Nitrogen (N)	2018/08/31	93	80 - 120	89	80 - 120	<0.020	mg/L	1.6	20
9124534	Benzene	2018/08/30	107	70 - 130	99	70 - 130	<0.40	ug/L	NC	30
9124534	Ethylbenzene	2018/08/30	118	70 - 130	110	70 - 130	<0.40	ug/L	NC	30
9124534	m & p-Xylene	2018/08/30	115	70 - 130	108	70 - 130	<0.40	ug/L	NC	30
9124534	Methyl-tert-butylether (MTBE)	2018/08/30	104	70 - 130	96	70 - 130	<4.0	ug/L	NC	30
9124534	o-Xylene	2018/08/30	115	70 - 130	109	70 - 130	<0.40	ug/L	NC	30
9124534	Styrene	2018/08/30	112	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
9124534	Toluene	2018/08/30	105	70 - 130	98	70 - 130	<0.40	ug/L	NC	30
9124534	VH C6-C10	2018/08/30			105	70 - 130	<300	ug/L	NC	30
9124534	Xylenes (Total)	2018/08/30					<0.40	ug/L	NC	30
9124588	Nitrate plus Nitrite (N)	2018/08/30	NC	80 - 120	107	80 - 120	<0.020	mg/L		
9124590	Nitrite (N)	2018/08/30	NC	80 - 120	103	80 - 120	<0.0050	mg/L		
9124729	Dissolved Chloride (Cl)	2018/08/30	98	80 - 120	97	80 - 120	<1.0	mg/L	NC	20
9124824	Total Phosphorus (P)	2018/08/30			98	80 - 120	<0.0050	mg/L		
9125787	Dissolved Sulphate (SO4)	2018/08/31			96	80 - 120	<1.0	mg/L		
9128687	Total Ammonia (N)	2018/09/04	93	80 - 120	95	80 - 120	<0.020	mg/L	4.9	20
9128765	Dissolved Organic Carbon (C)	2018/09/04	102	80 - 120	111	80 - 120	<0.50	mg/L	1.6	20

Maxxam Job #: B869782  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9129063	Orthophosphate (P)	2018/09/04			100	80 - 120	<0.0050	mg/L		

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

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

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

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

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

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

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

Maxxam Job #: B869782  
Report Date: 2018/09/04

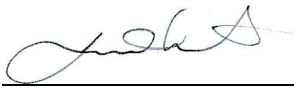
STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



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



Jas Khatkar, BBY Organics



Rob Reinert, B.Sc., Scientific Spécialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Stantec



### Custody Tracking Form

Aug-16



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
Carey Sibbald <i>Print</i>	<i>Sign</i>	Date	2018/08/16	<i>Print</i> PEDRO TACK	<i>Sign</i>	Date	2018/08/17
		Time (24 HR)	16:16			Time (24 HR)	14:45
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue

Micro  Food Chemistry

**\*\*\* LAB USE ONLY \*\*\***

Received At	<input type="text"/>	Comments: RECEIVED IN WHITEHORSE BY: <i>[Signature]</i> @ 16:15 2018-08-16 TEMP: 9/6/6	Custody Seal		Cooling Media	Temperature °C		
Labeled By	<input type="text"/>		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By	<input type="text"/>		YES	YES	YES	6	7	8

1590



B869782\_COC

Stantec



### Custody Tracking Form

Aug. 16



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
Carey S. Board <i>Print</i>	<i>Signature</i>	Date	2018/08/16	PEDRO TACK <i>Print</i>	<i>Signature</i>	Date	2018/08/17
		Time (24 HR)	16:41:00			Time (24 HR)	14:45
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue

Micro  Food Chemistry

\*\*\* LAB USE ONLY \*\*\*

Received At: <input type="text"/>	Comments: RECEIVED IN WHITEHORSE BY: <i>[Signature]</i> 8/16/15 2018-08-16 TEMP: 9/6/6	Custody Seal		Cooling Media	Temperature °C		
Labeled By: <input type="text"/>		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By: <input type="text"/>		YES	YES	YES	6	7	8

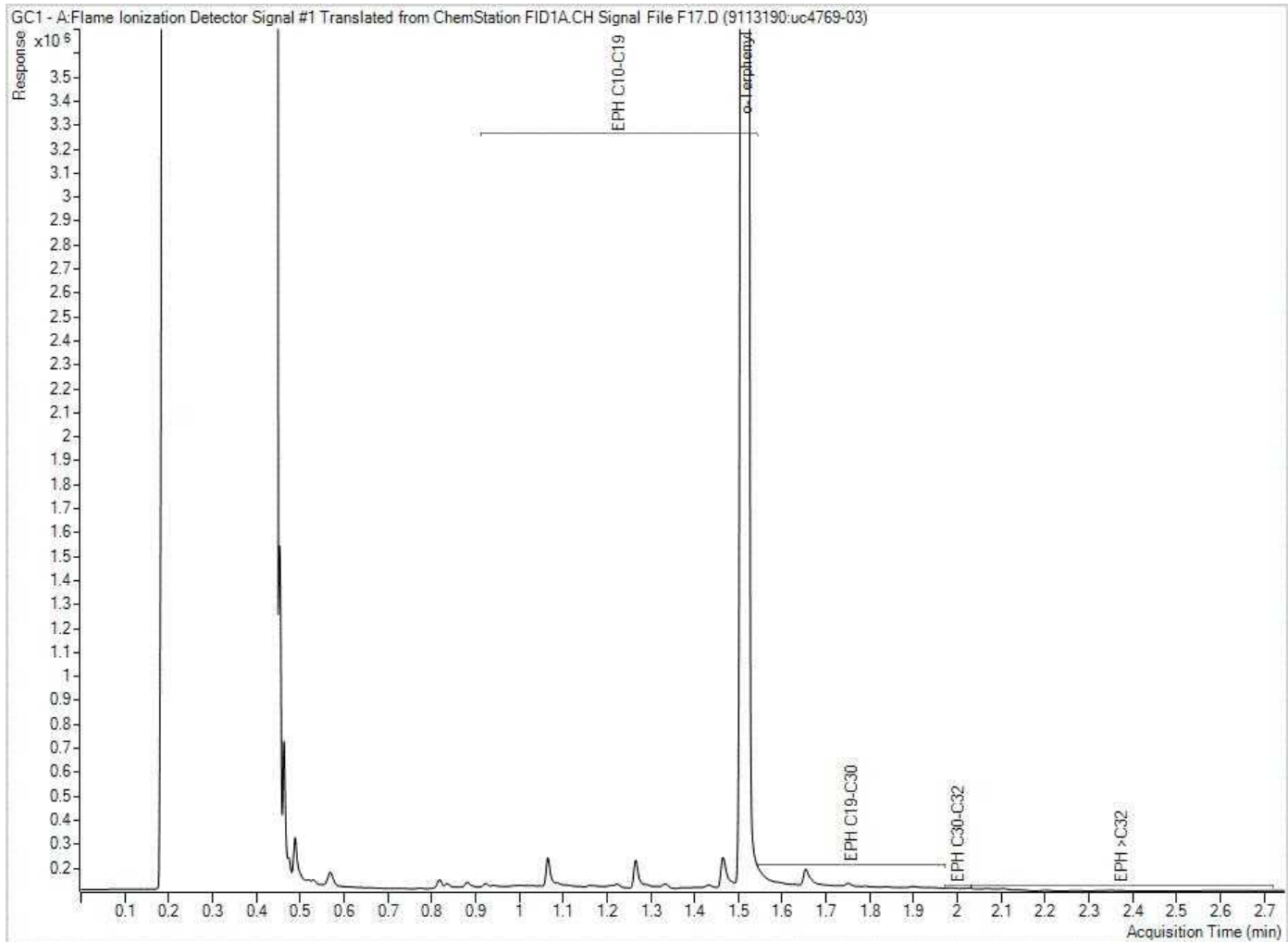
1590



B869782\_COC

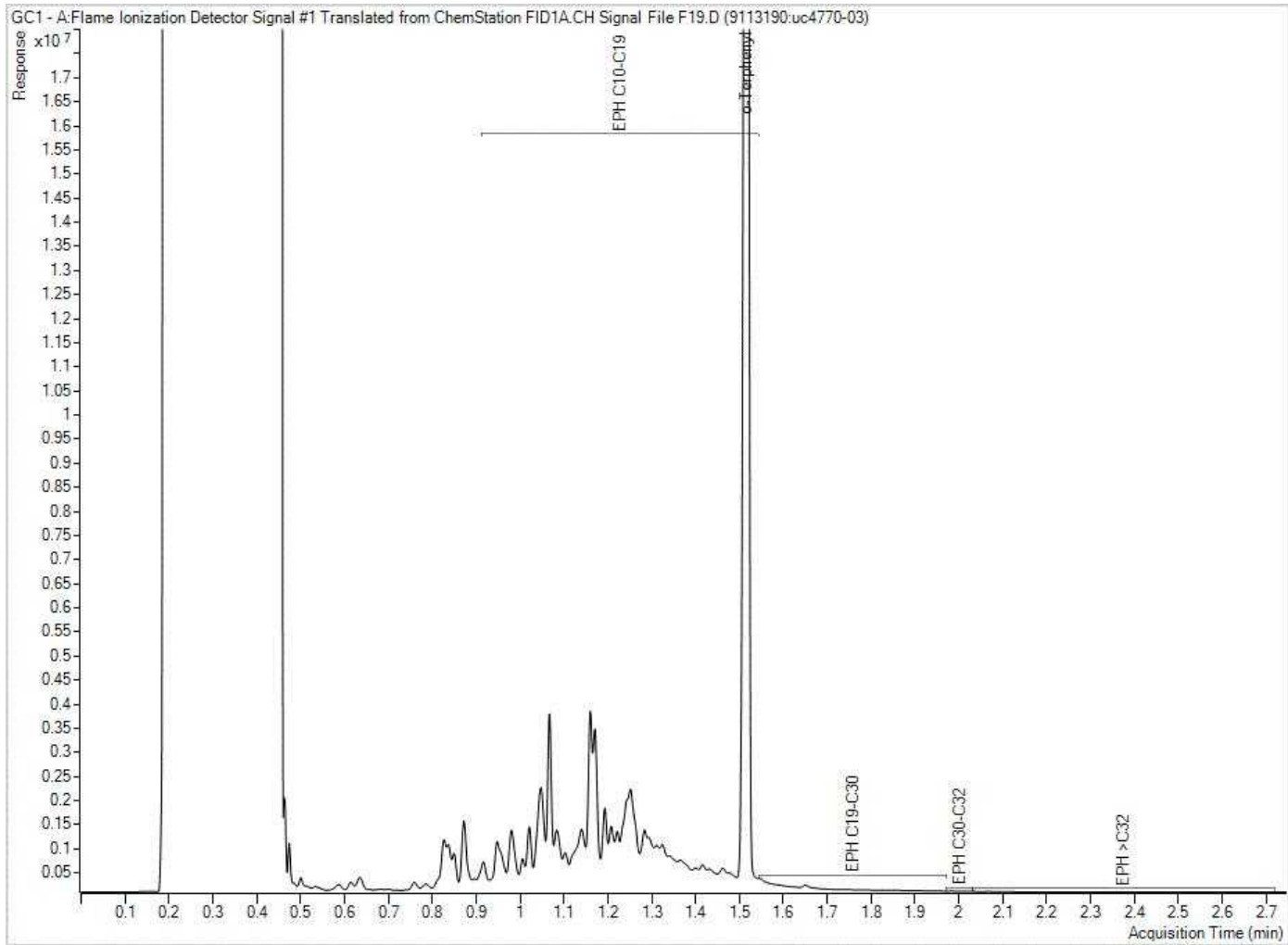


EPH in Water when PAH required Chromatogram



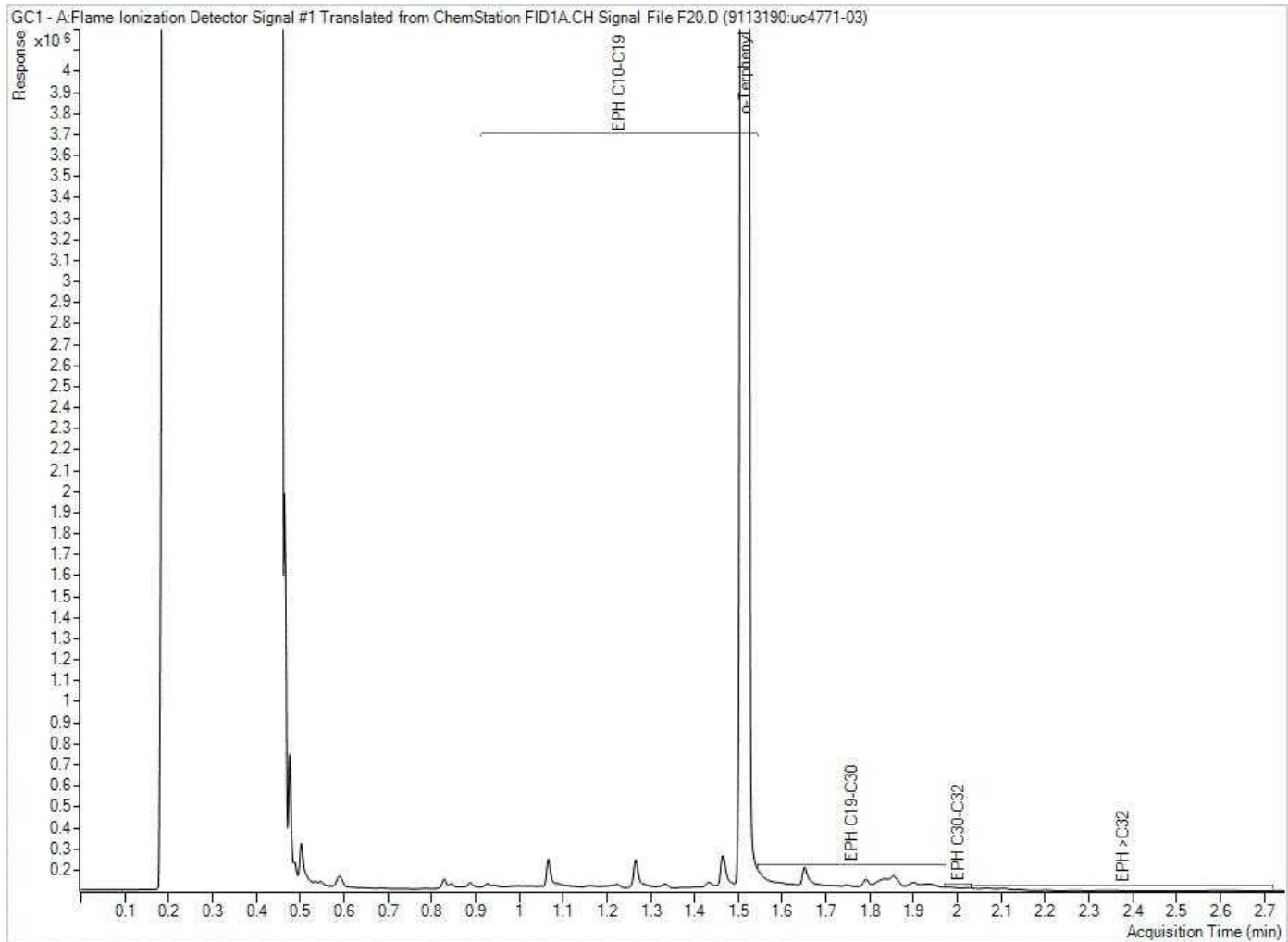
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



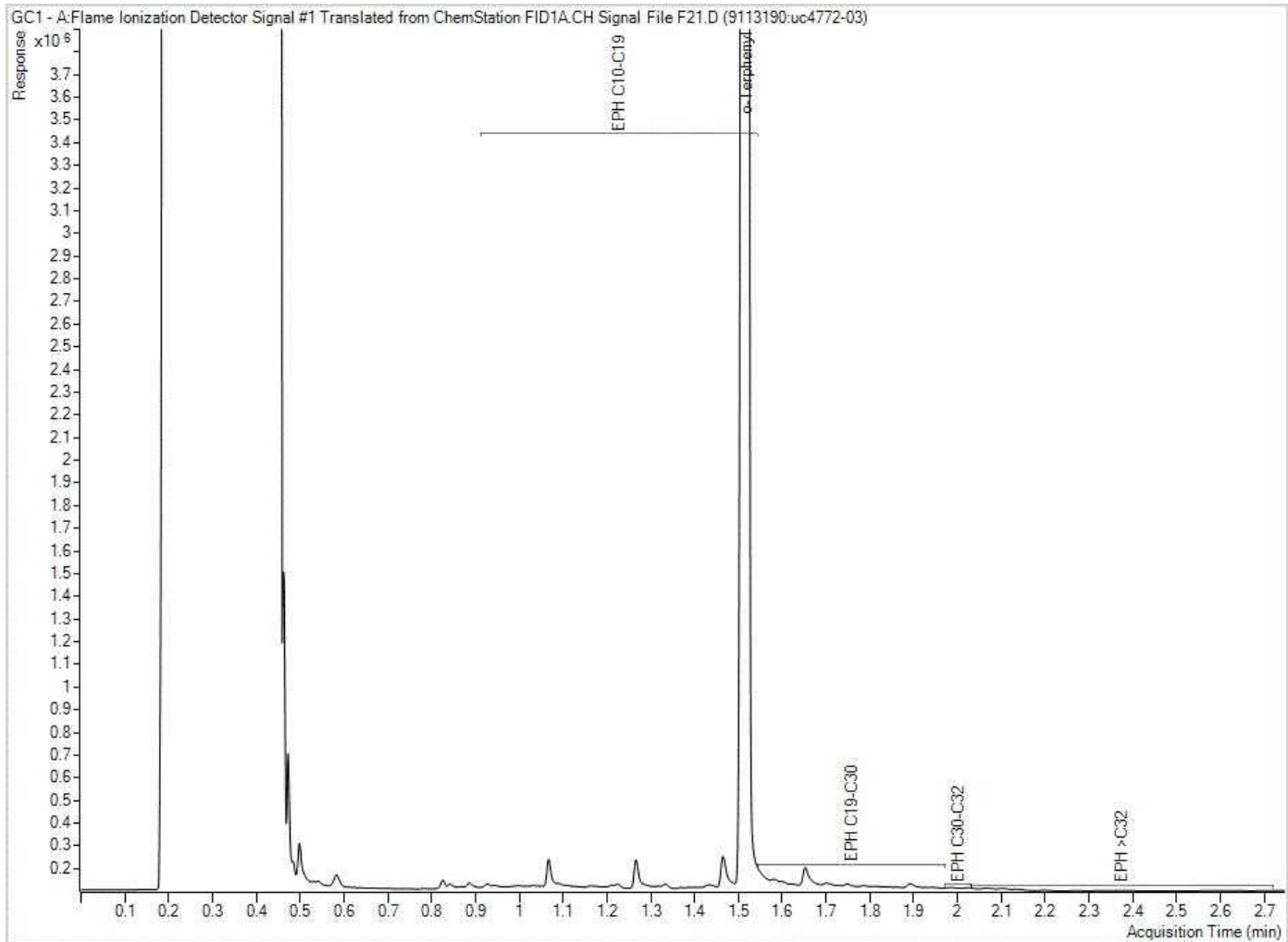
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7962

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613580  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B870078**

**Received: 2018/08/17, 16:35**

Sample Matrix: GROUND WATER  
# Samples Received: 9

Analyses	Date		Laboratory Method	Analytical Method
	Quantity	Extracted		
BTEX/MTBE LH, VH, F1 SIM/MS	2	N/A	2018/08/30 BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
BTEX/MTBE LH, VH, F1 SIM/MS	3	N/A	2018/08/31 BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Chloride by Automated Colourimetry	6	N/A	2018/08/30 BBY6SOP-00011	SM 22 4500-Cl- E m
Carbon (DOC) - field filtered/preserved (1)	6	N/A	2018/09/04 BBY6SOP-00003	SM 22 5310 C m
Fluoride	4	N/A	2018/08/30 BBY6SOP-00048	SM 22 4500-F C m
Fluoride	2	N/A	2018/08/31 BBY6SOP-00048	SM 22 4500-F C m
Hardness (calculated as CaCO <sub>3</sub> )	6	N/A	2018/08/29 BBY WI-00033	Auto Calc
EPH in Water when PAH required	9	2018/08/23	2018/08/23 BBY8SOP-00029	BCMOE BCLM Mar 2017
Elements by CRC ICPMS (dissolved)	6	N/A	2018/08/29 BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	6	N/A	2018/08/31 BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	6	N/A	2018/09/04 BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	6	N/A	2018/08/30 BBY6SOP-00010	SM 23 4500-NO <sub>3</sub> - I m
Nitrite (N) by CFA	6	N/A	2018/08/30 BBY6SOP-00010	SM 22 4500-NO <sub>3</sub> - I m
Nitrogen - Nitrate (as N)	6	N/A	2018/08/31 BBY WI-00033	Auto Calc
PAH in Water by GC/MS (SIM)	9	2018/08/23	2018/08/23 BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (2)	9	N/A	2018/08/24 BBY WI-00033	Auto Calc
Orthophosphate by Konelab	6	N/A	2018/08/30 BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	6	N/A	2018/08/30 BBY6SOP-00017	SM 22 4500-SO42- E m
EPH less PAH in Water by GC/FID (3)	9	N/A	2018/08/24 BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	6	N/A	2018/08/31 BBY WI-00033	Auto Calc
Total Phosphorus	6	2018/08/30	2018/08/30 BBY6SOP-00013	SM 22 4500-P E m
Volatile HC-BTEX (4)	4	N/A	2018/08/31 BBY WI-00033	Auto Calc
Volatile HC-BTEX (4)	1	N/A	2018/09/01 BBY WI-00033	Auto Calc

**Remarks:**

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 7962

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/09/04**  
Report #: R2613580  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B870078**

**Received: 2018/08/17, 16:35**

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) DOC present in the sample should be considered as non-purgeable DOC.

(2) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(3) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

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Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF GROUND WATER**

Maxxam ID		UC6883		UC6884		UC6885		
Sampling Date		2018/08/16 16:30		2018/08/16 17:10		2018/08/16 19:00		
COC Number		7962		7962		7962		
	UNITS	MW16-13-RW	QC Batch	MW17-16	QC Batch	MW18-56	RDL	QC Batch
<b>ANIONS</b>								
Nitrite (N)	mg/L	<0.0050	9124596	<0.0050	9124596	<0.0050	0.0050	9124596
<b>Calculated Parameters</b>								
Nitrate (N)	mg/L	<0.020	9120246	<0.020	9120246	<0.020	0.020	9120246
<b>Misc. Inorganics</b>								
Fluoride (F)	mg/L	0.250	9123854	0.250	9125731	0.290	0.020	9123854
Dissolved Organic Carbon (C)	mg/L	1.82	9128765	2.66	9128765	1.96	0.50	9128765
<b>Anions</b>								
Dissolved Sulphate (SO4)	mg/L	480 (1)	9124731	556 (1)	9124731	814 (1)	10	9124731
Dissolved Chloride (Cl)	mg/L	5.1	9124729	5.9	9124729	2.2	1.0	9124729
<b>Nutrients</b>								
Orthophosphate (P)	mg/L	<0.0050	9124778	<0.0050	9124778	0.0134	0.0050	9124778
Total Ammonia (N)	mg/L	<0.020	9128684	<0.020	9128684	0.25	0.020	9128684
Nitrate plus Nitrite (N)	mg/L	<0.020	9124591	<0.020	9124591	<0.020	0.020	9124591
Total Phosphorus (P)	mg/L	0.0483	9124816	0.0443	9124816	0.0359	0.0050	9124816
RDL = Reportable Detection Limit								
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.								

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF GROUND WATER**

Maxxam ID		UC6885			UC6886		UC6889		
Sampling Date		2018/08/16 19:00			2018/08/17 10:30		2018/08/17 14:50		
COC Number		7962			7962		7962		
	UNITS	MW18-56 Lab-Dup	RDL	QC Batch	MW16-11	QC Batch	MW18-39	RDL	QC Batch
<b>ANIONS</b>									
Nitrite (N)	mg/L	<0.0050	0.0050	9124596	<0.0050	9124596	<0.0050	0.0050	9124596
<b>Calculated Parameters</b>									
Nitrate (N)	mg/L				<0.020	9120246	<0.020	0.020	9120246
<b>Misc. Inorganics</b>									
Fluoride (F)	mg/L				0.260	9123854	0.280	0.020	9125731
Dissolved Organic Carbon (C)	mg/L				2.54	9128765	1.99	0.50	9128765
<b>Anions</b>									
Dissolved Sulphate (SO4)	mg/L				579 (1)	9124731	552 (1)	10	9124731
Dissolved Chloride (Cl)	mg/L				6.8	9124729	5.7	1.0	9124729
<b>Nutrients</b>									
Orthophosphate (P)	mg/L				<0.0050	9124778	<0.0050	0.0050	9124778
Total Ammonia (N)	mg/L				0.022	9128684	<0.020	0.020	9128684
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	9124591	<0.020	9124591	<0.020	0.020	9124591
Total Phosphorus (P)	mg/L				0.0247	9124816	0.0674	0.0050	9124816
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.									



Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**RESULTS OF CHEMICAL ANALYSES OF GROUND WATER**

<b>Maxxam ID</b>		UC6890		
<b>Sampling Date</b>		2018/08/17 15:05		
<b>COC Number</b>		7962		
	<b>UNITS</b>	<b>MW18-39A</b>	<b>RDL</b>	<b>QC Batch</b>
<b>ANIONS</b>				
Nitrite (N)	mg/L	<0.0050	0.0050	9124600
<b>Calculated Parameters</b>				
Nitrate (N)	mg/L	<0.020	0.020	9120246
<b>Misc. Inorganics</b>				
Fluoride (F)	mg/L	0.270	0.020	9123854
Dissolved Organic Carbon (C)	mg/L	2.87	0.50	9128765
<b>Anions</b>				
Dissolved Sulphate (SO4)	mg/L	548 (1)	10	9124731
Dissolved Chloride (Cl)	mg/L	5.8	1.0	9124729
<b>Nutrients</b>				
Orthophosphate (P)	mg/L	<0.0050	0.0050	9124778
Total Ammonia (N)	mg/L	<0.020	0.020	9128684
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	9124598
Total Phosphorus (P)	mg/L	0.0681	0.0050	9124816
RDL = Reportable Detection Limit				
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.				

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**CSR BTEX/VPH IN WATER (GROUND WATER)**

Maxxam ID		UC6883	UC6884	UC6885	UC6886	UC6890		
Sampling Date		2018/08/16 16:30	2018/08/16 17:10	2018/08/16 19:00	2018/08/17 10:30	2018/08/17 15:05		
COC Number		7962	7962	7962	7962	7962		
	<b>UNITS</b>	<b>MW16-13-RW</b>	<b>MW17-16</b>	<b>MW18-56</b>	<b>MW16-11</b>	<b>MW18-39A</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
VPH (VH6 to 10 - BTEX)	ug/L	<300	<300	<300	<300	<300	300	9124041
<b>Volatiles</b>								
Methyl-tert-butylether (MTBE)	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	9124534
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	9124534
Toluene	ug/L	<0.40	<0.40	0.43	<0.40	<0.40	0.40	9124534
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	9124534
m & p-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	0.89	0.40	9124534
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	9124534
Styrene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	9124534
Xylenes (Total)	ug/L	<0.40	<0.40	<0.40	<0.40	0.89	0.40	9124534
VH C6-C10	ug/L	<300	<300	<300	<300	<300	300	9124534
<b>Surrogate Recovery (%)</b>								
1,4-Difluorobenzene (sur.)	%	102	101	102	100	101		9124534
4-Bromofluorobenzene (sur.)	%	103	103	103	102	102		9124534
D4-1,2-Dichloroethane (sur.)	%	121	115	117	114	114		9124534
RDL = Reportable Detection Limit								

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6883		UC6884			UC6884		
Sampling Date		2018/08/16 16:30		2018/08/16 17:10			2018/08/16 17:10		
COC Number		7962		7962			7962		
	UNITS	MW16-13-RW	RDL	MW17-16	RDL	QC Batch	MW17-16 Lab-Dup	RDL	QC Batch
<b>Calculated Parameters</b>									
Low Molecular Weight PAH's	ug/L	14	0.11	7.9	0.10	9109381			
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	9109381			
Total PAH	ug/L	14	0.11	7.9	0.10	9109381			
<b>Polycyclic Aromatics</b>									
Quinoline	ug/L	<0.11 (1)	0.11	<0.065 (1)	0.065	9114325	<0.086	0.086	9114325
Naphthalene	ug/L	0.86 (2)	0.10	0.65 (2)	0.10	9114325	0.61	0.10	9114325
1-Methylnaphthalene	ug/L	7.2	0.050	4.7	0.050	9114325	4.4	0.050	9114325
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	9114325	<0.10	0.10	9114325
Acenaphthylene	ug/L	0.055 (2)	0.050	<0.050	0.050	9114325	<0.050	0.050	9114325
Acenaphthene	ug/L	0.92 (2)	0.050	0.42 (2)	0.050	9114325	0.37	0.050	9114325
Fluorene	ug/L	3.3	0.050	1.5	0.050	9114325	1.4	0.050	9114325
Phenanthrene	ug/L	1.2	0.050	0.61	0.050	9114325	0.59	0.050	9114325
Anthracene	ug/L	0.029 (2)	0.010	0.018 (2)	0.010	9114325	0.018	0.010	9114325
Acridine	ug/L	<0.050	0.050	<0.050	0.050	9114325	<0.050	0.050	9114325
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	9114325	<0.020	0.020	9114325
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	9114325	<0.020	0.020	9114325
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	9114325	<0.010	0.010	9114325
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	9114325	<0.020	0.020	9114325
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	9114325	<0.030	0.030	9114325
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	9114325	<0.050	0.050	9114325
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	9114325	<0.0050	0.0050	9114325
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	9114325	<0.050	0.050	9114325
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	9114325	<0.0030	0.0030	9114325
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	9114325	<0.050	0.050	9114325
<b>Calculated Parameters</b>									
LEPH (C10-C19 less PAH)	mg/L	0.96	0.20	0.54	0.20	9109382			
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	9109382			
<b>Ext. Pet. Hydrocarbon</b>									
EPH (C10-C19)	mg/L	0.97	0.20	0.54	0.20	9114335	0.53	0.20	9114335
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate (1) Detection limits raised due to matrix interference. (2) Tentatively identified result and may be potentially biased high due to matrix interference.									

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6883		UC6884			UC6884		
Sampling Date		2018/08/16 16:30		2018/08/16 17:10			2018/08/16 17:10		
COC Number		7962		7962			7962		
	UNITS	MW16-13-RW	RDL	MW17-16	RDL	QC Batch	MW17-16 Lab-Dup	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	9114335	<0.20	0.20	9114335
<b>Surrogate Recovery (%)</b>									
O-TERPHENYL (sur.)	%	88		102		9114335	90		9114335
D10-ANTHRACENE (sur.)	%	81		91		9114325	84		9114325
D8-ACENAPHTHYLENE (sur.)	%	88		93		9114325	91		9114325
D8-NAPHTHALENE (sur.)	%	74		77		9114325	75		9114325
TERPHENYL-D14 (sur.)	%	72		88		9114325	75		9114325
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6885		UC6886		UC6887		UC6888		
Sampling Date		2018/08/16 19:00		2018/08/17 10:30		2018/08/17 12:05		2018/08/17 15:40		
COC Number		7962		7962		7962		7962		
	<b>UNITS</b>	<b>MW18-56</b>	<b>RDL</b>	<b>MW16-11</b>	<b>RDL</b>	<b>MW17-20</b>	<b>RDL</b>	<b>MW18-35</b>	<b>RDL</b>	<b>QC Batch</b>

Calculated Parameters										
Low Molecular Weight PAH's	ug/L	<0.10	0.10	2.3	0.10	8.0	0.10	0.29	0.10	9109381
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9109381
Total PAH	ug/L	<0.10	0.10	2.3	0.10	8.0	0.10	0.29	0.10	9109381

Polycyclic Aromatics										
Quinoline	ug/L	<0.020	0.020	<0.062 (1)	0.062	<0.041 (1)	0.041	<0.079 (1)	0.079	9114325
Naphthalene	ug/L	<0.10	0.10	0.32 (2)	0.10	0.76	0.10	<0.10	0.10	9114325
1-Methylnaphthalene	ug/L	<0.050	0.050	1.3	0.050	4.3	0.050	<0.050	0.050	9114325
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	2.0	0.10	<0.10	0.10	9114325
Acenaphthylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Acenaphthene	ug/L	<0.050	0.050	0.090 (2)	0.050	0.21	0.050	<0.050	0.050	9114325
Fluorene	ug/L	<0.050	0.050	0.41	0.050	0.59	0.050	0.11 (2)	0.050	9114325
Phenanthrene	ug/L	<0.050	0.050	0.22	0.050	0.18	0.050	0.19	0.050	9114325
Anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	9114325
Acridine	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	9114325
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	<0.030	0.030	<0.030	0.030	9114325
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	9114325
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	9114325
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325

Calculated Parameters										
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	0.23	0.20	1.8	0.20	<0.20	0.20	9109382
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	0.30	0.20	<0.20	0.20	9109382

Ext. Pet. Hydrocarbon										
EPH (C10-C19)	mg/L	<0.20	0.20	0.23	0.20	1.9	0.20	<0.20	0.20	9114335
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	0.30	0.20	<0.20	0.20	9114335

RDL = Reportable Detection Limit

(1) Detection limits raised due to matrix interference.

(2) Tentatively identified result and may be potentially biased high due to matrix interference.

Maxxam Job #: B870078  
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STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6885		UC6886		UC6887		UC6888		
Sampling Date		2018/08/16 19:00		2018/08/17 10:30		2018/08/17 12:05		2018/08/17 15:40		
COC Number		7962		7962		7962		7962		
	<b>UNITS</b>	<b>MW18-56</b>	<b>RDL</b>	<b>MW16-11</b>	<b>RDL</b>	<b>MW17-20</b>	<b>RDL</b>	<b>MW18-35</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Surrogate Recovery (%)</b>										
O-TERPHENYL (sur.)	%	98		85		89		99		9114335
D10-ANTHRACENE (sur.)	%	84		81		88		84		9114325
D8-ACENAPHTHYLENE (sur.)	%	83		92		94		88		9114325
D8-NAPHTHALENE (sur.)	%	83		85		83		74		9114325
TERPHENYL-D14 (sur.)	%	81		70		75		77		9114325
RDL = Reportable Detection Limit										

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6889		UC6890		UC6891		
Sampling Date		2018/08/17 14:50		2018/08/17 15:05		2018/08/17 10:05		
COC Number		7962		7962		7962		
	<b>UNITS</b>	<b>MW18-39</b>	<b>RDL</b>	<b>MW18-39A</b>	<b>RDL</b>	<b>MW17-19</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	ug/L	8.1	0.10	7.9	0.10	<0.10	0.10	9109381
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9109381
Total PAH	ug/L	8.1	0.10	7.9	0.10	<0.10	0.10	9109381
<b>Polycyclic Aromatics</b>								
Quinoline	ug/L	<0.087 (1)	0.087	<0.041 (1)	0.041	<0.020	0.020	9114325
Naphthalene	ug/L	0.45 (2)	0.10	0.44 (2)	0.10	<0.10	0.10	9114325
1-Methylnaphthalene	ug/L	6.1	0.050	5.9	0.050	<0.050	0.050	9114325
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9114325
Acenaphthylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Acenaphthene	ug/L	0.35 (2)	0.050	0.34 (2)	0.050	<0.050	0.050	9114325
Fluorene	ug/L	1.0	0.050	0.99	0.050	<0.050	0.050	9114325
Phenanthrene	ug/L	0.25	0.050	0.24	0.050	<0.050	0.050	9114325
Anthracene	ug/L	0.014 (2)	0.010	0.013 (2)	0.010	<0.010	0.010	9114325
Acridine	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	9114325
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9114325
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	<0.030	0.030	9114325
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	9114325
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	9114325
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114325
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/L	0.53	0.20	0.54	0.20	<0.20	0.20	9109382
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9109382
<b>Ext. Pet. Hydrocarbon</b>								
EPH (C10-C19)	mg/L	0.53	0.20	0.54	0.20	<0.20	0.20	9114335
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9114335
RDL = Reportable Detection Limit								
(1) Detection limits raised due to matrix interference.								
(2) Tentatively identified result and may be potentially biased high due to matrix interference.								

Maxxam Job #: B870078  
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STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)**

Maxxam ID		UC6889		UC6890		UC6891		
Sampling Date		2018/08/17 14:50		2018/08/17 15:05		2018/08/17 10:05		
COC Number		7962		7962		7962		
	UNITS	MW18-39	RDL	MW18-39A	RDL	MW17-19	RDL	QC Batch
<b>Surrogate Recovery (%)</b>								
O-TERPHENYL (sur.)	%	88		80		103		9114335
D10-ANTHRACENE (sur.)	%	86		79		86		9114325
D8-ACENAPHTHYLENE (sur.)	%	95		91		88		9114325
D8-NAPHTHALENE (sur.)	%	84		83		80		9114325
TERPHENYL-D14 (sur.)	%	71		63		84		9114325
RDL = Reportable Detection Limit								



Maxxam Job #: B870078  
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Client Project #: 123221161  
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Sampler Initials: MV

**CSR DISSOLVED METALS (NO CV-HG) IN WATER**

<b>Maxxam ID</b>		UC6883	UC6884		UC6885		UC6886	UC6889	UC6890		
<b>Sampling Date</b>		2018/08/16 16:30	2018/08/16 17:10		2018/08/16 19:00		2018/08/17 10:30	2018/08/17 14:50	2018/08/17 15:05		
<b>COC Number</b>		7962	7962		7962		7962	7962	7962		
	<b>UNITS</b>	<b>MW16-13-RW</b>	<b>MW17-16</b>	<b>RDL</b>	<b>MW18-56</b>	<b>RDL</b>	<b>MW16-11</b>	<b>MW18-39</b>	<b>MW18-39A</b>	<b>RDL</b>	<b>QC Batch</b>

**Calculated Parameters**

Dissolved Hardness (CaCO3)	mg/L	695	784	0.50	804	0.50	828	763	762	0.50	9119988
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**Dissolved Metals by ICPMS**

Dissolved Arsenic (As)	ug/L	4.76	9.72	0.10	1.48	0.20	11.8	15.7	15.9	0.10	9121570
Dissolved Iron (Fe)	ug/L	2690	3970	5.0	<10	10	1570	1580	1580	5.0	9121570
Dissolved Manganese (Mn)	ug/L	385	263	1.0	180	2.0	90.2	173	170	1.0	9121570
Dissolved Magnesium (Mg)	ug/L	93000	103000	50	99600	100	110000	101000	101000	50	9121570

RDL = Reportable Detection Limit

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**TOTAL TKN IN WATER (GROUND WATER)**

Maxxam ID		UC6883	UC6884	UC6885	UC6886	UC6889	UC6890		
Sampling Date		2018/08/16 16:30	2018/08/16 17:10	2018/08/16 19:00	2018/08/17 10:30	2018/08/17 14:50	2018/08/17 15:05		
COC Number		7962	7962	7962	7962	7962	7962		
	<b>UNITS</b>	<b>MW16-13-RW</b>	<b>MW17-16</b>	<b>MW18-56</b>	<b>MW16-11</b>	<b>MW18-39</b>	<b>MW18-39A</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>									
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.137	0.151	0.228	0.107	0.149	0.127	0.020	9120647
<b>Nutrients</b>									
Total Nitrogen (N)	mg/L	0.137	0.151	0.228	0.107	0.149	0.127	0.020	9123910
RDL = Reportable Detection Limit									

Maxxam Job #: B870078  
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STANTEC CONSULTING LTD.  
Client Project #: 123221161  
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Sampler Initials: MV

### GENERAL COMMENTS

Version 3: Report reissued to include results for BTEX/VPH on select samples as per request from Matthew Deane on 2018/08/30

Sample UC6883 [MW16-13-RW] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS. Sample was analyzed past method specified hold time for BTEX/MTBE LH, VH, F1 SIM/MS.

Sample UC6884 [MW17-16] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample UC6885 [MW18-56] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample UC6886 [MW16-11] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample UC6889 [MW18-39] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

Sample UC6890 [MW18-39A] : Sample was analyzed past method specified hold time for Nitrate + Nitrite (N). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised. Sample was analyzed past method specified hold time for Nitrite (N) by CFA. Sample was analyzed past method specified hold time for Orthophosphate by Konelab. Sample was analyzed past method specified hold time for Orthophosphate by Konelab.

#### CSR DISSOLVED METALS (NO CV-HG) IN WATER Comments

Sample UC6885 [MW18-56] Elements by CRC ICPMS (dissolved): RDL raised due to concentration over linear range, sample dilution required.

**Results relate only to the items tested.**

Maxxam Job #: B870078  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9114325	D10-ANTHRACENE (sur.)	2018/08/23	83	50 - 140	102	50 - 140	86	%		
9114325	D8-ACENAPHTHYLENE (sur.)	2018/08/23	89	50 - 140	100	50 - 140	84	%		
9114325	D8-NAPHTHALENE (sur.)	2018/08/23	76	50 - 140	91	50 - 140	73	%		
9114325	TERPHENYL-D14 (sur.)	2018/08/23	76	50 - 140	105	50 - 140	83	%		
9114335	O-TERPHENYL (sur.)	2018/08/23	103	60 - 140	102	60 - 140	98	%		
9124534	1,4-Difluorobenzene (sur.)	2018/08/30	98	70 - 130	102	70 - 130	107	%		
9124534	4-Bromofluorobenzene (sur.)	2018/08/30	102	70 - 130	101	70 - 130	101	%		
9124534	D4-1,2-Dichloroethane (sur.)	2018/08/30	109	70 - 130	108	70 - 130	114	%		
9114325	1-Methylnaphthalene	2018/08/23	NC	50 - 140	91	50 - 140	<0.050	ug/L	7.0	40
9114325	2-Methylnaphthalene	2018/08/23	75	50 - 140	83	50 - 140	<0.10	ug/L	NC	40
9114325	Acenaphthene	2018/08/23	74	50 - 140	90	50 - 140	<0.050	ug/L	11	40
9114325	Acenaphthylene	2018/08/23	87	50 - 140	89	50 - 140	<0.050	ug/L	NC	40
9114325	Acridine	2018/08/23	88	50 - 140	87	50 - 140	<0.050	ug/L	NC	40
9114325	Anthracene	2018/08/23	76	50 - 140	90	50 - 140	<0.010	ug/L	1.7	40
9114325	Benzo(a)anthracene	2018/08/23	69	50 - 140	86	50 - 140	<0.010	ug/L	NC	40
9114325	Benzo(a)pyrene	2018/08/23	69	50 - 140	92	50 - 140	<0.0050	ug/L	NC	40
9114325	Benzo(b&j)fluoranthene	2018/08/23	70	50 - 140	92	50 - 140	<0.030	ug/L	NC	40
9114325	Benzo(g,h,i)perylene	2018/08/23	70	50 - 140	99	50 - 140	<0.050	ug/L	NC	40
9114325	Benzo(k)fluoranthene	2018/08/23	76	50 - 140	102	50 - 140	<0.050	ug/L	NC	40
9114325	Chrysene	2018/08/23	72	50 - 140	88	50 - 140	<0.020	ug/L	NC	40
9114325	Dibenz(a,h)anthracene	2018/08/23	69	50 - 140	100	50 - 140	<0.0030	ug/L	NC	40
9114325	Fluoranthene	2018/08/23	79	50 - 140	96	50 - 140	<0.020	ug/L	NC	40
9114325	Fluorene	2018/08/23	77	50 - 140	86	50 - 140	<0.050	ug/L	6.4	40
9114325	Indeno(1,2,3-cd)pyrene	2018/08/23	71	50 - 140	101	50 - 140	<0.050	ug/L	NC	40
9114325	Naphthalene	2018/08/23	66	50 - 140	80	50 - 140	<0.10	ug/L	6.5	40
9114325	Phenanthrene	2018/08/23	76	50 - 140	91	50 - 140	<0.050	ug/L	4.2	40
9114325	Pyrene	2018/08/23	80	50 - 140	98	50 - 140	<0.020	ug/L	NC	40
9114325	Quinoline	2018/08/23	113	50 - 140	100	50 - 140	<0.020	ug/L	NC	40
9114335	EPH (C10-C19)	2018/08/23	94	60 - 140	88	70 - 130	<0.20	mg/L	1.9	30
9114335	EPH (C19-C32)	2018/08/23	85	60 - 140	85	70 - 130	<0.20	mg/L	NC	30

Maxxam Job #: B870078  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9121570	Dissolved Arsenic (As)	2018/08/29	104	80 - 120	104	80 - 120	<0.10	ug/L	0.55	20
9121570	Dissolved Iron (Fe)	2018/08/29	97	80 - 120	93	80 - 120	<5.0	ug/L	NC	20
9121570	Dissolved Magnesium (Mg)	2018/08/29	NC	80 - 120	98	80 - 120	<50	ug/L	0.21	20
9121570	Dissolved Manganese (Mn)	2018/08/29	96	80 - 120	97	80 - 120	<1.0	ug/L	1.7	20
9123854	Fluoride (F)	2018/08/30	102	80 - 120	104	80 - 120	<0.020	mg/L	3.2	20
9123910	Total Nitrogen (N)	2018/08/31	92	80 - 120	87	80 - 120	<0.020	mg/L	3.5	20
9124534	Benzene	2018/08/30	107	70 - 130	99	70 - 130	<0.40	ug/L	NC	30
9124534	Ethylbenzene	2018/08/30	118	70 - 130	110	70 - 130	<0.40	ug/L	NC	30
9124534	m & p-Xylene	2018/08/30	115	70 - 130	108	70 - 130	<0.40	ug/L	NC	30
9124534	Methyl-tert-butylether (MTBE)	2018/08/30	104	70 - 130	96	70 - 130	<4.0	ug/L	NC	30
9124534	o-Xylene	2018/08/30	115	70 - 130	109	70 - 130	<0.40	ug/L	NC	30
9124534	Styrene	2018/08/30	112	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
9124534	Toluene	2018/08/30	105	70 - 130	98	70 - 130	<0.40	ug/L	NC	30
9124534	VH C6-C10	2018/08/30			105	70 - 130	<300	ug/L	NC	30
9124534	Xylenes (Total)	2018/08/30					<0.40	ug/L	NC	30
9124591	Nitrate plus Nitrite (N)	2018/08/30	104	80 - 120	108	80 - 120	<0.020	mg/L	NC	25
9124596	Nitrite (N)	2018/08/30	97	80 - 120	103	80 - 120	<0.0050	mg/L	NC	20
9124598	Nitrate plus Nitrite (N)	2018/08/30	100	80 - 120	108	80 - 120	<0.020	mg/L	3.4	25
9124600	Nitrite (N)	2018/08/30	102	80 - 120	103	80 - 120	<0.0050	mg/L	NC	20
9124729	Dissolved Chloride (Cl)	2018/08/30	98	80 - 120	97	80 - 120	<1.0	mg/L	NC	20
9124731	Dissolved Sulphate (SO4)	2018/08/30	93	80 - 120	92	80 - 120	<1.0	mg/L	NC	20
9124778	Orthophosphate (P)	2018/08/30			104	80 - 120	<0.0050	mg/L		
9124816	Total Phosphorus (P)	2018/08/30			105	80 - 120	<0.0050	mg/L		
9125731	Fluoride (F)	2018/08/31	104	80 - 120	102	80 - 120	<0.020	mg/L	1.6	20
9128684	Total Ammonia (N)	2018/09/04	94	80 - 120	101	80 - 120	<0.020	mg/L	8.3	20

Maxxam Job #: B870078  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9128765	Dissolved Organic Carbon (C)	2018/09/04	102	80 - 120	111	80 - 120	<0.50	mg/L	1.6	20

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

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

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

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

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

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

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

Maxxam Job #: B870078  
Report Date: 2018/09/04

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



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



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Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

### Custody Tracking Form

*Aug. 17*



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
<i>Mark Verhalla</i> <small>Print</small>	<i>Mark Verhalla</i> <small>Sign</small>	Date	<i>2018/08/17</i>	<i>Pedro Tack</i> <small>Print</small>	<i>[Signature]</i> <small>Sign</small>	Date	<i>2018/08/20</i>
		Time (24 HR)	<i>16:33</i>			Time (24 HR)	<i>09:45</i>
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue   
 Micro  Food Chemistry

\*\*\* LAB USE ONLY \*\*\*

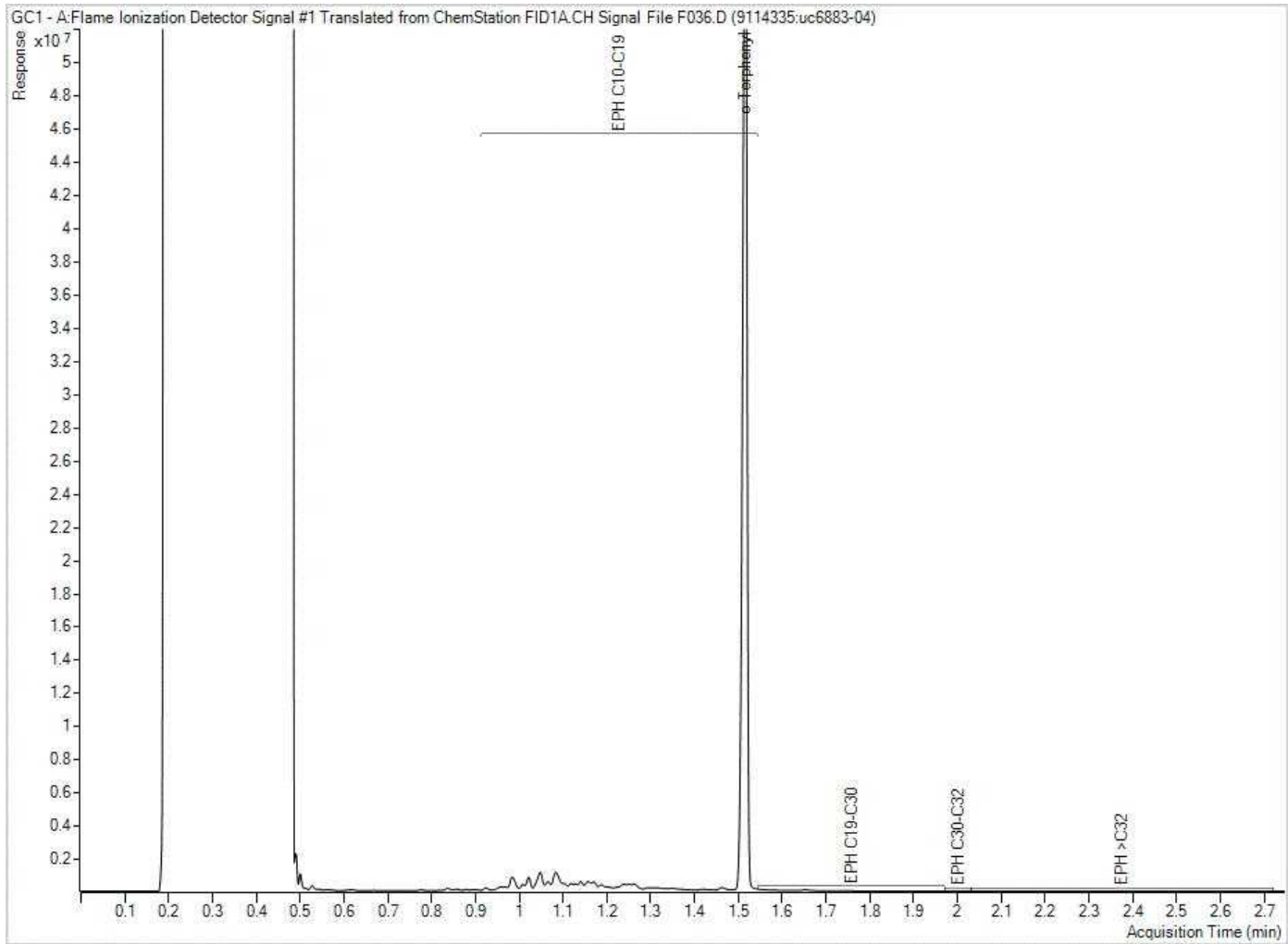
Received At: <input type="text"/>	Comments: <b>RECEIVED IN WHITEHORSE</b> <b>BY: <i>X. Murphy @ 1635</i></b> <i>2018/08/17</i> <b>TEMP: 4 5 10</b> <i>9 8 5</i>	Custody Seal		Cooling Media	Temperature °C		
Labeled By: <input type="text"/>		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By: <input type="text"/>		<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>4</i>	<i>5</i>	<i>2</i>
	<i>YES</i>	<i>YES</i>	<i>YES</i>	<i>3</i>	<i>5</i>	<i>3</i>	

*1668*



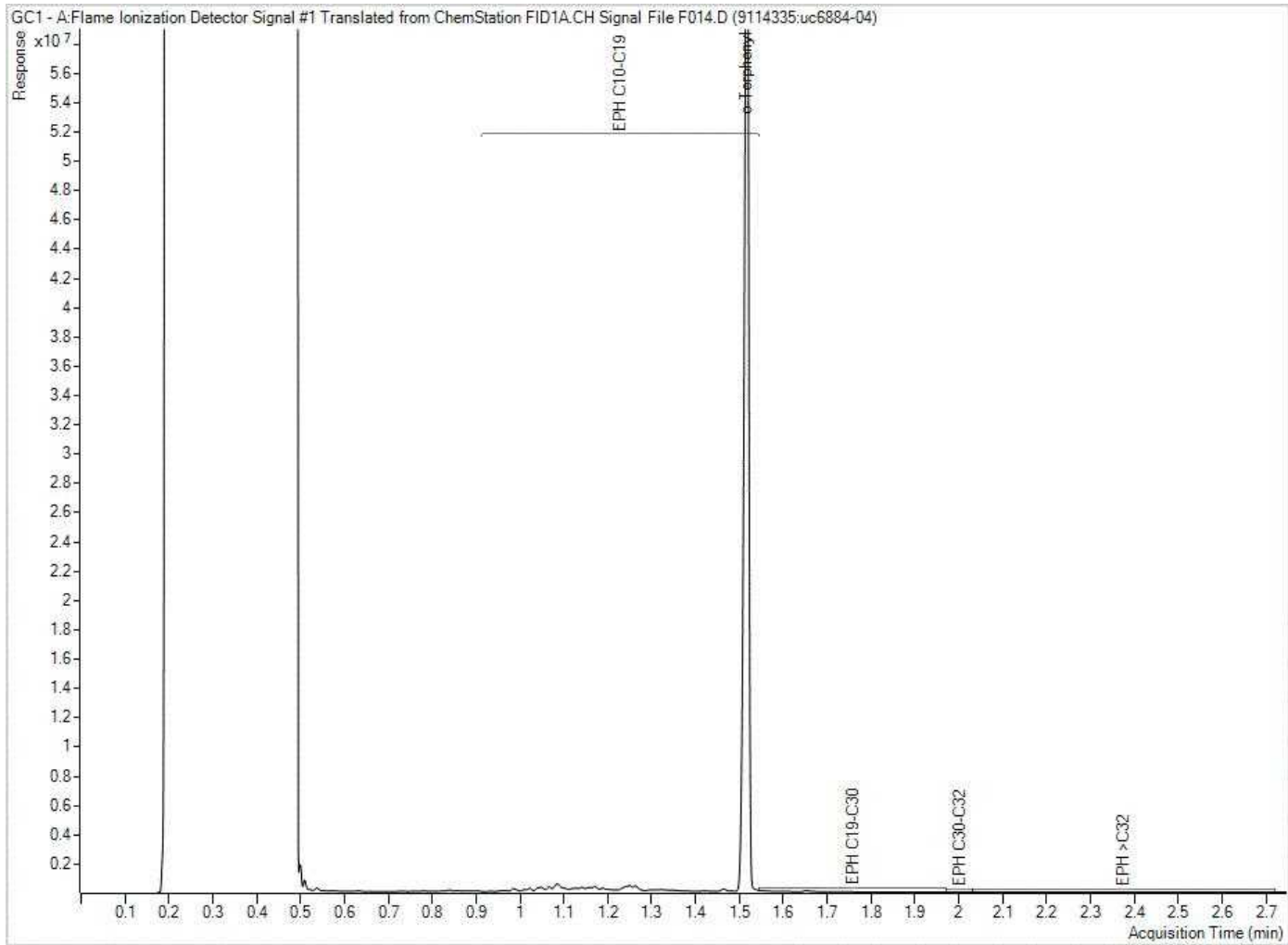


EPH in Water when PAH required Chromatogram



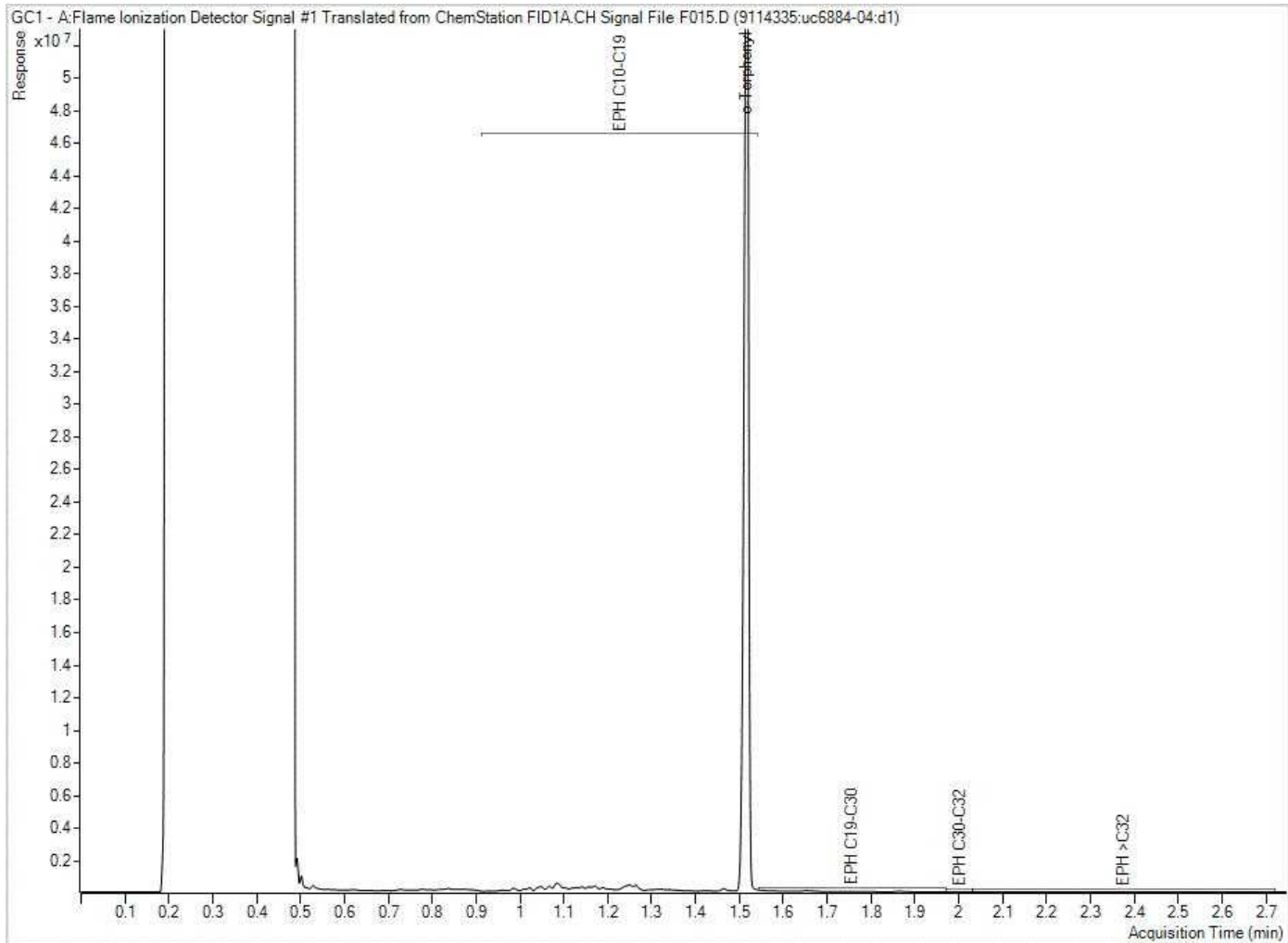
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



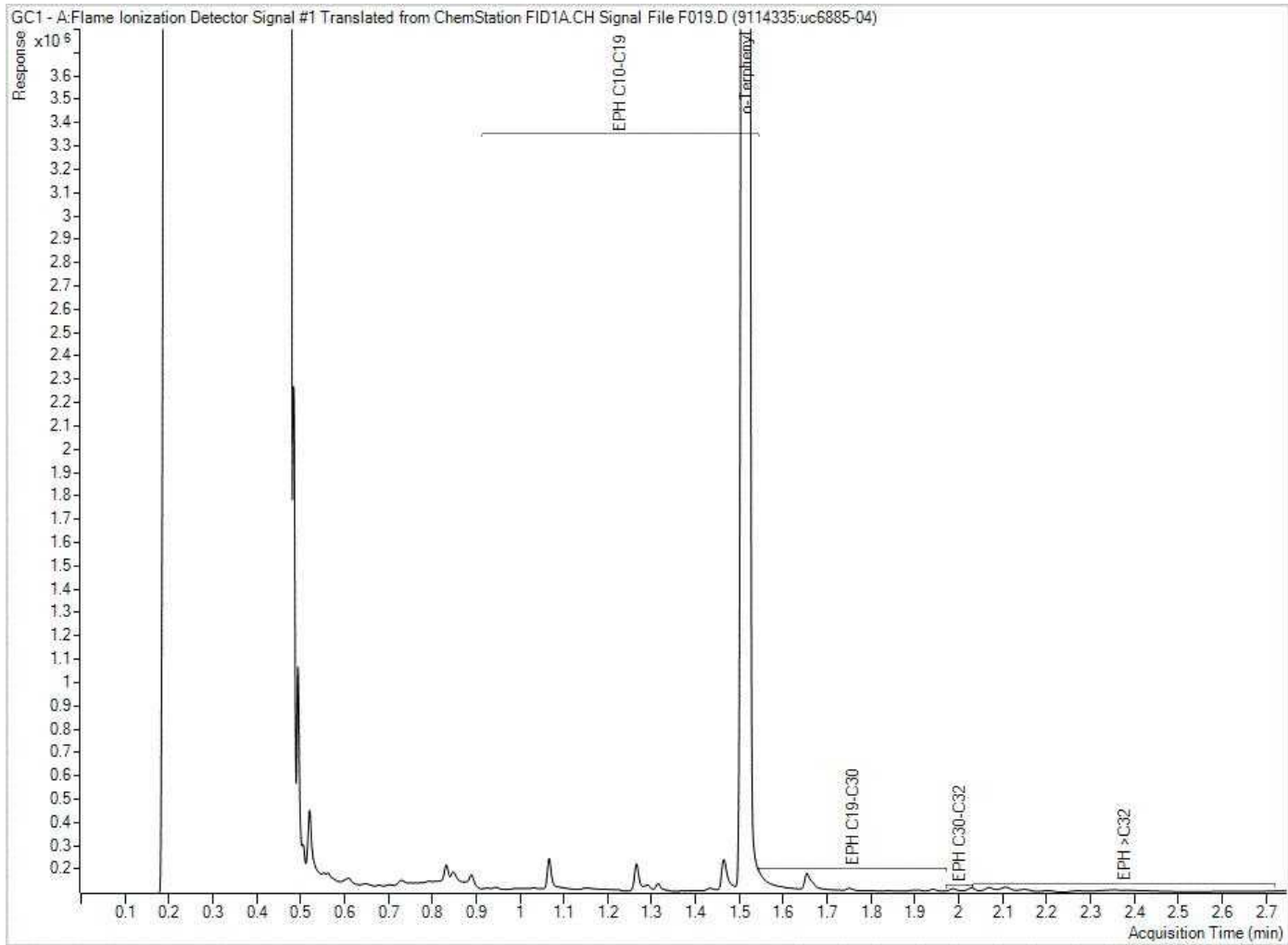
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



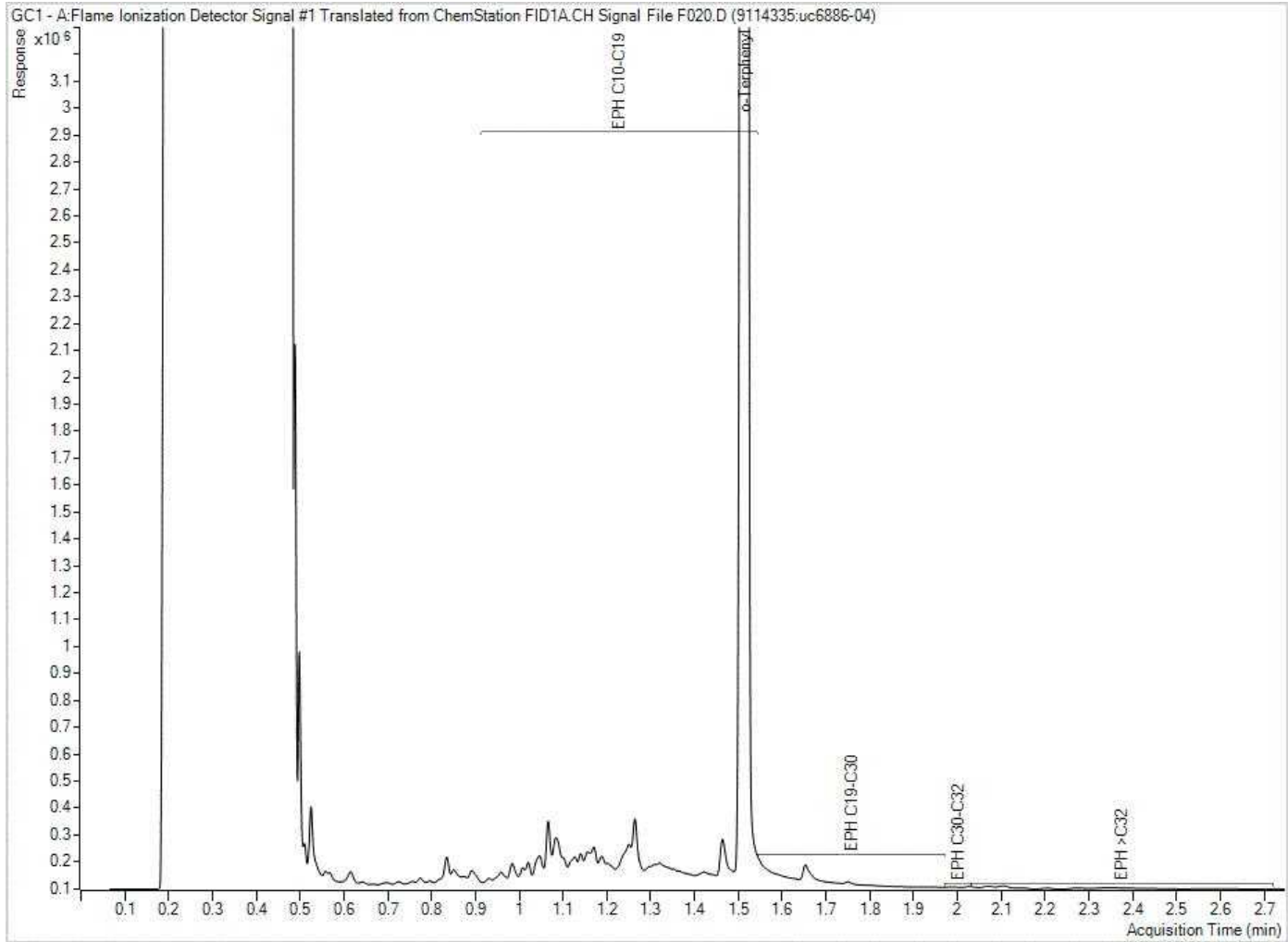
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



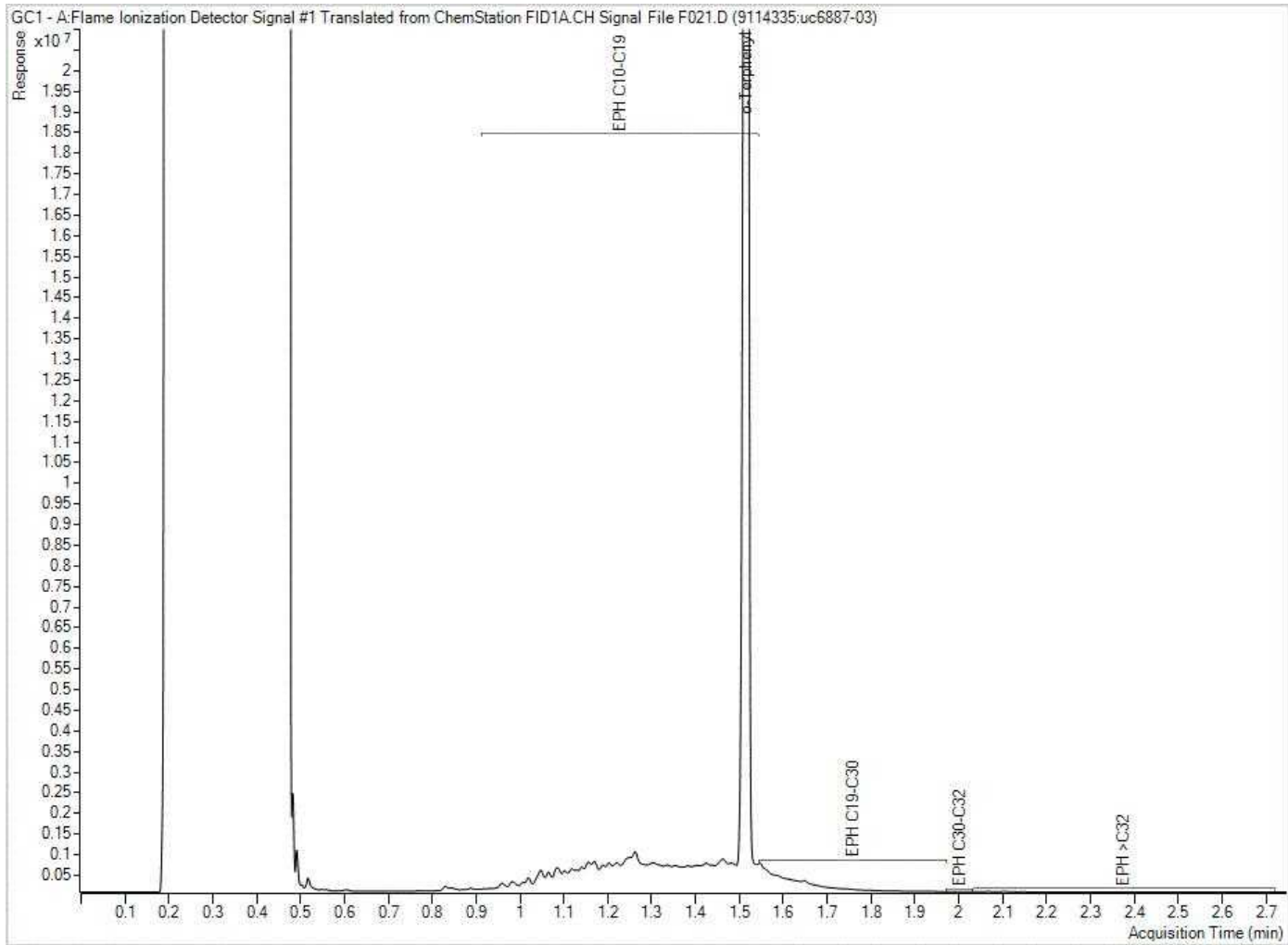
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



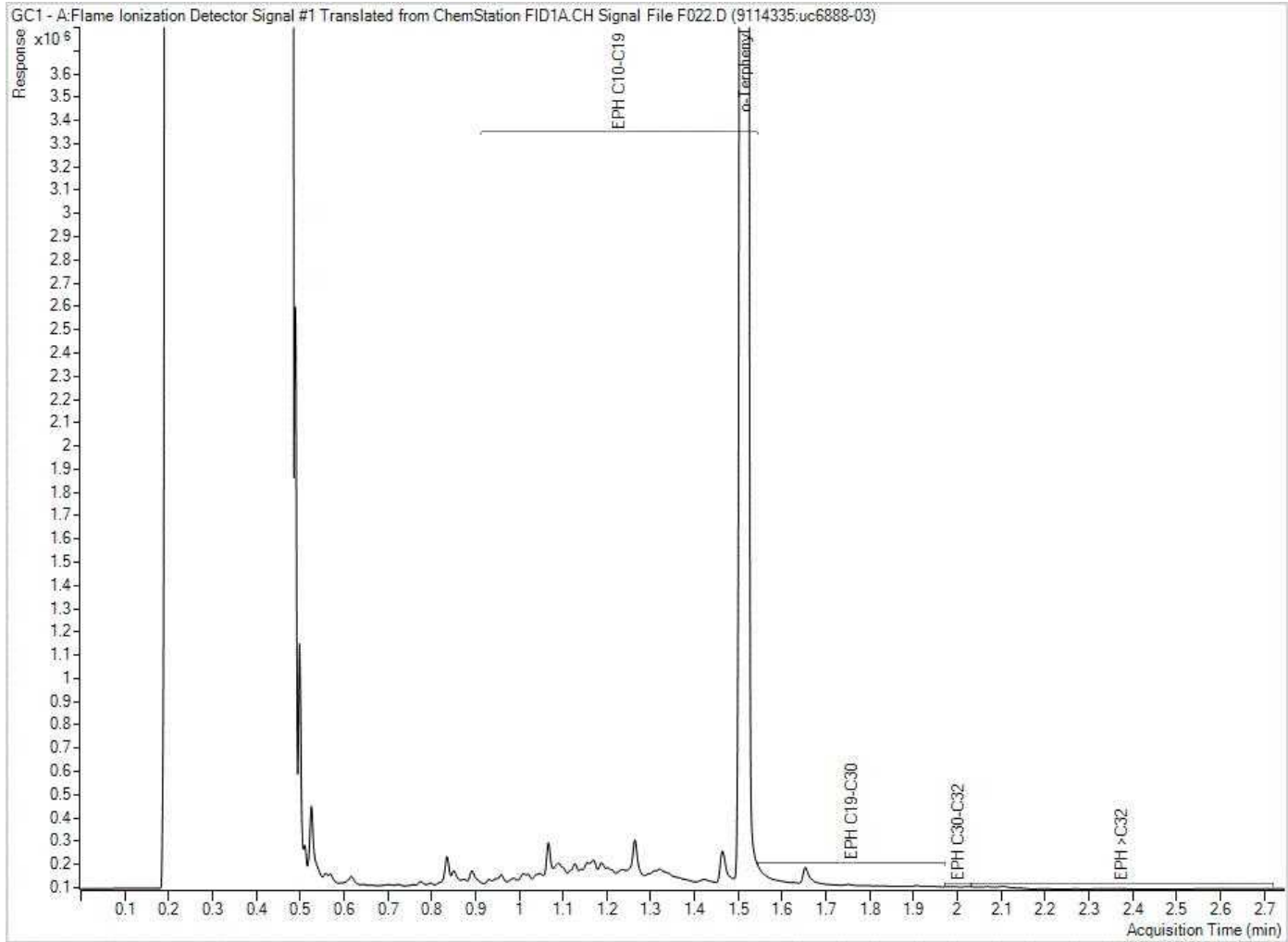
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



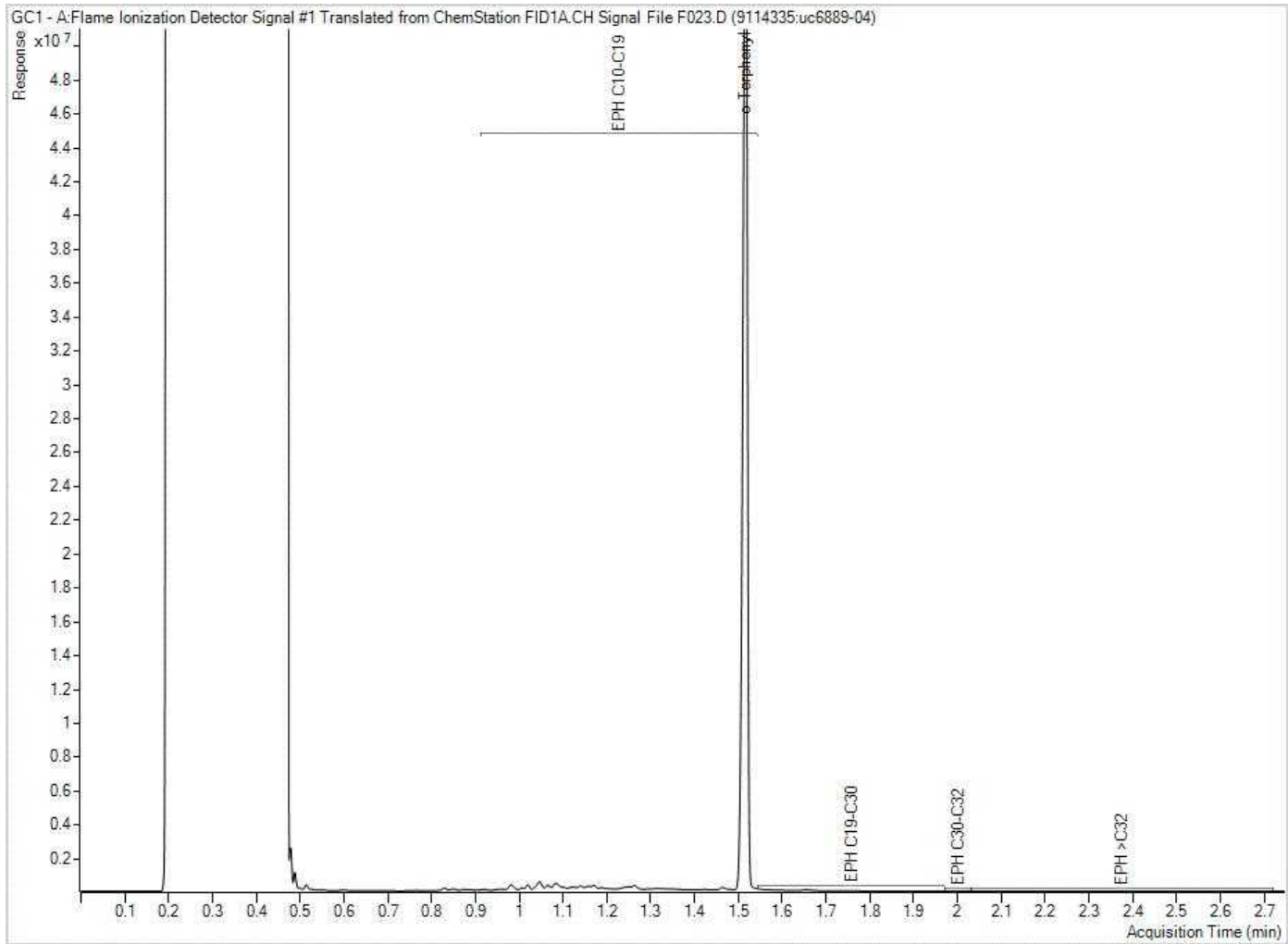
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

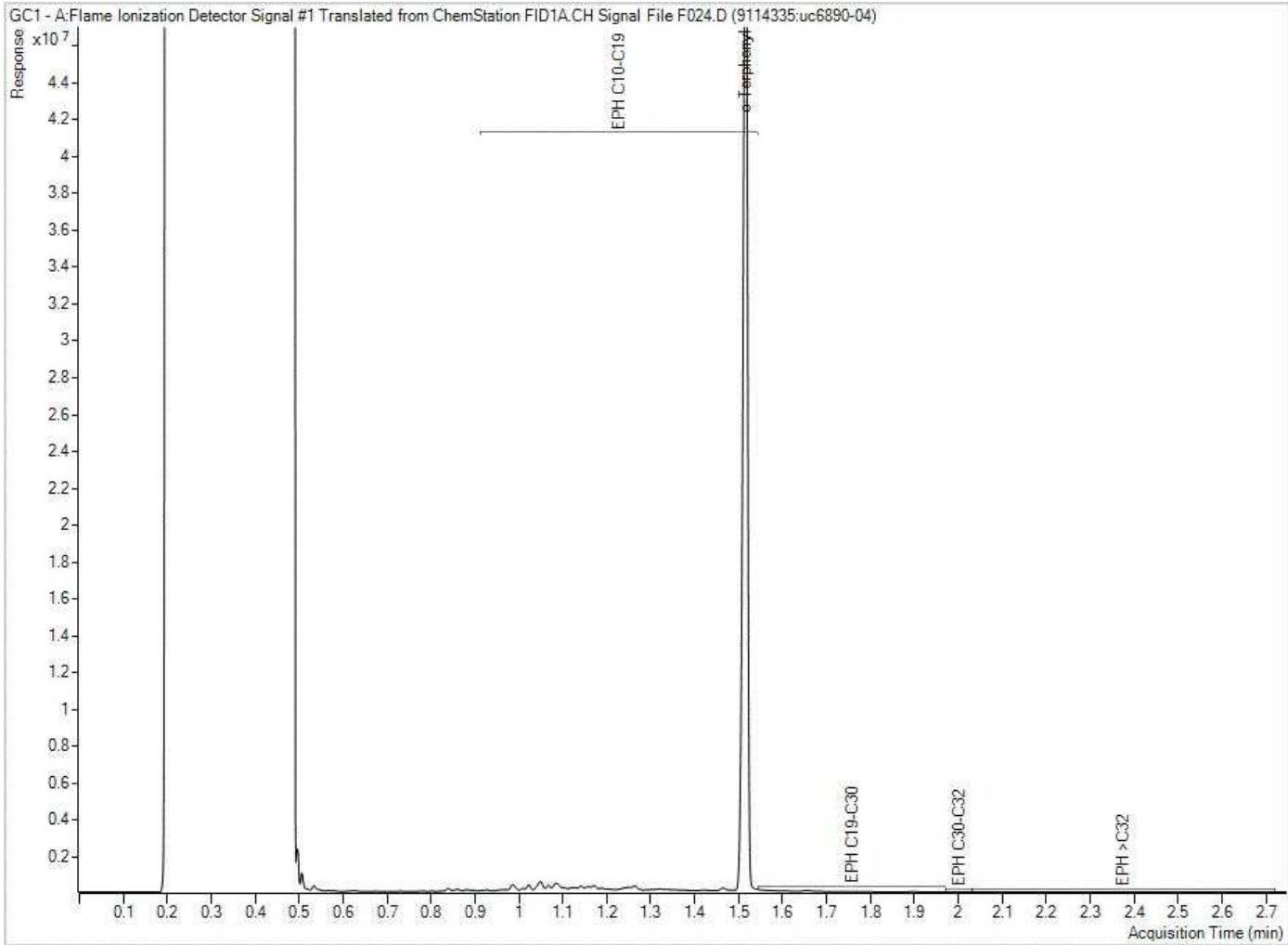
EPH in Water when PAH required Chromatogram



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

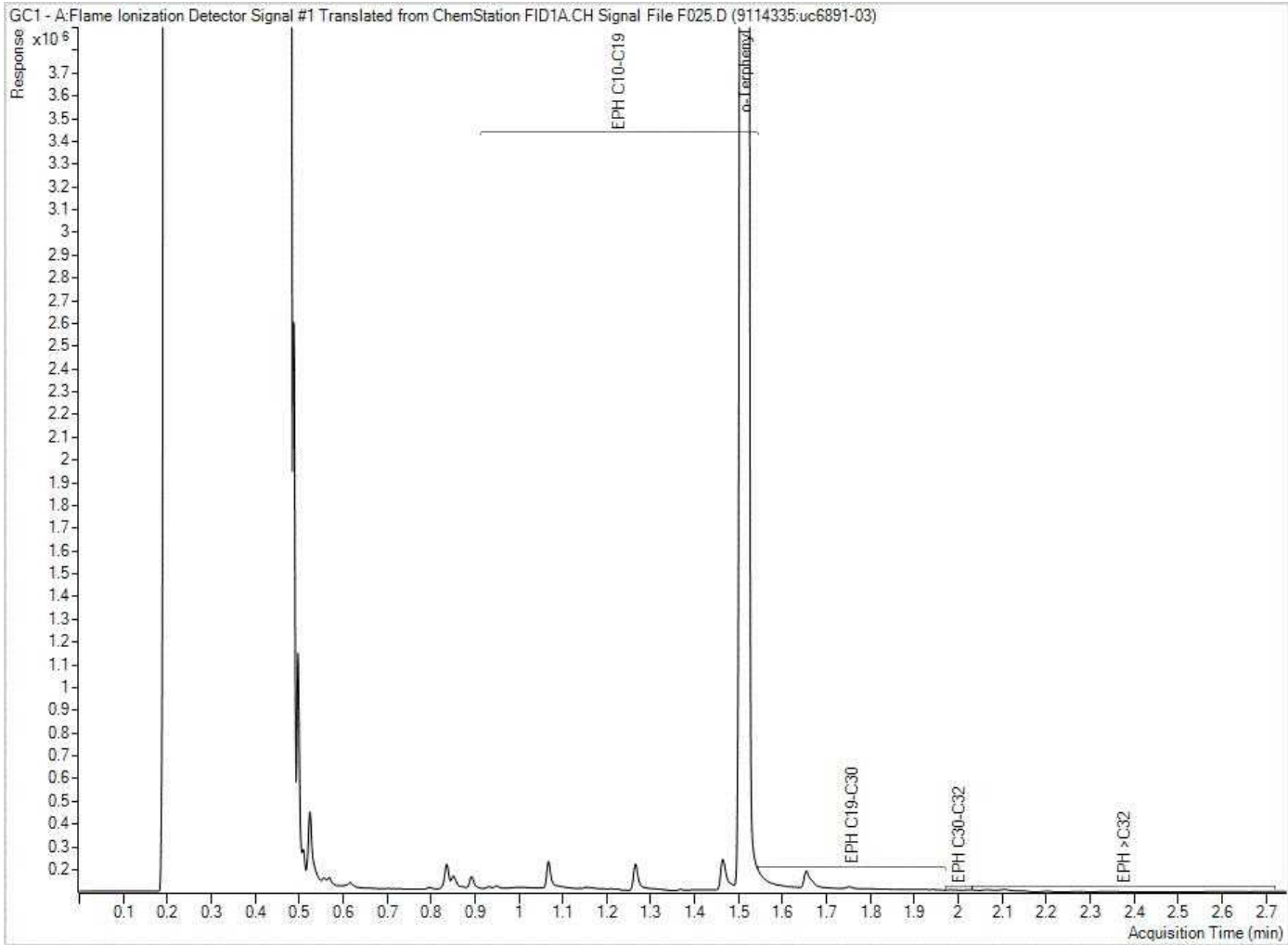


EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 8122

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/08/28**  
Report #: R2610588  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B871282**

**Received: 2018/08/21, 16:25**

Sample Matrix: Water  
# Samples Received: 6

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
EPH in Water when PAH required	6	2018/08/24	2018/08/25	BBY8SOP-00029	BCMOE BCLM Mar 2017
PAH in Water by GC/MS (SIM)	5	2018/08/24	2018/08/24	BBY8SOP-00021	BCMOE BCLM Jul2017m
PAH in Water by GC/MS (SIM)	1	2018/08/24	2018/08/25	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1)	6	N/A	2018/08/27	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (2)	6	N/A	2018/08/27	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(2) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Your P.O. #: 123221161-250.200  
Your Project #: 123221161  
Your C.O.C. #: 8122

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD.  
Whitehorse\_  
107 Main Street  
Suite 202  
Whitehorse, YT  
CANADA Y1A 2A7

**Report Date: 2018/08/28**  
Report #: R2610588  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B871282**  
**Received: 2018/08/21, 16:25**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UD3681		UD3682		UD3683			UD3683		
Sampling Date		2018/08/21 10:10		2018/08/21 11:20		2018/08/21 15:12			2018/08/21 15:12		
COC Number		8122		8122		8122			8122		
	UNITS	MW16-12	RDL	MW18-31	RDL	MW16-02	RDL	QC Batch	MW16-02 Lab-Dup	RDL	QC Batch

Calculated Parameters											
Low Molecular Weight PAH's	ug/L	<0.10	0.10	3.7	0.10	<0.10	0.10	9114428			
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114428			
Total PAH	ug/L	<0.10	0.10	3.7	0.10	<0.10	0.10	9114428			

Polycyclic Aromatics											
Quinoline	ug/L	<0.020	0.020	<0.050 (1)	0.050	<0.020	0.020	9115794	<0.020	0.020	9115794
Naphthalene	ug/L	<0.10	0.10	0.42 (2)	0.10	<0.10	0.10	9115794	<0.10	0.10	9115794
1-Methylnaphthalene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
2-Methylnaphthalene	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9115794	<0.10	0.10	9115794
Acenaphthylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Acenaphthene	ug/L	<0.050	0.050	0.66	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Fluorene	ug/L	<0.050	0.050	1.8	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Phenanthrene	ug/L	<0.050	0.050	0.73	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Anthracene	ug/L	<0.010	0.010	0.018 (2)	0.010	<0.010	0.010	9115794	<0.010	0.010	9115794
Acridine	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794	<0.020	0.020	9115794
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794	<0.020	0.020	9115794
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	9115794	<0.010	0.010	9115794
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794	<0.020	0.020	9115794
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	<0.030	0.030	9115794	<0.030	0.030	9115794
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	9115794	<0.0050	0.0050	9115794
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	9115794	<0.0030	0.0030	9115794
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794	<0.050	0.050	9115794

Calculated Parameters											
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	0.58	0.20	<0.20	0.20	9114659			
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9114659			

Ext. Pet. Hydrocarbon											
EPH (C10-C19)	mg/L	<0.20	0.20	0.58	0.20	<0.20	0.20	9115809	<0.20	0.20	9115809

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

(1) Detection limits raised due to matrix interference.

(2) Tentatively identified result and may be potentially biased high due to matrix interference.

Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UD3681		UD3682		UD3683			UD3683		
Sampling Date		2018/08/21 10:10		2018/08/21 11:20		2018/08/21 15:12			2018/08/21 15:12		
COC Number		8122		8122		8122			8122		
	UNITS	MW16-12	RDL	MW18-31	RDL	MW16-02	RDL	QC Batch	MW16-02 Lab-Dup	RDL	QC Batch
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9115809	<0.20	0.20	9115809
<b>Surrogate Recovery (%)</b>											
O-TERPHENYL (sur.)	%	95		89		87		9115809	86		9115809
D10-ANTHRACENE (sur.)	%	92		93		89		9115794	87		9115794
D8-ACENAPHTHYLENE (sur.)	%	94		98		93		9115794	88		9115794
D8-NAPHTHALENE (sur.)	%	94		93		90		9115794	81		9115794
TERPHENYL-D14 (sur.)	%	99		93		93		9115794	89		9115794
RDL = Reportable Detection Limit											
Lab-Dup = Laboratory Initiated Duplicate											

Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UD3684		UD3685		UD3686		
Sampling Date		2018/08/21 15:25		2018/08/21 11:45		2018/08/21 14:40		
COC Number		8122		8122		8122		
	UNITS	MW16-02A	RDL	MW16-09	RDL	MW16-10	RDL	QC Batch
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	ug/L	<0.10	0.10	19	0.10	<0.10	0.10	9114428
High Molecular Weight PAH's	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9114428
Total PAH	ug/L	<0.10	0.10	19	0.10	<0.10	0.10	9114428
<b>Polycyclic Aromatics</b>								
Quinoline	ug/L	<0.020	0.020	<0.040 (1)	0.040	<0.020	0.020	9115794
Naphthalene	ug/L	<0.10	0.10	3.0	0.10	<0.10	0.10	9115794
1-Methylnaphthalene	ug/L	<0.050	0.050	7.7	0.050	<0.050	0.050	9115794
2-Methylnaphthalene	ug/L	<0.10	0.10	5.9	0.10	<0.10	0.10	9115794
Acenaphthylene	ug/L	<0.050	0.050	0.33	0.050	<0.050	0.050	9115794
Acenaphthene	ug/L	<0.050	0.050	0.42	0.050	<0.050	0.050	9115794
Fluorene	ug/L	<0.050	0.050	1.3	0.050	<0.050	0.050	9115794
Phenanthrene	ug/L	<0.050	0.050	0.68	0.050	<0.050	0.050	9115794
Anthracene	ug/L	<0.010	0.010	0.018 (2)	0.010	<0.010	0.010	9115794
Acridine	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794
Fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794
Pyrene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	9115794
Chrysene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	9115794
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	<0.030	0.030	<0.030	0.030	9115794
Benzo(k)fluoranthene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794
Benzo(a)pyrene	ug/L	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	9115794
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	9115794
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	<0.050	0.050	<0.050	0.050	9115794
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	0.55	0.20	<0.20	0.20	9114659
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9114659
<b>Ext. Pet. Hydrocarbon</b>								
EPH (C10-C19)	mg/L	<0.20	0.20	0.55	0.20	<0.20	0.20	9115809
EPH (C19-C32)	mg/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	9115809
RDL = Reportable Detection Limit								
(1) Detection limits raised due to matrix interference.								
(2) Tentatively identified result and may be potentially biased high due to matrix interference.								

Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		UD3684		UD3685		UD3686		
Sampling Date		2018/08/21 15:25		2018/08/21 11:45		2018/08/21 14:40		
COC Number		8122		8122		8122		
	UNITS	MW16-02A	RDL	MW16-09	RDL	MW16-10	RDL	QC Batch
<b>Surrogate Recovery (%)</b>								
O-TERPHENYL (sur.)	%	88		91		87		9115809
D10-ANTHRACENE (sur.)	%	89		92		91		9115794
D8-ACENAPHTHYLENE (sur.)	%	89		94		90		9115794
D8-NAPHTHALENE (sur.)	%	83		86		86		9115794
TERPHENYL-D14 (sur.)	%	91		92		92		9115794
RDL = Reportable Detection Limit								



Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

**GENERAL COMMENTS**

**Results relate only to the items tested.**

Maxxam Job #: B871282  
Report Date: 2018/08/28

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9115794	D10-ANTHRACENE (sur.)	2018/08/24	89	50 - 140	93	50 - 140	92	%		
9115794	D8-ACENAPHTHYLENE (sur.)	2018/08/24	93	50 - 140	92	50 - 140	92	%		
9115794	D8-NAPHTHALENE (sur.)	2018/08/24	92	50 - 140	87	50 - 140	90	%		
9115794	TERPHENYL-D14 (sur.)	2018/08/24	96	50 - 140	99	50 - 140	99	%		
9115809	O-TERPHENYL (sur.)	2018/08/25	90	60 - 140	92	60 - 140	95	%		
9115794	1-Methylnaphthalene	2018/08/24	97	50 - 140	88	50 - 140	<0.050	ug/L	NC	40
9115794	2-Methylnaphthalene	2018/08/24	92	50 - 140	81	50 - 140	<0.10	ug/L	NC	40
9115794	Acenaphthene	2018/08/24	93	50 - 140	84	50 - 140	<0.050	ug/L	NC	40
9115794	Acenaphthylene	2018/08/24	92	50 - 140	84	50 - 140	<0.050	ug/L	NC	40
9115794	Acridine	2018/08/24	99	50 - 140	92	50 - 140	<0.050	ug/L	NC	40
9115794	Anthracene	2018/08/24	91	50 - 140	84	50 - 140	<0.010	ug/L	NC	40
9115794	Benzo(a)anthracene	2018/08/24	90	50 - 140	83	50 - 140	<0.010	ug/L	NC	40
9115794	Benzo(a)pyrene	2018/08/24	88	50 - 140	82	50 - 140	<0.0050	ug/L	NC	40
9115794	Benzo(b&j)fluoranthene	2018/08/24	89	50 - 140	86	50 - 140	<0.030	ug/L	NC	40
9115794	Benzo(g,h,i)perylene	2018/08/24	80	50 - 140	76	50 - 140	<0.050	ug/L	NC	40
9115794	Benzo(k)fluoranthene	2018/08/24	94	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9115794	Chrysene	2018/08/24	94	50 - 140	86	50 - 140	<0.020	ug/L	NC	40
9115794	Dibenz(a,h)anthracene	2018/08/24	81	50 - 140	77	50 - 140	<0.0030	ug/L	NC	40
9115794	Fluoranthene	2018/08/24	93	50 - 140	87	50 - 140	<0.020	ug/L	NC	40
9115794	Fluorene	2018/08/24	89	50 - 140	82	50 - 140	<0.050	ug/L	NC	40
9115794	Indeno(1,2,3-cd)pyrene	2018/08/24	80	50 - 140	76	50 - 140	<0.050	ug/L	NC	40
9115794	Naphthalene	2018/08/24	99	50 - 140	90	50 - 140	<0.10	ug/L	NC	40
9115794	Phenanthrene	2018/08/24	91	50 - 140	86	50 - 140	<0.050	ug/L	NC	40
9115794	Pyrene	2018/08/24	96	50 - 140	90	50 - 140	<0.020	ug/L	NC	40
9115794	Quinoline	2018/08/24	113	50 - 140	102	50 - 140	<0.020	ug/L	NC	40
9115809	EPH (C10-C19)	2018/08/25	89	60 - 140	88	70 - 130	<0.20	mg/L	NC	30

Maxxam Job #: B871282  
Report Date: 2018/08/28

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9115809	EPH (C19-C32)	2018/08/25	83	60 - 140	80	70 - 130	<0.20	mg/L	NC	30

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

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

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

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

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

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

Maxxam Job #: B871282  
Report Date: 2018/08/28

STANTEC CONSULTING LTD.  
Client Project #: 123221161  
Your P.O. #: 123221161-250.200  
Sampler Initials: MV

### VALIDATION SIGNATURE PAGE

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



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Richard Cheng, Scientific Service Specialist



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Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

### Custody Tracking Form



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample:  
Last Sample:  
Sample Count: 1

Relinquished By				Received By			
Mark Verhale	<i>Mark Verhale</i>	Date	2018/08/21	S Lyons	<i>S Lyons</i>	Date	2018/08/21
		Time (24 HR)	16:23			Time (24 HR)	16:25
S Lyons	<i>S Lyons</i>	Date	2018/08/21	PEDRO TACK	<i>[Signature]</i>	Date	2018/08/22
		Time (24 HR)	17:00			Time (24 HR)	14:40
		Date				Date	
		Time (24 HR)				Time (24 HR)	

**Submission Triage Information**

Sampled By:  # of Coolers/Pkgs:

Rush  Immediate Test  Food Residue

Micro  Food Chemistry

**\*\*\* LAB USE ONLY \*\*\***

Received At:  Comments:

Labeled By:

Verified By:

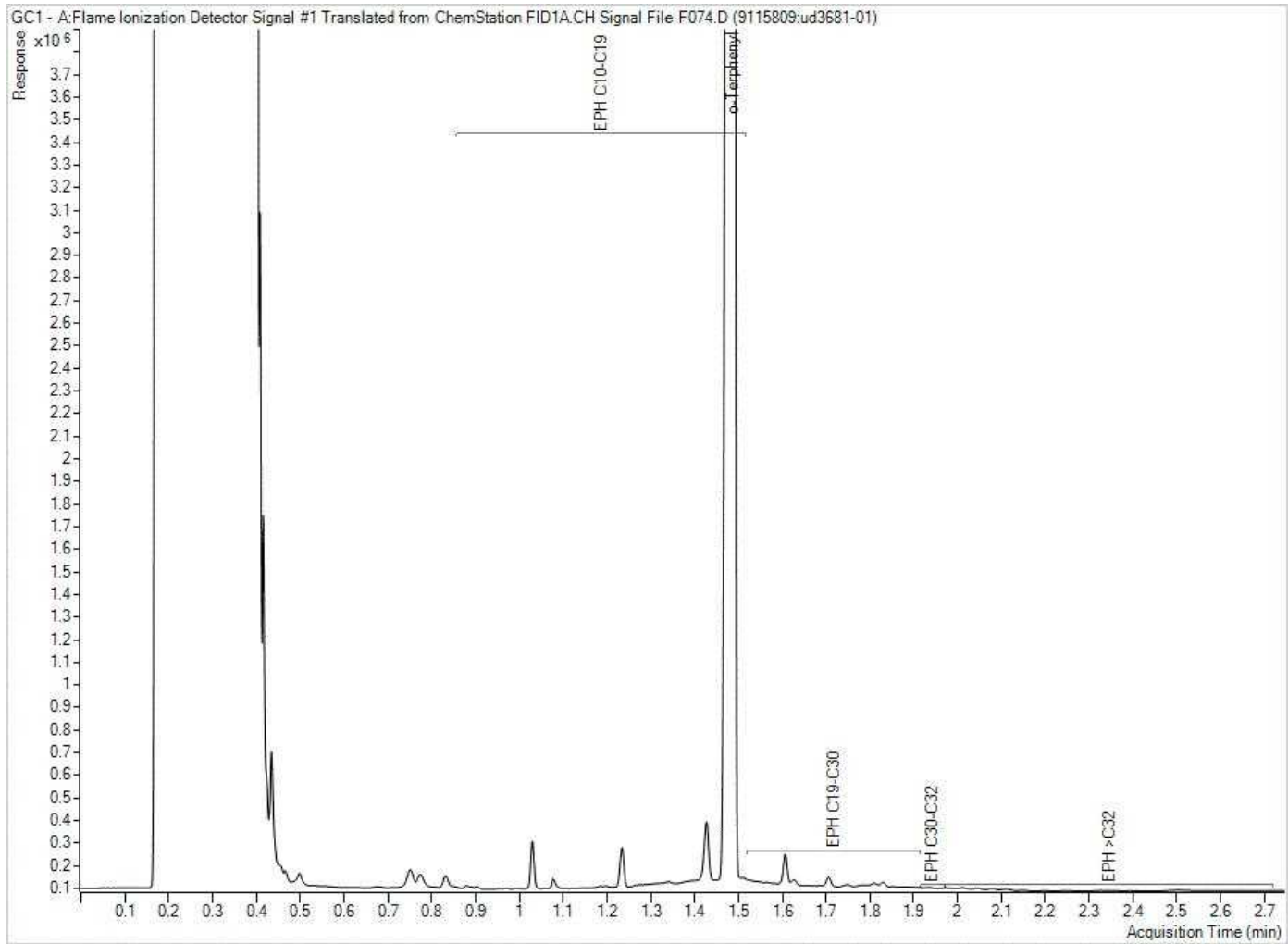
Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
N	N/A	Y	5	8	7
YES	YES	YES	11	10	9

1 Lg cooler

1908

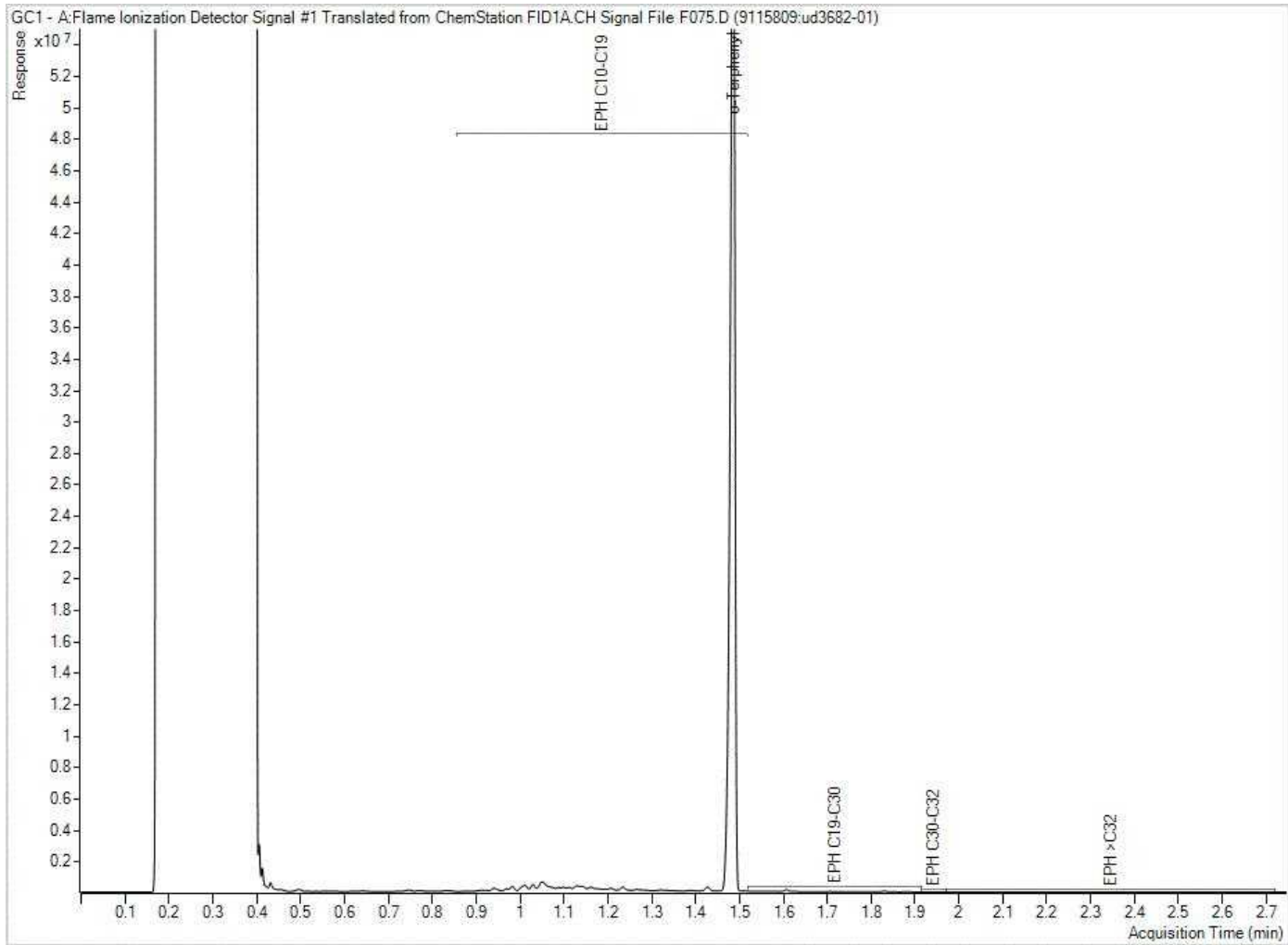


EPH in Water when PAH required Chromatogram



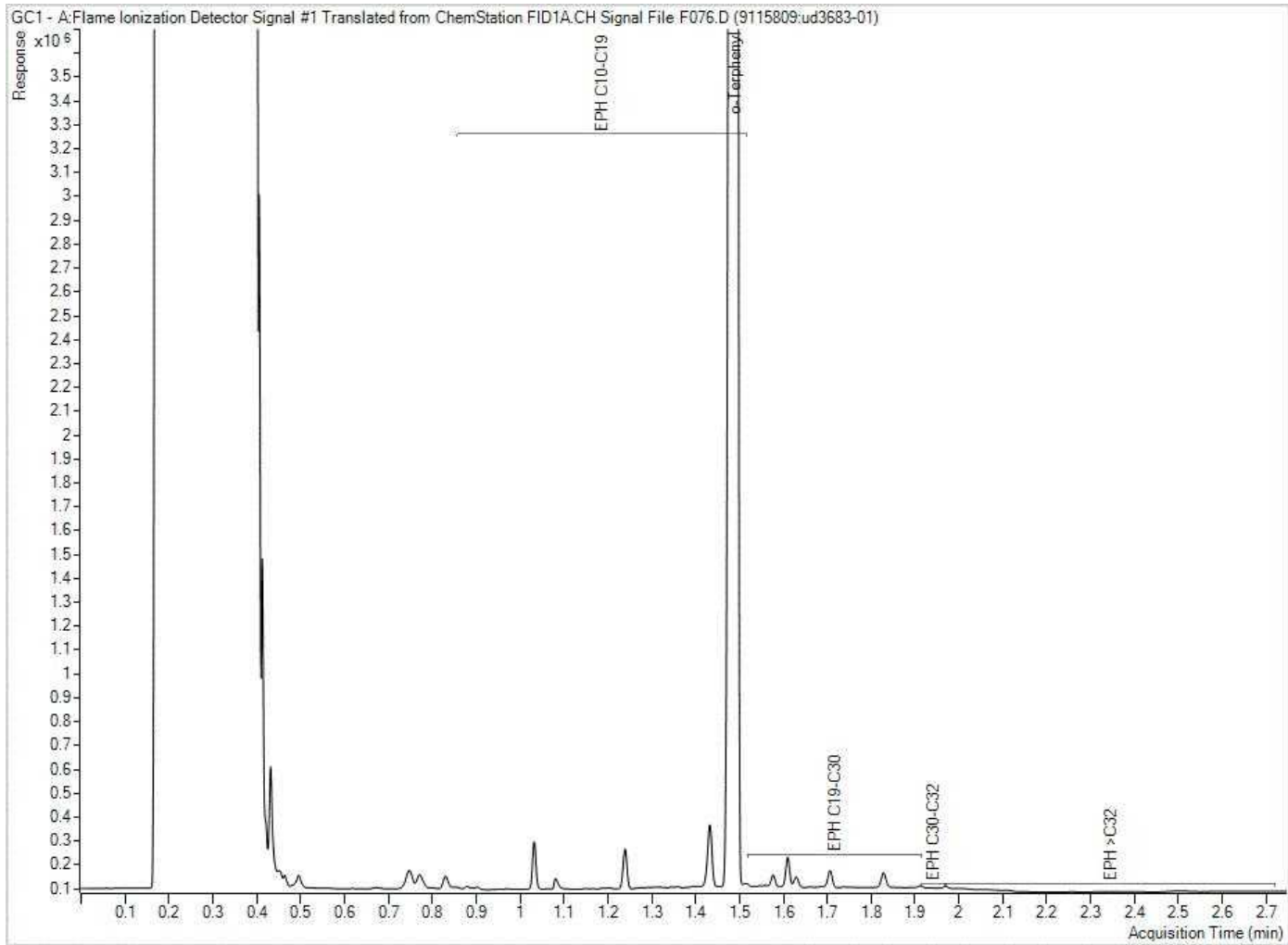
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

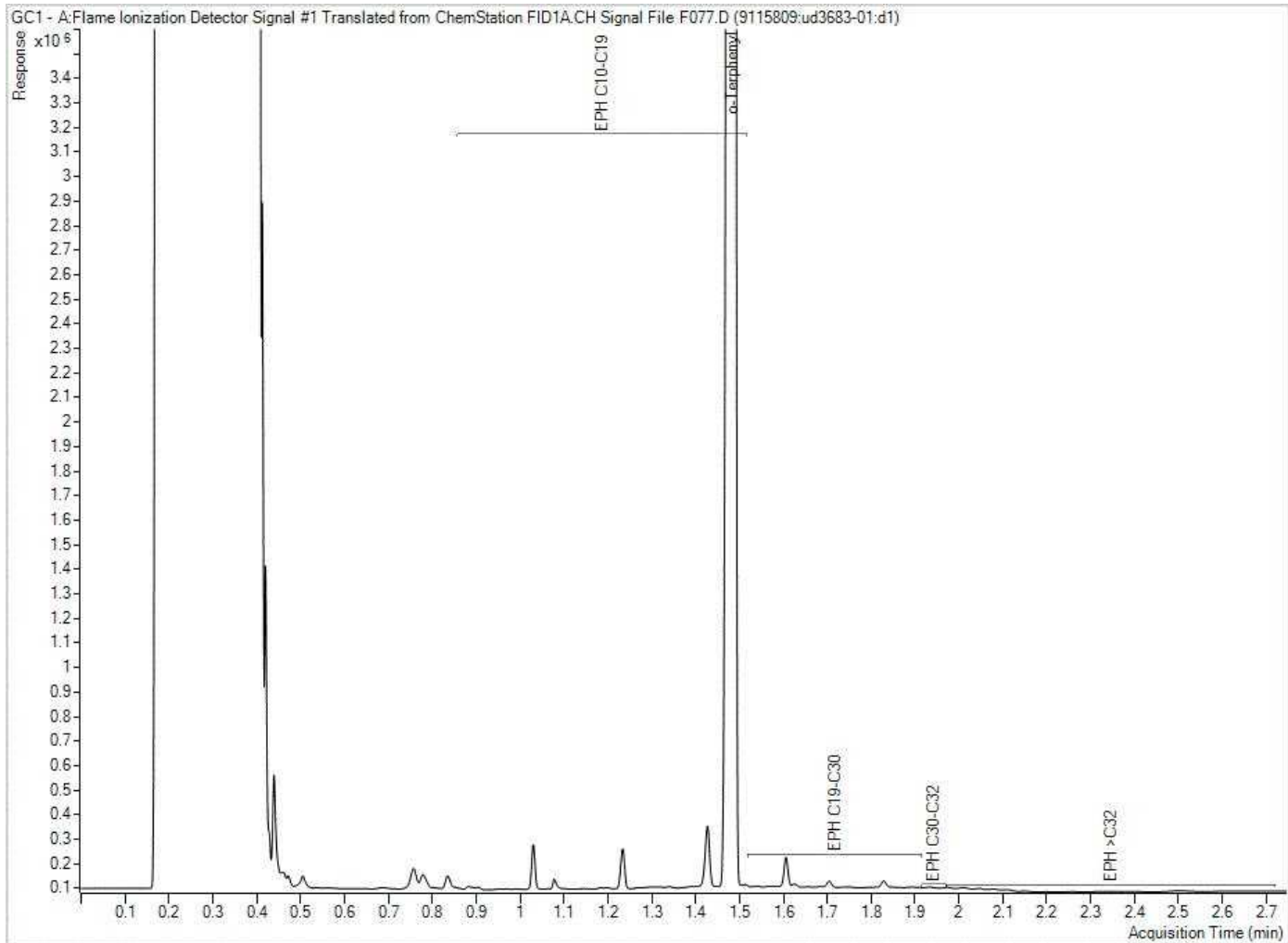
EPH in Water when PAH required Chromatogram



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

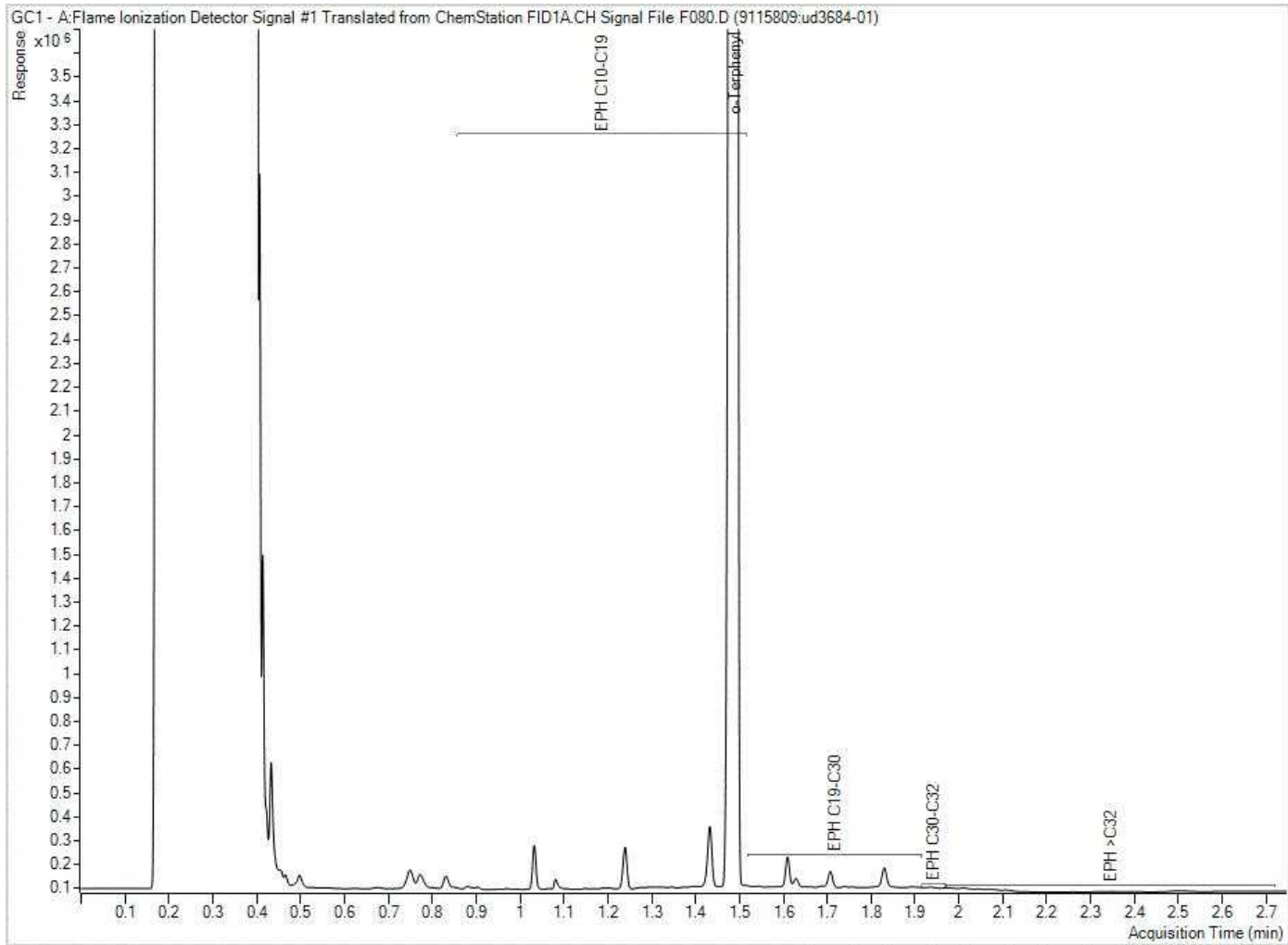


EPH in Water when PAH required Chromatogram



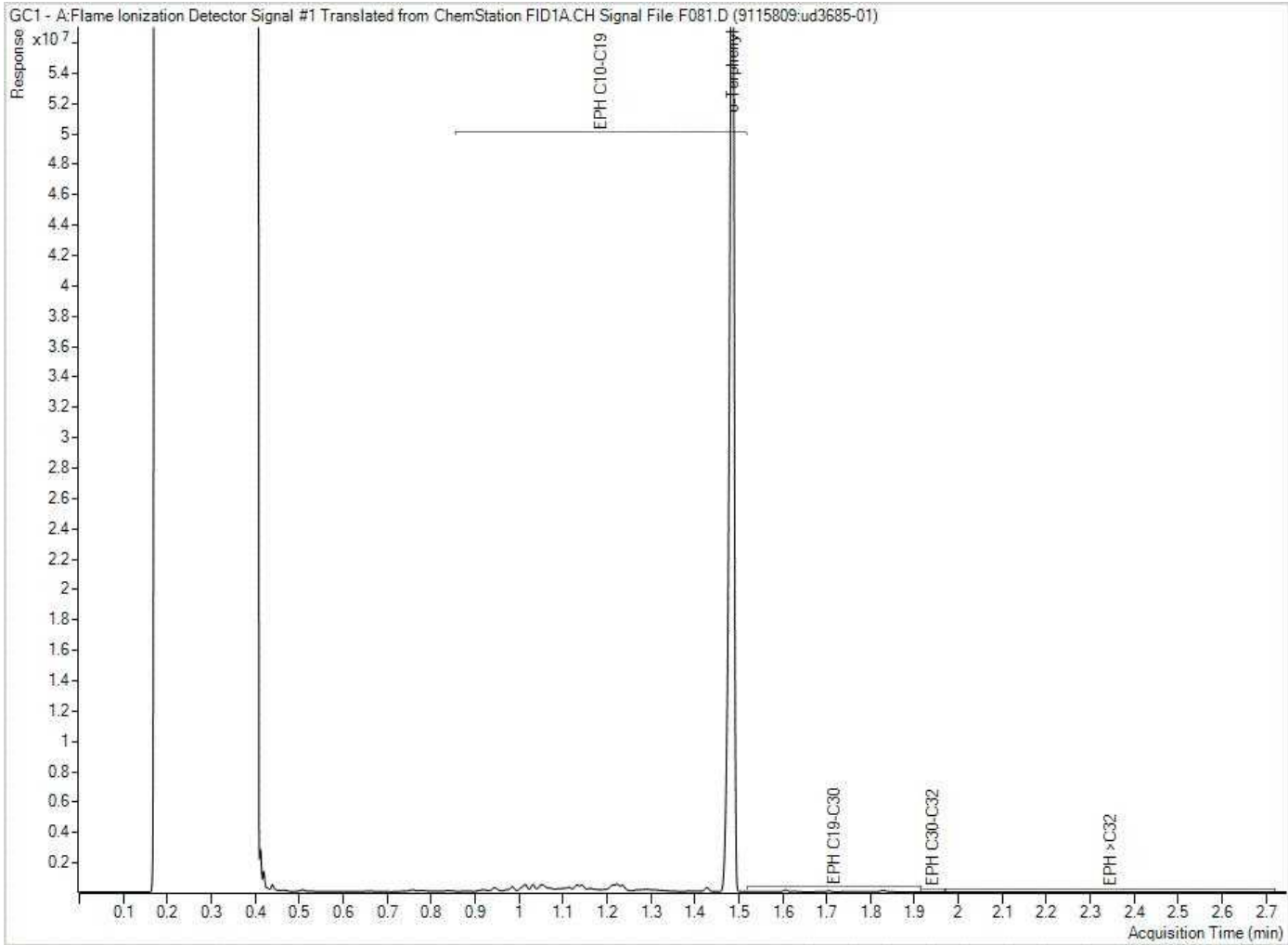
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



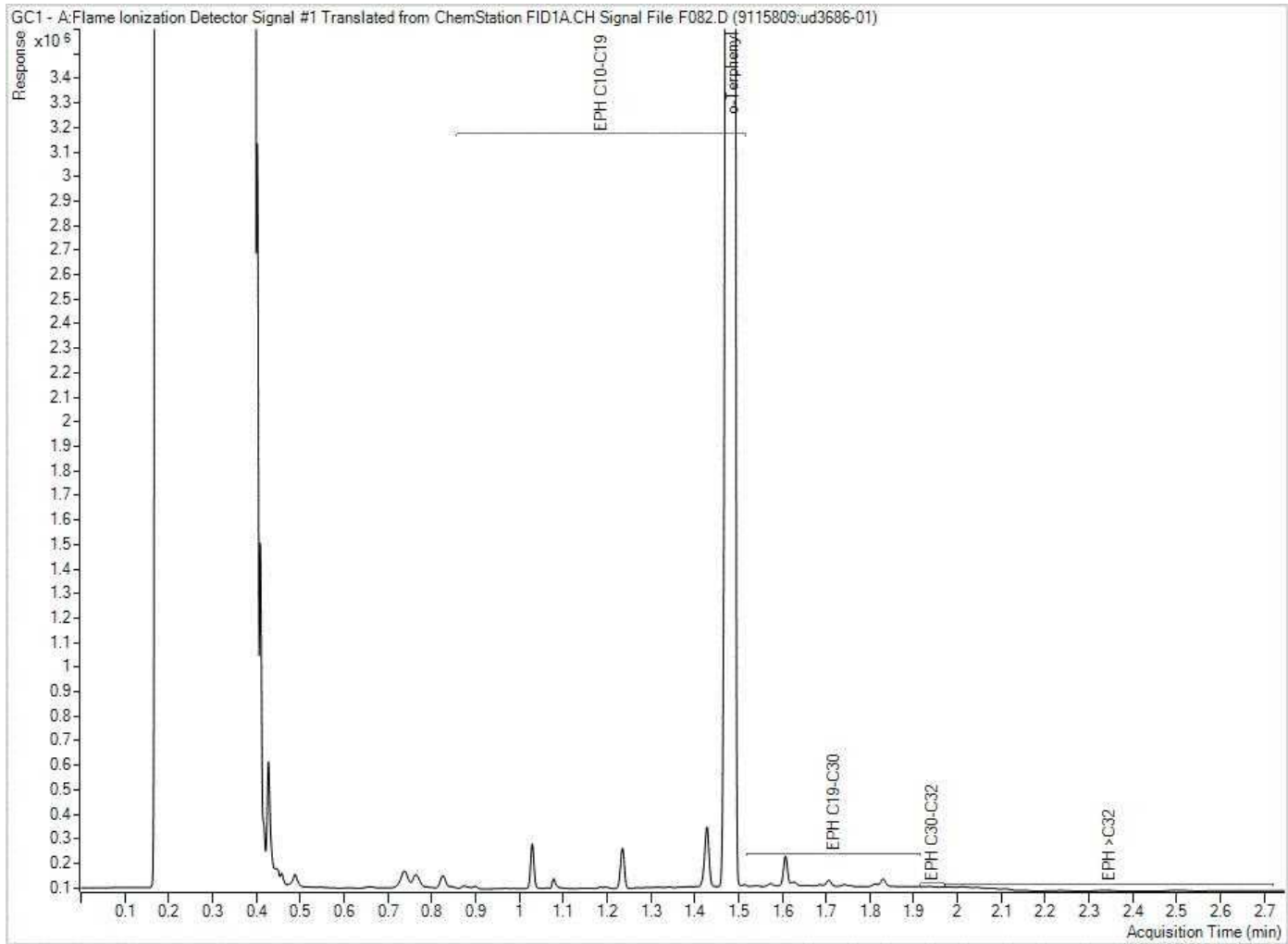
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Water when PAH required Chromatogram



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

EPH in Water when PAH required Chromatogram



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

Your Project #: 123221161  
 Site Location: WHITEHORSE  
 Your C.O.C. #: G134603

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD  
 Metrotower III  
 Suite 500, 4730 Kingsway  
 BURNABY, BC  
 CANADA V5H 4M1

**Report Date: 2018/11/08**  
 Report #: R2647992  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B896179**

**Received: 2018/10/31, 09:16**

Sample Matrix: Water  
 # Samples Received: 8

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
PAH in Water by GC/MS (SIM)	8	2018/11/07	2018/11/07	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1)	8	N/A	2018/11/07	BBY WI-00033	Auto Calc
EPH (Low Level) in Water by GC/FID	8	2018/11/07	2018/11/07	BBY8SOP-00029	BCMOE BCLM Mar 2017
EPH less PAH in Water by GC/FID (2)	8	N/A	2018/11/08	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(2) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Your Project #: 123221161  
Site Location: WHITEHORSE  
Your C.O.C. #: G134603

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/11/08**  
Report #: R2647992  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B896179**  
**Received: 2018/10/31, 09:16**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

Maxxam ID		UR6306		UR6307		UR6308		
Sampling Date		2018/10/30 16:45		2018/10/30 10:15		2018/10/30 12:15		
COC Number		G134603		G134603		G134603		
	<b>UNITS</b>	<b>MW18-31@16:45</b>	<b>RDL</b>	<b>MW18-31@10:15</b>	<b>RDL</b>	<b>MW18-31@12:15</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	ug/L	4.2	0.20	3.3	0.23	4.0	0.20	9212023
High Molecular Weight PAH's	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9212023
Total PAH	ug/L	4.2	0.20	3.3	0.23	4.0	0.20	9212023
<b>Polycyclic Aromatics</b>								
Naphthalene	ug/L	0.57 (1)	0.20	0.50 (1)	0.20	0.54 (1)	0.20	9218098
Acenaphthene	ug/L	0.63 (1)	0.10	0.50 (1)	0.10	0.62 (1)	0.10	9218098
Fluorene	ug/L	2.0	0.10	1.6	0.10	1.9 (1)	0.10	9218098
Phenanthrene	ug/L	0.89	0.10	0.70	0.10	0.87	0.10	9218098
Anthracene	ug/L	0.026 (1)	0.020	0.024 (1)	0.020	0.027 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9218098
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/L	0.56	0.11	0.51	0.11	0.55	0.11	9213178
<b>Ext. Pet. Hydrocarbon</b>								
EPH (C10-C19)	mg/L	0.56 (2)	0.11	0.51 (2)	0.11	0.55 (2)	0.11	9218103
EPH (C19-C32)	mg/L	<0.50 (2)	0.50	<0.50 (2)	0.50	<0.50 (2)	0.50	9218103
<b>Surrogate Recovery (%)</b>								
D10-ANTHRACENE (sur.)	%	89		88		88		9218098
D8-ACENAPHTHYLENE (sur.)	%	94		91		92		9218098
D8-NAPHTHALENE (sur.)	%	79		74		74		9218098
TERPHENYL-D14 (sur.)	%	75		76		76		9218098
O-TERPHENYL (sur.)	%	99		101		102		9218103
RDL = Reportable Detection Limit								
(1) Tentatively identified result and may be potentially biased high due to matrix interference.								
(2) Detection limits raised due to insufficient sample volume.								

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

Maxxam ID		UR6309		UR6310	UR6311	UR6312		
Sampling Date		2018/10/30 14:15		2018/10/29 17:55	2018/10/29 15:55	2018/10/29 13:55		
COC Number		G134603		G134603	G134603	G134603		
	<b>UNITS</b>	<b>MW18-31@14:15</b>	<b>RDL</b>	<b>MW16-09@17:55</b>	<b>MW16-09@15:55</b>	<b>MW16-09@13:55</b>	<b>RDL</b>	<b>QC Batch</b>

Calculated Parameters								
Low Molecular Weight PAH`s	ug/L	3.9	0.24	7.9	7.0	7.8	0.20	9212023
High Molecular Weight PAH`s	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	0.10	9212023
Total PAH	ug/L	3.9	0.24	7.9	7.0	7.8	0.20	9212023

Polycyclic Aromatics								
Naphthalene	ug/L	0.54 (1)	0.20	1.1	0.95	1.1	0.20	9218098
Acenaphthene	ug/L	0.62 (1)	0.10	0.23 (1)	0.17 (1)	0.17 (1)	0.10	9218098
Fluorene	ug/L	1.9	0.10	0.75	0.71	0.75	0.10	9218098
Phenanthrene	ug/L	0.84	0.10	0.36	0.35	0.40	0.10	9218098
Anthracene	ug/L	0.024 (1)	0.020	<0.020 (1)	<0.020 (1)	<0.020 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	0.10	9218098

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	0.56	0.11	0.31	0.31	0.32	0.11	9213178

Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	0.56 (2)	0.11	0.31 (2)	0.31 (2)	0.32 (2)	0.11	9218103
EPH (C19-C32)	mg/L	<0.50 (2)	0.50	<0.50 (2)	<0.50 (2)	<0.50 (2)	0.50	9218103

Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	88		88	89	90		9218098
D8-ACENAPHTHYLENE (sur.)	%	91		92	92	94		9218098
D8-NAPHTHALENE (sur.)	%	73		80	77	79		9218098
TERPHENYL-D14 (sur.)	%	75		77	76	77		9218098
O-TERPHENYL (sur.)	%	102		102	103	102		9218103

RDL = Reportable Detection Limit  
(1) Tentatively identified result and may be potentially biased high due to matrix interference.  
(2) Detection limits raised due to insufficient sample volume.



Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

<b>Maxxam ID</b>		UR6313		
<b>Sampling Date</b>		2018/10/29 11:55		
<b>COC Number</b>		G134603		
	<b>UNITS</b>	<b>MW16-09@11:55</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Low Molecular Weight PAH's	ug/L	15	0.35	9212023
High Molecular Weight PAH's	ug/L	<0.10	0.10	9212023
Total PAH	ug/L	15	0.35	9212023
<b>Polycyclic Aromatics</b>				
Naphthalene	ug/L	2.0	0.20	9218098
Acenaphthene	ug/L	0.27 (1)	0.10	9218098
Fluorene	ug/L	1.4	0.10	9218098
Phenanthrene	ug/L	0.90	0.10	9218098
Anthracene	ug/L	0.063 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	9218098
<b>Calculated Parameters</b>				
LEPH (C10-C19 less PAH)	mg/L	4.8	0.11	9213178
<b>Ext. Pet. Hydrocarbon</b>				
EPH (C10-C19)	mg/L	4.8 (2)	0.11	9218103
EPH (C19-C32)	mg/L	0.60 (2)	0.50	9218103
<b>Surrogate Recovery (%)</b>				
D10-ANTHRACENE (sur.)	%	92		9218098
D8-ACENAPHTHYLENE (sur.)	%	98		9218098
D8-NAPHTHALENE (sur.)	%	77		9218098
TERPHENYL-D14 (sur.)	%	82		9218098
O-TERPHENYL (sur.)	%	105		9218103
RDL = Reportable Detection Limit				
(1) Tentatively identified result and may be potentially biased high due to matrix interference.				
(2) Detection limits raised due to insufficient sample volume.				

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

### GENERAL COMMENTS

Sample UR6306 [MW18-31@16:45] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6307 [MW18-31@10:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6308 [MW18-31@12:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6309 [MW18-31@14:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6310 [MW16-09@17:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6311 [MW16-09@15:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6312 [MW16-09@13:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6313 [MW16-09@11:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

**Results relate only to the items tested.**

Maxxam Job #: B896179  
Report Date: 2018/11/08

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

QC Batch	Parameter	Date	Spiked Blank		Method Blank	
			% Recovery	QC Limits	Value	UNITS
9218098	D10-ANTHRACENE (sur.)	2018/11/07	85	50 - 140	98	%
9218098	D8-ACENAPHTHYLENE (sur.)	2018/11/07	83	50 - 140	81	%
9218098	D8-NAPHTHALENE (sur.)	2018/11/07	73	50 - 140	74	%
9218098	TERPHENYL-D14 (sur.)	2018/11/07	74	50 - 140	89	%
9218103	O-TERPHENYL (sur.)	2018/11/07	92	50 - 130	94	%
9218098	Acenaphthene	2018/11/07	88	50 - 140	<0.050	ug/L
9218098	Acridine	2018/11/07	98	50 - 140	<0.050	ug/L
9218098	Anthracene	2018/11/07	87	50 - 140	<0.010	ug/L
9218098	Fluorene	2018/11/07	88	50 - 140	<0.050	ug/L
9218098	Naphthalene	2018/11/07	88	50 - 140	<0.10	ug/L
9218098	Phenanthrene	2018/11/07	85	50 - 140	<0.050	ug/L
9218103	EPH (C10-C19)	2018/11/07	114	70 - 130	<0.050	mg/L
9218103	EPH (C19-C32)	2018/11/07	124	70 - 130	<0.20	mg/L

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

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

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

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

### VALIDATION SIGNATURE PAGE

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



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



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Jose Cueva, Supervisor, Organics-VOC & HC

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Invoice Information	Report Information (if differs from invoice)	Project Information	Turnaround Time (TAT) Required
Company: <u>Stantec</u>	Company:	Quotation: <u>Stantec Regular</u>	<input checked="" type="checkbox"/> 5 - 7 Days Regular (Most analyses)
Contact Name: <u>Carey Sibald</u>	Contact Name:	P.O. #/AFE#:	<b>PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS</b>
Address: <u>202-107 Main St. Whitehorse YT PC: <del>Y1A 2A7</del></u>	Address:	Project #: <u>123221161</u>	<b>Rush TAT (Surcharges will be applied)</b>
Phone/Fax: <u>867 446 7644</u>	Phone/Fax:	Site Location: <u>Whitehorse</u>	<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days
Email: <u>Carey.Sibald@stantec.com</u>	Email:	Site #:	<input type="checkbox"/> 1 Day <input type="checkbox"/> 3-4 Days
Copies: <u>Joseph.Riddell@stantec.com</u>	Copies: <u>Brad.Suley@stantec.com</u>	Sampled By: <u>BCS</u>	Date Required: _____
Laboratory Use Only		Analysis Requested	

Laboratory Use Only				Analysis Requested												Regulatory Criteria		
Seal Present	YES	NO	Cooler ID: <u>1</u>	Depot Reception # of Containers: <u>2</u> <input type="checkbox"/> BTEX / VPH <input type="checkbox"/> VOC / BTEX / VPH <input type="checkbox"/> MTBE <input type="checkbox"/> Seal Intact <input type="checkbox"/> VOC / BTEX / F1 <input type="checkbox"/> VOC / BTEX / F1 <input type="checkbox"/> Cooling Media <input type="checkbox"/> PAH <input type="checkbox"/> LEPH / HEPH / PAH <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Cooler ID <input type="checkbox"/> Seal Present <input type="checkbox"/> TEH <input type="checkbox"/> F2 - F4 <input type="checkbox"/> Seal Intact <input type="checkbox"/> Dissolved Metals <input type="checkbox"/> Filtered? <input type="checkbox"/> Preserved? <input type="checkbox"/> Cooling Media <input type="checkbox"/> Dissolved Mercury <input type="checkbox"/> Filtered? <input type="checkbox"/> Preserved? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Cooler ID <input type="checkbox"/> Seal Present <input type="checkbox"/> Total Metals <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Seal Intact <input type="checkbox"/> Total Mercury <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Cooling Media <input type="checkbox"/> Chloride <input type="checkbox"/> Sulphate <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Cooler ID <input type="checkbox"/> Seal Present <input type="checkbox"/> Fluoride <input type="checkbox"/> COD <input type="checkbox"/> Seal Intact <input type="checkbox"/> TDS <input type="checkbox"/> BOD <input type="checkbox"/> Cooling Media <input type="checkbox"/> pH <input type="checkbox"/> Conductivity <input type="checkbox"/> Alkalinity <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Cooler ID <input type="checkbox"/> Seal Present <input type="checkbox"/> Nitrate <input type="checkbox"/> Ammonia <input type="checkbox"/> Seal Intact <input type="checkbox"/> LEPH / HEPH (+CSR PAH) <input type="checkbox"/> Cooling Media	<input type="checkbox"/> BC CSR <input checked="" type="checkbox"/> YK CSR <input type="checkbox"/> CCME <input type="checkbox"/> Drinking Water <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other													
Sample Identification					HOLD - DO NOT ANALYZE												Special Instructions	

Sample Identification	Date Sampled (yyyy/mm/dd)	Time Sampled (hh:mm)	Matrix	# of Containers	BTEX / VPH	VOC / BTEX / VPH	VOC / BTEX / F1	PAH	LEPH / HEPH / PAH	F2 - F4	Dissolved Metals	Filtered?	Dissolved Mercury	Filtered?	Total Metals	Field Preserved?	Total Mercury	Field Preserved?	Chloride	Sulphate	Fluoride	COD	BOD	pH	Conductivity	Alkalinity	Nitrate	Ammonia	LEPH / HEPH (+CSR PAH)
1 MW18-31@16:45	2018/10/30	16:45	GW	2																									X
2 MW18-31@10:15	↓	10:15	↓	↓																									X
3 MW18-31@12:15	↓	12:15	↓	↓																									X
4 MW18-31@14:15	↓	14:15	↓	↓																									X
5 MW16-09@17:55	2018/10/29	17:55	↓	↓																									X
6 MW16-09@15:55	↓	15:55	↓	↓																									X
7 MW16-09@13:55	↓	13:55	↓	↓																									X
8 MW16-09@11:55	↓	11:55	↓	↓																									X

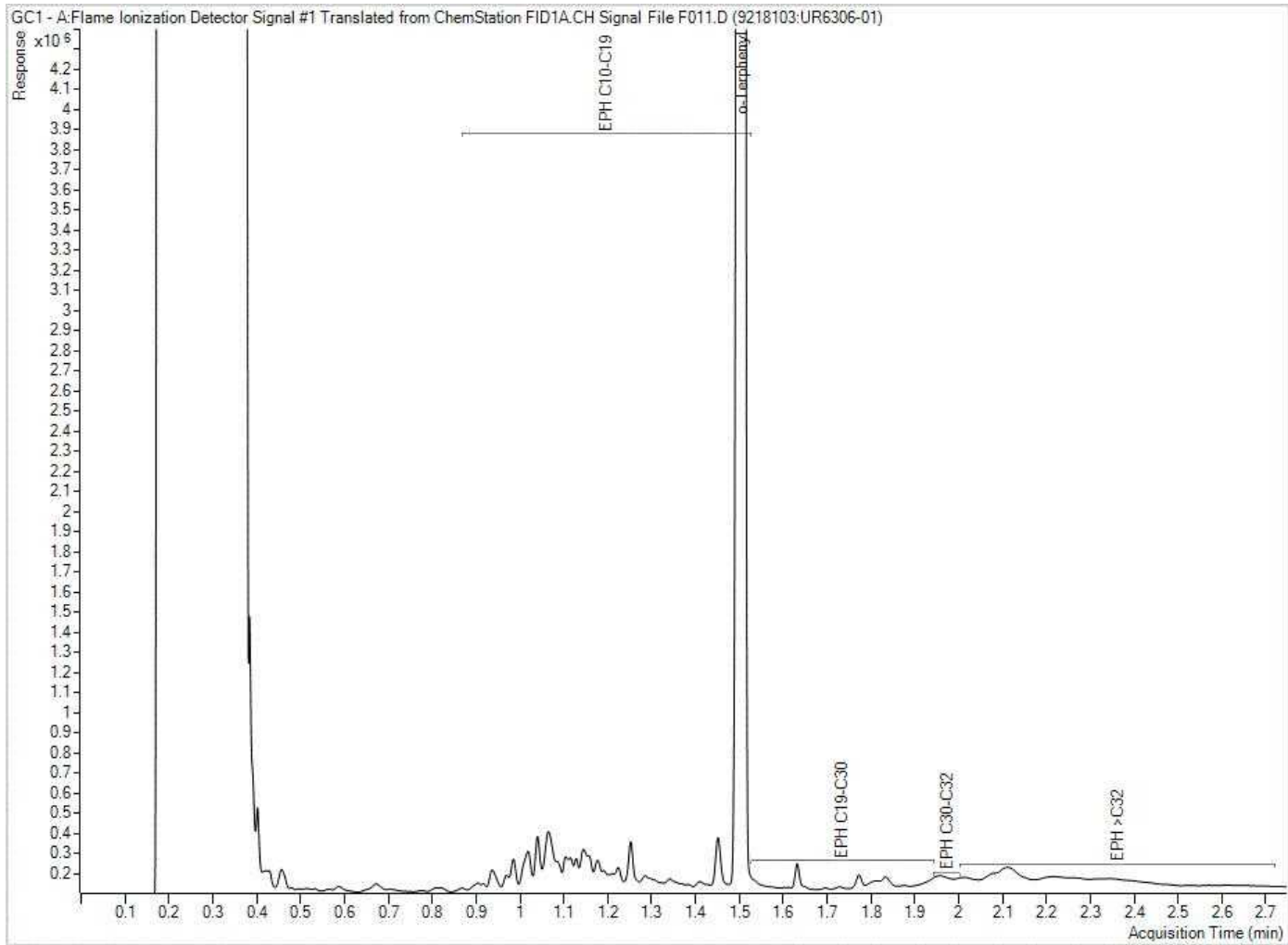
RECEIVED IN WHITEHORSE  
BY: Syomo@0916  
2018-10-31  
TEMP: 5 / 5 / 5

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgement and acceptance of our terms.

Relinquished by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):	Received by: (Signature/ Print)	Date (yyyy/mm/dd):	Time (hh:mm):
<u>Brad Suley</u>	2018/10/31	9:16	<u>BRITTANY BURLONE</u>	2018/11/01	08:05

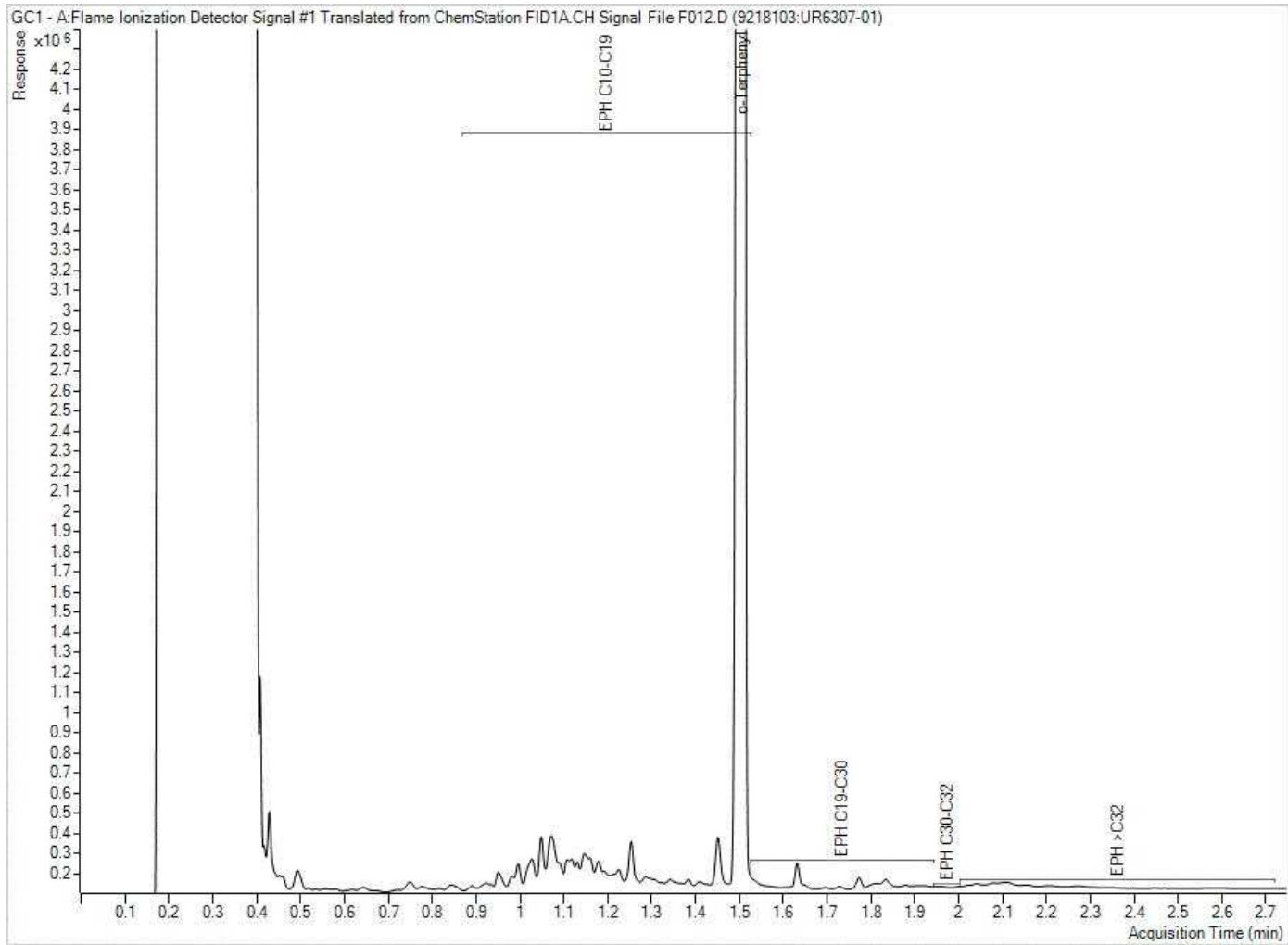


EPH (Low Level) in Water by GC/FID Chromatogram



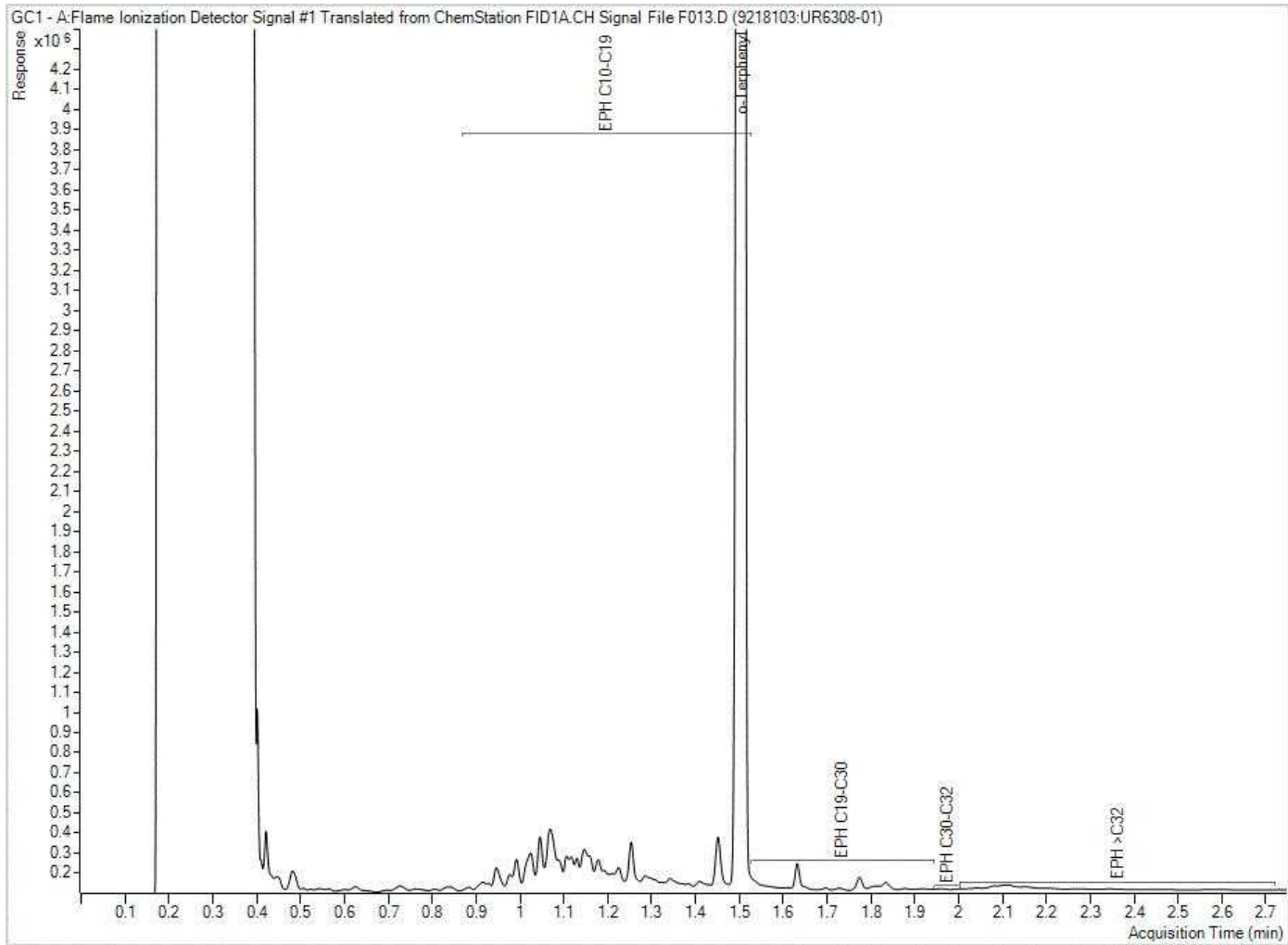
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



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

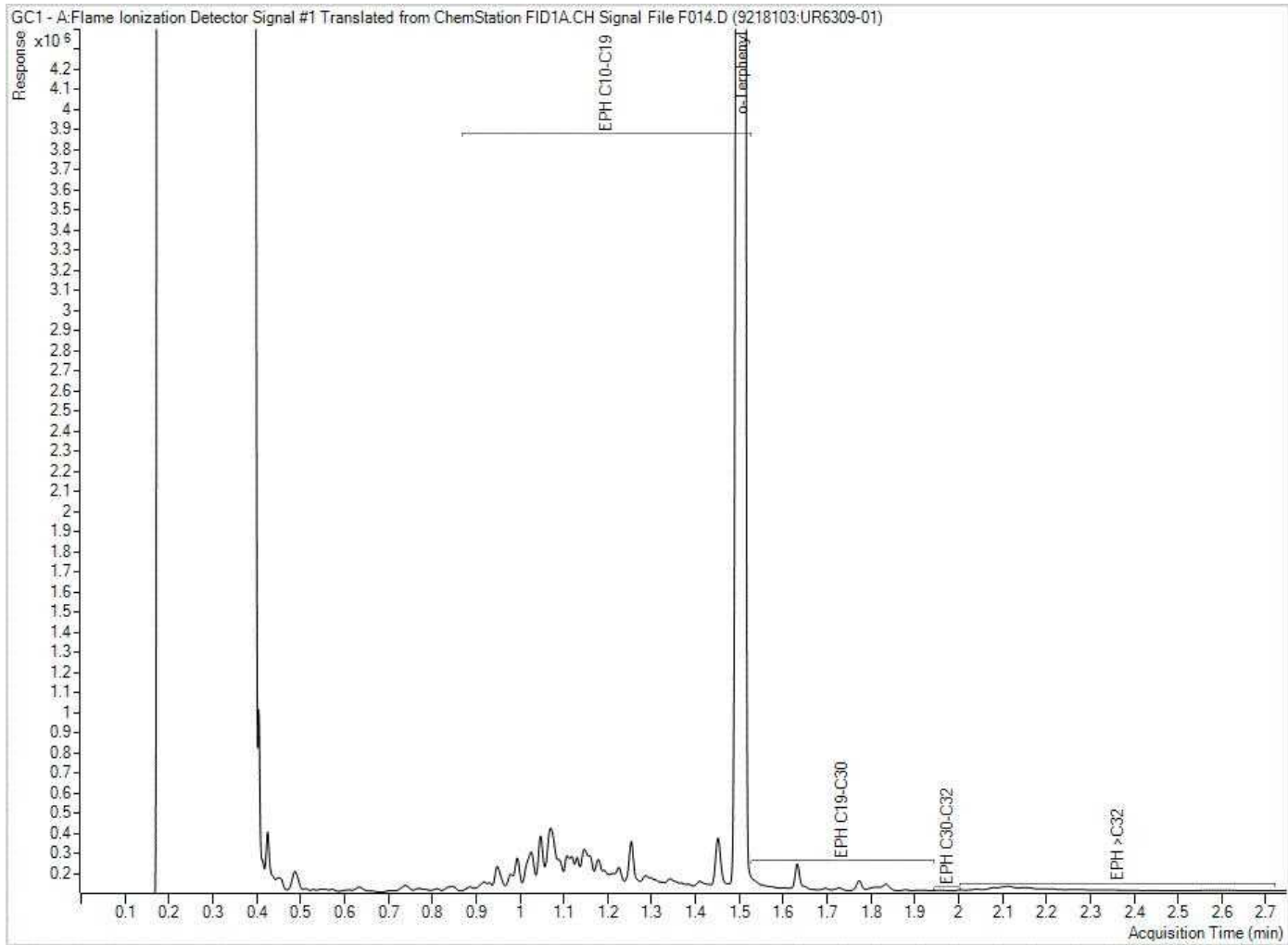
EPH (Low Level) in Water by GC/FID Chromatogram



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

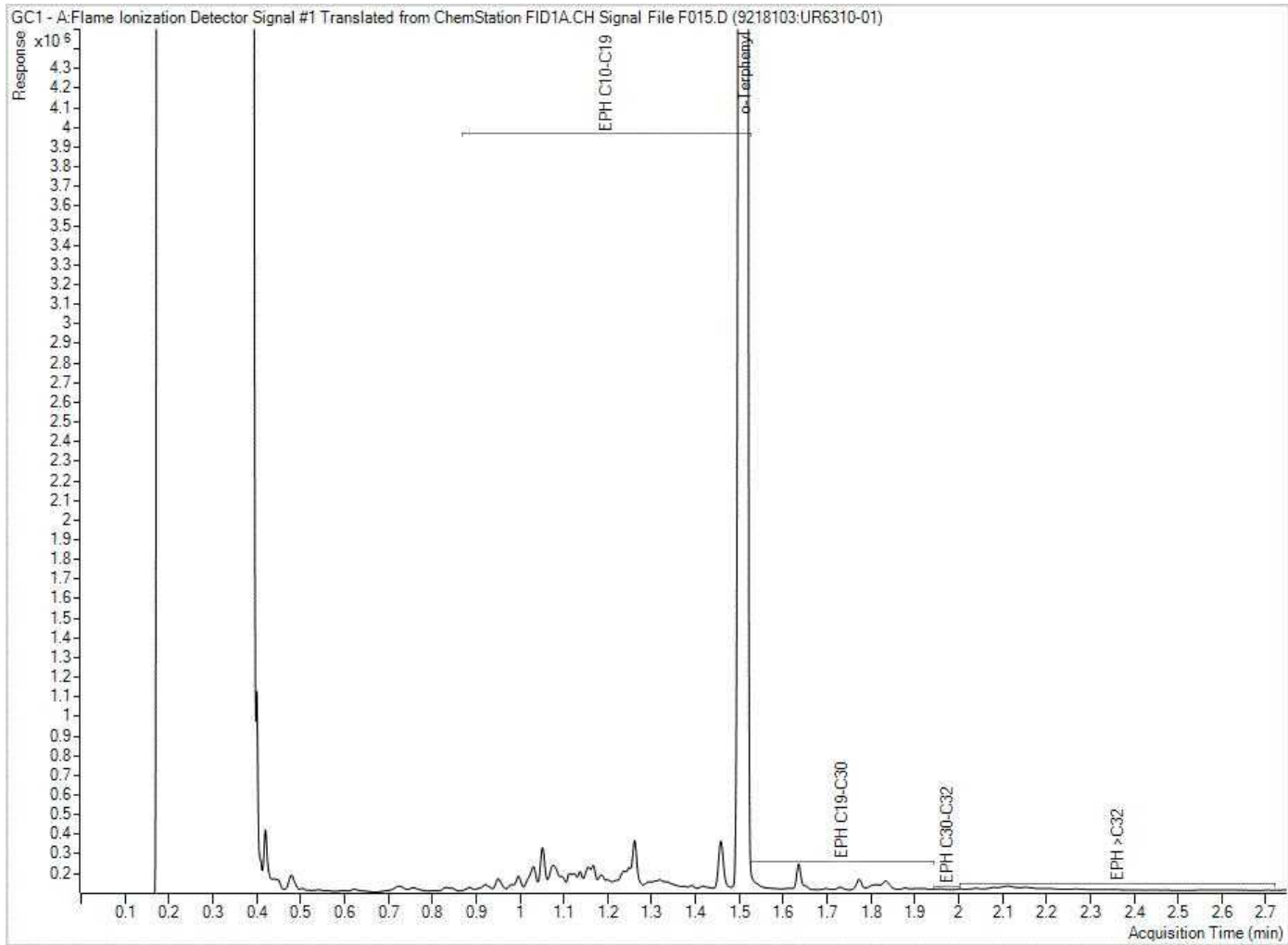


EPH (Low Level) in Water by GC/FID Chromatogram



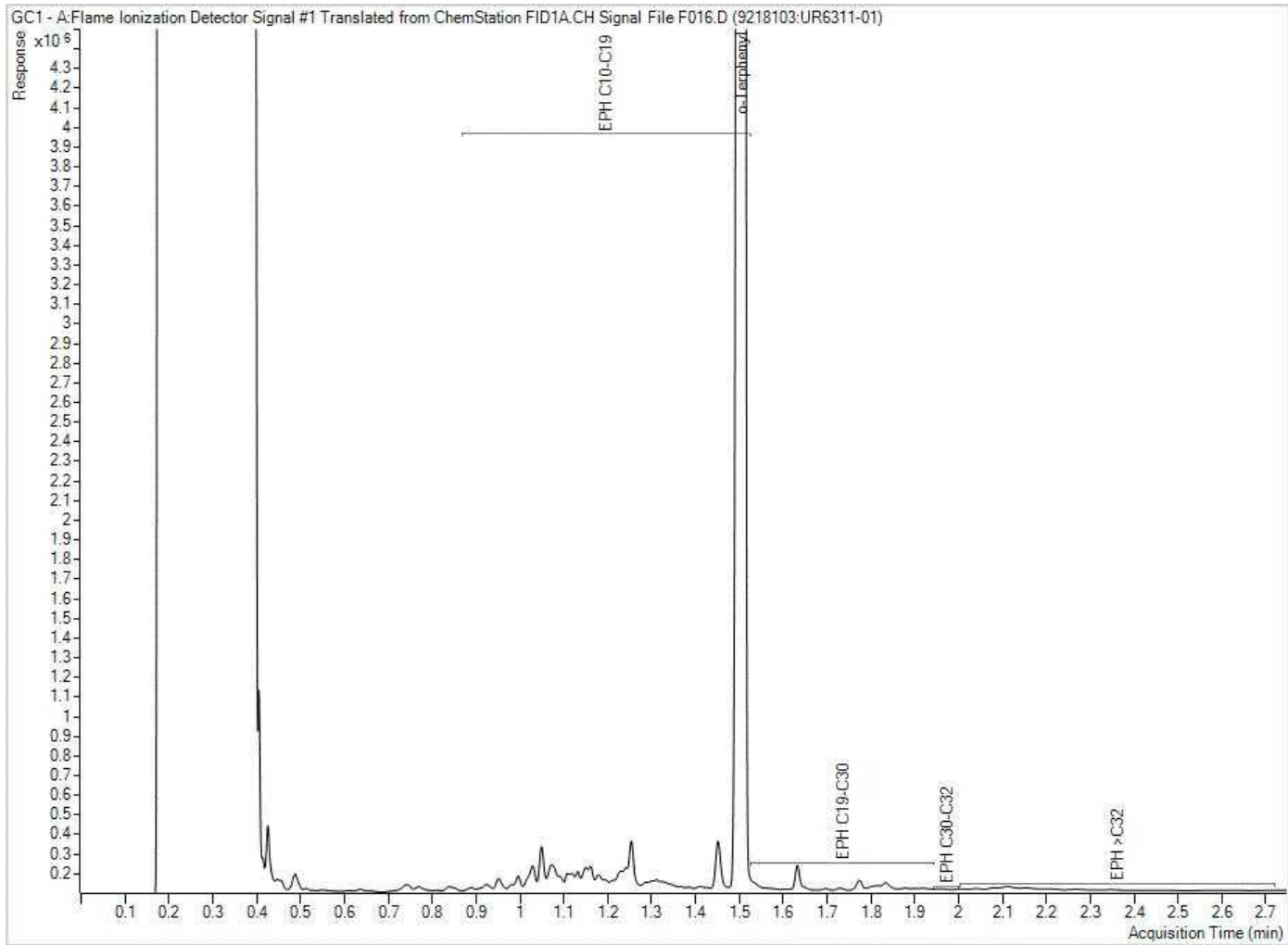
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



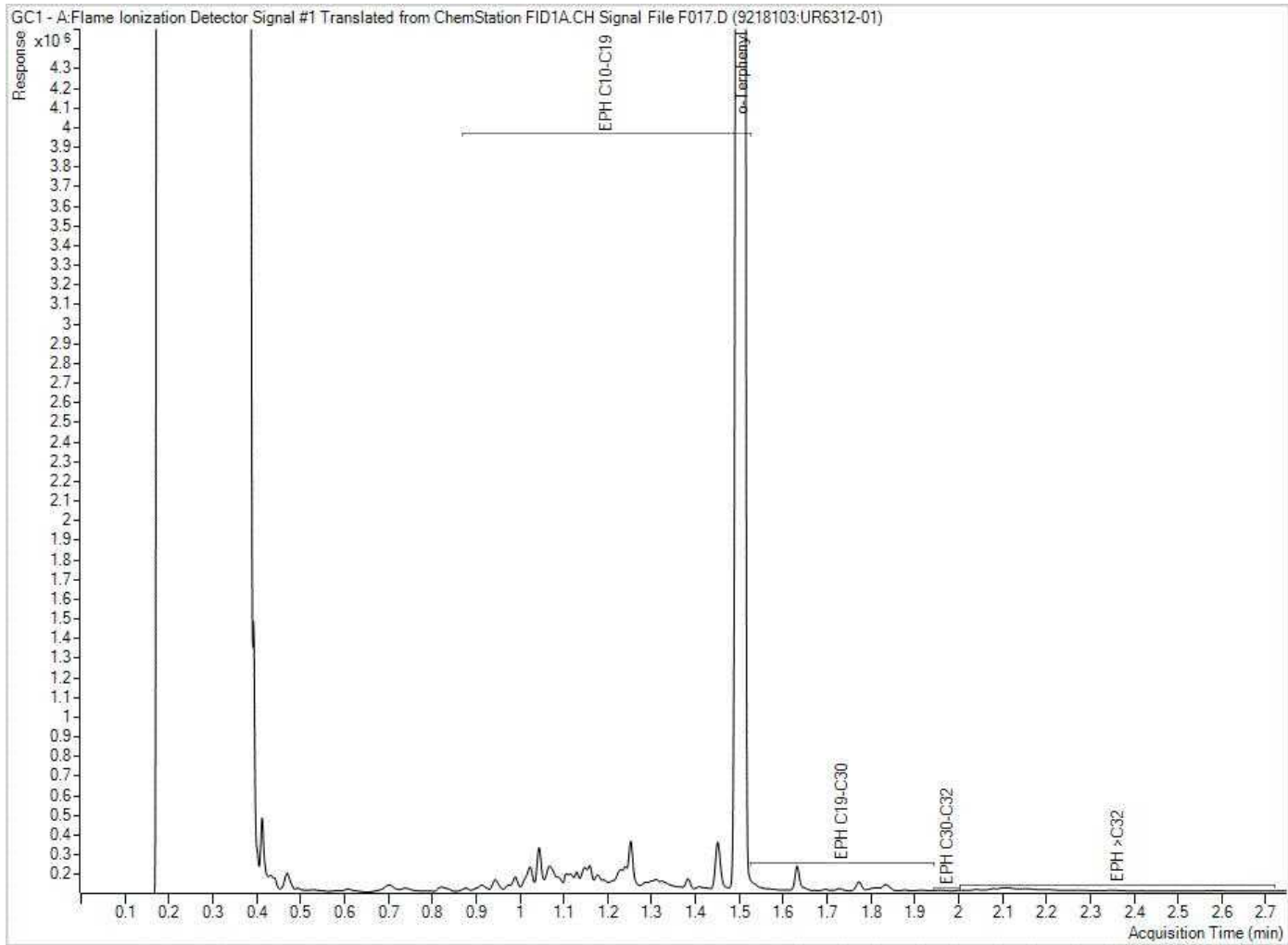
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



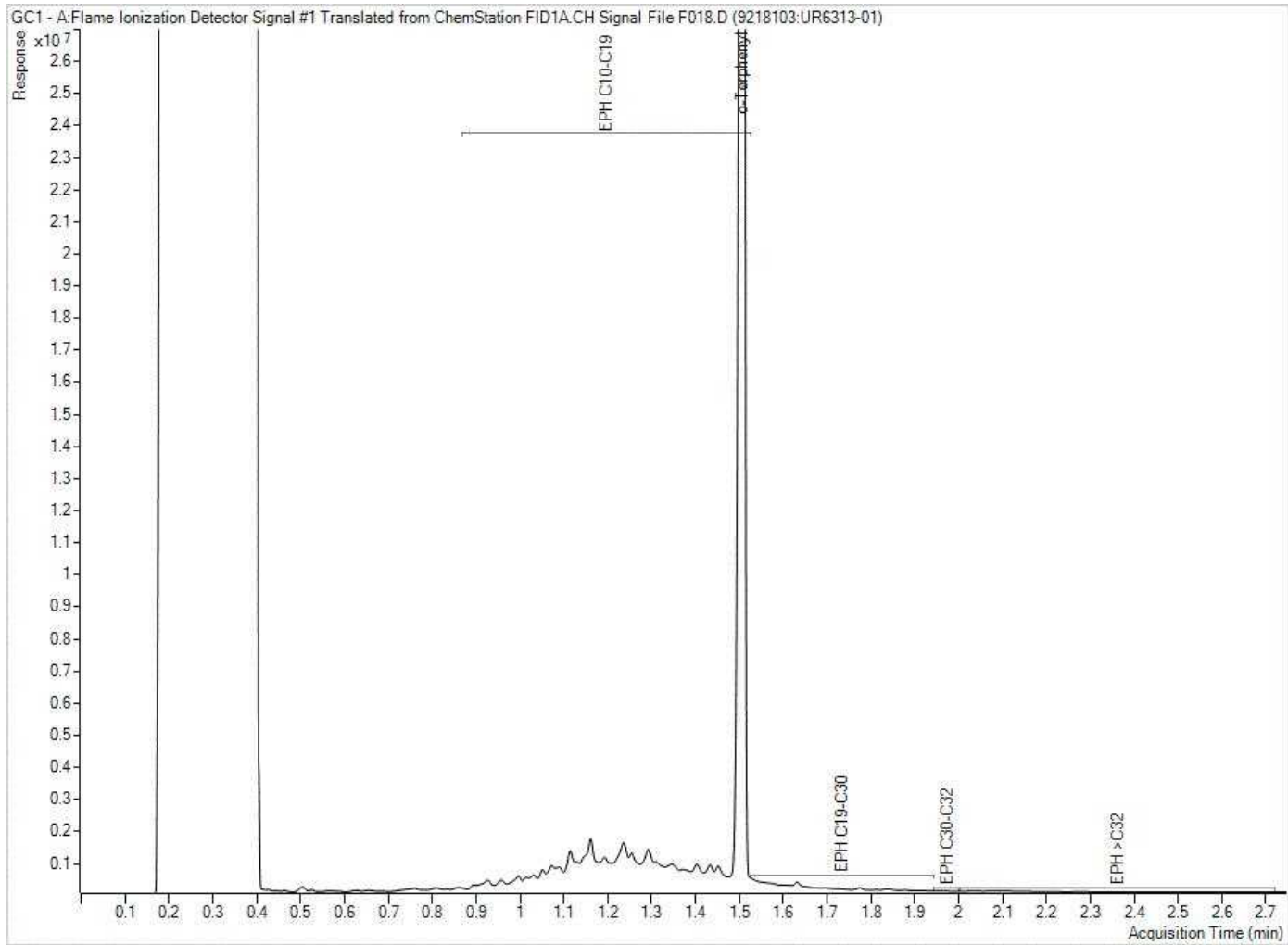
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



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

EPH (Low Level) in Water by GC/FID Chromatogram



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

Your Project #: 123221161  
Your C.O.C. #: 560386-01-01, 560386-02-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/30**  
Report #: R2611669  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862213**

**Received: 2018/07/25, 09:00**

Sample Matrix: Soil  
# Samples Received: 7

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICPMS (total)	1	2018/08/27	2018/08/27	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
Moisture	4	2018/07/27	2018/07/28	BBY8SOP-00017	BCMOE BCLM Dec2000 m
pH (2:1 DI Water Extract)	1	2018/08/27	2018/08/27	BBY6SOP-00028	BCMOE BCLM Mar2005 m
EPH in Soil by GC/FID	4	2018/07/28	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
Texture by Hydrometer, incl Gravel (Wet)	2	N/A	2018/08/16	BBY6SOP-00051	Carter 2nd ed 55.3
TOC Soil Subcontract (1)	2	N/A	2018/08/17		
TOC Soil Subcontract (1)	1	N/A	2018/08/29		

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) This test was performed by Maxxam Ontario (From Burnaby)

Your Project #: 123221161  
Your C.O.C. #: 560386-01-01, 560386-02-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/30**  
Report #: R2611669  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862213**  
**Received: 2018/07/25, 09:00**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.  
Nahed Amer, Project Manager  
Email: NAmer@maxxam.ca  
Phone# (604) 734 7276

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**RESULTS OF CHEMICAL ANALYSES OF SOIL**

Maxxam ID		TY2769	TY2775			TY2785	
Sampling Date		2018/07/24	2018/07/24			2018/07/25	
COC Number		560386-01-01	560386-01-01			560386-02-01	
	UNITS	MW18-44 SA06	MW18-33 SA06	RDL	QC Batch	MW18-34 SA01	QC Batch
<b>Parameter</b>							
Subcontract Parameter	N/A	ATTACHED	ATTACHED	N/A	9107493	ATTACHED	9107493
<b>Physical Properties</b>							
% sand by hydrometer	%	46	36	2.0	9103384		
% silt by hydrometer	%	3.0	51	2.0	9103384		
Clay Content	%	2.1	12	2.0	9103384		
Gravel	%	49	<2.0	2.0	9103384		
RDL = Reportable Detection Limit							
N/A = Not Applicable							



Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

Maxxam ID		TY2768	TY2774	TY2789	TY2790		
Sampling Date		2018/07/24	2018/07/24	2018/07/25	2018/07/25		
COC Number		560386-01-01	560386-01-01	560386-02-01	560386-02-01		
	<b>UNITS</b>	<b>MW18-44 SA05</b>	<b>MW18-33 SA05</b>	<b>MW18-34 SA05</b>	<b>MW18-34 SA06</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>							
Moisture	%	11	13	15	18	0.30	9082290
RDL = Reportable Detection Limit							

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**TOTAL PETROLEUM HYDROCARBONS (SOIL)**

Maxxam ID		TY2768	TY2774	TY2789		TY2790		
Sampling Date		2018/07/24	2018/07/24	2018/07/25		2018/07/25		
COC Number		560386-01-01	560386-01-01	560386-02-01		560386-02-01		
	UNITS	MW18-44 SA05	MW18-33 SA05	MW18-34 SA05	QC Batch	MW18-34 SA06	RDL	QC Batch
<b>Hydrocarbons</b>								
EPH (C10-C19)	mg/kg	<100	<100	<100	9083746	<100	100	9083792
EPH (C19-C32)	mg/kg	<100	<100	<100	9083746	<100	100	9083792
<b>Surrogate Recovery (%)</b>								
O-TERPHENYL (sur.)	%	82	84	81	9083746	84		9083792
RDL = Reportable Detection Limit								

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

<b>Maxxam ID</b>		TY2785		
<b>Sampling Date</b>		2018/07/25		
<b>COC Number</b>		560386-02-01		
	<b>UNITS</b>	<b>MW18-34 SA01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>				
Soluble (2:1) pH	pH	8.79	N/A	9118359
<b>Total Metals by ICPMS</b>				
Total Aluminum (Al)	mg/kg	12600	100	9118303
Total Antimony (Sb)	mg/kg	1.16	0.10	9118303
Total Arsenic (As)	mg/kg	9.64	0.50	9118303
Total Barium (Ba)	mg/kg	167	0.10	9118303
Total Beryllium (Be)	mg/kg	0.38	0.20	9118303
Total Bismuth (Bi)	mg/kg	0.14	0.10	9118303
Total Boron (B)	mg/kg	2.3	1.0	9118303
Total Cadmium (Cd)	mg/kg	0.918	0.050	9118303
Total Calcium (Ca)	mg/kg	22200	100	9118303
Total Chromium (Cr)	mg/kg	40.0	1.0	9118303
Total Cobalt (Co)	mg/kg	9.61	0.30	9118303
Total Copper (Cu)	mg/kg	29.4	0.50	9118303
Total Iron (Fe)	mg/kg	23800	100	9118303
Total Lead (Pb)	mg/kg	47.5	0.10	9118303
Total Lithium (Li)	mg/kg	10.2	5.0	9118303
Total Magnesium (Mg)	mg/kg	8600	100	9118303
Total Manganese (Mn)	mg/kg	436	0.20	9118303
Total Mercury (Hg)	mg/kg	<0.050	0.050	9118303
Total Molybdenum (Mo)	mg/kg	1.07	0.10	9118303
Total Nickel (Ni)	mg/kg	33.1	0.80	9118303
Total Phosphorus (P)	mg/kg	830	10	9118303
Total Potassium (K)	mg/kg	1320	100	9118303
Total Selenium (Se)	mg/kg	<0.50	0.50	9118303
Total Silver (Ag)	mg/kg	0.570	0.050	9118303
Total Sodium (Na)	mg/kg	314	100	9118303
Total Strontium (Sr)	mg/kg	67.7	0.10	9118303
Total Thallium (Tl)	mg/kg	0.104	0.050	9118303
Total Tin (Sn)	mg/kg	0.63	0.10	9118303
Total Titanium (Ti)	mg/kg	839	1.0	9118303
Total Tungsten (W)	mg/kg	<0.50	0.50	9118303
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

<b>Maxxam ID</b>		TY2785		
<b>Sampling Date</b>		2018/07/25		
<b>COC Number</b>		560386-02-01		
	<b>UNITS</b>	<b>MW18-34 SA01</b>	<b>RDL</b>	<b>QC Batch</b>
Total Uranium (U)	mg/kg	1.25	0.050	9118303
Total Vanadium (V)	mg/kg	49.3	2.0	9118303
Total Zinc (Zn)	mg/kg	92.4	1.0	9118303
Total Zirconium (Zr)	mg/kg	5.52	0.50	9118303
RDL = Reportable Detection Limit				

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### GENERAL COMMENTS

Version 2: Revised report reissued to include results for TOC and Grain Size on samples MW18-33 SA06 and MW18-44 SA06 as per request from Matthew Deane on 2018/08/10

Version 3: Report reissued to include results for metals and TOC on sample MW18-34 SA01 as per request from Matthew Deane on 2018/08/23  
Sample analyzed past hold time. Analysis performed with client's consent.

**Results relate only to the items tested.**

Maxxam Job #: B862213  
Report Date: 2018/08/30

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9083746	O-TERPHENYL (sur.)	2018/07/31	81	60 - 140	77	60 - 140	84	%				
9083792	O-TERPHENYL (sur.)	2018/07/31	82	60 - 140	82	60 - 140	82	%				
9082290	Moisture	2018/07/28					<0.30	%	11	20		
9083746	EPH (C10-C19)	2018/07/31	81	60 - 140	84	70 - 130	<100	mg/kg	NC	40		
9083746	EPH (C19-C32)	2018/07/31	84	60 - 140	88	70 - 130	<100	mg/kg	NC	40		
9083792	EPH (C10-C19)	2018/07/31	83	60 - 140	84	70 - 130	<100	mg/kg				
9083792	EPH (C19-C32)	2018/07/31	86	60 - 140	87	70 - 130	<100	mg/kg				
9103384	% sand by hydrometer	2018/08/16							4.4	35	102	90 - 110
9103384	% silt by hydrometer	2018/08/16							1.9	35		
9103384	Clay Content	2018/08/16							2.5	35		
9103384	Gravel	2018/08/16							26	35		
9118303	Total Aluminum (Al)	2018/08/27					<100	mg/kg			99	70 - 130
9118303	Total Antimony (Sb)	2018/08/27	98	75 - 125	102	75 - 125	<0.10	mg/kg			132 (1)	70 - 130
9118303	Total Arsenic (As)	2018/08/27	100	75 - 125	99	75 - 125	<0.50	mg/kg	5.8	30	100	70 - 130
9118303	Total Barium (Ba)	2018/08/27	106	75 - 125	99	75 - 125	<0.10	mg/kg	0.55	40	110	70 - 130
9118303	Total Beryllium (Be)	2018/08/27	97	75 - 125	94	75 - 125	<0.20	mg/kg			103	70 - 130
9118303	Total Bismuth (Bi)	2018/08/27					<0.10	mg/kg				
9118303	Total Boron (B)	2018/08/27					<1.0	mg/kg				
9118303	Total Cadmium (Cd)	2018/08/27	98	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	101	70 - 130
9118303	Total Calcium (Ca)	2018/08/27					<100	mg/kg	3.3	30	107	70 - 130
9118303	Total Chromium (Cr)	2018/08/27	98	75 - 125	102	75 - 125	<1.0	mg/kg	10	30	107	70 - 130
9118303	Total Cobalt (Co)	2018/08/27	97	75 - 125	99	75 - 125	<0.30	mg/kg			104	70 - 130
9118303	Total Copper (Cu)	2018/08/27	96	75 - 125	99	75 - 125	<0.50	mg/kg	7.3	30	110	70 - 130
9118303	Total Iron (Fe)	2018/08/27					<100	mg/kg	9.3	30	110	70 - 130
9118303	Total Lead (Pb)	2018/08/27	101	75 - 125	103	75 - 125	<0.10	mg/kg	25	40	123	70 - 130
9118303	Total Lithium (Li)	2018/08/27	100	75 - 125	96	75 - 125	<5.0	mg/kg			101	70 - 130
9118303	Total Magnesium (Mg)	2018/08/27					<100	mg/kg	1.7	30	109	70 - 130
9118303	Total Manganese (Mn)	2018/08/27	NC	75 - 125	97	75 - 125	<0.20	mg/kg			106	70 - 130
9118303	Total Mercury (Hg)	2018/08/27	101	75 - 125	102	75 - 125	<0.050	mg/kg			100	70 - 130
9118303	Total Molybdenum (Mo)	2018/08/27	101	75 - 125	100	75 - 125	<0.10	mg/kg			112	70 - 130
9118303	Total Nickel (Ni)	2018/08/27	97	75 - 125	98	75 - 125	<0.80	mg/kg			113	70 - 130

Maxxam Job #: B862213  
Report Date: 2018/08/30

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9118303	Total Phosphorus (P)	2018/08/27					<10	mg/kg	1.8	30	106	70 - 130
9118303	Total Potassium (K)	2018/08/27					<100	mg/kg			92	70 - 130
9118303	Total Selenium (Se)	2018/08/27	102	75 - 125	103	75 - 125	<0.50	mg/kg				
9118303	Total Silver (Ag)	2018/08/27	101	75 - 125	103	75 - 125	<0.050	mg/kg	NC	40	128	70 - 130
9118303	Total Sodium (Na)	2018/08/27					<100	mg/kg			97	70 - 130
9118303	Total Strontium (Sr)	2018/08/27	105	75 - 125	97	75 - 125	<0.10	mg/kg			113	70 - 130
9118303	Total Thallium (Tl)	2018/08/27	99	75 - 125	101	75 - 125	<0.050	mg/kg			88	70 - 130
9118303	Total Tin (Sn)	2018/08/27	103	75 - 125	104	75 - 125	<0.10	mg/kg	10	40	104	70 - 130
9118303	Total Titanium (Ti)	2018/08/27	NC	75 - 125	98	75 - 125	<1.0	mg/kg				
9118303	Total Tungsten (W)	2018/08/27					<0.50	mg/kg				
9118303	Total Uranium (U)	2018/08/27	103	75 - 125	102	75 - 125	<0.050	mg/kg			99	70 - 130
9118303	Total Vanadium (V)	2018/08/27	89	75 - 125	98	75 - 125	<2.0	mg/kg			108	70 - 130
9118303	Total Zinc (Zn)	2018/08/27	90	75 - 125	96	75 - 125	<1.0	mg/kg	6.8	30	106	70 - 130
9118303	Total Zirconium (Zr)	2018/08/27					<0.50	mg/kg				
9118359	Soluble (2:1) pH	2018/08/27			100	97 - 103			1.4	20		

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

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

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

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

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

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

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

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

(1) Reference Material exceeds acceptance criteria for Sb. 10% of analytes failure in multielement scan is allowed.

Maxxam Job #: B862213  
Report Date: 2018/08/30

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



---

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



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Jose Cueva, Supervisor, Organics-VOC & HC



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Thomas Pinchin, Junior Project Manager

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Matthew Deane	Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name		P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MD



Regulatory Criteria	Special Instructions	Analysis Requested						Turnaround Time (TAT) Required				
		Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/PH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	EPA	WOOD	Regular (Standard) TAT <input checked="" type="checkbox"/>
<p>Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form</p> <p>Samples must be kept cool (&lt; 10°C) from time of sampling until delivery to maxxam</p>												

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/PH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	EPA	WOOD	# of Bottles	Comments
1	MW18-44 SA05	7/24/18		SOIL									X		4	RECEIVED IN WHITEHORSE
2	MW18-44 SA06	7/24/18												X	4	BY: shawn@0900
3	MW18-33 SA01													X	1	2018-07-25
4														X	1	
5														X	1	TEMP: 8/7/18
6														X	1	
7													X		2	
8														X	2	
9														X	4	
10														X	2	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
MD	18/07/18	2000	SHAWN JAWB JOY	2018/07/26	15:05		Time Sensitive <input type="checkbox"/>	Temperature (°C) on Receipt: 7.6/10	Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

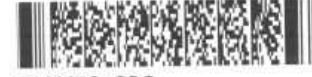
0074

ICE: YES



Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free 800-563-6266 Fax: (604) 731 2386 www.maxxam.ca

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221151
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MD



B862213\_COC

Bottle Order #: 560386  
 Project Manager: Nahed Amer

Regulatory Criteria	Special Instructions	Analysis Requested									
		Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	ERY	HOLD

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

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

**Job Specific Rush TAT (if applies to entire submission)**  
 Date Required: \_\_\_\_\_ Time Required: \_\_\_\_\_

Rush Confirmation Number: \_\_\_\_\_ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form  
 Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	ERY	HOLD	# of Bottles	Comments
1	MW18-44 SA01	18/07/24		SPIL											2	
2	MW18-34 SA01														1	RECEIVED IN WHITEHORSE
3	SA02														1	BY: styano@0900
4	SA03														1	2018-07-25
5	SA04														1	TEMP: 8, 7, 8
6	SA05											X			2	
7	SA06											X			4	
8	SA07												X		1	
9	SA08												X		1	
10																

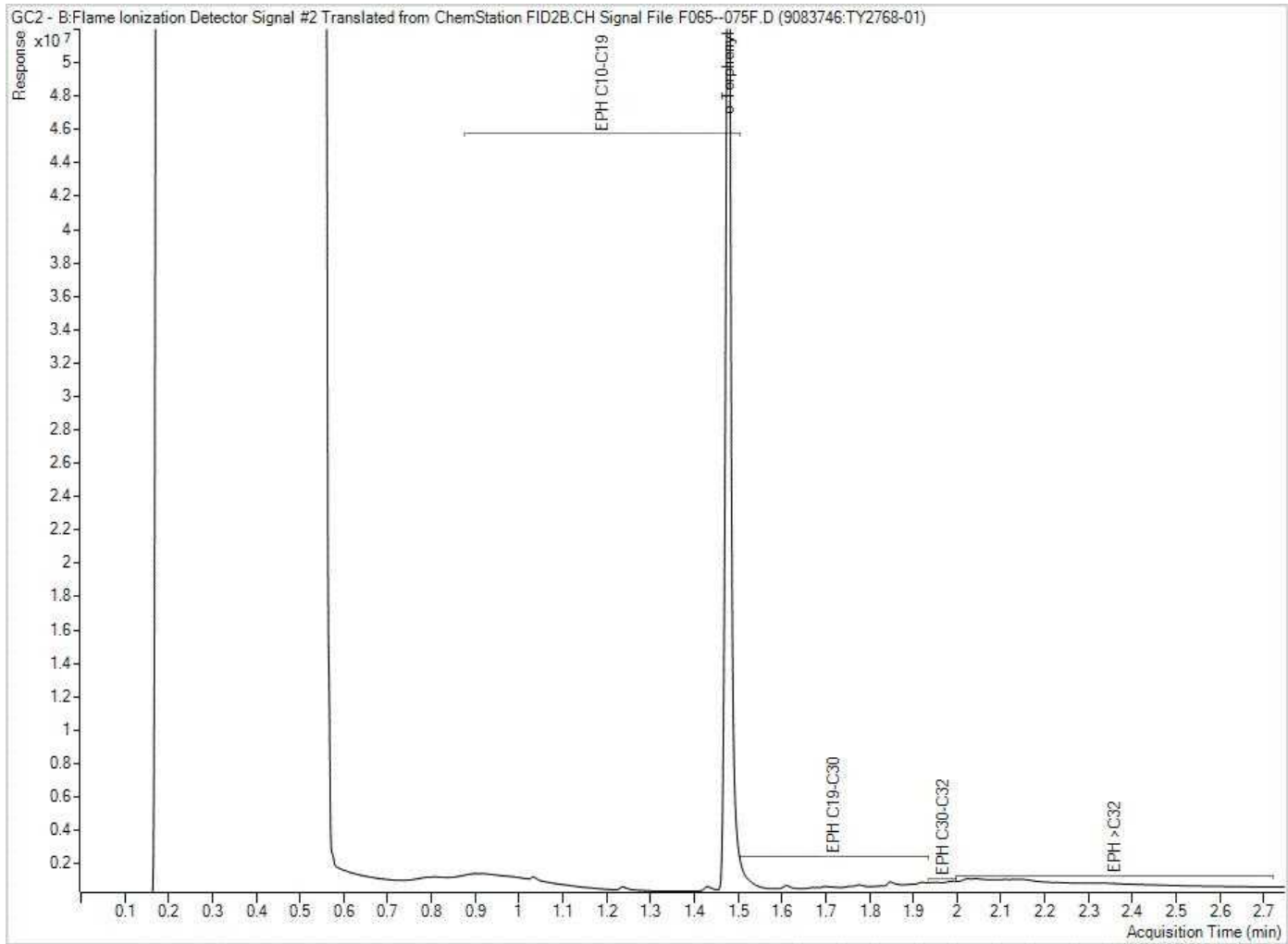
Relinquished By: (Signature/Print)	Date: (YY/MM/DD)	Time	Received By: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
MD	18/07/24	2000	SHAN JIA/DB JOY	2018/07/26	15:05		Time Sensitive	Temperature (°C) on Receipt	Customary Seal Intact on Cooler?
							<input type="checkbox"/>	7.6/1.0	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
 \* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

1CB:4B3

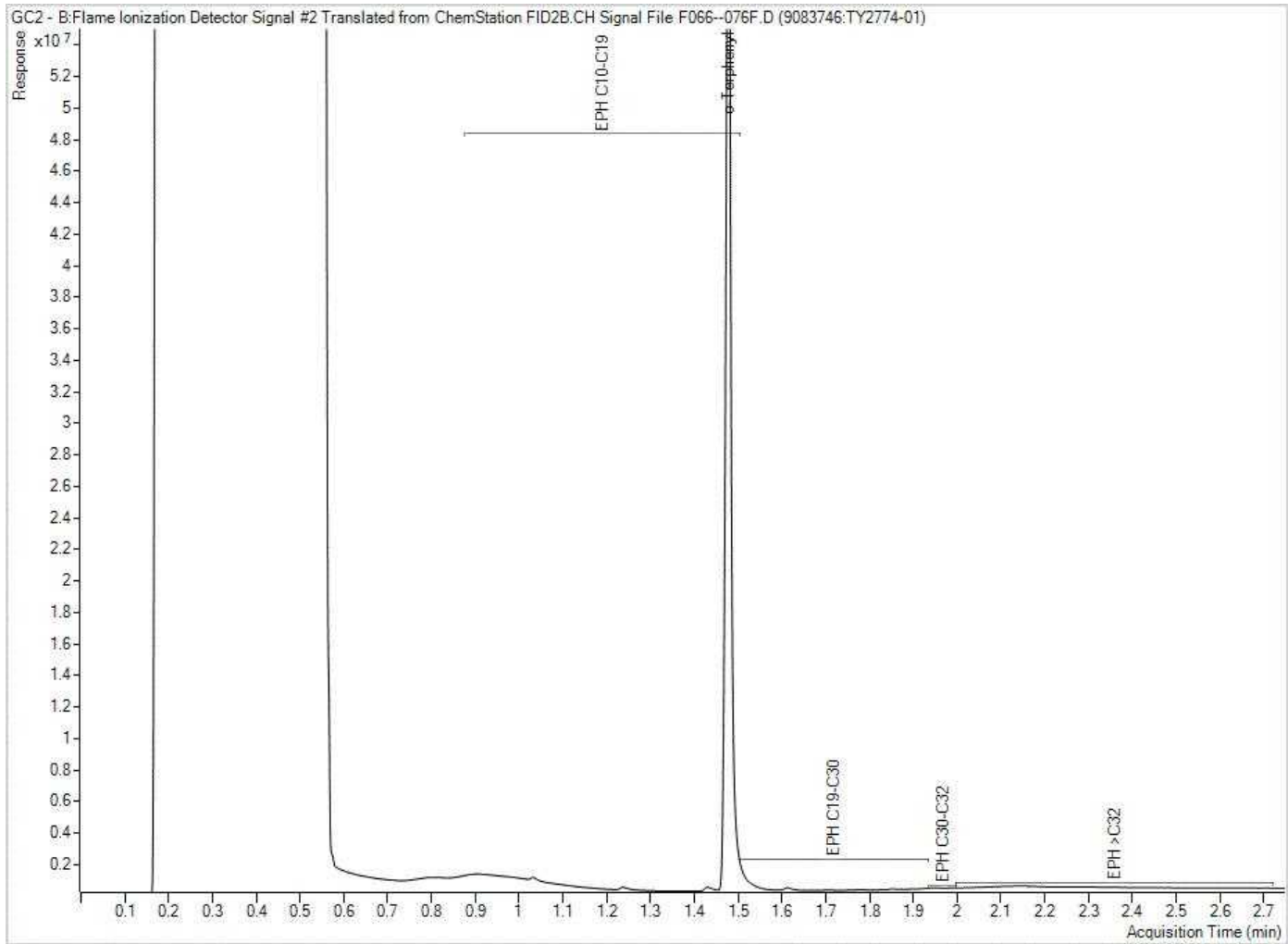
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EPH in Soil by GC/FID Chromatogram



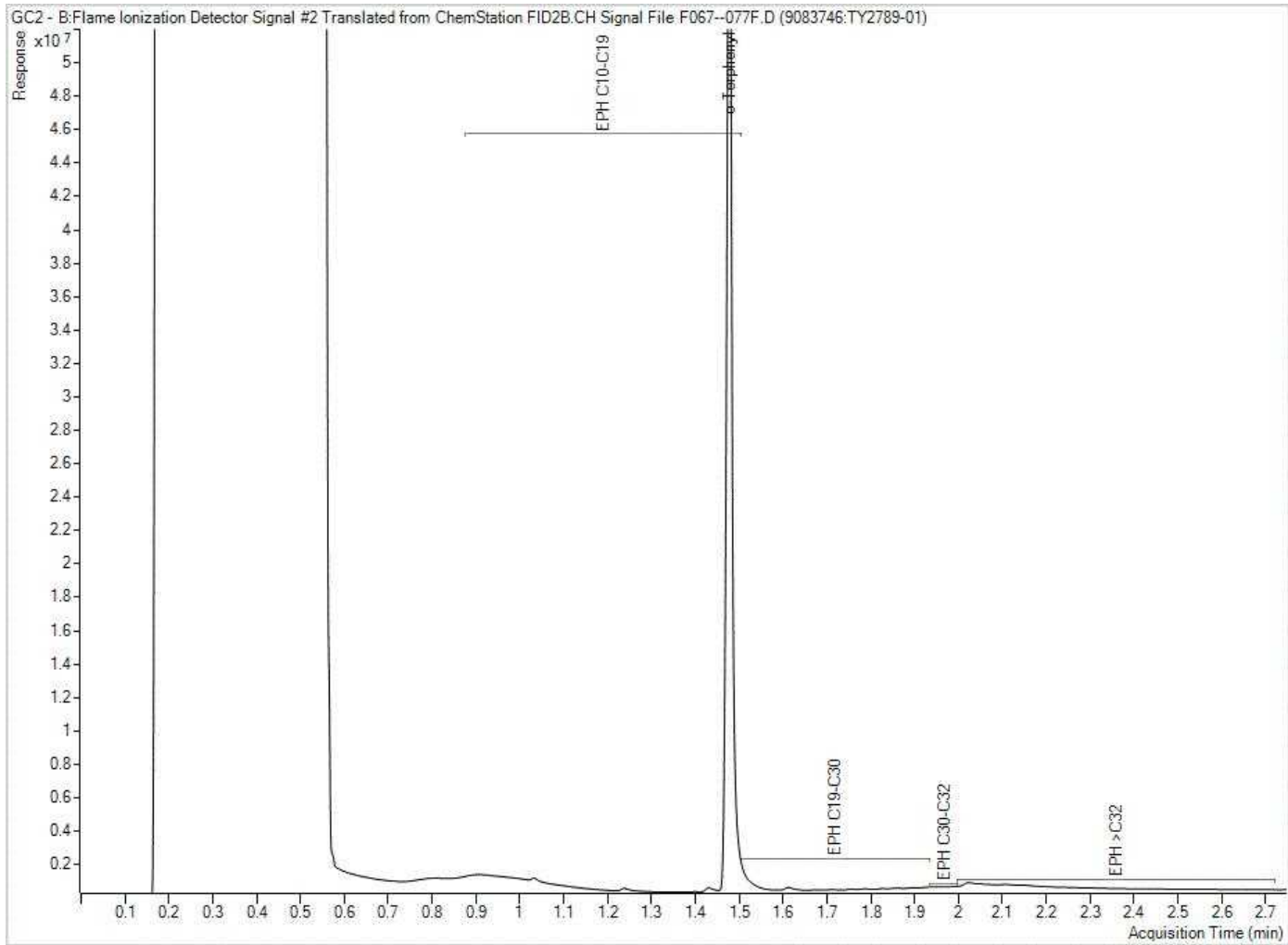
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



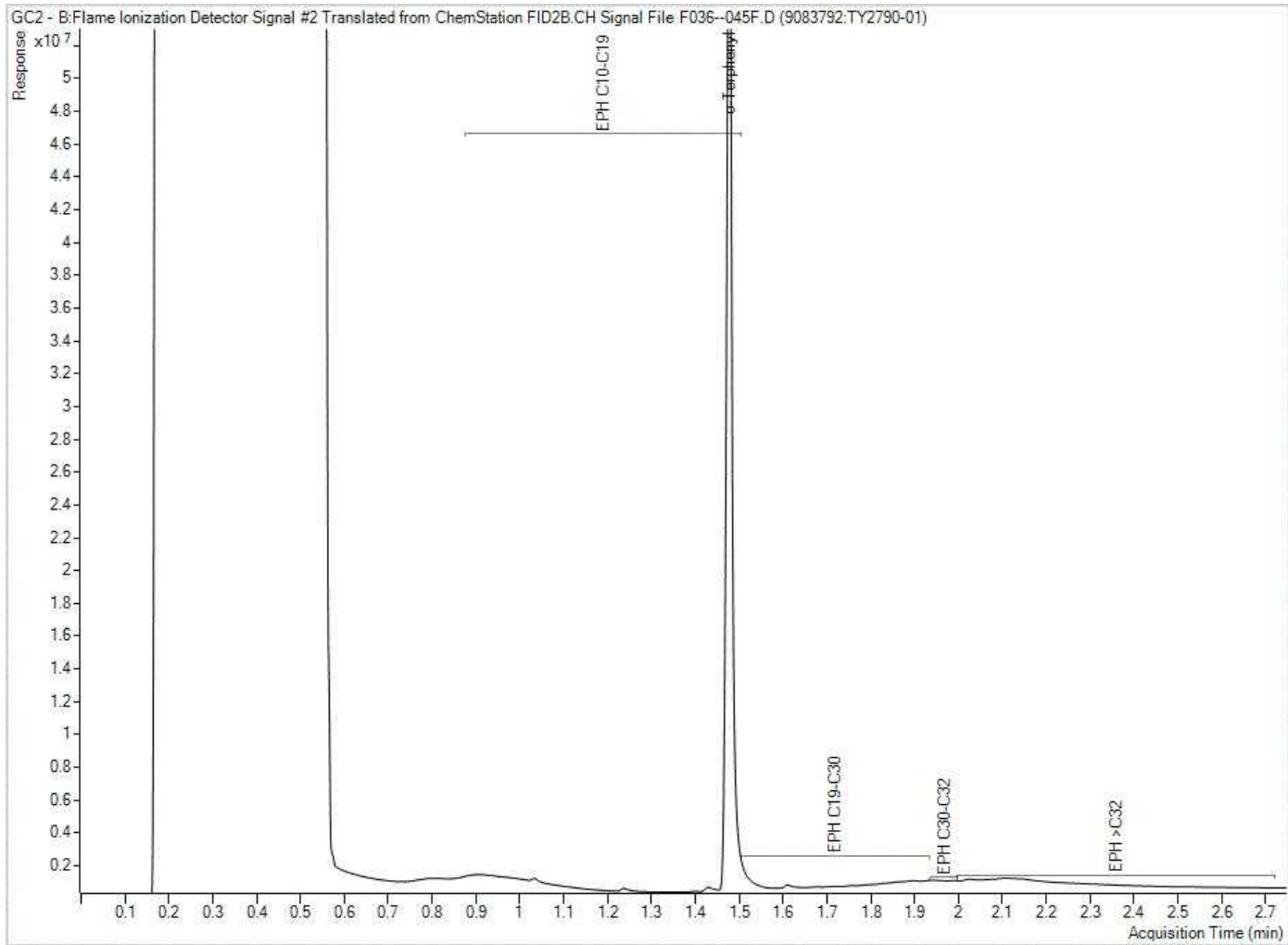
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



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

EPH in Soil by GC/FID Chromatogram



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

Your P.O. #: 1232  
 Your Project #: 123221161  
 Site#: B862213  
 Your C.O.C. #: B862213-ONTV-01-01

**Attention: Stantec Reporting**

Maxxam Analytics  
 Burnaby (Stantec)  
 4606 Canada Way  
 Burnaby, BC  
 CANADA V5G 1K5

**Report Date: 2018/08/17**  
 Report #: R5360806  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K5399**  
**Received: 2018/08/13, 10:28**

Sample Matrix: Soil  
 # Samples Received: 2

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Reference</b>
Total Organic Carbon in Soil	2	N/A	2018/08/16	CAM SOP-00468	BCMOE TOC Aug 2014

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Your P.O. #: 1232  
Your Project #: 123221161  
Site#: B862213  
Your C.O.C. #: B862213-ONTV-01-01

**Attention: Stantec Reporting**

Maxxam Analytics  
Burnaby (Stantec)  
4606 Canada Way  
Burnaby, BC  
CANADA V5G 1K5

**Report Date: 2018/08/17**  
Report #: R5360806  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K5399**  
**Received: 2018/08/13, 10:28**

Encryption Key

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

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



**RESULTS OF ANALYSES OF SOIL**

<b>Maxxam ID</b>		HLM622	HLM623		
<b>Sampling Date</b>		2018/07/24	2018/07/24		
<b>COC Number</b>		B862213-ONTV-01-01	B862213-ONTV-01-01		
	<b>UNITS</b>	<b>TY2769-MW18-44 SA06</b>	<b>TY2775-MW18-33 SA06</b>	<b>RDL</b>	<b>QC Batch</b>
Total Organic Carbon	mg/kg	1200	<500	500	5680650
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

**TEST SUMMARY**

**Maxxam ID:** HLM622  
**Sample ID:** TY2769-MW18-44 SA06  
**Matrix:** Soil

**Collected:** 2018/07/24  
**Shipped:**  
**Received:** 2018/08/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5680650	N/A	2018/08/16	Charles Opoku-Ware

**Maxxam ID:** HLM623  
**Sample ID:** TY2775-MW18-33 SA06  
**Matrix:** Soil

**Collected:** 2018/07/24  
**Shipped:**  
**Received:** 2018/08/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5680650	N/A	2018/08/16	Charles Opoku-Ware

**GENERAL COMMENTS**

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

Package 1	17.7°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5680650	Total Organic Carbon	2018/08/16	<500	mg/kg	0.33	35	103	75 - 125

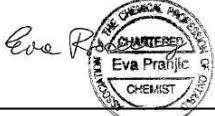
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

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

### VALIDATION SIGNATURE PAGE

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



---

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

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 123221161  
Your C.O.C. #: 560386-04-01, 560386-03-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/02**  
Report #: R2599071  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B862756**  
**Received: 2018/07/26, 09:00**

Sample Matrix: Soil  
# Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1)	3	N/A	2018/07/31	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Moisture	4	2018/07/28	2018/07/28	BBY8SOP-00017	BCMOE BCLM Dec2000 m
EPH in Soil by GC/FID	4	2018/07/28	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
Volatile HC-BTEX for Soil (2)	3	N/A	2018/08/02	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.

(2) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Your Project #: 123221161  
Your C.O.C. #: 560386-04-01, 560386-03-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/02**  
Report #: R2599071  
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**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B862756**  
**Received: 2018/07/26, 09:00**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B862756  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		TY5286	TY5296	TY5297	TY5302		
<b>Sampling Date</b>		2018/07/25	2018/07/25	2018/07/25	2018/07/25		
<b>COC Number</b>		560386-04-01	560386-03-01	560386-03-01	560386-03-01		
	<b>UNITS</b>	<b>MW18-45 SA05</b>	<b>MW18-43 SA05</b>	<b>MW18-43 SA06</b>	<b>QC18-01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>							
Moisture	%	19	2.1	15	12	0.30	9082660
RDL = Reportable Detection Limit							



Maxxam Job #: B862756  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161  
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**TOTAL PETROLEUM HYDROCARBONS (SOIL)**

Maxxam ID		TY5286	TY5296	TY5297	TY5302		
Sampling Date		2018/07/25	2018/07/25	2018/07/25	2018/07/25		
COC Number		560386-04-01	560386-03-01	560386-03-01	560386-03-01		
	UNITS	MW18-45 SA05	MW18-43 SA05	MW18-43 SA06	QC18-01	RDL	QC Batch
<b>Hydrocarbons</b>							
EPH (C10-C19)	mg/kg	<100	<100	<100	<100	100	9083792
EPH (C19-C32)	mg/kg	<100	<100	<100	<100	100	9083792
<b>Surrogate Recovery (%)</b>							
O-TERPHENYL (sur.)	%	83	82	83	84		9083792
RDL = Reportable Detection Limit							

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Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

Maxxam ID		TY5286	TY5297	TY5302		
Sampling Date		2018/07/25	2018/07/25	2018/07/25		
COC Number		560386-04-01	560386-03-01	560386-03-01		
	UNITS	MW18-45 SA05	MW18-43 SA06	QC18-01	RDL	QC Batch
<b>Calculated Parameters</b>						
VPH (VH6 to 10 - BTEX)	mg/kg	<10	<10	<10	10	9082615
<b>Volatiles</b>						
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	0.10	9084347
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	0.0050	9084347
Toluene	mg/kg	<0.020	<0.020	<0.020	0.020	9084347
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	0.010	9084347
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	0.040	9084347
o-Xylene	mg/kg	<0.040	<0.040	<0.040	0.040	9084347
Styrene	mg/kg	<0.030	<0.030	<0.030	0.030	9084347
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	0.040	9084347
VH C6-C10	mg/kg	<10	<10	<10	10	9084347
<b>Surrogate Recovery (%)</b>						
1,4-Difluorobenzene (sur.)	%	105	105	105		9084347
4-Bromofluorobenzene (sur.)	%	101	100	100		9084347
D10-ETHYLBENZENE (sur.)	%	101	98	101		9084347
D4-1,2-Dichloroethane (sur.)	%	104	105	104		9084347
RDL = Reportable Detection Limit						

Maxxam Job #: B862756  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
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**GENERAL COMMENTS**

**Results relate only to the items tested.**

Maxxam Job #: B862756  
Report Date: 2018/08/02

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9083792	O-TERPHENYL (sur.)	2018/07/31	82	60 - 140	82	60 - 140	82	%		
9084347	1,4-Difluorobenzene (sur.)	2018/07/31	103	70 - 130	102	70 - 130	105	%		
9084347	4-Bromofluorobenzene (sur.)	2018/07/31	100	70 - 130	99	70 - 130	100	%		
9084347	D10-ETHYLBENZENE (sur.)	2018/07/31	96	60 - 130	84	60 - 130	91	%		
9084347	D4-1,2-Dichloroethane (sur.)	2018/07/31	92	70 - 130	92	70 - 130	100	%		
9082660	Moisture	2018/07/28					<0.30	%	6.5	20
9083792	EPH (C10-C19)	2018/07/31	83	60 - 140	84	70 - 130	<100	mg/kg		
9083792	EPH (C19-C32)	2018/07/31	86	60 - 140	87	70 - 130	<100	mg/kg		
9084347	Benzene	2018/07/31	88	60 - 140	93	70 - 130	<0.0050	mg/kg	NC	40
9084347	Ethylbenzene	2018/07/31	90	60 - 140	98	70 - 130	<0.010	mg/kg	8.9	40
9084347	m & p-Xylene	2018/07/31	90	60 - 140	98	70 - 130	<0.040	mg/kg	32	40
9084347	Methyl-tert-butylether (MTBE)	2018/07/31					<0.10	mg/kg	NC	40
9084347	o-Xylene	2018/07/31	91	60 - 140	101	70 - 130	<0.040	mg/kg	NC	40
9084347	Styrene	2018/07/31					<0.030	mg/kg	NC	40
9084347	Toluene	2018/07/31	86	60 - 140	92	70 - 130	<0.020	mg/kg	36	40
9084347	VH C6-C10	2018/07/31			71	70 - 130	<10	mg/kg	NC	40
9084347	Xylenes (Total)	2018/07/31					<0.040	mg/kg	32	40

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

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

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

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

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

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

Maxxam Job #: B862756  
Report Date: 2018/08/02

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



---

Jose Cueva, Supervisor, Organics-VOC & HC



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Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free 800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

Page 1 of 2

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Matthew Deane	Quotation #	B71770	Maxxam Job #	B862756
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #		Bottle Ord. #:	560386
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161	Chain Of Custody Record	Project Manager
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name		Barcode	Nashed Amer
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #		Barcode	
				Sampled By	MD	Barcode	

Regulatory Criteria	Special Instructions	Analysis Requested		Turnaround Time (TAT) Required	
		Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Please provide advance notice for rush projects	
		LEPH/HEP/PAH	Dissolved Metals (with Hg)	Regular (Standard) TAT	
		BTEX/MPH	Nutrients (TP, NH4, TKN)	(will be applied if Rush TAT is not specified)	
			Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Standard TAT = 5-7 Working days for most tests.	
			Carbon (DOC)	Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
				Job Specific Rush TAT (if applies to entire submission)	
				Date Required: _____ Time Required: _____	
				Rush Confirmation Number _____ (call lab for #)	

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/MPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	EM	HO	# of Bottles	Comments
1	MW18-45 SA01	18/07/15		SOIL									X		1	RECEIVED IN WHITEHORSE BY: <u>Slyons@0900</u> 2018-07-26 TEMP: 7/7/19
2	SA02												X		1	
3	SA03												X		1	
4	SA04												X		1	
5	SA05							X				X			4	
6	SA06												X		2	
7	SA07												X		1	
8	SA08												X		1	
9	MW18-43 SA01												X		1	B862756_COC
10	SA02												X		1	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal intact on Cooler?
<i>Matthew Deane</i>	18/07/15	18:00	<i>[Signature]</i>	20/07/17	07:00	20/07/17	<input checked="" type="checkbox"/>	6.6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
 \* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770	Maxxam Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #			
Address	Metrotower III Suite 500, 4730 Kingsway	Address		Project #	123221161	8862756	550386
	BURNABY BC V5H 4M1			Project Name		Chain Of Custody Record	Project Manager
Phone	(604) 436-3014 Fax (604) 436-3752	Phone		Site #			Nahed Amer
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Sampled By		CF50386-03-01	

Regulatory Criteria	Special Instructions	Analysis Requested		Turnaround Time (TAT) Required	
		Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Please provide advance notice for rush projects	
		LEPH/HEP/PAH	Dissolved Metals (with Hg)	Regular (Standard) TAT	
		BTEX/APH	Nutrients (TP, NH4, TKN)	(will be applied if Rush TAT is not specified)	
			Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Standard TAT = 5-7 Working days for most tests.	
			Carbon (DOC)	Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.	
				Job Specific Rush TAT (if applies to entire submission)	
				Date Required: _____ Time Required: _____	
				Rush Confirmation Number _____ (call lab for #)	

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

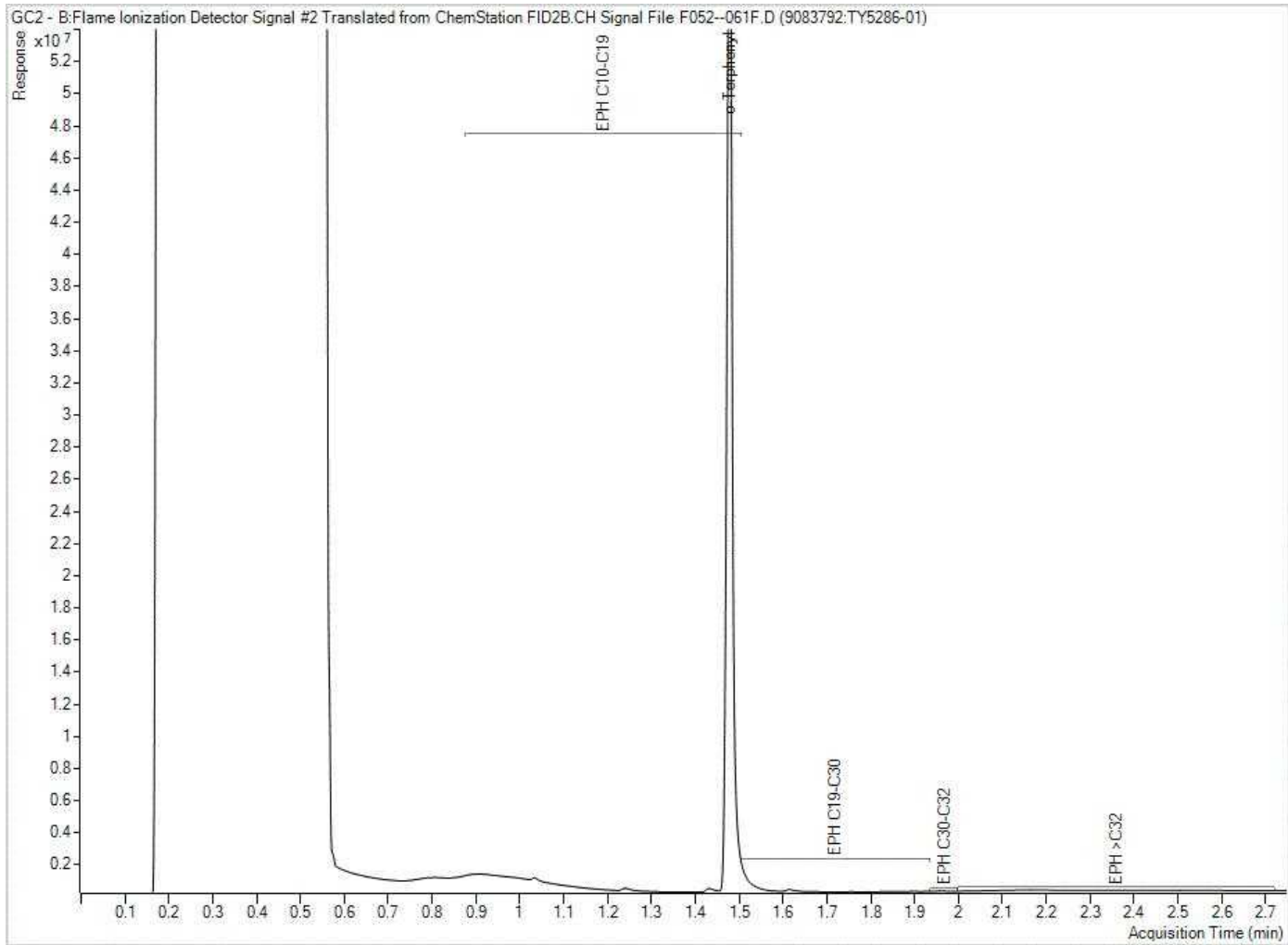
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	EPA	Hold	# of Bottles	Comments
1	MW18-43 SA03	15/07/25		Soil									X		1	RECEIVED IN WHITEHORSE
2	SA04												X		1	BY: Syam@0900
3	SA05												X		2	2018-07-20
4	SA06							X					X		4	
5	SA07												X		1	TEMP: 7 / 7 / 19
6	SA08												X		1	
7	SA09												X		1	
8	SA10												X		1	
9	QC18-31							X					X		4	
10																

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<i>[Signature]</i>	15/07/25	15:00	<i>[Signature]</i>	2018/07/22	07:00	1/1	Time Sensitive <input checked="" type="checkbox"/> Temperature (°C) on Receipt 6.6, 5.5
							Custody Sign/Intact on Cooler? <input type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

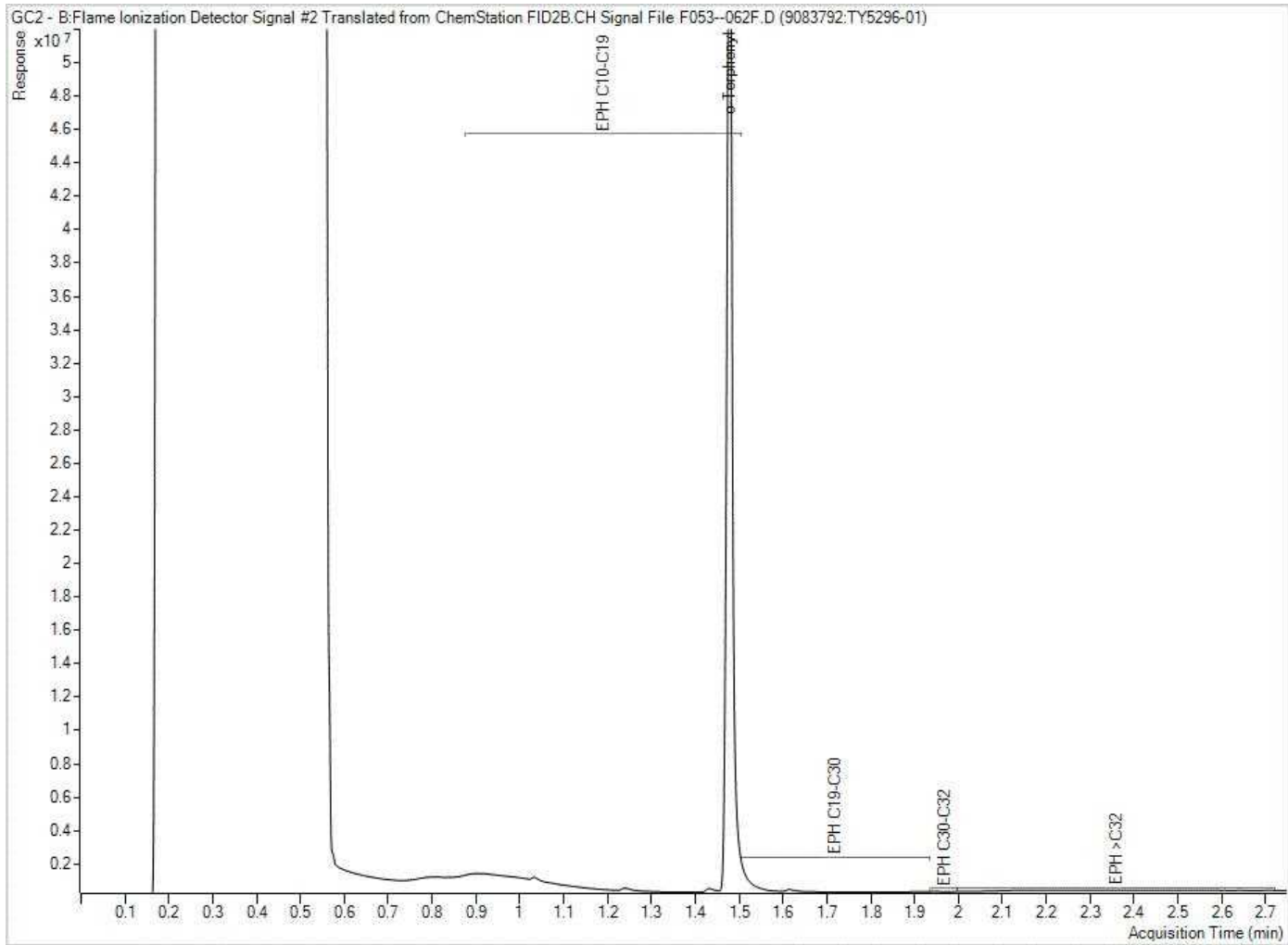
EPH in Soil by GC/FID Chromatogram



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

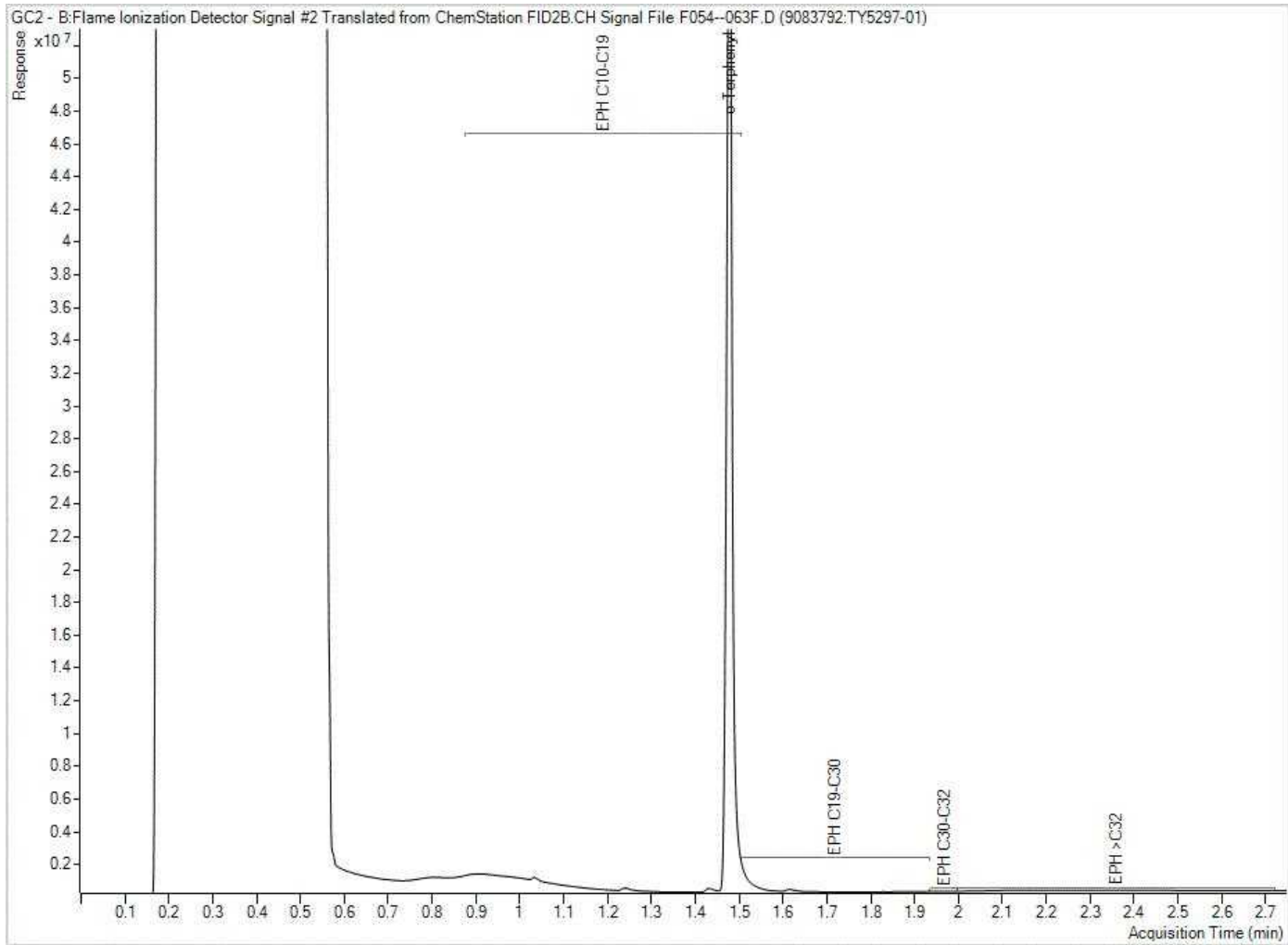


EPH in Soil by GC/FID Chromatogram



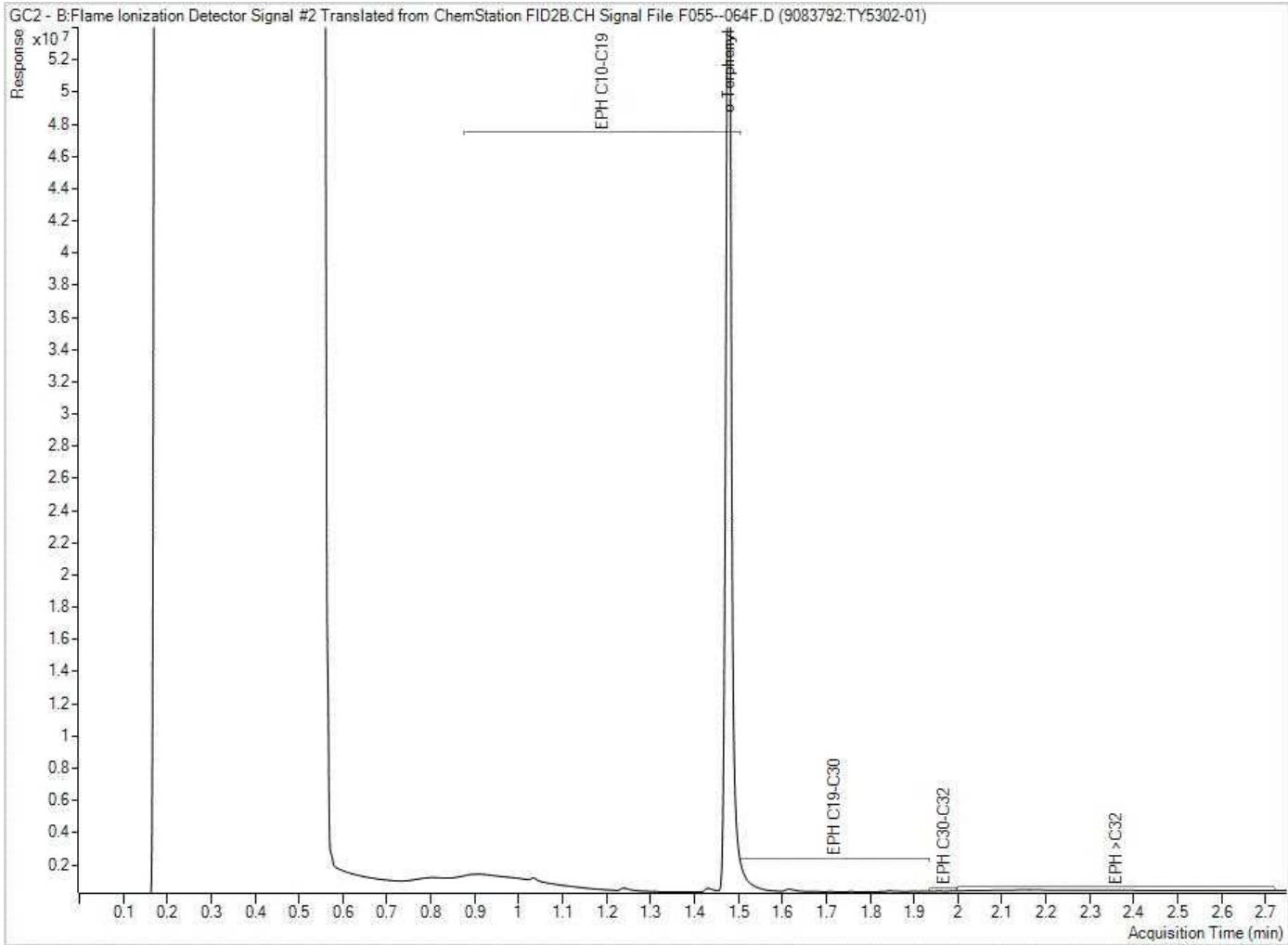
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



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EPH in Soil by GC/FID Chromatogram



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

Your Project #: 123221161  
Your C.O.C. #: 560386-05-01, 560386-06-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/17**  
Report #: R2605693  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862770**

**Received: 2018/07/27, 08:50**

Sample Matrix: Soil  
# Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH VH F1 in Soil - Field Pres. (2)	2	N/A	2018/07/31	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
BTEX/MTBE LH VH F1 in Soil - Field Pres. (2)	1	N/A	2018/08/01	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Moisture	3	2018/07/28	2018/07/28	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	1	2018/07/30	2018/07/31	BBY8SOP-00017	BCMOE BCLM Dec2000 m
PAH in Soil by GC/MS (SIM)	3	2018/07/28	2018/07/31	BBY8SOP-00022	BCMOE BCLM Jul2017m
PAH in Soil by GC/MS (SIM)	1	2018/07/30	2018/07/31	BBY8SOP-00022	BCMOE BCLM Jul2017m
Total PAH and B(a)P Calculation (3)	4	N/A	2018/07/31	BBY WI-00033	Auto Calc
EPH less PAH in Soil By GC/FID (4)	4	N/A	2018/07/31	BBY WI-00033	Auto Calc
EPH in Soil by GC/FID	3	2018/07/28	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	1	2018/07/30	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
Texture by Hydrometer, incl Gravel (Wet)	1	N/A	2018/08/16	BBY6SOP-00051	Carter 2nd ed 55.3
Volatile HC-BTEX for Soil (5)	2	N/A	2018/07/31	BBY WI-00033	Auto Calc
Volatile HC-BTEX for Soil (5)	1	N/A	2018/08/02	BBY WI-00033	Auto Calc
TOC Soil Subcontract (1)	1	N/A	2018/08/17		

**Remarks:**

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

Your Project #: 123221161  
Your C.O.C. #: 560386-05-01, 560386-06-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/08/17**  
Report #: R2605693  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862770**

**Received: 2018/07/27, 08:50**

dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

- (1) This test was performed by Maxxam Ontario (From Burnaby)
- (2) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.
- (3) Total PAHs in Soil include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

Total PAHs in Sediment include: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenz(a,h)anthracene.

(4) LEPH = EPH (C10 to C19) - (Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Benzo(b)fluoranthene + Benzo(k)fluoranthene + Dibenz(a,h)anthracene + Indeno(1,2,3-cd)pyrene + Pyrene)

(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**RESULTS OF CHEMICAL ANALYSES OF SOIL**

<b>Maxxam ID</b>		TY5396		TY5398		
<b>Sampling Date</b>		2018/07/26		2018/07/26		
<b>COC Number</b>		560386-05-01		560386-05-01		
	<b>UNITS</b>	<b>MW18-35 SA08</b>	<b>QC Batch</b>	<b>MW18-35 SA10</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Parameter</b>						
Subcontract Parameter	N/A	ATTACHED	9107498			
<b>Physical Properties</b>						
% sand by hydrometer	%			25	2.0	9103384
% silt by hydrometer	%			41	2.0	9103384
Clay Content	%			7.0	2.0	9103384
Gravel	%			27	2.0	9103384
RDL = Reportable Detection Limit						

Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		TY5396	TY5398		TY5399	TY5399		
<b>Sampling Date</b>		2018/07/26	2018/07/26		2018/07/26	2018/07/26		
<b>COC Number</b>		560386-05-01	560386-05-01		560386-06-01	560386-06-01		
	<b>UNITS</b>	<b>MW18-35 SA08</b>	<b>MW18-35 SA10</b>	<b>QC Batch</b>	<b>MW18-35 SA11</b>	<b>MW18-35 SA11 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>								
Moisture	%	14	19	9082660	18	18	0.30	9084606
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								

<b>Maxxam ID</b>		TY5405		
<b>Sampling Date</b>		2018/07/26		
<b>COC Number</b>		560386-06-01		
	<b>UNITS</b>	<b>QC18-02</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>				
Moisture	%	19	0.30	9082660
RDL = Reportable Detection Limit				

Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

Maxxam ID		TY5396	TY5398		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	QC18-02	RDL	QC Batch
<b>Calculated Parameters</b>							
VPH (VH6 to 10 - BTEX)	mg/kg	<10	<10	9082615	<10	10	9082615
<b>Volatiles</b>							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	9085249	<0.10	0.10	9087637
Benzene	mg/kg	<0.0050	<0.0050	9085249	0.036	0.0050	9087637
Toluene	mg/kg	<0.020	<0.020	9085249	0.049	0.020	9087637
Ethylbenzene	mg/kg	<0.010	<0.010	9085249	0.050	0.010	9087637
m & p-Xylene	mg/kg	<0.040	<0.040	9085249	0.047	0.040	9087637
o-Xylene	mg/kg	<0.040	<0.040	9085249	0.048	0.040	9087637
Styrene	mg/kg	<0.030	<0.030	9085249	<0.030	0.030	9087637
Xylenes (Total)	mg/kg	<0.040	<0.040	9085249	0.095	0.040	9087637
VH C6-C10	mg/kg	<10	<10	9085249	<10	10	9087637
<b>Surrogate Recovery (%)</b>							
1,4-Difluorobenzene (sur.)	%	106	105	9085249	105		9087637
4-Bromofluorobenzene (sur.)	%	101	101	9085249	102		9087637
D10-ETHYLBENZENE (sur.)	%	98	103	9085249	99		9087637
D4-1,2-Dichloroethane (sur.)	%	105	104	9085249	104		9087637
RDL = Reportable Detection Limit							



Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TY5396	TY5398		TY5399		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	MW18-35 SA11	QC Batch	QC18-02	RDL	QC Batch
<b>Calculated Parameters</b>									
Low Molecular Weight PAH's	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
High Molecular Weight PAH's	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
Total PAH	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
<b>Polycyclic Aromatics</b>									
Naphthalene	mg/kg	<0.010	<0.010	9084780	<0.010	9084780	<0.010	0.010	9084780
1-Methylnaphthalene	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
2-Methylnaphthalene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Acenaphthylene	mg/kg	<0.0050	<0.0050	9084780	<0.0050	9084780	<0.0050	0.0050	9084780
Acenaphthene	mg/kg	<0.0050	<0.0050	9084780	<0.0050	9084780	<0.0050	0.0050	9084780
Fluorene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Phenanthrene	mg/kg	<0.010	<0.010	9084780	<0.010	9084780	<0.010	0.010	9084780
Anthracene	mg/kg	<0.0040	<0.0040	9084780	<0.0040	9084780	<0.0040	0.0040	9084780
Acridine	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
Fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(a)anthracene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Chrysene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(a)pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Dibenz(a,h)anthracene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
<b>Calculated Parameters</b>									
LEPH (C10-C19 less PAH)	mg/kg	<100	<100	9082613	<100	9084002	<100	100	9082613
HEPH (C19-C32 less PAH)	mg/kg	<100	<100	9082613	<100	9084002	<100	100	9082613
<b>Hydrocarbons</b>									
EPH (C10-C19)	mg/kg	<100	<100	9084776	<100	9084776	<100	100	9084776
EPH (C19-C32)	mg/kg	<100	<100	9084776	<100	9084776	<100	100	9084776
<b>Surrogate Recovery (%)</b>									
D10-ANTHRACENE (sur.)	%	67	66	9084780	72	9084780	70		9084780
D8-ACENAPHTHYLENE (sur.)	%	72	71	9084780	71	9084780	74		9084780
RDL = Reportable Detection Limit									

Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TY5396	TY5398		TY5399		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	MW18-35 SA11	QC Batch	QC18-02	RDL	QC Batch
D8-NAPHTHALENE (sur.)	%	70	69	9084780	70	9084780	70		9084780
TERPHENYL-D14 (sur.)	%	74	73	9084780	74	9084780	75		9084780
O-TERPHENYL (sur.)	%	87	88	9084776	86	9084776	84		9084776
RDL = Reportable Detection Limit									

Maxxam Job #: B862770  
Report Date: 2018/08/17

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### GENERAL COMMENTS

Version 3: Report reissued to include results for TOC and Grain Size on samples MW18-35 SA08 and MW18-35 SA10 as per request from Matthew Deane on 2018/08/10

**Results relate only to the items tested.**

Maxxam Job #: B862770  
Report Date: 2018/08/17

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9084776	O-TERPHENYL (sur.)	2018/07/31	89	60 - 140	86	60 - 140	85	%				
9084780	D10-ANTHRACENE (sur.)	2018/07/31	71	50 - 140	72	50 - 140	76	%				
9084780	D8-ACENAPHTHYLENE (sur.)	2018/07/31	69	50 - 140	69	50 - 140	67	%				
9084780	D8-NAPHTHALENE (sur.)	2018/07/31	70	50 - 140	61	50 - 140	66	%				
9084780	TERPHENYL-D14 (sur.)	2018/07/31	74	50 - 140	72	50 - 140	76	%				
9085249	1,4-Difluorobenzene (sur.)	2018/07/31	101	70 - 130	103	70 - 130	105	%				
9085249	4-Bromofluorobenzene (sur.)	2018/07/31	101	70 - 130	101	70 - 130	100	%				
9085249	D10-ETHYLBENZENE (sur.)	2018/07/31	99	60 - 130	87	60 - 130	94	%				
9085249	D4-1,2-Dichloroethane (sur.)	2018/07/31	95	70 - 130	92	70 - 130	105	%				
9087637	1,4-Difluorobenzene (sur.)	2018/08/01	102	70 - 130	103	70 - 130	105	%				
9087637	4-Bromofluorobenzene (sur.)	2018/08/01	100	70 - 130	102	70 - 130	101	%				
9087637	D10-ETHYLBENZENE (sur.)	2018/08/01	103	60 - 130	84	60 - 130	87	%				
9087637	D4-1,2-Dichloroethane (sur.)	2018/08/01	96	70 - 130	94	70 - 130	105	%				
9082660	Moisture	2018/07/28					<0.30	%	6.5	20		
9084606	Moisture	2018/07/31					<0.30	%	1.7	20		
9084776	EPH (C10-C19)	2018/07/31	87	60 - 140	84	70 - 130	<100	mg/kg	NC	40		
9084776	EPH (C19-C32)	2018/07/31	90	60 - 140	88	70 - 130	<100	mg/kg	NC	40		
9084780	1-Methylnaphthalene	2018/07/31	70	50 - 140	72	50 - 140	<0.050	mg/kg	NC	50		
9084780	2-Methylnaphthalene	2018/07/31	66	50 - 140	68	50 - 140	<0.020	mg/kg	NC	50		
9084780	Acenaphthene	2018/07/31	68	50 - 140	71	50 - 140	<0.0050	mg/kg	NC	50		
9084780	Acenaphthylene	2018/07/31	67	50 - 140	70	50 - 140	<0.0050	mg/kg	NC	50		
9084780	Acridine	2018/07/31	98	50 - 140	100	N/A	<0.050	mg/kg				
9084780	Anthracene	2018/07/31	68	50 - 140	70	50 - 140	<0.0040	mg/kg	NC	50		
9084780	Benzo(a)anthracene	2018/07/31	63	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(a)pyrene	2018/07/31	63	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(b&j)fluoranthene	2018/07/31	69	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(b)fluoranthene	2018/07/31	73	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(g,h,i)perylene	2018/07/31	61	50 - 140	63	50 - 140	<0.050	mg/kg	NC	50		
9084780	Benzo(k)fluoranthene	2018/07/31	76	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50		
9084780	Chrysene	2018/07/31	66	50 - 140	66	50 - 140	<0.020	mg/kg	NC	50		
9084780	Dibenz(a,h)anthracene	2018/07/31	62	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9084780	Fluoranthene	2018/07/31	67	50 - 140	68	50 - 140	<0.020	mg/kg	NC	50		
9084780	Fluorene	2018/07/31	67	50 - 140	70	50 - 140	<0.020	mg/kg	NC	50		
9084780	Indeno(1,2,3-cd)pyrene	2018/07/31	62	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		
9084780	Naphthalene	2018/07/31	67	50 - 140	68	50 - 140	<0.010	mg/kg	NC	50		
9084780	Phenanthrene	2018/07/31	67	50 - 140	67	50 - 140	<0.010	mg/kg	NC	50		
9084780	Pyrene	2018/07/31	71	50 - 140	71	50 - 140	<0.020	mg/kg	NC	50		
9085249	Benzene	2018/07/31	100	60 - 140	88	70 - 130	<0.0050	mg/kg	NC	40		
9085249	Ethylbenzene	2018/07/31	99	60 - 140	93	70 - 130	<0.010	mg/kg	NC	40		
9085249	m & p-Xylene	2018/07/31	99	60 - 140	93	70 - 130	<0.040	mg/kg	NC	40		
9085249	Methyl-tert-butylether (MTBE)	2018/07/31					<0.10	mg/kg				
9085249	o-Xylene	2018/07/31	101	60 - 140	96	70 - 130	<0.040	mg/kg	NC	40		
9085249	Styrene	2018/07/31					<0.030	mg/kg	NC	40		
9085249	Toluene	2018/07/31	95	60 - 140	87	70 - 130	<0.020	mg/kg	NC	40		
9085249	VH C6-C10	2018/07/31			71	70 - 130	<10	mg/kg	NC	40		
9085249	Xylenes (Total)	2018/07/31					<0.040	mg/kg	NC	40		
9087637	Benzene	2018/08/02	94	60 - 140	82	70 - 130	<0.0050	mg/kg	NC	40		
9087637	Ethylbenzene	2018/08/02	92	60 - 140	87	70 - 130	<0.010	mg/kg	NC	40		
9087637	m & p-Xylene	2018/08/02	92	60 - 140	87	70 - 130	<0.040	mg/kg	NC	40		
9087637	Methyl-tert-butylether (MTBE)	2018/08/01					<0.10	mg/kg				
9087637	o-Xylene	2018/08/02	95	60 - 140	89	70 - 130	<0.040	mg/kg	NC	40		
9087637	Styrene	2018/08/02					<0.030	mg/kg	NC	40		
9087637	Toluene	2018/08/02	89	60 - 140	82	70 - 130	<0.020	mg/kg	0.57	40		
9087637	VH C6-C10	2018/08/02			74	70 - 130	<10	mg/kg	NC	40		
9087637	Xylenes (Total)	2018/08/02					<0.040	mg/kg	NC	40		
9103384	% sand by hydrometer	2018/08/16							4.4	35	102	90 - 110
9103384	% silt by hydrometer	2018/08/16							1.9	35		
9103384	Clay Content	2018/08/16							2.5	35		

Maxxam Job #: B862770  
Report Date: 2018/08/17

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9103384	Gravel	2018/08/16							26	35		

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

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

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

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

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

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

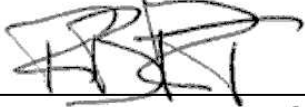
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Maxxam Job #: B862770  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
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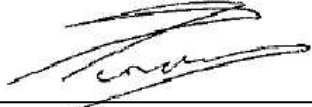
### VALIDATION SIGNATURE PAGE

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



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Rob Reinert, B.Sc., Scientific Spécialist



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Thomas Pinchin, Junior Project Manager

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4506 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:800-563-6286 Fax:(604) 731 2386 www.maxxam.ca

Chain Of Custody Record

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770	Maxxam Job #	B862770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #			560386
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161	Chain Of Custody Record	Project Manager
Phone	(604) 436-3014 Fax (604) 436-3752	Phone		Project Name			
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #			
				Sampled By	MD		Nohed Amer

Regulatory Criteria	Special Instructions	Analysis Requested						Turnaround Time (TAT) Required	
		Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/MPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)
									Regular (Standard) TAT <input checked="" type="checkbox"/> (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number _____ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/MPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	# of Bottles	Comments
1	MW18-35 SA01	18/07/26		SOIL									1	
2	SA02												1	RECEIVED IN WHITEHORSE BY: <i>Styona@6850</i> 2018-07-27
3	SA03												1	
4	SA04												1	
5	SA05												2	
6	SA06												2	TEMP: 9 / 10 / 18
7	SA07												1	
8	SA08						X	X					3	
9	SA09												1	
10	SA10						X	X					3	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
<i>M. Deane</i>	18/07/26	1800	<i>M. Deane</i>	2018/07/28	09:05		<input type="checkbox"/>	4.6.6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
 \* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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B862770\_COC





<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770	Maxxam Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #			
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161	Chain Of Custody Record	Project Manager
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name			
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #			
				Sampled By	MD		

Regulatory Criteria	Special Instructions	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested							Turnaround Time (TAT) Required	
				LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/PH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)			

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/PH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	# of Bottles	Comments
1	MW18-35 SA11	18/07/16		Soil									1	RECEIVED IN WHITEHORSE
2	MW18-35 SA12												1	BY: <u>Styano @ 0850</u>
3	BH18-46 SA01												1	2018-07-21
4	SA02												1	TEMP: 9 110 18
5	SA03												1	
6	SA04												1	
7	QC18-02						X	X					3	
8														
9														
10														

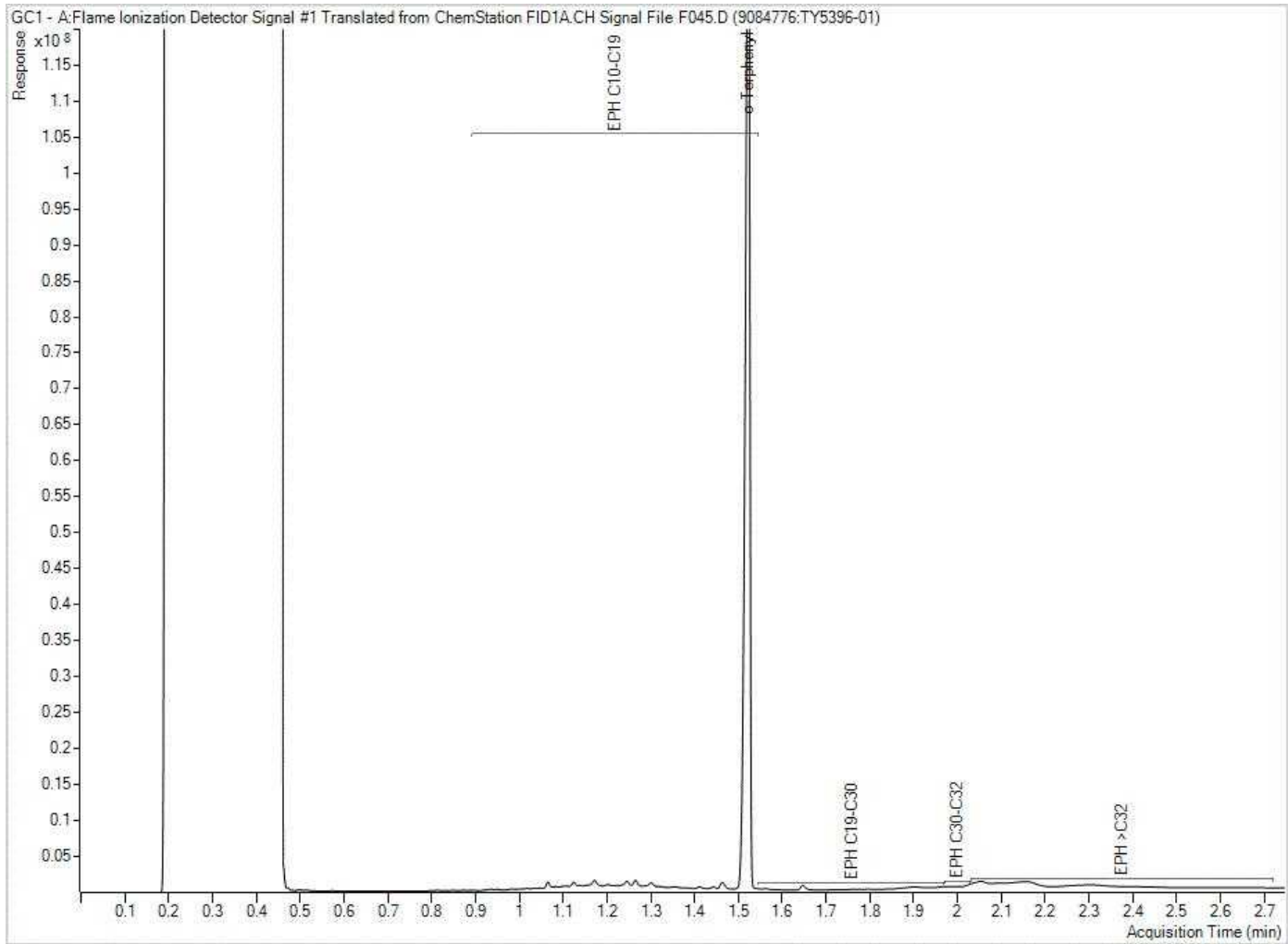
RELEASSED BY: (Signature/Print)	Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMMDD)	Time	# Jars used and not submitted	Lab Use Only		
<u>M. Deane</u>	18/07/16	1500	<u>JULIA PERO JACK</u>	20180716	09:05		Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
							<input type="checkbox"/>	4.6.6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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

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

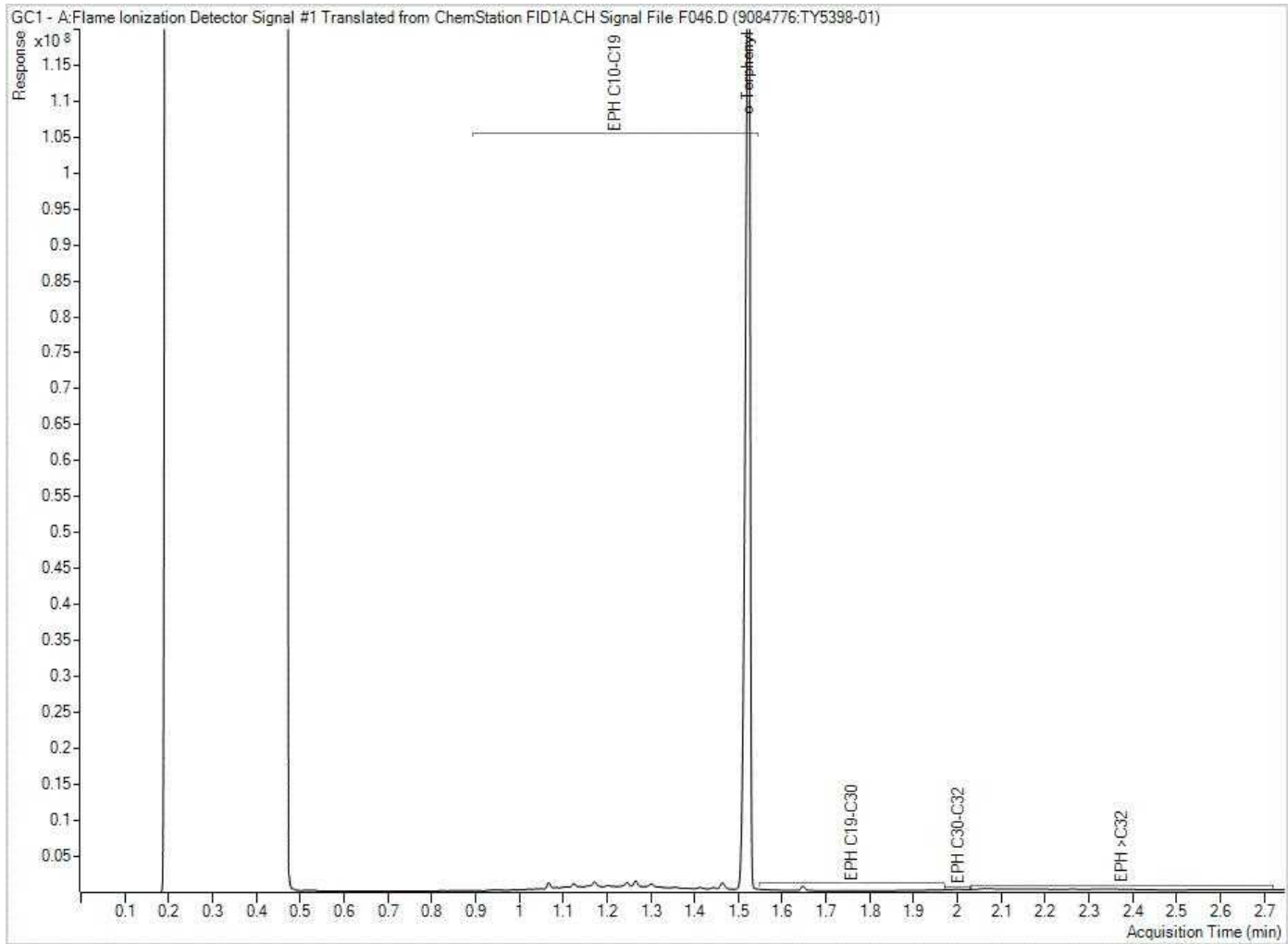
190

EPH in Soil by GC/FID Chromatogram



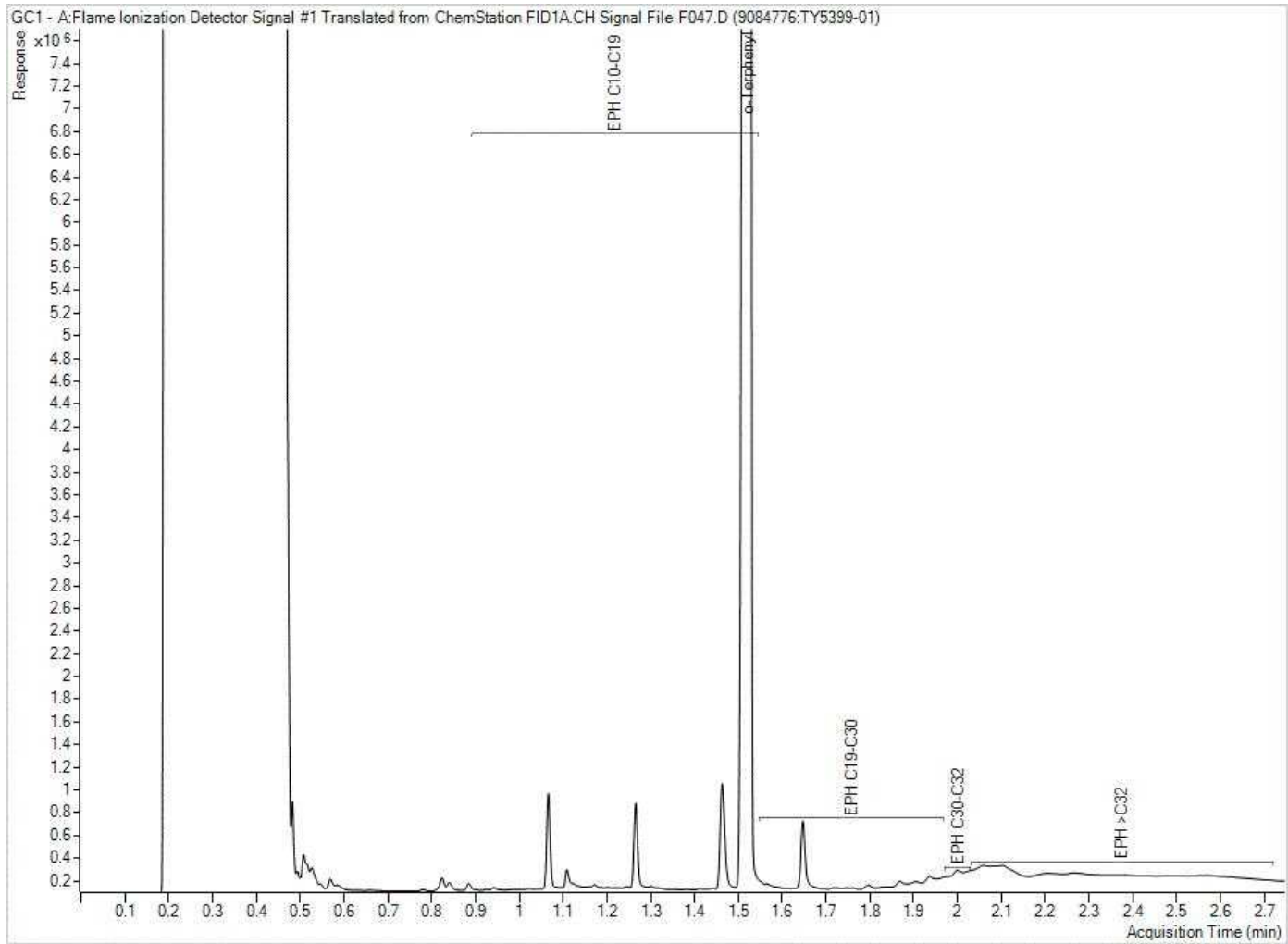
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



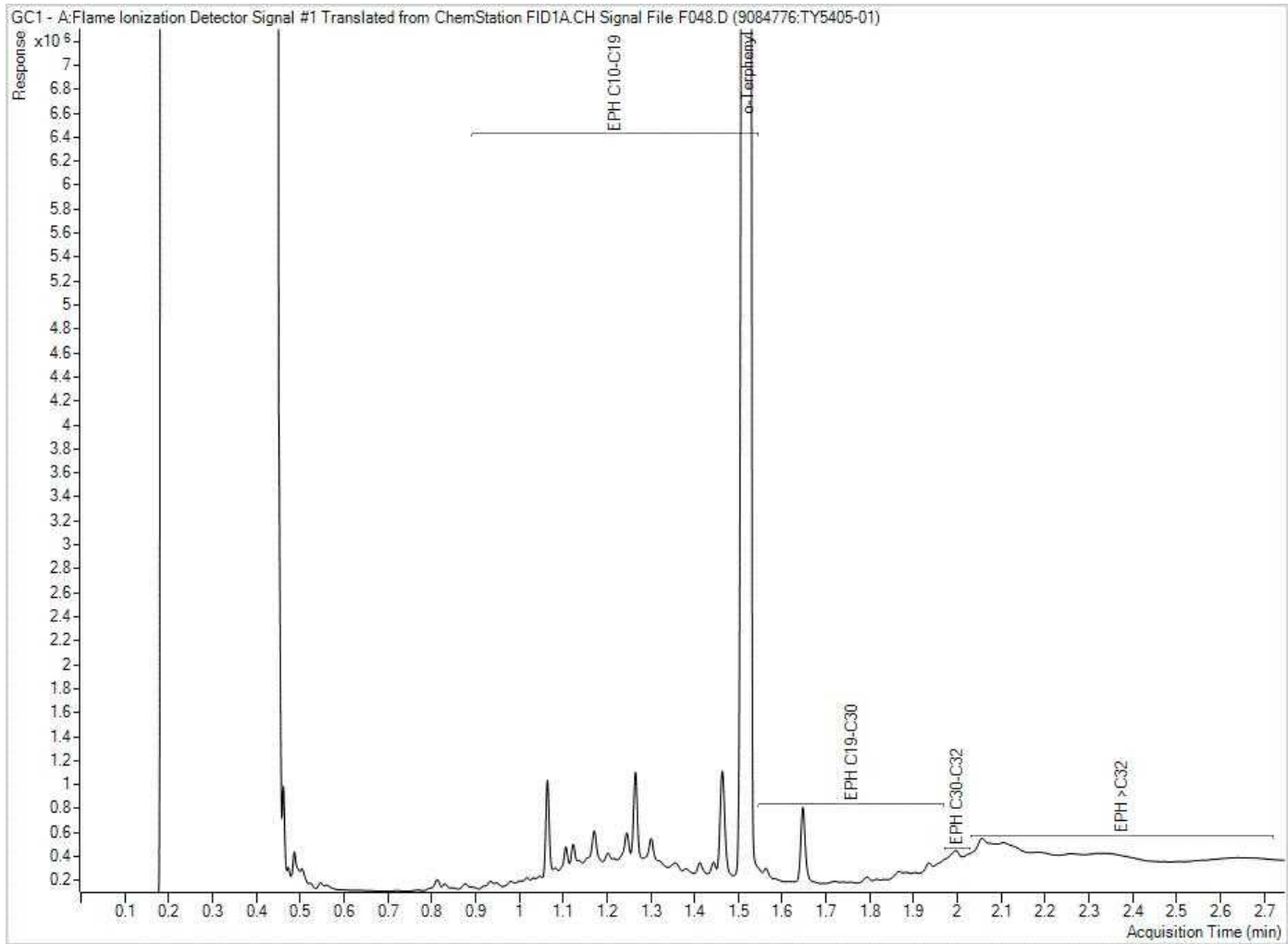
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



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

EPH in Soil by GC/FID Chromatogram



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

Your Project #: 123221161  
Your C.O.C. #: 560386-05-01, 560386-06-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/09/04**  
Report #: R2613508  
Version: 4 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862770**

**Received: 2018/07/27, 08:50**

Sample Matrix: Soil  
# Samples Received: 5

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH VH F1 in Soil - Field Pres. (2)	2	N/A	2018/07/31	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
BTEX/MTBE LH VH F1 in Soil - Field Pres. (2)	1	N/A	2018/08/01	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Elements by ICPMS (total)	1	2018/08/27	2018/08/27	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
Moisture	3	2018/07/28	2018/07/28	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	1	2018/07/30	2018/07/31	BBY8SOP-00017	BCMOE BCLM Dec2000 m
PAH in Soil by GC/MS (SIM)	3	2018/07/28	2018/07/31	BBY8SOP-00022	BCMOE BCLM Jul2017m
PAH in Soil by GC/MS (SIM)	1	2018/07/30	2018/07/31	BBY8SOP-00022	BCMOE BCLM Jul2017m
Total PAH and B(a)P Calculation (3)	4	N/A	2018/07/31	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	1	2018/08/27	2018/08/27	BBY6SOP-00028	BCMOE BCLM Mar2005 m
EPH less PAH in Soil By GC/FID (4)	4	N/A	2018/07/31	BBY WI-00033	Auto Calc
EPH in Soil by GC/FID	3	2018/07/28	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	1	2018/07/30	2018/07/31	BBY8SOP-00029	BCMOE BCLM Jul 2016
Texture by Hydrometer, incl Gravel (Wet)	1	N/A	2018/08/16	BBY6SOP-00051	Carter 2nd ed 55.3
Volatile HC-BTEX for Soil (5)	2	N/A	2018/07/31	BBY WI-00033	Auto Calc
Volatile HC-BTEX for Soil (5)	1	N/A	2018/08/02	BBY WI-00033	Auto Calc
TOC Soil Subcontract (1)	1	N/A	2018/08/17		
TOC Soil Subcontract (1)	1	N/A	2018/09/04		

**Remarks:**

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

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

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

Your Project #: 123221161  
Your C.O.C. #: 560386-05-01, 560386-06-01

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/09/04**  
Report #: R2613508  
Version: 4 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B862770**

**Received: 2018/07/27, 08:50**

agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) This test was performed by Maxxam Ontario (From Burnaby)

(2) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.

(3) Total PAHs in Soil include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

Total PAHs in Sediment include: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenz(a,h)anthracene.

(4) LEPH = EPH (C10 to C19) - (Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Benzo(b)fluoranthene + Benzo(k)fluoranthene + Dibenz(a,h)anthracene + Indeno(1,2,3-cd)pyrene + Pyrene)

(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**RESULTS OF CHEMICAL ANALYSES OF SOIL**

Maxxam ID		TY5389	TY5396		TY5398		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-05-01		
	UNITS	MW18-35 SA01	MW18-35 SA08	QC Batch	MW18-35 SA10	RDL	QC Batch
<b>Parameter</b>							
Subcontract Parameter	N/A	ATTACHED	ATTACHED	9107498			
<b>Physical Properties</b>							
% sand by hydrometer	%				25	2.0	9103384
% silt by hydrometer	%				41	2.0	9103384
Clay Content	%				7.0	2.0	9103384
Gravel	%				27	2.0	9103384
RDL = Reportable Detection Limit							



Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		TY5396	TY5398		TY5399	TY5399		
<b>Sampling Date</b>		2018/07/26	2018/07/26		2018/07/26	2018/07/26		
<b>COC Number</b>		560386-05-01	560386-05-01		560386-06-01	560386-06-01		
	<b>UNITS</b>	<b>MW18-35 SA08</b>	<b>MW18-35 SA10</b>	<b>QC Batch</b>	<b>MW18-35 SA11</b>	<b>MW18-35 SA11 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>								
Moisture	%	14	19	9082660	18	18	0.30	9084606
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								

<b>Maxxam ID</b>		TY5405		
<b>Sampling Date</b>		2018/07/26		
<b>COC Number</b>		560386-06-01		
	<b>UNITS</b>	<b>QC18-02</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>				
Moisture	%	19	0.30	9082660
RDL = Reportable Detection Limit				

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

Maxxam ID		TY5396	TY5398		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	QC18-02	RDL	QC Batch
<b>Calculated Parameters</b>							
VPH (VH6 to 10 - BTEX)	mg/kg	<10	<10	9082615	<10	10	9082615
<b>Volatiles</b>							
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	9085249	<0.10	0.10	9087637
Benzene	mg/kg	<0.0050	<0.0050	9085249	0.036	0.0050	9087637
Toluene	mg/kg	<0.020	<0.020	9085249	0.049	0.020	9087637
Ethylbenzene	mg/kg	<0.010	<0.010	9085249	0.050	0.010	9087637
m & p-Xylene	mg/kg	<0.040	<0.040	9085249	0.047	0.040	9087637
o-Xylene	mg/kg	<0.040	<0.040	9085249	0.048	0.040	9087637
Styrene	mg/kg	<0.030	<0.030	9085249	<0.030	0.030	9087637
Xylenes (Total)	mg/kg	<0.040	<0.040	9085249	0.095	0.040	9087637
VH C6-C10	mg/kg	<10	<10	9085249	<10	10	9087637
<b>Surrogate Recovery (%)</b>							
1,4-Difluorobenzene (sur.)	%	106	105	9085249	105		9087637
4-Bromofluorobenzene (sur.)	%	101	101	9085249	102		9087637
D10-ETHYLBENZENE (sur.)	%	98	103	9085249	99		9087637
D4-1,2-Dichloroethane (sur.)	%	105	104	9085249	104		9087637
RDL = Reportable Detection Limit							

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TY5396	TY5398		TY5399		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	MW18-35 SA11	QC Batch	QC18-02	RDL	QC Batch
<b>Calculated Parameters</b>									
Low Molecular Weight PAH's	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
High Molecular Weight PAH's	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
Total PAH	mg/kg	<0.050	<0.050	9082612	<0.050	9083998	<0.050	0.050	9082612
<b>Polycyclic Aromatics</b>									
Naphthalene	mg/kg	<0.010	<0.010	9084780	<0.010	9084780	<0.010	0.010	9084780
1-Methylnaphthalene	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
2-Methylnaphthalene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Acenaphthylene	mg/kg	<0.0050	<0.0050	9084780	<0.0050	9084780	<0.0050	0.0050	9084780
Acenaphthene	mg/kg	<0.0050	<0.0050	9084780	<0.0050	9084780	<0.0050	0.0050	9084780
Fluorene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Phenanthrene	mg/kg	<0.010	<0.010	9084780	<0.010	9084780	<0.010	0.010	9084780
Anthracene	mg/kg	<0.0040	<0.0040	9084780	<0.0040	9084780	<0.0040	0.0040	9084780
Acridine	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
Fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(a)anthracene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Chrysene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(a)pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Dibenz(a,h)anthracene	mg/kg	<0.020	<0.020	9084780	<0.020	9084780	<0.020	0.020	9084780
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	9084780	<0.050	9084780	<0.050	0.050	9084780
<b>Calculated Parameters</b>									
LEPH (C10-C19 less PAH)	mg/kg	<100	<100	9082613	<100	9084002	<100	100	9082613
HEPH (C19-C32 less PAH)	mg/kg	<100	<100	9082613	<100	9084002	<100	100	9082613
<b>Hydrocarbons</b>									
EPH (C10-C19)	mg/kg	<100	<100	9084776	<100	9084776	<100	100	9084776
EPH (C19-C32)	mg/kg	<100	<100	9084776	<100	9084776	<100	100	9084776
<b>Surrogate Recovery (%)</b>									
D10-ANTHRACENE (sur.)	%	67	66	9084780	72	9084780	70		9084780
D8-ACENAPHTHYLENE (sur.)	%	72	71	9084780	71	9084780	74		9084780
RDL = Reportable Detection Limit									

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TY5396	TY5398		TY5399		TY5405		
Sampling Date		2018/07/26	2018/07/26		2018/07/26		2018/07/26		
COC Number		560386-05-01	560386-05-01		560386-06-01		560386-06-01		
	UNITS	MW18-35 SA08	MW18-35 SA10	QC Batch	MW18-35 SA11	QC Batch	QC18-02	RDL	QC Batch
D8-NAPHTHALENE (sur.)	%	70	69	9084780	70	9084780	70		9084780
TERPHENYL-D14 (sur.)	%	74	73	9084780	74	9084780	75		9084780
O-TERPHENYL (sur.)	%	87	88	9084776	86	9084776	84		9084776
RDL = Reportable Detection Limit									

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

<b>Maxxam ID</b>		TY5389		
<b>Sampling Date</b>		2018/07/26		
<b>COC Number</b>		560386-05-01		
	<b>UNITS</b>	<b>MW18-35 SA01</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>				
Soluble (2:1) pH	pH	8.52	N/A	9118359
<b>Total Metals by ICPMS</b>				
Total Aluminum (Al)	mg/kg	13400	100	9118303
Total Antimony (Sb)	mg/kg	1.11	0.10	9118303
Total Arsenic (As)	mg/kg	9.46	0.50	9118303
Total Barium (Ba)	mg/kg	198	0.10	9118303
Total Beryllium (Be)	mg/kg	0.40	0.20	9118303
Total Bismuth (Bi)	mg/kg	0.16	0.10	9118303
Total Boron (B)	mg/kg	2.1	1.0	9118303
Total Cadmium (Cd)	mg/kg	0.820	0.050	9118303
Total Calcium (Ca)	mg/kg	28200	100	9118303
Total Chromium (Cr)	mg/kg	42.3	1.0	9118303
Total Cobalt (Co)	mg/kg	9.93	0.30	9118303
Total Copper (Cu)	mg/kg	29.9	0.50	9118303
Total Iron (Fe)	mg/kg	24300	100	9118303
Total Lead (Pb)	mg/kg	39.8	0.10	9118303
Total Lithium (Li)	mg/kg	10.6	5.0	9118303
Total Magnesium (Mg)	mg/kg	9420	100	9118303
Total Manganese (Mn)	mg/kg	454	0.20	9118303
Total Mercury (Hg)	mg/kg	<0.050	0.050	9118303
Total Molybdenum (Mo)	mg/kg	0.74	0.10	9118303
Total Nickel (Ni)	mg/kg	36.1	0.80	9118303
Total Phosphorus (P)	mg/kg	909	10	9118303
Total Potassium (K)	mg/kg	1320	100	9118303
Total Selenium (Se)	mg/kg	<0.50	0.50	9118303
Total Silver (Ag)	mg/kg	0.450	0.050	9118303
Total Sodium (Na)	mg/kg	355	100	9118303
Total Strontium (Sr)	mg/kg	78.6	0.10	9118303
Total Thallium (Tl)	mg/kg	0.110	0.050	9118303
Total Tin (Sn)	mg/kg	0.51	0.10	9118303
Total Titanium (Ti)	mg/kg	889	1.0	9118303
Total Tungsten (W)	mg/kg	<0.50	0.50	9118303
RDL = Reportable Detection Limit				
N/A = Not Applicable				

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

<b>Maxxam ID</b>		TY5389		
<b>Sampling Date</b>		2018/07/26		
<b>COC Number</b>		560386-05-01		
	<b>UNITS</b>	<b>MW18-35 SA01</b>	<b>RDL</b>	<b>QC Batch</b>
Total Uranium (U)	mg/kg	1.20	0.050	9118303
Total Vanadium (V)	mg/kg	49.6	2.0	9118303
Total Zinc (Zn)	mg/kg	86.9	1.0	9118303
Total Zirconium (Zr)	mg/kg	7.10	0.50	9118303
RDL = Reportable Detection Limit				

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### GENERAL COMMENTS

Version 3: Report reissued to include results for TOC and Grain Size on samples MW18-35 SA08 and MW18-35 SA10 as per request from Matthew Deane on 2018/08/10

Version 4: Report reissued to include results for metals and TOC on sample MW18-35 SA01 as per request from Matthew Deane on 2018/08/23 REG TAT

Sample analyzed past hold time. Analysis performed with client's consent.

**Results relate only to the items tested.**

Maxxam Job #: B862770  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9084776	O-TERPHENYL (sur.)	2018/07/31	89	60 - 140	86	60 - 140	85	%				
9084780	D10-ANTHRACENE (sur.)	2018/07/31	71	50 - 140	72	50 - 140	76	%				
9084780	D8-ACENAPHTHYLENE (sur.)	2018/07/31	69	50 - 140	69	50 - 140	67	%				
9084780	D8-NAPHTHALENE (sur.)	2018/07/31	70	50 - 140	61	50 - 140	66	%				
9084780	TERPHENYL-D14 (sur.)	2018/07/31	74	50 - 140	72	50 - 140	76	%				
9085249	1,4-Difluorobenzene (sur.)	2018/07/31	101	70 - 130	103	70 - 130	105	%				
9085249	4-Bromofluorobenzene (sur.)	2018/07/31	101	70 - 130	101	70 - 130	100	%				
9085249	D10-ETHYLBENZENE (sur.)	2018/07/31	99	60 - 130	87	60 - 130	94	%				
9085249	D4-1,2-Dichloroethane (sur.)	2018/07/31	95	70 - 130	92	70 - 130	105	%				
9087637	1,4-Difluorobenzene (sur.)	2018/08/01	102	70 - 130	103	70 - 130	105	%				
9087637	4-Bromofluorobenzene (sur.)	2018/08/01	100	70 - 130	102	70 - 130	101	%				
9087637	D10-ETHYLBENZENE (sur.)	2018/08/01	103	60 - 130	84	60 - 130	87	%				
9087637	D4-1,2-Dichloroethane (sur.)	2018/08/01	96	70 - 130	94	70 - 130	105	%				
9082660	Moisture	2018/07/28					<0.30	%	6.5	20		
9084606	Moisture	2018/07/31					<0.30	%	1.7	20		
9084776	EPH (C10-C19)	2018/07/31	87	60 - 140	84	70 - 130	<100	mg/kg	NC	40		
9084776	EPH (C19-C32)	2018/07/31	90	60 - 140	88	70 - 130	<100	mg/kg	NC	40		
9084780	1-Methylnaphthalene	2018/07/31	70	50 - 140	72	50 - 140	<0.050	mg/kg	NC	50		
9084780	2-Methylnaphthalene	2018/07/31	66	50 - 140	68	50 - 140	<0.020	mg/kg	NC	50		
9084780	Acenaphthene	2018/07/31	68	50 - 140	71	50 - 140	<0.0050	mg/kg	NC	50		
9084780	Acenaphthylene	2018/07/31	67	50 - 140	70	50 - 140	<0.0050	mg/kg	NC	50		
9084780	Acridine	2018/07/31	98	50 - 140	100	N/A	<0.050	mg/kg				
9084780	Anthracene	2018/07/31	68	50 - 140	70	50 - 140	<0.0040	mg/kg	NC	50		
9084780	Benzo(a)anthracene	2018/07/31	63	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(a)pyrene	2018/07/31	63	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(b&j)fluoranthene	2018/07/31	69	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(b)fluoranthene	2018/07/31	73	50 - 140	65	50 - 140	<0.020	mg/kg	NC	50		
9084780	Benzo(g,h,i)perylene	2018/07/31	61	50 - 140	63	50 - 140	<0.050	mg/kg	NC	50		
9084780	Benzo(k)fluoranthene	2018/07/31	76	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50		
9084780	Chrysene	2018/07/31	66	50 - 140	66	50 - 140	<0.020	mg/kg	NC	50		
9084780	Dibenz(a,h)anthracene	2018/07/31	62	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		



Maxxam Job #: B862770  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9084780	Fluoranthene	2018/07/31	67	50 - 140	68	50 - 140	<0.020	mg/kg	NC	50		
9084780	Fluorene	2018/07/31	67	50 - 140	70	50 - 140	<0.020	mg/kg	NC	50		
9084780	Indeno(1,2,3-cd)pyrene	2018/07/31	62	50 - 140	64	50 - 140	<0.020	mg/kg	NC	50		
9084780	Naphthalene	2018/07/31	67	50 - 140	68	50 - 140	<0.010	mg/kg	NC	50		
9084780	Phenanthrene	2018/07/31	67	50 - 140	67	50 - 140	<0.010	mg/kg	NC	50		
9084780	Pyrene	2018/07/31	71	50 - 140	71	50 - 140	<0.020	mg/kg	NC	50		
9085249	Benzene	2018/07/31	100	60 - 140	88	70 - 130	<0.0050	mg/kg	NC	40		
9085249	Ethylbenzene	2018/07/31	99	60 - 140	93	70 - 130	<0.010	mg/kg	NC	40		
9085249	m & p-Xylene	2018/07/31	99	60 - 140	93	70 - 130	<0.040	mg/kg	NC	40		
9085249	Methyl-tert-butylether (MTBE)	2018/07/31					<0.10	mg/kg				
9085249	o-Xylene	2018/07/31	101	60 - 140	96	70 - 130	<0.040	mg/kg	NC	40		
9085249	Styrene	2018/07/31					<0.030	mg/kg	NC	40		
9085249	Toluene	2018/07/31	95	60 - 140	87	70 - 130	<0.020	mg/kg	NC	40		
9085249	VH C6-C10	2018/07/31			71	70 - 130	<10	mg/kg	NC	40		
9085249	Xylenes (Total)	2018/07/31					<0.040	mg/kg	NC	40		
9087637	Benzene	2018/08/02	94	60 - 140	82	70 - 130	<0.0050	mg/kg	NC	40		
9087637	Ethylbenzene	2018/08/02	92	60 - 140	87	70 - 130	<0.010	mg/kg	NC	40		
9087637	m & p-Xylene	2018/08/02	92	60 - 140	87	70 - 130	<0.040	mg/kg	NC	40		
9087637	Methyl-tert-butylether (MTBE)	2018/08/01					<0.10	mg/kg				
9087637	o-Xylene	2018/08/02	95	60 - 140	89	70 - 130	<0.040	mg/kg	NC	40		
9087637	Styrene	2018/08/02					<0.030	mg/kg	NC	40		
9087637	Toluene	2018/08/02	89	60 - 140	82	70 - 130	<0.020	mg/kg	0.57	40		
9087637	VH C6-C10	2018/08/02			74	70 - 130	<10	mg/kg	NC	40		
9087637	Xylenes (Total)	2018/08/02					<0.040	mg/kg	NC	40		
9103384	% sand by hydrometer	2018/08/16							4.4	35	102	90 - 110
9103384	% silt by hydrometer	2018/08/16							1.9	35		
9103384	Clay Content	2018/08/16							2.5	35		
9103384	Gravel	2018/08/16							26	35		
9118303	Total Aluminum (Al)	2018/08/27					<100	mg/kg			99	70 - 130
9118303	Total Antimony (Sb)	2018/08/27	98	75 - 125	102	75 - 125	<0.10	mg/kg			132 (1)	70 - 130
9118303	Total Arsenic (As)	2018/08/27	100	75 - 125	99	75 - 125	<0.50	mg/kg	5.8	30	100	70 - 130

Maxxam Job #: B862770  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9118303	Total Barium (Ba)	2018/08/27	106	75 - 125	99	75 - 125	<0.10	mg/kg	0.55	40	110	70 - 130
9118303	Total Beryllium (Be)	2018/08/27	97	75 - 125	94	75 - 125	<0.20	mg/kg			103	70 - 130
9118303	Total Bismuth (Bi)	2018/08/27					<0.10	mg/kg				
9118303	Total Boron (B)	2018/08/27					<1.0	mg/kg				
9118303	Total Cadmium (Cd)	2018/08/27	98	75 - 125	99	75 - 125	<0.050	mg/kg	NC	30	101	70 - 130
9118303	Total Calcium (Ca)	2018/08/27					<100	mg/kg	3.3	30	107	70 - 130
9118303	Total Chromium (Cr)	2018/08/27	98	75 - 125	102	75 - 125	<1.0	mg/kg	10	30	107	70 - 130
9118303	Total Cobalt (Co)	2018/08/27	97	75 - 125	99	75 - 125	<0.30	mg/kg			104	70 - 130
9118303	Total Copper (Cu)	2018/08/27	96	75 - 125	99	75 - 125	<0.50	mg/kg	7.3	30	110	70 - 130
9118303	Total Iron (Fe)	2018/08/27					<100	mg/kg	9.3	30	110	70 - 130
9118303	Total Lead (Pb)	2018/08/27	101	75 - 125	103	75 - 125	<0.10	mg/kg	25	40	123	70 - 130
9118303	Total Lithium (Li)	2018/08/27	100	75 - 125	96	75 - 125	<5.0	mg/kg			101	70 - 130
9118303	Total Magnesium (Mg)	2018/08/27					<100	mg/kg	1.7	30	109	70 - 130
9118303	Total Manganese (Mn)	2018/08/27	NC	75 - 125	97	75 - 125	<0.20	mg/kg			106	70 - 130
9118303	Total Mercury (Hg)	2018/08/27	101	75 - 125	102	75 - 125	<0.050	mg/kg			100	70 - 130
9118303	Total Molybdenum (Mo)	2018/08/27	101	75 - 125	100	75 - 125	<0.10	mg/kg			112	70 - 130
9118303	Total Nickel (Ni)	2018/08/27	97	75 - 125	98	75 - 125	<0.80	mg/kg			113	70 - 130
9118303	Total Phosphorus (P)	2018/08/27					<10	mg/kg	1.8	30	106	70 - 130
9118303	Total Potassium (K)	2018/08/27					<100	mg/kg			92	70 - 130
9118303	Total Selenium (Se)	2018/08/27	102	75 - 125	103	75 - 125	<0.50	mg/kg				
9118303	Total Silver (Ag)	2018/08/27	101	75 - 125	103	75 - 125	<0.050	mg/kg	NC	40	128	70 - 130
9118303	Total Sodium (Na)	2018/08/27					<100	mg/kg			97	70 - 130
9118303	Total Strontium (Sr)	2018/08/27	105	75 - 125	97	75 - 125	<0.10	mg/kg			113	70 - 130
9118303	Total Thallium (Tl)	2018/08/27	99	75 - 125	101	75 - 125	<0.050	mg/kg			88	70 - 130
9118303	Total Tin (Sn)	2018/08/27	103	75 - 125	104	75 - 125	<0.10	mg/kg	10	40	104	70 - 130
9118303	Total Titanium (Ti)	2018/08/27	NC	75 - 125	98	75 - 125	<1.0	mg/kg				
9118303	Total Tungsten (W)	2018/08/27					<0.50	mg/kg				
9118303	Total Uranium (U)	2018/08/27	103	75 - 125	102	75 - 125	<0.050	mg/kg			99	70 - 130
9118303	Total Vanadium (V)	2018/08/27	89	75 - 125	98	75 - 125	<2.0	mg/kg			108	70 - 130
9118303	Total Zinc (Zn)	2018/08/27	90	75 - 125	96	75 - 125	<1.0	mg/kg	6.8	30	106	70 - 130
9118303	Total Zirconium (Zr)	2018/08/27					<0.50	mg/kg				

Maxxam Job #: B862770  
Report Date: 2018/09/04

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9118359	Soluble (2:1) pH	2018/08/27			100	97 - 103			1.4	20		

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

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

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

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

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

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

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

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

(1) Reference Material exceeds acceptance criteria for Sb. 10% of analytes failure in multielement scan is allowed.

Maxxam Job #: B862770  
Report Date: 2018/09/04

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



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Rob Reinert, B.Sc., Scientific Spécialist



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Thomas Pinchin, Junior Project Manager

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770	Maxxam Job #	B862770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #		Chain Of Custody Record	560386
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161	Project Manager	
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name			
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #			
				Sampled By	MD		

Regulatory Criteria	Special Instructions	Analysis Requested	Turnaround Time (TAT) Required
		Regulated Drinking Water? (Y/N) Metals Field Filtered? (Y/N) LEPH/HEPH/PAH Dissolved Metals (with Hg) BTEX/MPH Nutrients (TP, NH4, TKN) Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate) Carbon (DOC)	Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/MPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	# of Bottles	Comments
1	MW18-35 SA01	18/07/26		SOIL								X	1	
2	SA02											X	1	
3	SA03											X	1	RECEIVED IN WHITEHORSE
4	SA04											X	1	BY: <i>Styona@B85D</i>
5	SA05											X	2	2018-07-27
6	SA06											X	2	TEMP: 9 / 10 / 18
7	SA07											X	1	
8	SA08						X	X					3	
9	SA09											X	1	
10	SA10						X	X					3	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<i>M. Deane</i>	18/07/26	1800	<i>M. Deane</i>	2018/07/28	09:05		Time Sensitive <input type="checkbox"/> Temperature (°C) on Receipt: 4.6.6 Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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

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

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B862770\_COC



Maxxam Analytics International Corporation of a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2385 www.maxxam.ca

Chain Of Custody Record

Page 2 of 2

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>		<b>Laboratory Use Only</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770	Maxxam Job #	Bottle Order #:
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #			
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161	Chain Of Custody Record	Project Manager
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name			
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #			
				Sampled By	MD		Nahed Amer

Regulatory Criteria	Special Instructions	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested							Turnaround Time (TAT) Required	
				LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)			

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

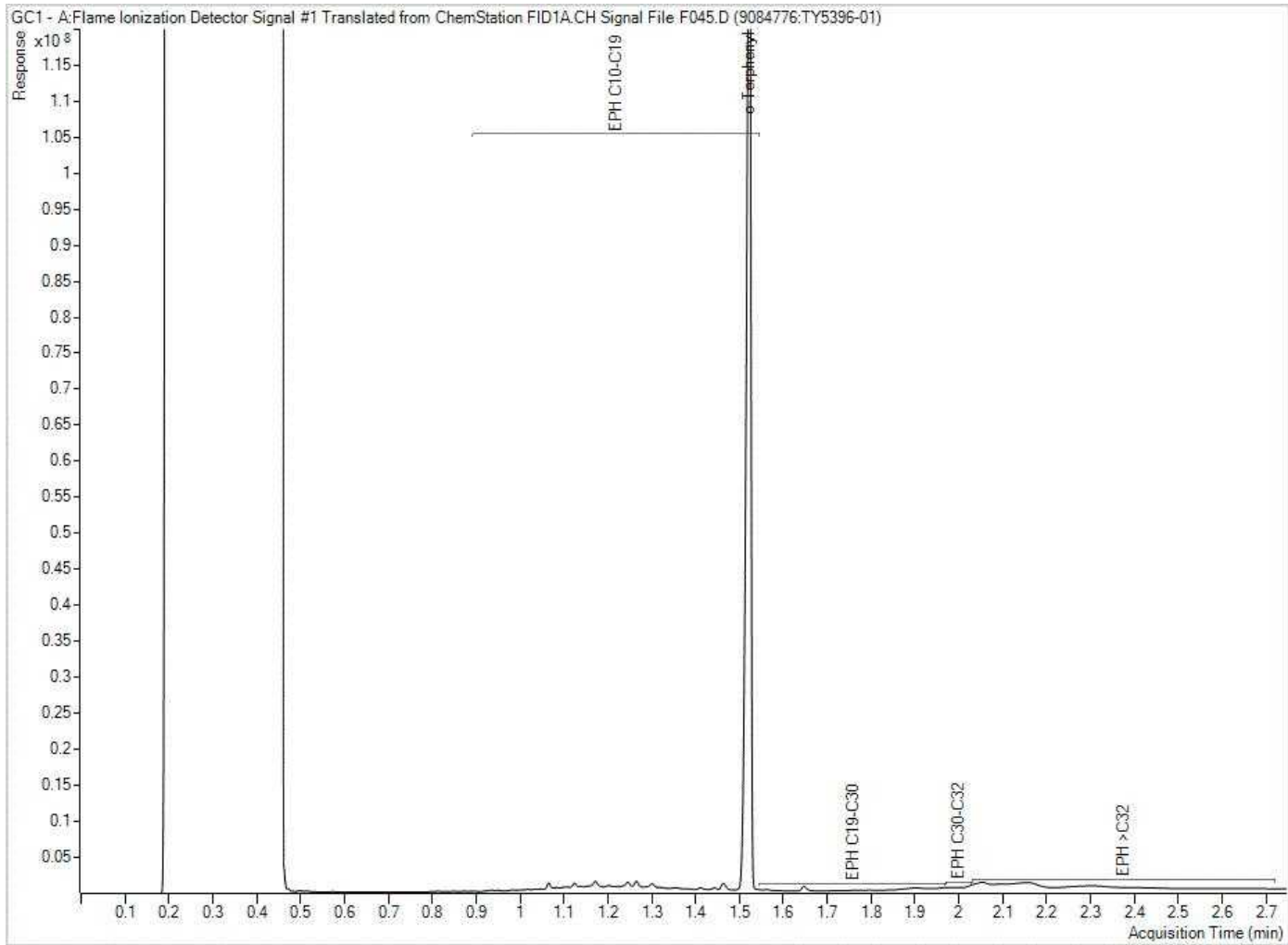
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	# of Bottles	Comments
1	MW18-35 SA11	18/07/16		Soil									1	RECEIVED IN WHITEHORSE
2	MW18-35 SA12												1	BY: <u>Styano @ 0850</u>
3	BH18-46 SA01												1	2018-07-21
4	SA02												1	TEMP: 9 110 18
5	SA03												1	
6	SA04												1	
7	QC18-02						X	X					3	
8														
9														
10														

RELEASSED BY: (Signature/Print)	Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMMDD)	Time	# Jars used and not submitted	Lab Use Only		
<u>M. Deane</u>	18/07/16	1500	<u>JULIA PEDRO TACK</u>	2018/07/18	09:05		Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
							<input type="checkbox"/>	4.6.6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
 \* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

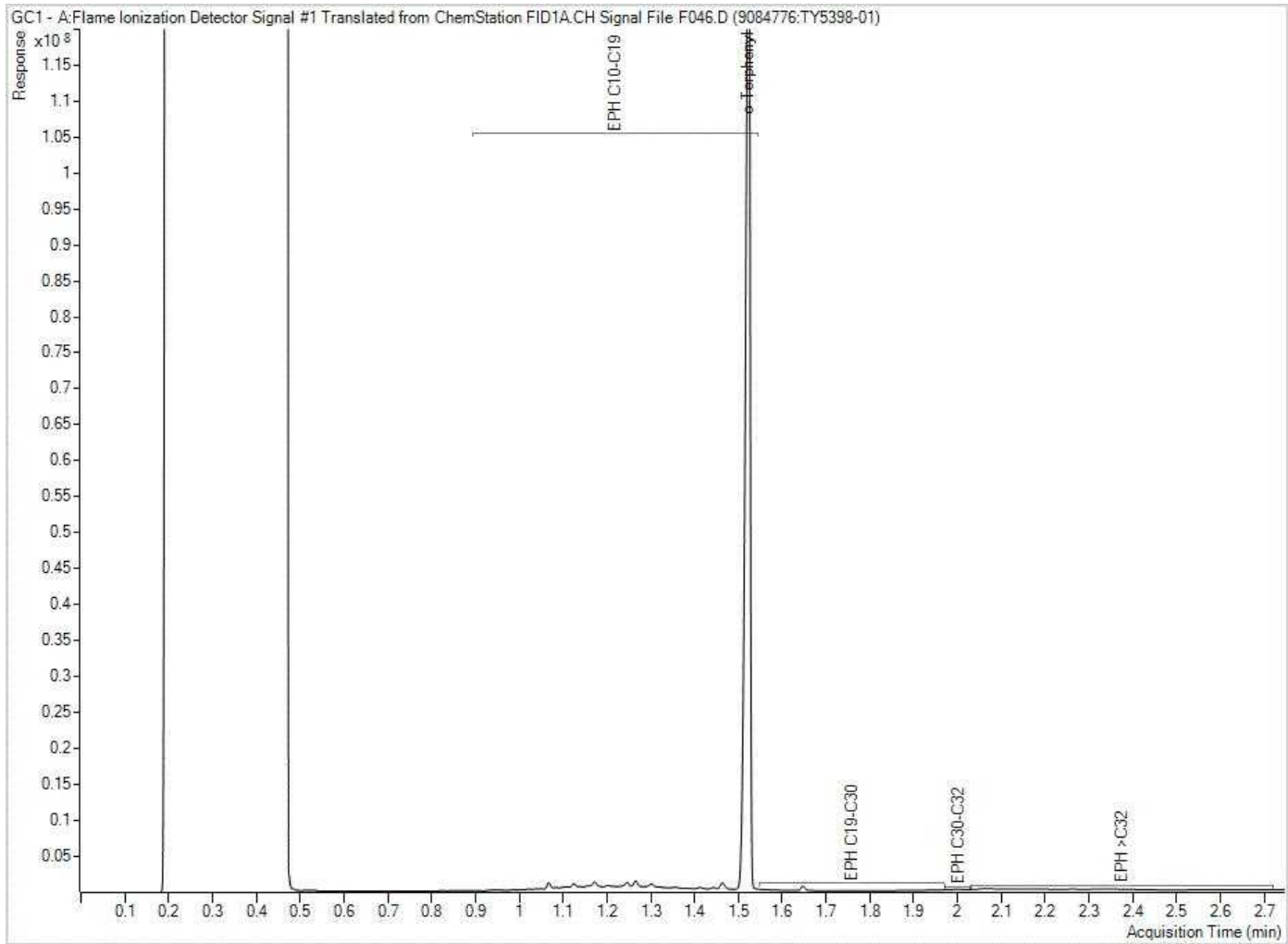
190

EPH in Soil by GC/FID Chromatogram



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

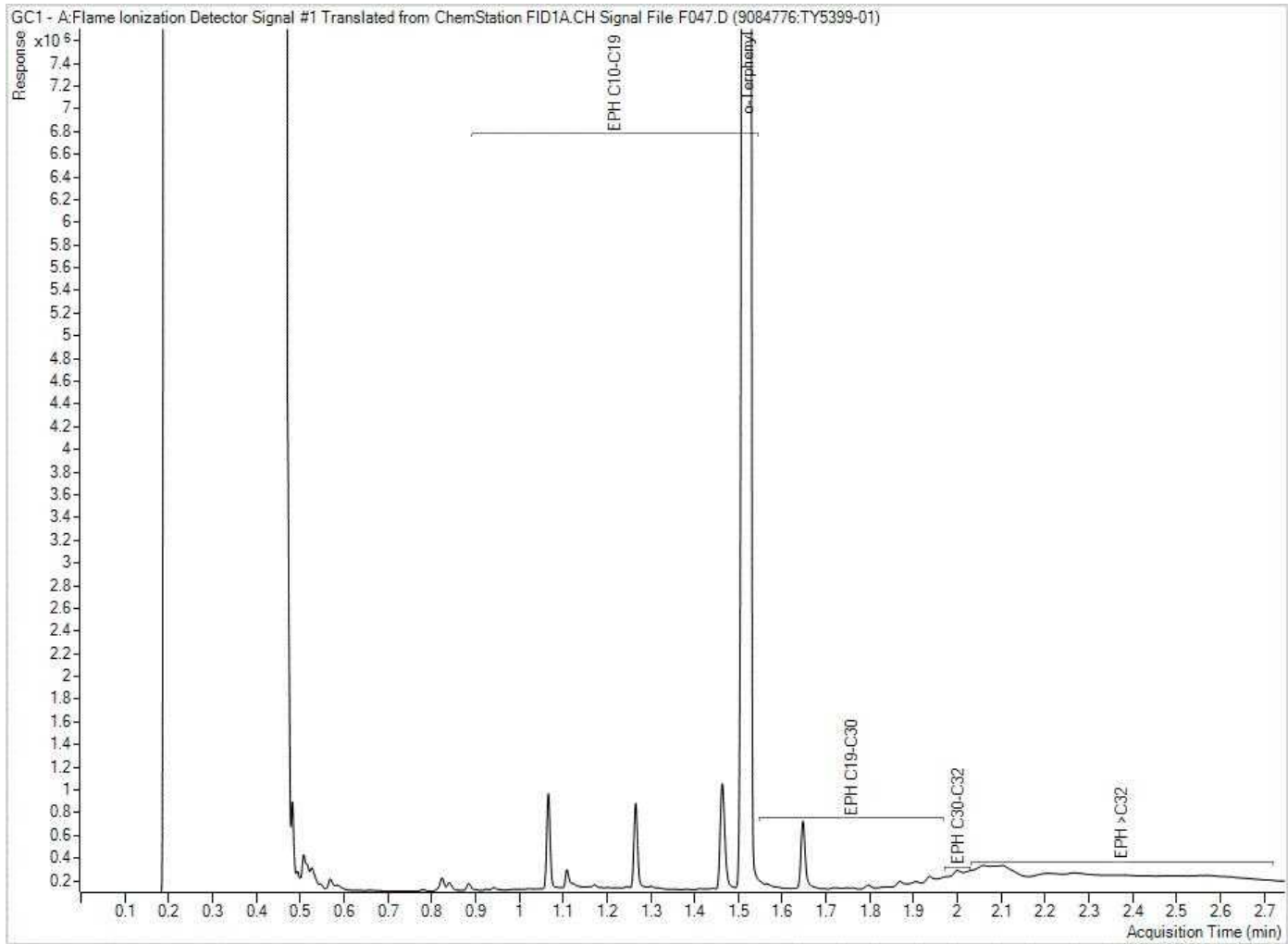
EPH in Soil by GC/FID Chromatogram



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

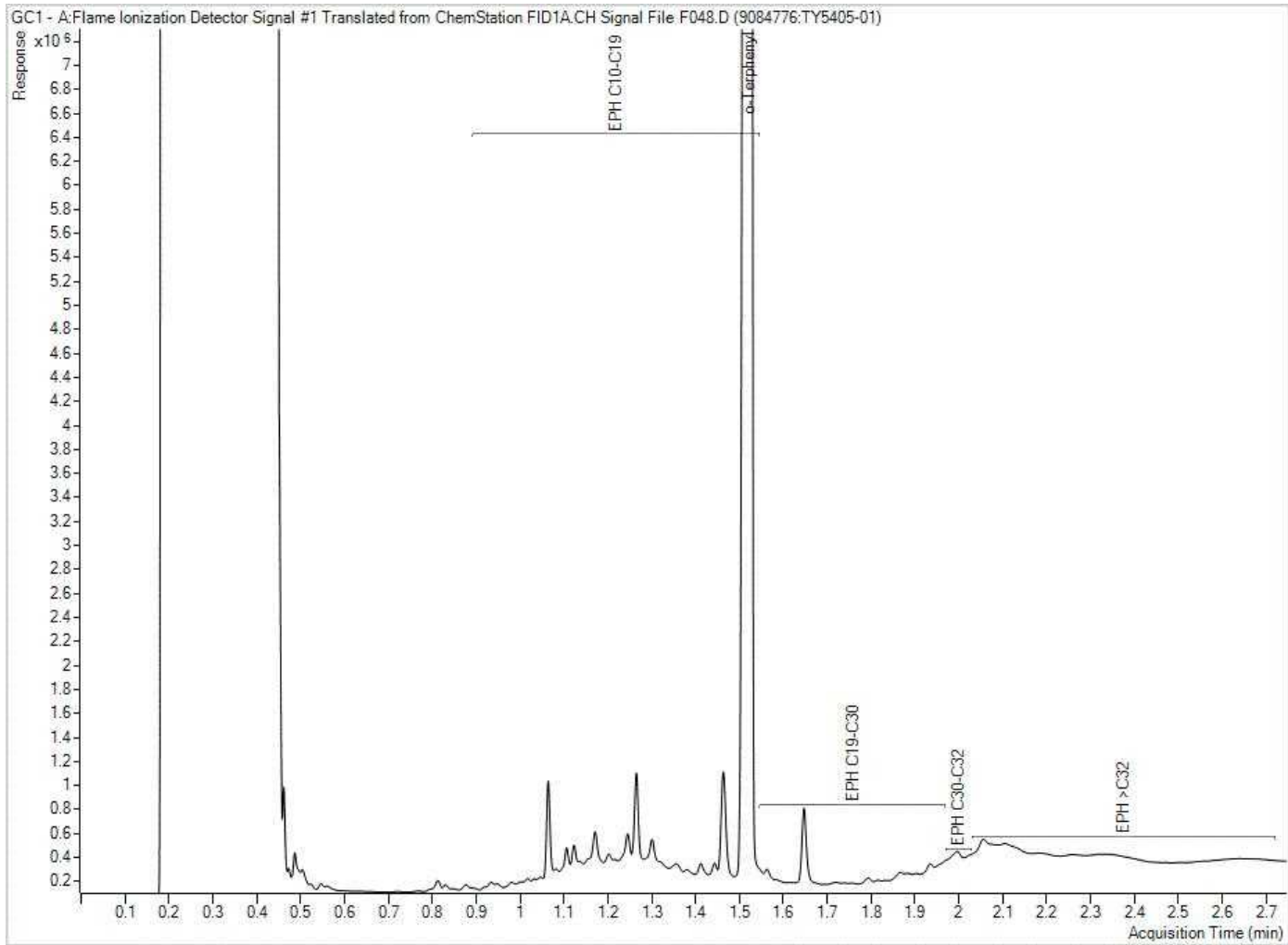


EPH in Soil by GC/FID Chromatogram



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

EPH in Soil by GC/FID Chromatogram



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

Your P.O. #: 1232  
 Your Project #: 123221161  
 Site#: B862770  
 Your C.O.C. #: B862770-ONTV-01-01

**Attention: Stantec Reporting**

Maxxam Analytics  
 Burnaby (Stantec)  
 4606 Canada Way  
 Burnaby, BC  
 CANADA V5G 1K5

**Report Date: 2018/08/17**  
 Report #: R5360810  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K5409**  
**Received: 2018/08/13, 10:28**

Sample Matrix: Soil  
 # Samples Received: 1

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Reference</b>
Total Organic Carbon in Soil	1	N/A	2018/08/16	CAM SOP-00468	BCMOE TOC Aug 2014

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Your P.O. #: 1232  
Your Project #: 123221161  
Site#: B862770  
Your C.O.C. #: B862770-ONTV-01-01

**Attention: Stantec Reporting**

Maxxam Analytics  
Burnaby (Stantec)  
4606 Canada Way  
Burnaby, BC  
CANADA V5G 1K5

**Report Date: 2018/08/17**  
Report #: R5360810  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K5409**  
**Received: 2018/08/13, 10:28**

Encryption Key

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

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**RESULTS OF ANALYSES OF SOIL**

<b>Maxxam ID</b>		HLM657		
<b>Sampling Date</b>		2018/07/26		
<b>COC Number</b>		B862770-ONTV-01-01		
	<b>UNITS</b>	<b>TY5396-MW18-35 SA08</b>	<b>RDL</b>	<b>QC Batch</b>
Total Organic Carbon	mg/kg	<500	500	5680650
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

Maxxam Job #: B8K5409  
Report Date: 2018/08/17

Maxxam Analytics  
Client Project #: 123221161  
Your P.O. #: 1232  
Sampler Initials: MD

### TEST SUMMARY

**Maxxam ID:** HLM657  
**Sample ID:** TY5396-MW18-35 SA08  
**Matrix:** Soil

**Collected:** 2018/07/26  
**Shipped:**  
**Received:** 2018/08/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5680650	N/A	2018/08/16	Charles Opoku-Ware

**GENERAL COMMENTS**

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

Package 1	17.7°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5680650	Total Organic Carbon	2018/08/16	<500	mg/kg	0.33	35	103	75 - 125

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


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

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



### VALIDATION SIGNATURE PAGE

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

*Eva Pranjić*  


---

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

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: 123221161  
 Site#: B862770  
 Your C.O.C. #: N/A

**Attention: Stantec Reporting**

Maxxam Analytics  
 Burnaby (Stantec)  
 4606 Canada Way  
 Burnaby, BC  
 CANADA V5G 1K5

**Report Date: 2018/09/04**  
 Report #: R5385020  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8M0223**  
**Received: 2018/08/25, 14:15**

Sample Matrix: Soil  
 # Samples Received: 1

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Reference</b>
Total Organic Carbon in Soil	1	N/A	2018/08/31	CAM SOP-00468	BCMOE TOC Aug 2014

**Remarks:**

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

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

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

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

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

Your Project #: 123221161  
Site#: B862770  
Your C.O.C. #: N/A

**Attention: Stantec Reporting**

Maxxam Analytics  
Burnaby (Stantec)  
4606 Canada Way  
Burnaby, BC  
CANADA V5G 1K5

**Report Date: 2018/09/04**  
Report #: R5385020  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8M0223**  
**Received: 2018/08/25, 14:15**

Encryption Key

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

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**RESULTS OF ANALYSES OF SOIL**

<b>Maxxam ID</b>		HOP728		
<b>Sampling Date</b>		2018/07/26		
	<b>UNITS</b>	<b>TY5389-MW18-35-SA01</b>	<b>RDL</b>	<b>QC Batch</b>
Total Organic Carbon	mg/kg	1800	500	5708076
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

**TEST SUMMARY**

**Maxxam ID:** HOP728  
**Sample ID:** TY5389-MW18-35-SA01  
**Matrix:** Soil

**Collected:** 2018/07/26  
**Shipped:**  
**Received:** 2018/08/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5708076	N/A	2018/08/31	Charles Opoku-Ware

**GENERAL COMMENTS**

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

Package 1	9.3°C
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**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5708076	Total Organic Carbon	2018/08/31	<500	mg/kg	7.2	35	100	75 - 125

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

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

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

### VALIDATION SIGNATURE PAGE

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

*Cristina Carriere*

---

Cristina Carriere, Scientific Service Specialist

---

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Sent to: Maxxam Campobello  
 6740 Campobello Road  
 Mississauga, ON, L5N 2L8  
 Tel: (905) 817-5700

MAXXAM INTERLAB CHAIN OF CUSTODY RECORD

Page 01 of 01

COC # B862770-ONTV-01-01

REPORT INFORMATION							ANALYSIS REQUESTED										Job Barcode Label																														
Company: Maxxam							<table border="1"> <tr> <td>25-Aug-18 14:15</td> </tr> <tr> <td>Nazeema Rahaman</td> </tr> <tr> <td></td> </tr> <tr> <td>B8M0223</td> </tr> <tr> <td>KVG ENV-877</td> </tr> <tr> <td> </td> </tr> <tr> <td> </td> </tr> </table>										25-Aug-18 14:15	Nazeema Rahaman		B8M0223	KVG ENV-877			ADDITIONAL SAMPLE INFORMATION (P: 01)																							
25-Aug-18 14:15																																															
Nazeema Rahaman																																															
B8M0223																																															
KVG ENV-877																																															
Address: 4606 Canada Way, Burnaby, British Columbia, V5G 1K5																																															
Contact Name: Nahed Amer																																															
Email: NAmer@maxxam.ca																																															
Phone:																																															
Maxxam Project #: B862770																																															
Client Invoice To: STANTEC CONSULTING LTD (2792)																																															
Client Report To: STANTEC CONSULTING LTD (2792) <span style="float: right;">Incl. on Report? Yes / No</span>																																															
#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	TDC Soil Subcontract																																								
1	TY5389-MW18-35 SA01	SOIL	2018/07/26		MD	1	X																																								
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SITE #:						Please inform Maxxam immediately if you are not accredited for the requested test(s). **Please return a copy of this form with the report.** Proceed past hold time			National Excel (N001) BEC Excel Export (A043) Stantec Equis (N047) Golder (Q001)			<input type="checkbox"/> Rush Required 2018/08/21 <input checked="" type="checkbox"/> Date Required Please inform us if rush charges will be incurred.																																			
PROJECT #:																																															
PO/AFE, TASK ORDER/SERVICE ORDER, LINE ITEM:																																															
COOLER ID:			COOLER ID:			COOLER ID:			RECEIVING LAB USE ONLY																																						
<table border="1"> <tr><td>YES</td><td>NO</td><td>Temp: (°C)</td></tr> <tr><td>✓</td><td></td><td>12.8</td></tr> <tr><td>✓</td><td></td><td>8.8</td></tr> <tr><td>✓</td><td></td><td>8.8</td></tr> </table>			YES	NO	Temp: (°C)	✓		12.8	✓		8.8	✓		8.8	<table border="1"> <tr><td>YES</td><td>NO</td><td>Temp: (°C)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table>			YES	NO	Temp: (°C)										<table border="1"> <tr><td>YES</td><td>NO</td><td>Temp: (°C)</td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table>			YES	NO	Temp: (°C)										Maxxam Job # _____ _____ _____		
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1. <i>PTAWARDS - DEERE TOMAS</i>			2018.05.04			15:00			1. <i>K. Van G...</i> KATHLN VAN GAWRUSSEN			2018/08/25			14:15			KVG																													
2.									2.																																						

Your Project #: 123221161

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

Your C.O.C. #: 560386-07-01, 560386-08-01, 560386-09-01

**Report Date: 2018/08/08**  
Report #: R2601289  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B863859**

**Received: 2018/07/30, 08:55**

Sample Matrix: Soil  
# Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1)	1	N/A	2018/08/02	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Moisture	2	2018/08/04	2018/08/07	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	1	2018/08/07	2018/08/08	BBY8SOP-00017	BCMOE BCLM Dec2000 m
PAH in Soil by GC/MS (SIM)	1	2018/08/07	2018/08/08	BBY8SOP-00022	BCMOE BCLM Jul2017m
Total PAH and B(a)P Calculation (2)	1	N/A	2018/08/08	BBY WI-00033	Auto Calc
EPH less PAH in Soil By GC/FID (3)	1	N/A	2018/08/08	BBY WI-00033	Auto Calc
EPH in Soil by GC/FID	2	2018/08/04	2018/08/07	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	1	2018/08/07	2018/08/08	BBY8SOP-00029	BCMOE BCLM Jul 2016
Volatile HC-BTEX for Soil (4)	1	N/A	2018/08/08	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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Your Project #: 123221161

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

Your C.O.C. #: 560386-07-01, 560386-08-01, 560386-09-01

**Report Date: 2018/08/08**  
Report #: R2601289  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B863859**

**Received: 2018/07/30, 08:55**

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

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

- (1) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.
- (2) Total PAHs in Soil include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

Total PAHs in Sediment include: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenz(a,h)anthracene.

(3) LEPH = EPH (C10 to C19) - (Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Benzo(b)fluoranthene + Benzo(k)fluoranthene + Dibenz(a,h)anthracene + Indeno(1,2,3-cd)pyrene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
This report has been generated and distributed using a secure automated process.

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Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		TZ2465	TZ2466		TZ2480		
<b>Sampling Date</b>		2018/07/27	2018/07/27		2018/07/27		
<b>COC Number</b>		560386-07-01	560386-07-01		560386-08-01		
	<b>UNITS</b>	<b>MW18-37 SA06</b>	<b>MW18-37 SA07</b>	<b>QC Batch</b>	<b>MW18-40 SA03</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>							
Moisture	%	2.8	19	9091575	4.1	0.30	9092915
RDL = Reportable Detection Limit							

Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**TOTAL PETROLEUM HYDROCARBONS (SOIL)**

Maxxam ID		TZ2465	TZ2466		
Sampling Date		2018/07/27	2018/07/27		
COC Number		560386-07-01	560386-07-01		
	UNITS	MW18-37 SA06	MW18-37 SA07	RDL	QC Batch
<b>Hydrocarbons</b>					
EPH (C10-C19)	mg/kg	<100	<100	100	9092936
EPH (C19-C32)	mg/kg	<100	<100	100	9092936
<b>Surrogate Recovery (%)</b>					
O-TERPHENYL (sur.)	%	69	69		9092936
RDL = Reportable Detection Limit					

Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

<b>Maxxam ID</b>		T22480		
<b>Sampling Date</b>		2018/07/27		
<b>COC Number</b>		560386-08-01		
	<b>UNITS</b>	<b>MW18-40 SA03</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
VPH (VH6 to 10 - BTEX)	mg/kg	<10	10	9087418
<b>Volatiles</b>				
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	0.10	9088932
Benzene	mg/kg	<0.0050	0.0050	9088932
Toluene	mg/kg	<0.020	0.020	9088932
Ethylbenzene	mg/kg	<0.010	0.010	9088932
m & p-Xylene	mg/kg	<0.040	0.040	9088932
o-Xylene	mg/kg	<0.040	0.040	9088932
Styrene	mg/kg	<0.030	0.030	9088932
Xylenes (Total)	mg/kg	<0.040	0.040	9088932
VH C6-C10	mg/kg	<10	10	9088932
<b>Surrogate Recovery (%)</b>				
1,4-Difluorobenzene (sur.)	%	98		9088932
4-Bromofluorobenzene (sur.)	%	105		9088932
D10-ETHYLBENZENE (sur.)	%	106		9088932
D4-1,2-Dichloroethane (sur.)	%	110		9088932
RDL = Reportable Detection Limit				

Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2480		
Sampling Date		2018/07/27		
COC Number		560386-08-01		
	UNITS	MW18-40 SA03	RDL	QC Batch
<b>Calculated Parameters</b>				
Low Molecular Weight PAH's	mg/kg	<0.050	0.050	9087241
High Molecular Weight PAH's	mg/kg	<0.050	0.050	9087241
Total PAH	mg/kg	<0.050	0.050	9087241
<b>Polycyclic Aromatics</b>				
Naphthalene	mg/kg	<0.010	0.010	9094240
1-Methylnaphthalene	mg/kg	<0.050	0.050	9094240
2-Methylnaphthalene	mg/kg	<0.020	0.020	9094240
Acenaphthylene	mg/kg	<0.0050	0.0050	9094240
Acenaphthene	mg/kg	<0.0050	0.0050	9094240
Fluorene	mg/kg	<0.020	0.020	9094240
Phenanthrene	mg/kg	<0.010	0.010	9094240
Anthracene	mg/kg	<0.0040	0.0040	9094240
Acridine	mg/kg	<0.050	0.050	9094240
Fluoranthene	mg/kg	<0.020	0.020	9094240
Pyrene	mg/kg	<0.020	0.020	9094240
Benzo(a)anthracene	mg/kg	<0.020	0.020	9094240
Chrysene	mg/kg	<0.020	0.020	9094240
Benzo(b&j)fluoranthene	mg/kg	<0.020	0.020	9094240
Benzo(b)fluoranthene	mg/kg	<0.020	0.020	9094240
Benzo(k)fluoranthene	mg/kg	<0.020	0.020	9094240
Benzo(a)pyrene	mg/kg	<0.020	0.020	9094240
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	0.020	9094240
Dibenz(a,h)anthracene	mg/kg	<0.020	0.020	9094240
Benzo(g,h,i)perylene	mg/kg	<0.050	0.050	9094240
<b>Calculated Parameters</b>				
LEPH (C10-C19 less PAH)	mg/kg	<100	100	9087254
HEPH (C19-C32 less PAH)	mg/kg	<100	100	9087254
<b>Hydrocarbons</b>				
EPH (C10-C19)	mg/kg	<100	100	9094235
EPH (C19-C32)	mg/kg	<100	100	9094235
<b>Surrogate Recovery (%)</b>				
D10-ANTHRACENE (sur.)	%	82		9094240
D8-ACENAPHTHYLENE (sur.)	%	78		9094240
RDL = Reportable Detection Limit				

Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

<b>Maxxam ID</b>		TZ2480		
<b>Sampling Date</b>		2018/07/27		
<b>COC Number</b>		560386-08-01		
	<b>UNITS</b>	<b>MW18-40 SA03</b>	<b>RDL</b>	<b>QC Batch</b>
D8-NAPHTHALENE (sur.)	%	85		9094240
TERPHENYL-D14 (sur.)	%	87		9094240
O-TERPHENYL (sur.)	%	91		9094235
RDL = Reportable Detection Limit				



Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**GENERAL COMMENTS**

**Results relate only to the items tested.**

Maxxam Job #: B863859  
Report Date: 2018/08/08

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9088932	1,4-Difluorobenzene (sur.)	2018/08/02	95	70 - 130	94	70 - 130	100	%		
9088932	4-Bromofluorobenzene (sur.)	2018/08/02	105	70 - 130	104	70 - 130	104	%		
9088932	D10-ETHYLBENZENE (sur.)	2018/08/02	110	60 - 130	93	60 - 130	107	%		
9088932	D4-1,2-Dichloroethane (sur.)	2018/08/02	101	70 - 130	101	70 - 130	114	%		
9092936	O-TERPHENYL (sur.)	2018/08/07	81	60 - 140	71	60 - 140	72	%		
9094235	O-TERPHENYL (sur.)	2018/08/08	88	60 - 140	87	60 - 140	91	%		
9094240	D10-ANTHRACENE (sur.)	2018/08/08	85	50 - 140	80	50 - 140	86	%		
9094240	D8-ACENAPHTHYLENE (sur.)	2018/08/08	83	50 - 140	80	50 - 140	82	%		
9094240	D8-NAPHTHALENE (sur.)	2018/08/08	92	50 - 140	82	50 - 140	93	%		
9094240	TERPHENYL-D14 (sur.)	2018/08/08	93	50 - 140	87	50 - 140	93	%		
9088932	Benzene	2018/08/02	98	60 - 140	95	70 - 130	<0.0050	mg/kg	3.8	40
9088932	Ethylbenzene	2018/08/02	96	60 - 140	94	70 - 130	<0.010	mg/kg	12	40
9088932	m & p-Xylene	2018/08/02	96	60 - 140	95	70 - 130	<0.040	mg/kg	12	40
9088932	Methyl-tert-butylether (MTBE)	2018/08/02	103	N/A			<0.10	mg/kg	NC	40
9088932	o-Xylene	2018/08/02	100	60 - 140	99	70 - 130	<0.040	mg/kg	NC	40
9088932	Styrene	2018/08/02	109	N/A			<0.030	mg/kg	NC	40
9088932	Toluene	2018/08/02	93	60 - 140	91	70 - 130	<0.020	mg/kg	2.4	40
9088932	VH C6-C10	2018/08/02			91	70 - 130	<10	mg/kg	NC	40
9088932	Xylenes (Total)	2018/08/02					<0.040	mg/kg	12	40
9091575	Moisture	2018/08/07					<0.30	%	2.7	20
9092915	Moisture	2018/08/08					<0.30	%	5.8	20
9092936	EPH (C10-C19)	2018/08/07	NC	60 - 140	77	70 - 130	<100	mg/kg	2.1	40
9092936	EPH (C19-C32)	2018/08/07	90	60 - 140	81	70 - 130	<100	mg/kg	1.8	40
9094235	EPH (C10-C19)	2018/08/08	101	60 - 140	99	70 - 130	<100	mg/kg	NC	40
9094235	EPH (C19-C32)	2018/08/08	103	60 - 140	102	70 - 130	<100	mg/kg	NC	40
9094240	1-Methylnaphthalene	2018/08/08	101	50 - 140	98	50 - 140	<0.050	mg/kg	NC	50
9094240	2-Methylnaphthalene	2018/08/08	98	50 - 140	95	50 - 140	<0.020	mg/kg	NC	50
9094240	Acenaphthene	2018/08/08	83	50 - 140	81	50 - 140	<0.0050	mg/kg	NC	50
9094240	Acenaphthylene	2018/08/08	81	50 - 140	79	50 - 140	<0.0050	mg/kg	NC	50
9094240	Acridine	2018/08/08	104	50 - 140	101	N/A	<0.050	mg/kg		
9094240	Anthracene	2018/08/08	84	50 - 140	77	50 - 140	<0.0040	mg/kg	NC	50

Maxxam Job #: B863859  
Report Date: 2018/08/08

**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9094240	Benzo(a)anthracene	2018/08/08	78	50 - 140	75	50 - 140	<0.020	mg/kg	NC	50
9094240	Benzo(a)pyrene	2018/08/08	78	50 - 140	80	50 - 140	<0.020	mg/kg	NC	50
9094240	Benzo(b&j)fluoranthene	2018/08/08	79	50 - 140	80	50 - 140	<0.020	mg/kg	NC	50
9094240	Benzo(b)fluoranthene	2018/08/08	76	50 - 140	77	50 - 140	<0.020	mg/kg	NC	50
9094240	Benzo(g,h,i)perylene	2018/08/08	69	50 - 140	70	50 - 140	<0.050	mg/kg	NC	50
9094240	Benzo(k)fluoranthene	2018/08/08	73	50 - 140	91	50 - 140	<0.020	mg/kg	NC	50
9094240	Chrysene	2018/08/08	80	50 - 140	79	50 - 140	<0.020	mg/kg	NC	50
9094240	Dibenz(a,h)anthracene	2018/08/08	73	50 - 140	71	50 - 140	<0.020	mg/kg	NC	50
9094240	Fluoranthene	2018/08/08	87	50 - 140	81	50 - 140	<0.020	mg/kg	NC	50
9094240	Fluorene	2018/08/08	81	50 - 140	78	50 - 140	<0.020	mg/kg	NC	50
9094240	Indeno(1,2,3-cd)pyrene	2018/08/08	71	50 - 140	70	50 - 140	<0.020	mg/kg	NC	50
9094240	Naphthalene	2018/08/08	91	50 - 140	89	50 - 140	<0.010	mg/kg	NC	50
9094240	Phenanthrene	2018/08/08	81	50 - 140	79	50 - 140	<0.010	mg/kg	NC	50
9094240	Pyrene	2018/08/08	90	50 - 140	83	50 - 140	<0.020	mg/kg	NC	50

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

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

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

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

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

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

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

Maxxam Job #: B863859  
Report Date: 2018/08/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



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

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Analytics International Corporation o/a Maxxam Analytics  
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2386 www.maxxam.ca

Page / of

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@Stanec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	AD



B863859\_COC

Bottle Order #:



560386

Project Manager

Nahed Amer



C#560386-07-01

Regulatory Criteria	Special Instructions	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested							Turnaround Time (TAT) Required	
				LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)			

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)			# of Bottles	Comments
1	MWIS-37 SA01	18/07/27		SOIL									X		X	RECEIVED IN WHITEHORSE
2	SA02												X		1	BY: <i>Slyam@0855</i>
3	SA03												X		1	2018-07-30
4	SA04												X		1	TEMP: 9, 9, 10
5	SA05												X		1	
6	SA06													X	1	
7	SA07													X	1	
8	SA08												X		1	
9	SA09												X		1	
10	SA10												X		1	

RELINQUISHED BY: (Signature/Print)	Date: (YYMMDD)	Time	RECEIVED BY: (Signature/Print)	Date: (YYMMDD)	Time	# Jars used and not submitted	Lab Use Only	
<i>M. Deane</i>	18/07/29	2000	<i>Matthew Deane</i>	20/07/21	14:45	NA	Time Sensitive <input checked="" type="checkbox"/>	Temperature (°C) on Receipt: 5, 6, 6
							Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

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

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

White: Maxxam Yellow: Client

375



Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel: (604) 734 7276 Toll-free: 800-563-6266 Fax: (604) 731 2386 www.maxxam.ca

INVOICE TO:		Report Information		Project Information	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Matthew Deane	Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name		P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MS



Bottle Order #: 560395  
 Project Manager: Nahed Amer

Regulatory Criteria	Special Instructions	Analysis Requested	Turnaround Time (TAT) Required
		Regulated Drinking Water ? (Y/N) Metals Field Filtered ? (Y/N) LEPH/MEPH/PAH Dissolved Metals (with Hg) BTEX/VPH Nutrients (TP, NH4, TKN) Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate) Carbon (DOC)	Please provide advance notice for rush projects <b>Regular (Standard) TAT</b> (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. <input checked="" type="checkbox"/> <b>Job Specific Rush TAT (if applies to entire submission)</b> Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/MEPH/PAH	Dissolved Metals (with Hg)	BTEX/VPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	# of Bottles	Comments
1	MW18-37 SA11	18/07/27		SOIL									1	RECEIVED IN WHITEHORSE
2	MW18-37 SA12												1	BY: <i>shyana@0855</i>
3	MW18-40 SA01												1	2018-07-30
4	SA02												1	TEMP: 9, 9, 10
5	SA03						X	X					3	
6	SA04												1	
7	SA05												1	
8	SA06												1	
9	SA07												1	
10	SA08												1	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only
<i>Matthew Deane</i>	18/07/27	2000	<i>Shyana</i>	08/07/28	19:45	1/1	Time Sensitive <input type="checkbox"/> Temperature (°C) on Receipt: 5.5°C Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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

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

INVOICE TO:		Report Information		Project Information	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Matthew Deane	Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	MD



8863859\_COC

Bottle Order #: 560395  
Project Manager: Nahed Amer

Regulatory Criteria	Special Instructions	Analysis Requested	Turnaround Time (TAT) Required
		Regulated Drinking Water ? (Y/N) Metals Field Filtered ? (Y/N) LEPH/HEPH/PAH Dissolved Metals (with Hg) BTEX/VPH Nutrients (TP, NH4, TKN) Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate) Carbon (DOC)	Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

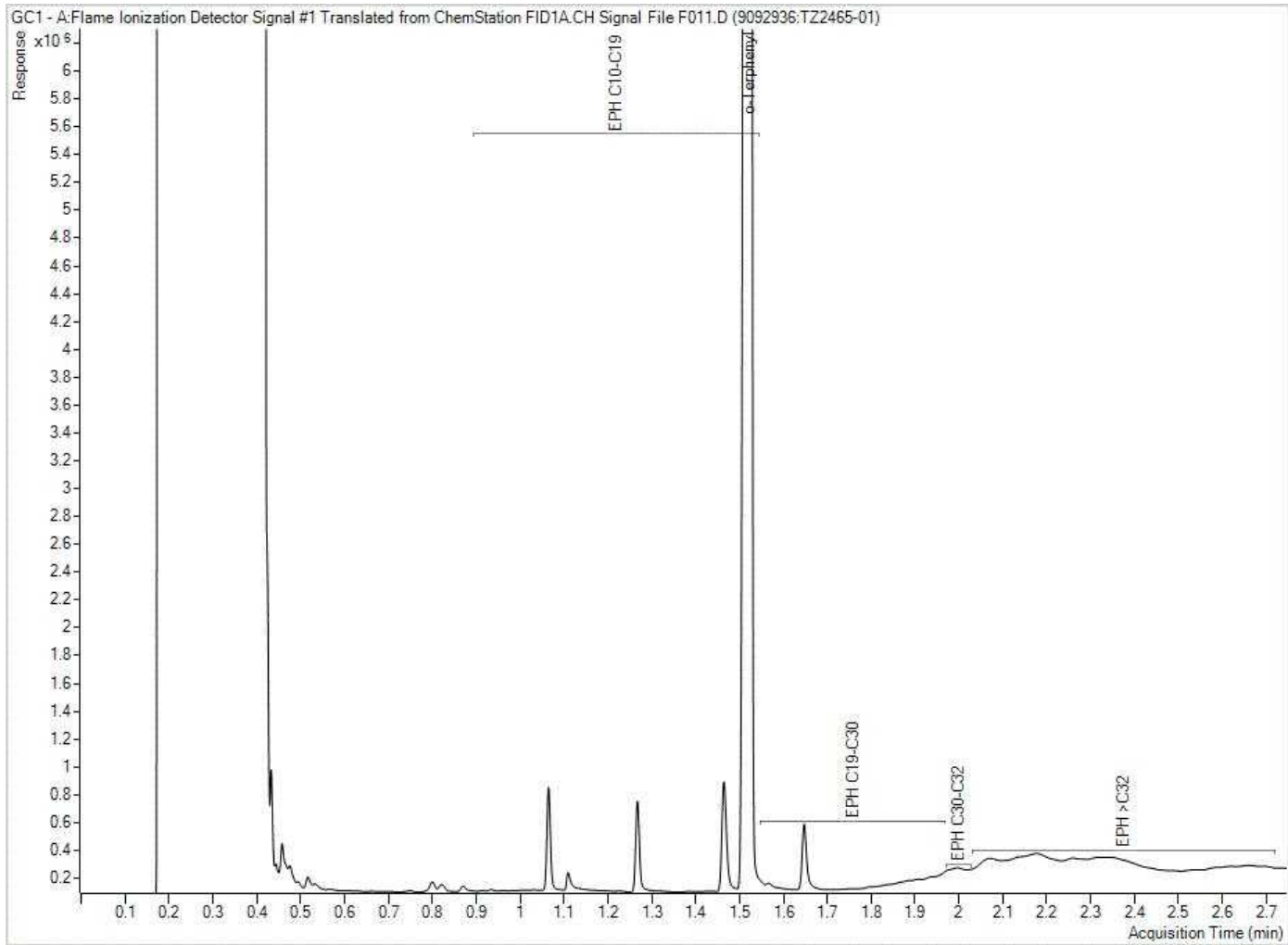
Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/VPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	Flow	# of Bottles	Comments
1	QC18-03	18/02/24		SOIL									X	1	RECEIVED IN WHITEHORSE
2	MW18-41 SA01	18/02/24		↓									X	1	BY: slycm@0855
3	MW18-41 SA02	18/02/24		↓									X	1	2018-07-31
4															
5															TEMP: 9 / 9 / 10
6															
7															
8															
9															
10															

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<i>M. Deane</i> M. DEANE	18/02/24	2000	<i>M. Deane</i>	2018/07/31	14:45	N/A	Time Sensitive <input checked="" type="checkbox"/> Temperature (°C) on Receipt: 5, 6, 6 Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
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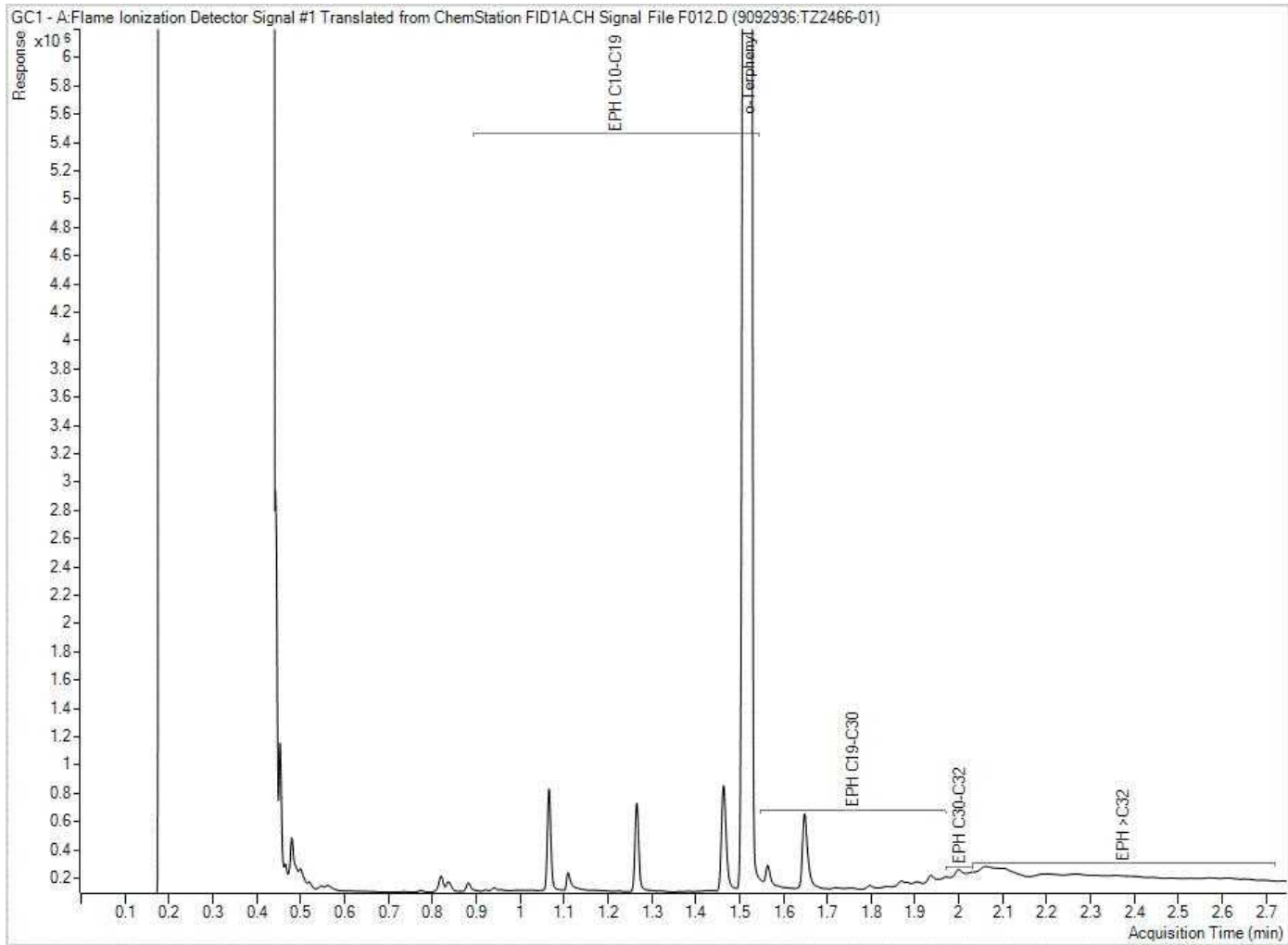
EPH in Soil by GC/FID Chromatogram



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

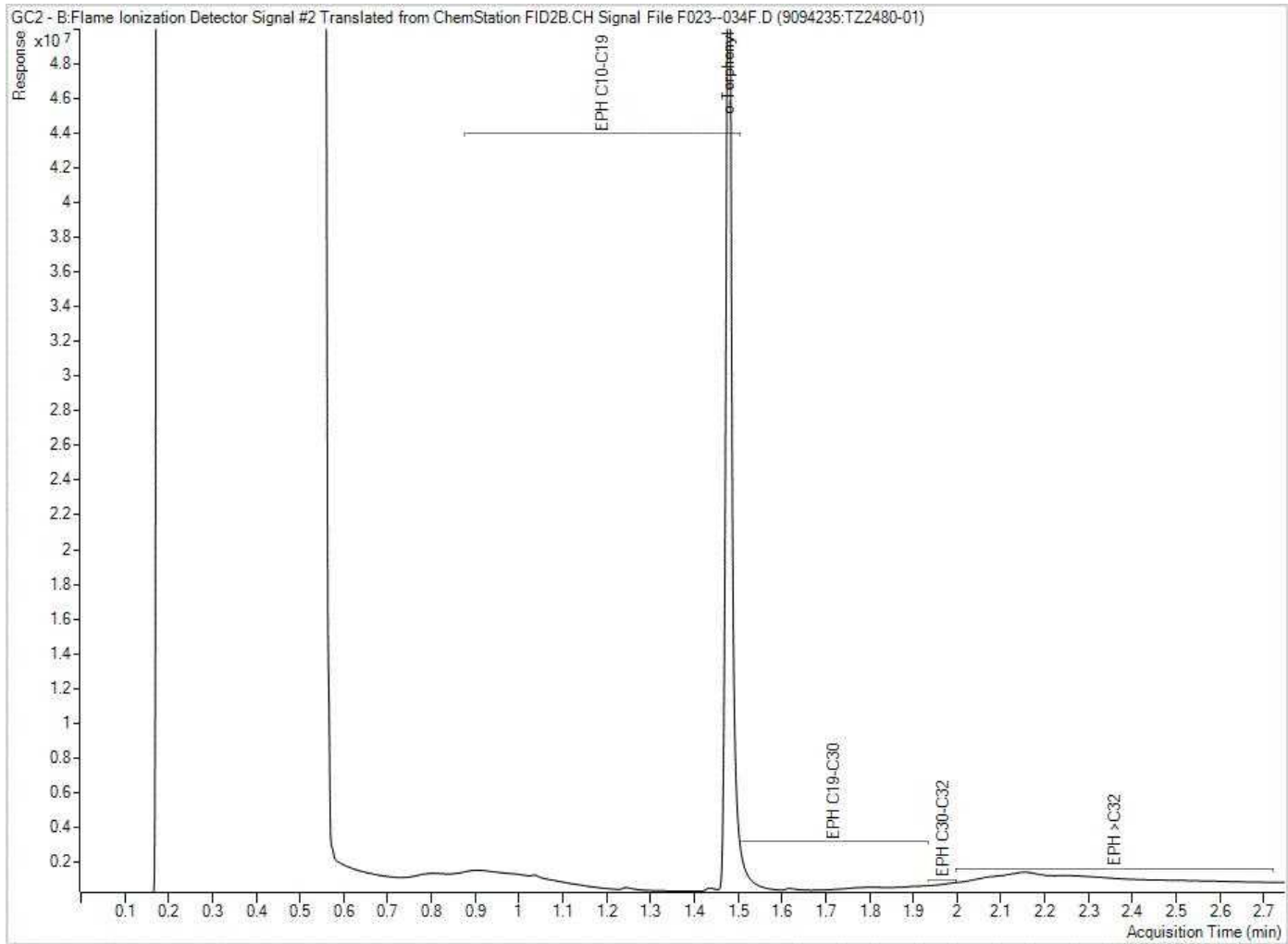


EPH in Soil by GC/FID Chromatogram



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

EPH in Soil by GC/FID Chromatogram



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

Your Project #: 123221161

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

Your C.O.C. #: 560386-11-01, 560386-12-01, 560386-13-01, 560386-14-01, 560391-02-01

**Report Date: 2018/08/29**  
Report #: R2611489  
Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B863863**

**Received: 2018/07/30, 08:55**

Sample Matrix: Soil  
# Samples Received: 17

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Analytical Method</b>
BTEX/MTBE LH VH F1 in Soil - Field Pres. (2)	5	N/A	2018/08/02	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Elements by ICPMS (total)	3	2018/08/27	2018/08/27	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
Moisture	7	2018/08/04	2018/08/07	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	1	2018/08/07	2018/08/08	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	6	2018/08/10	2018/08/11	BBY8SOP-00017	BCMOE BCLM Dec2000 m
PAH in Soil by GC/MS (SIM)	3	2018/08/04	2018/08/07	BBY8SOP-00022	BCMOE BCLM Jul2017m
PAH in Soil by GC/MS (SIM)	5	2018/08/04	2018/08/08	BBY8SOP-00022	BCMOE BCLM Jul2017m
Total PAH and B(a)P Calculation (3)	8	N/A	2018/08/08	BBY WI-00033	Auto Calc
pH (2:1 DI Water Extract)	3	2018/08/27	2018/08/27	BBY6SOP-00028	BCMOE BCLM Mar2005 m
EPH less PAH in Soil By GC/FID (4)	8	N/A	2018/08/08	BBY WI-00033	Auto Calc
EPH in Soil by GC/FID	3	2018/08/04	2018/08/07	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	5	2018/08/04	2018/08/08	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	6	2018/08/11	2018/08/13	BBY8SOP-00029	BCMOE BCLM Jul 2016
Texture by Hydrometer, incl Gravel (Wet)	2	N/A	2018/08/16	BBY6SOP-00051	Carter 2nd ed 55.3
Volatile HC-BTEX for Soil (5)	5	N/A	2018/08/08	BBY WI-00033	Auto Calc
TOC Soil Subcontract (1)	2	N/A	2018/08/17		
TOC Soil Subcontract (1)	3	N/A	2018/08/29		

**Remarks:**

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

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

Your Project #: 123221161

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

Your C.O.C. #: 560386-11-01, 560386-12-01, 560386-13-01, 560386-14-01, 560391-02-01

**Report Date: 2018/08/29**

Report #: R2611489

Version: 3 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B863863**

**Received: 2018/07/30, 08:55**

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) This test was performed by Maxxam Ontario (From Burnaby)

(2) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.

(3) Total PAHs in Soil include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

Total PAHs in Sediment include: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenz(a,h)anthracene.

(4) LEPH = EPH (C10 to C19) - (Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Benzo(b)fluoranthene + Benzo(k)fluoranthene + Dibenz(a,h)anthracene + Indeno(1,2,3-cd)pyrene + Pyrene)

(5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**RESULTS OF CHEMICAL ANALYSES OF SOIL**

<b>Maxxam ID</b>		TZ2551	TZ2559	TZ2564		TZ2565		
<b>Sampling Date</b>		2018/07/28	2018/07/28	2018/07/28		2018/07/28		
<b>COC Number</b>		560386-12-01	560386-13-01	560386-14-01		560386-14-01		
	<b>UNITS</b>	<b>MW18-30 SA01</b>	<b>MW18-31 SA01</b>	<b>MW18-31 SA06</b>	<b>QC Batch</b>	<b>MW18-31 SA07</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Parameter</b>								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	9107503			
<b>Physical Properties</b>								
% sand by hydrometer	%					84	2.0	9103384
% silt by hydrometer	%					<2.0	2.0	9103384
Clay Content	%					2.0	2.0	9103384
Gravel	%					14	2.0	9103384
RDL = Reportable Detection Limit								

<b>Maxxam ID</b>		TZ2567	TZ2574		TZ2575	TZ2575		
<b>Sampling Date</b>		2018/07/28	2018/07/28		2018/07/28	2018/07/28		
<b>COC Number</b>		560386-14-01	560391-02-01		560391-02-01	560391-02-01		
	<b>UNITS</b>	<b>MW18-39 SA01</b>	<b>MW18-39 SA08</b>	<b>QC Batch</b>	<b>MW18-39 SA09</b>	<b>MW18-39 SA09 Lab-Dup</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Parameter</b>								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	9107503				
<b>Physical Properties</b>								
% sand by hydrometer	%				31	33	2.0	9103384
% silt by hydrometer	%				51	52	2.0	9103384
Clay Content	%				8.0	7.8	2.0	9103384
Gravel	%				9.7	7.5	2.0	9103384
RDL = Reportable Detection Limit								
Lab-Dup = Laboratory Initiated Duplicate								

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		TZ2536		TZ2540		TZ2541		
<b>Sampling Date</b>		2018/07/28		2018/07/28		2018/07/28		
<b>COC Number</b>		560386-11-01		560386-11-01		560386-11-01		
	<b>UNITS</b>	<b>MW18-48 SA03</b>	<b>QC Batch</b>	<b>MW18-47 SA04</b>	<b>QC Batch</b>	<b>MW18-47 SA05</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>								
Moisture	%	20	9091575	15	9092915	15	0.30	9098612
RDL = Reportable Detection Limit								

<b>Maxxam ID</b>		TZ2549	TZ2549	TZ2554	TZ2564		TZ2565		
<b>Sampling Date</b>		2018/07/28	2018/07/28	2018/07/28	2018/07/28		2018/07/28		
<b>COC Number</b>		560386-12-01	560386-12-01	560386-13-01	560386-14-01		560386-14-01		
	<b>UNITS</b>	<b>MW18-38 SA07</b>	<b>MW18-38 SA07 Lab-Dup</b>	<b>MW18-30 SA04</b>	<b>MW18-31 SA06</b>	<b>QC Batch</b>	<b>MW18-31 SA07</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>									
Moisture	%	18	19	18	7.5	9091575	20	0.30	9098612
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate									

<b>Maxxam ID</b>		TZ2566	TZ2573		TZ2574		TZ2575		
<b>Sampling Date</b>		2018/07/28	2018/07/28		2018/07/28		2018/07/28		
<b>COC Number</b>		560386-14-01	560386-14-01		560391-02-01		560391-02-01		
	<b>UNITS</b>	<b>MW18-31 SA08</b>	<b>MW18-39 SA07</b>	<b>QC Batch</b>	<b>MW18-39 SA08</b>	<b>QC Batch</b>	<b>MW18-39 SA09</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>									
Moisture	%	20	7.6	9098612	18	9091575	20	0.30	9098612
RDL = Reportable Detection Limit									

<b>Maxxam ID</b>		TZ2576		TZ2579	TZ2580		
<b>Sampling Date</b>		2018/07/28		2018/07/28	2018/07/28		
<b>COC Number</b>		560391-02-01		560391-02-01	560391-02-01		
	<b>UNITS</b>	<b>MW18-39 SA10</b>	<b>QC Batch</b>	<b>QC18-04</b>	<b>QC18-05</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Physical Properties</b>							
Moisture	%	20	9098612	18	19	0.30	9091575
RDL = Reportable Detection Limit							

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**TOTAL PETROLEUM HYDROCARBONS (SOIL)**

Maxxam ID		TZ2541	TZ2565	TZ2566	TZ2573	TZ2575		
Sampling Date		2018/07/28	2018/07/28	2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-11-01	560386-14-01	560386-14-01	560386-14-01	560391-02-01		
	UNITS	MW18-47 SA05	MW18-31 SA07	MW18-31 SA08	MW18-39 SA07	MW18-39 SA09	RDL	QC Batch
<b>Hydrocarbons</b>								
EPH (C10-C19)	mg/kg	<100	<100	<100	960	170	100	9099655
EPH (C19-C32)	mg/kg	<100	<100	<100	110	<100	100	9099655
<b>Surrogate Recovery (%)</b>								
O-TERPHENYL (sur.)	%	85	86	86	88	86		9099655
RDL = Reportable Detection Limit								

Maxxam ID		TZ2576		
Sampling Date		2018/07/28		
COC Number		560391-02-01		
	UNITS	MW18-39 SA10	RDL	QC Batch
<b>Hydrocarbons</b>				
EPH (C10-C19)	mg/kg	<100	100	9099655
EPH (C19-C32)	mg/kg	<100	100	9099655
<b>Surrogate Recovery (%)</b>				
O-TERPHENYL (sur.)	%	86		9099655
RDL = Reportable Detection Limit				

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

Maxxam ID		TZ2554	TZ2564	TZ2574	TZ2579	TZ2580		
Sampling Date		2018/07/28	2018/07/28	2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-13-01	560386-14-01	560391-02-01	560391-02-01	560391-02-01		
	UNITS	MW18-30 SA04	MW18-31 SA06	MW18-39 SA08	QC18-04	QC18-05	RDL	QC Batch
<b>Calculated Parameters</b>								
VPH (VH6 to 10 - BTEX)	mg/kg	<10	82	27	<10	28	10	9087418
<b>Volatiles</b>								
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9088932
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9088932
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9088932
Ethylbenzene	mg/kg	0.013	<0.010	<0.010	<0.010	<0.010	0.010	9088932
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9088932
o-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9088932
Styrene	mg/kg	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	9088932
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9088932
VH C6-C10	mg/kg	<10	82	27	<10	28	10	9088932
<b>Surrogate Recovery (%)</b>								
1,4-Difluorobenzene (sur.)	%	95	95	96	97	96		9088932
4-Bromofluorobenzene (sur.)	%	105	106	106	106	105		9088932
D10-ETHYLBENZENE (sur.)	%	114	116	118	119	119		9088932
D4-1,2-Dichloroethane (sur.)	%	114	113	114	115	114		9088932
RDL = Reportable Detection Limit								



Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2536	TZ2540	TZ2549		TZ2554		
Sampling Date		2018/07/28	2018/07/28	2018/07/28		2018/07/28		
COC Number		560386-11-01	560386-11-01	560386-12-01		560386-13-01		
	UNITS	MW18-48 SA03	MW18-47 SA04	MW18-38 SA07	QC Batch	MW18-30 SA04	RDL	QC Batch
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	mg/kg	<0.050	1.3	<0.050	9087241	<0.050	0.050	9087241
High Molecular Weight PAH's	mg/kg	<0.050	0.37	<0.050	9087241	<0.050	0.050	9087241
Total PAH	mg/kg	<0.050	1.6	<0.050	9087241	<0.050	0.050	9087241
<b>Polycyclic Aromatics</b>								
Naphthalene	mg/kg	<0.010	0.057	<0.010	9092931	<0.010	0.010	9093468
1-Methylnaphthalene	mg/kg	<0.050	0.42	<0.050	9092931	<0.050	0.050	9093468
2-Methylnaphthalene	mg/kg	<0.020	0.34	<0.020	9092931	<0.020	0.020	9093468
Acenaphthylene	mg/kg	<0.0050	0.0088 (1)	<0.0050	9092931	<0.0050	0.0050	9093468
Acenaphthene	mg/kg	<0.0050	0.033 (1)	<0.0050	9092931	<0.0050	0.0050	9093468
Fluorene	mg/kg	<0.020	0.040 (1)	<0.020	9092931	<0.020	0.020	9093468
Phenanthrene	mg/kg	<0.010	0.30	<0.010	9092931	<0.010	0.010	9093468
Anthracene	mg/kg	<0.0040	0.049 (1)	<0.0040	9092931	<0.0040	0.0040	9093468
Acridine	mg/kg	<0.050	<0.050	<0.050	9092931	<0.050	0.050	9093468
Fluoranthene	mg/kg	<0.020	0.11	<0.020	9092931	<0.020	0.020	9093468
Pyrene	mg/kg	<0.020	0.14	<0.020	9092931	<0.020	0.020	9093468
Benzo(a)anthracene	mg/kg	<0.020	0.038	<0.020	9092931	<0.020	0.020	9093468
Chrysene	mg/kg	<0.020	0.049	<0.020	9092931	<0.020	0.020	9093468
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	9092931	<0.020	0.020	9093468
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	9092931	<0.020	0.020	9093468
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	9092931	<0.020	0.020	9093468
Benzo(a)pyrene	mg/kg	<0.020	0.034	<0.020	9092931	<0.020	0.020	9093468
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	<0.020	<0.020	9092931	<0.020	0.020	9093468
Dibenz(a,h)anthracene	mg/kg	<0.020	<0.020	<0.020	9092931	<0.020	0.020	9093468
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	9092931	<0.050	0.050	9093468
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/kg	<100	990	<100	9087254	<100	100	9087254
HEPH (C19-C32 less PAH)	mg/kg	<100	510	<100	9087254	<100	100	9087254
<b>Hydrocarbons</b>								
EPH (C10-C19)	mg/kg	<100	990	<100	9092936	<100	100	9093456
EPH (C19-C32)	mg/kg	<100	510	<100	9092936	<100	100	9093456
<b>Surrogate Recovery (%)</b>								
D10-ANTHRACENE (sur.)	%	88	97	104	9092931	92		9093468
RDL = Reportable Detection Limit								
(1) Tentatively identified result and may be potentially biased high due to matrix interference.								

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2536	TZ2540	TZ2549		TZ2554		
Sampling Date		2018/07/28	2018/07/28	2018/07/28		2018/07/28		
COC Number		560386-11-01	560386-11-01	560386-12-01		560386-13-01		
	UNITS	MW18-48 SA03	MW18-47 SA04	MW18-38 SA07	QC Batch	MW18-30 SA04	RDL	QC Batch
D8-ACENAPHTHYLENE (sur.)	%	87	85	91	9092931	92		9093468
D8-NAPHTHALENE (sur.)	%	97	85	95	9092931	91		9093468
TERPHENYL-D14 (sur.)	%	89	92	99	9092931	101		9093468
O-TERPHENYL (sur.)	%	70	99	72	9092936	92		9093456
RDL = Reportable Detection Limit								

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2564	TZ2574	TZ2579	TZ2580		
Sampling Date		2018/07/28	2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-14-01	560391-02-01	560391-02-01	560391-02-01		
	UNITS	MW18-31 SA06	MW18-39 SA08	QC18-04	QC18-05	RDL	QC Batch
<b>Calculated Parameters</b>							
Low Molecular Weight PAH's	mg/kg	0.88	0.36	<0.050	0.38	0.050	9087241
High Molecular Weight PAH's	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	9087241
Total PAH	mg/kg	0.88	0.36	<0.050	0.38	0.050	9087241
<b>Polycyclic Aromatics</b>							
Naphthalene	mg/kg	0.012 (1)	0.022 (1)	<0.010	0.055	0.010	9093468
1-Methylnaphthalene	mg/kg	<0.050	0.087	<0.050	0.084	0.050	9093468
2-Methylnaphthalene	mg/kg	0.041 (1)	0.044 (1)	<0.020	0.082	0.020	9093468
Acenaphthylene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	9093468
Acenaphthene	mg/kg	0.24 (1)	0.079 (1)	<0.0050	0.060 (1)	0.0050	9093468
Fluorene	mg/kg	0.28	0.091	<0.020	0.076	0.020	9093468
Phenanthrene	mg/kg	0.29	0.037	<0.010	0.028	0.010	9093468
Anthracene	mg/kg	0.012 (1)	0.0049 (1)	<0.0040	<0.0040	0.0040	9093468
Acridine	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	9093468
Fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(a)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Chrysene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(b&j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(b)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(k)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(a)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Dibenz(a,h)anthracene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.020	9093468
Benzo(g,h,i)perylene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	9093468
<b>Calculated Parameters</b>							
LEPH (C10-C19 less PAH)	mg/kg	1400	780	<100	530	100	9087254
HEPH (C19-C32 less PAH)	mg/kg	160	<100	<100	<100	100	9087254
<b>Hydrocarbons</b>							
EPH (C10-C19)	mg/kg	1400	780	<100	530	100	9093456
EPH (C19-C32)	mg/kg	160	<100	<100	<100	100	9093456
<b>Surrogate Recovery (%)</b>							
D10-ANTHRACENE (sur.)	%	101	91	91	93		9093468
RDL = Reportable Detection Limit							
(1) Tentatively identified result and may be potentially biased high due to matrix interference.							

Maxxam Job #: B863863  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2564	TZ2574	TZ2579	TZ2580		
Sampling Date		2018/07/28	2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-14-01	560391-02-01	560391-02-01	560391-02-01		
	UNITS	MW18-31 SA06	MW18-39 SA08	QC18-04	QC18-05	RDL	QC Batch
D8-ACENAPHTHYLENE (sur.)	%	85	83	92	88		9093468
D8-NAPHTHALENE (sur.)	%	81	78	89	84		9093468
TERPHENYL-D14 (sur.)	%	110	103	100	108		9093468
O-TERPHENYL (sur.)	%	89	91	90	89		9093456
RDL = Reportable Detection Limit							

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		TZ2580		
Sampling Date		2018/07/28		
COC Number		560391-02-01		
	UNITS	QC18-05 Lab-Dup	RDL	QC Batch
<b>Polycyclic Aromatics</b>				
Naphthalene	mg/kg	0.054	0.010	9093468
1-Methylnaphthalene	mg/kg	0.084	0.050	9093468
2-Methylnaphthalene	mg/kg	0.099	0.020	9093468
Acenaphthylene	mg/kg	<0.0050	0.0050	9093468
Acenaphthene	mg/kg	0.053	0.0050	9093468
Fluorene	mg/kg	0.070	0.020	9093468
Phenanthrene	mg/kg	0.024	0.010	9093468
Anthracene	mg/kg	<0.0040	0.0040	9093468
Acridine	mg/kg	<0.050	0.050	9093468
Fluoranthene	mg/kg	<0.020	0.020	9093468
Pyrene	mg/kg	<0.020	0.020	9093468
Benzo(a)anthracene	mg/kg	<0.020	0.020	9093468
Chrysene	mg/kg	<0.020	0.020	9093468
Benzo(b&j)fluoranthene	mg/kg	<0.020	0.020	9093468
Benzo(b)fluoranthene	mg/kg	<0.020	0.020	9093468
Benzo(k)fluoranthene	mg/kg	<0.020	0.020	9093468
Benzo(a)pyrene	mg/kg	<0.020	0.020	9093468
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	0.020	9093468
Dibenz(a,h)anthracene	mg/kg	<0.020	0.020	9093468
Benzo(g,h,i)perylene	mg/kg	<0.050	0.050	9093468
<b>Hydrocarbons</b>				
EPH (C10-C19)	mg/kg	450	100	9093456
EPH (C19-C32)	mg/kg	<100	100	9093456
<b>Surrogate Recovery (%)</b>				
D10-ANTHRACENE (sur.)	%	86		9093468
D8-ACENAPHTHYLENE (sur.)	%	84		9093468
D8-NAPHTHALENE (sur.)	%	80		9093468
TERPHENYL-D14 (sur.)	%	103		9093468
O-TERPHENYL (sur.)	%	89		9093456
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate				

Maxxam Job #: B863863  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
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**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

Maxxam ID		TZ2551	TZ2559	TZ2567		
Sampling Date		2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-12-01	560386-13-01	560386-14-01		
	UNITS	MW18-30 SA01	MW18-31 SA01	MW18-39 SA01	RDL	QC Batch
<b>Physical Properties</b>						
Soluble (2:1) pH	pH	8.47	8.43	8.10	N/A	9118424
<b>Total Metals by ICPMS</b>						
Total Aluminum (Al)	mg/kg	10400	15900	15200	100	9118366
Total Antimony (Sb)	mg/kg	0.61	1.00	0.91	0.10	9118366
Total Arsenic (As)	mg/kg	7.17	10.9	10.3	0.50	9118366
Total Barium (Ba)	mg/kg	154	249	240	0.10	9118366
Total Beryllium (Be)	mg/kg	0.33	0.46	0.48	0.20	9118366
Total Bismuth (Bi)	mg/kg	0.11	0.17	0.18	0.10	9118366
Total Boron (B)	mg/kg	2.2	2.5	3.9	1.0	9118366
Total Cadmium (Cd)	mg/kg	0.213	0.343	0.324	0.050	9118366
Total Calcium (Ca)	mg/kg	21700	31600	44800	100	9118366
Total Chromium (Cr)	mg/kg	48.2	52.4	49.5	1.0	9118366
Total Cobalt (Co)	mg/kg	8.11	12.1	11.3	0.30	9118366
Total Copper (Cu)	mg/kg	21.7	36.4	31.3	0.50	9118366
Total Iron (Fe)	mg/kg	20400	29100	26900	100	9118366
Total Lead (Pb)	mg/kg	7.27	10.6	9.81	0.10	9118366
Total Lithium (Li)	mg/kg	9.1	13.0	12.6	5.0	9118366
Total Magnesium (Mg)	mg/kg	8170	10700	11000	100	9118366
Total Manganese (Mn)	mg/kg	370	529	512	0.20	9118366
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	0.050	9118366
Total Molybdenum (Mo)	mg/kg	0.67	0.75	0.84	0.10	9118366
Total Nickel (Ni)	mg/kg	35.7	44.7	41.0	0.80	9118366
Total Phosphorus (P)	mg/kg	808	955	975	10	9118366
Total Potassium (K)	mg/kg	1110	1770	1610	100	9118366
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	0.50	9118366
Total Silver (Ag)	mg/kg	0.082	0.137	0.152	0.050	9118366
Total Sodium (Na)	mg/kg	239	314	591	100	9118366
Total Strontium (Sr)	mg/kg	59.3	83.4	145	0.10	9118366
Total Thallium (Tl)	mg/kg	0.082	0.127	0.128	0.050	9118366
Total Tin (Sn)	mg/kg	0.37	0.53	0.48	0.10	9118366
Total Titanium (Ti)	mg/kg	741	1070	1150	1.0	9118366
Total Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	0.50	9118366
RDL = Reportable Detection Limit						
N/A = Not Applicable						

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**CSR/CCME METALS IN SOIL WITH HG (SOIL)**

Maxxam ID		TZ2551	TZ2559	TZ2567		
Sampling Date		2018/07/28	2018/07/28	2018/07/28		
COC Number		560386-12-01	560386-13-01	560386-14-01		
	UNITS	MW18-30 SA01	MW18-31 SA01	MW18-39 SA01	RDL	QC Batch
Total Uranium (U)	mg/kg	0.858	1.15	1.80	0.050	9118366
Total Vanadium (V)	mg/kg	41.8	59.3	56.1	2.0	9118366
Total Zinc (Zn)	mg/kg	44.4	65.3	56.8	1.0	9118366
Total Zirconium (Zr)	mg/kg	5.99	8.71	8.10	0.50	9118366
RDL = Reportable Detection Limit						

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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### GENERAL COMMENTS

Version 2: Report reissued to include results for EPH, TOC and Grain size on select samples as per request from Matthew Deane on 2018/08/10  
Sample were analyzed past hold time for EPH and moisture. Analysis performed with client's consent.

Version 3: Report reissued to include results for Metals and TOC on sample MW18-31 SA01, MW18-39 SA01 and MW18-30 SA01 as per request from Matthew Deane on 2018/08/23

**Results relate only to the items tested.**



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**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9088932	1,4-Difluorobenzene (sur.)	2018/08/02	95	70 - 130	94	70 - 130	100	%				
9088932	4-Bromofluorobenzene (sur.)	2018/08/02	105	70 - 130	104	70 - 130	104	%				
9088932	D10-ETHYLBENZENE (sur.)	2018/08/02	110	60 - 130	93	60 - 130	107	%				
9088932	D4-1,2-Dichloroethane (sur.)	2018/08/02	101	70 - 130	101	70 - 130	114	%				
9092931	D10-ANTHRACENE (sur.)	2018/08/07	101	50 - 140	97	50 - 140	97	%				
9092931	D8-ACENAPHTHYLENE (sur.)	2018/08/07	83	50 - 140	87	50 - 140	84	%				
9092931	D8-NAPHTHALENE (sur.)	2018/08/07	83	50 - 140	95	50 - 140	92	%				
9092931	TERPHENYL-D14 (sur.)	2018/08/07	92	50 - 140	86	50 - 140	90	%				
9092936	O-TERPHENYL (sur.)	2018/08/07	81	60 - 140	71	60 - 140	72	%				
9093456	O-TERPHENYL (sur.)	2018/08/08	90	60 - 140	87	60 - 140	85	%				
9093468	D10-ANTHRACENE (sur.)	2018/08/08	89	50 - 140	81	50 - 140	86	%				
9093468	D8-ACENAPHTHYLENE (sur.)	2018/08/08	90	50 - 140	87	50 - 140	88	%				
9093468	D8-NAPHTHALENE (sur.)	2018/08/08	83	50 - 140	87	50 - 140	89	%				
9093468	TERPHENYL-D14 (sur.)	2018/08/08	104	50 - 140	91	50 - 140	96	%				
9099655	O-TERPHENYL (sur.)	2018/08/13	74	60 - 140	77	60 - 140	85	%				
9088932	Benzene	2018/08/02	98	60 - 140	95	70 - 130	<0.0050	mg/kg	3.8	40		
9088932	Ethylbenzene	2018/08/02	96	60 - 140	94	70 - 130	<0.010	mg/kg	12	40		
9088932	m & p-Xylene	2018/08/02	96	60 - 140	95	70 - 130	<0.040	mg/kg	12	40		
9088932	Methyl-tert-butylether (MTBE)	2018/08/02	103	N/A			<0.10	mg/kg	NC	40		
9088932	o-Xylene	2018/08/02	100	60 - 140	99	70 - 130	<0.040	mg/kg	NC	40		
9088932	Styrene	2018/08/02	109	N/A			<0.030	mg/kg	NC	40		
9088932	Toluene	2018/08/02	93	60 - 140	91	70 - 130	<0.020	mg/kg	2.4	40		
9088932	VH C6-C10	2018/08/02			91	70 - 130	<10	mg/kg	NC	40		
9088932	Xylenes (Total)	2018/08/02					<0.040	mg/kg	12	40		
9091575	Moisture	2018/08/07					<0.30	%	2.7	20		
9092915	Moisture	2018/08/08					<0.30	%	5.8	20		
9092931	1-Methylnaphthalene	2018/08/07	69	50 - 140	95	50 - 140	<0.050	mg/kg	11	50		
9092931	2-Methylnaphthalene	2018/08/07	NC	50 - 140	89	50 - 140	<0.020	mg/kg	5.1	50		
9092931	Acenaphthene	2018/08/07	94	50 - 140	90	50 - 140	<0.0050	mg/kg	5.3	50		
9092931	Acenaphthylene	2018/08/07	80	50 - 140	85	50 - 140	<0.0050	mg/kg	9.8	50		
9092931	Acridine	2018/08/07	103	50 - 140			<0.050	mg/kg				

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9092931	Anthracene	2018/08/07	99	50 - 140	98	50 - 140	<0.0040	mg/kg	73 (1)	50		
9092931	Benzo(a)anthracene	2018/08/07	81	50 - 140	85	50 - 140	<0.020	mg/kg	NC	50		
9092931	Benzo(a)pyrene	2018/08/07	79	50 - 140	84	50 - 140	<0.020	mg/kg	NC	50		
9092931	Benzo(b&j)fluoranthene	2018/08/07	84	50 - 140	82	50 - 140	<0.020	mg/kg	117 (1)	50		
9092931	Benzo(b)fluoranthene	2018/08/07	81	50 - 140	79	50 - 140	<0.020	mg/kg	NC	50		
9092931	Benzo(g,h,i)perylene	2018/08/07	77	50 - 140	70	50 - 140	<0.050	mg/kg	NC	50		
9092931	Benzo(k)fluoranthene	2018/08/07	79	50 - 140	74	50 - 140	<0.020	mg/kg	36	50		
9092931	Chrysene	2018/08/07	82	50 - 140	92	50 - 140	<0.020	mg/kg	49	50		
9092931	Dibenz(a,h)anthracene	2018/08/07	78	50 - 140	79	50 - 140	<0.020	mg/kg	NC	50		
9092931	Fluoranthene	2018/08/07	79	50 - 140	86	50 - 140	<0.020	mg/kg	18	50		
9092931	Fluorene	2018/08/07	78	50 - 140	77	50 - 140	<0.020	mg/kg	10	50		
9092931	Indeno(1,2,3-cd)pyrene	2018/08/07	78	50 - 140	79	50 - 140	<0.020	mg/kg	28	50		
9092931	Naphthalene	2018/08/07	73	50 - 140	91	50 - 140	<0.010	mg/kg	4.5	50		
9092931	Phenanthrene	2018/08/07	70	50 - 140	83	50 - 140	<0.010	mg/kg	23	50		
9092931	Pyrene	2018/08/07	71	50 - 140	87	50 - 140	<0.020	mg/kg	49	50		
9092936	EPH (C10-C19)	2018/08/07	NC	60 - 140	77	70 - 130	<100	mg/kg	2.1	40		
9092936	EPH (C19-C32)	2018/08/07	90	60 - 140	81	70 - 130	<100	mg/kg	1.8	40		
9093456	EPH (C10-C19)	2018/08/08	97	60 - 140	100	70 - 130	<100	mg/kg	15	40		
9093456	EPH (C19-C32)	2018/08/08	103	60 - 140	103	70 - 130	<100	mg/kg	NC	40		
9093468	1-Methylnaphthalene	2018/08/08	94	50 - 140	89	50 - 140	<0.050	mg/kg	1.0	50		
9093468	2-Methylnaphthalene	2018/08/08	91	50 - 140	86	50 - 140	<0.020	mg/kg	18	50		
9093468	Acenaphthene	2018/08/08	89	50 - 140	86	50 - 140	<0.0050	mg/kg	12	50		
9093468	Acenaphthylene	2018/08/08	89	50 - 140	85	50 - 140	<0.0050	mg/kg	NC	50		
9093468	Acridine	2018/08/08	101	50 - 140			<0.050	mg/kg	NC	50		
9093468	Anthracene	2018/08/08	88	50 - 140	80	50 - 140	<0.0040	mg/kg	NC	50		
9093468	Benzo(a)anthracene	2018/08/08	84	50 - 140	81	50 - 140	<0.020	mg/kg	NC	50		
9093468	Benzo(a)pyrene	2018/08/08	80	50 - 140	85	50 - 140	<0.020	mg/kg	NC	50		
9093468	Benzo(b&j)fluoranthene	2018/08/08	91	50 - 140	89	50 - 140	<0.020	mg/kg	NC	50		
9093468	Benzo(b)fluoranthene	2018/08/08	94	50 - 140	92	50 - 140	<0.020	mg/kg	NC	50		
9093468	Benzo(g,h,i)perylene	2018/08/08	72	50 - 140	74	50 - 140	<0.050	mg/kg	NC	50		
9093468	Benzo(k)fluoranthene	2018/08/08	91	50 - 140	88	50 - 140	<0.020	mg/kg	NC	50		

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**QUALITY ASSURANCE REPORT(CONT'D)**

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9093468	Chrysene	2018/08/08	88	50 - 140	85	50 - 140	<0.020	mg/kg	NC	50		
9093468	Dibenz(a,h)anthracene	2018/08/08	75	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50		
9093468	Fluoranthene	2018/08/08	95	50 - 140	86	50 - 140	<0.020	mg/kg	NC	50		
9093468	Fluorene	2018/08/08	85	50 - 140	79	50 - 140	<0.020	mg/kg	8.4	50		
9093468	Indeno(1,2,3-cd)pyrene	2018/08/08	73	50 - 140	74	50 - 140	<0.020	mg/kg	NC	50		
9093468	Naphthalene	2018/08/08	91	50 - 140	87	50 - 140	<0.010	mg/kg	2.5	50		
9093468	Phenanthrene	2018/08/08	89	50 - 140	85	50 - 140	<0.010	mg/kg	12	50		
9093468	Pyrene	2018/08/08	97	50 - 140	86	50 - 140	<0.020	mg/kg	NC	50		
9098612	Moisture	2018/08/11					<0.30	%	6.7	20		
9099655	EPH (C10-C19)	2018/08/14	96	60 - 140	96	70 - 130	<100	mg/kg	NC	40		
9099655	EPH (C19-C32)	2018/08/14	103	60 - 140	109	70 - 130	<100	mg/kg	3.0	40		
9103384	% sand by hydrometer	2018/08/16							4.4	35	102	90 - 110
9103384	% silt by hydrometer	2018/08/16							1.9	35		
9103384	Clay Content	2018/08/16							2.5	35		
9103384	Gravel	2018/08/16							26	35		
9118366	Total Aluminum (Al)	2018/08/27					<100	mg/kg	3.8	40	97	70 - 130
9118366	Total Antimony (Sb)	2018/08/27	82	75 - 125	97	75 - 125	<0.10	mg/kg	9.6	30	116	70 - 130
9118366	Total Arsenic (As)	2018/08/27	94	75 - 125	97	75 - 125	<0.50	mg/kg	36 (1)	30	92	70 - 130
9118366	Total Barium (Ba)	2018/08/27	NC	75 - 125	97	75 - 125	<0.10	mg/kg	0.82	40	106	70 - 130
9118366	Total Beryllium (Be)	2018/08/27	110	75 - 125	95	75 - 125	<0.20	mg/kg	4.3	30	106	70 - 130
9118366	Total Bismuth (Bi)	2018/08/27					<0.10	mg/kg	17	30		
9118366	Total Boron (B)	2018/08/27					<1.0	mg/kg	0.78	30		
9118366	Total Cadmium (Cd)	2018/08/27	111	75 - 125	99	75 - 125	<0.050	mg/kg	6.9	30	94	70 - 130
9118366	Total Calcium (Ca)	2018/08/27					<100	mg/kg	8.3	30	101	70 - 130
9118366	Total Chromium (Cr)	2018/08/27	NC	75 - 125	100	75 - 125	<1.0	mg/kg	9.6	30	105	70 - 130
9118366	Total Cobalt (Co)	2018/08/27	109	75 - 125	99	75 - 125	<0.30	mg/kg	3.5	30	101	70 - 130
9118366	Total Copper (Cu)	2018/08/27	NC	75 - 125	99	75 - 125	<0.50	mg/kg	15	30	105	70 - 130
9118366	Total Iron (Fe)	2018/08/27					<100	mg/kg	11	30	104	70 - 130
9118366	Total Lead (Pb)	2018/08/27	NC	75 - 125	103	75 - 125	<0.10	mg/kg	45 (1)	40	117	70 - 130
9118366	Total Lithium (Li)	2018/08/27	108	75 - 125	97	75 - 125	<5.0	mg/kg	1.7	30	100	70 - 130
9118366	Total Magnesium (Mg)	2018/08/27					<100	mg/kg	5.2	30	104	70 - 130

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9118366	Total Manganese (Mn)	2018/08/27	NC	75 - 125	96	75 - 125	<0.20	mg/kg	6.7	30	103	70 - 130
9118366	Total Mercury (Hg)	2018/08/27	NC	75 - 125	104	75 - 125	<0.050	mg/kg	9.3	40	116	70 - 130
9118366	Total Molybdenum (Mo)	2018/08/27	NC	75 - 125	101	75 - 125	<0.10	mg/kg	7.4	40	108	70 - 130
9118366	Total Nickel (Ni)	2018/08/27	NC	75 - 125	99	75 - 125	<0.80	mg/kg	4.2	30	108	70 - 130
9118366	Total Phosphorus (P)	2018/08/27					<10	mg/kg	11	30	100	70 - 130
9118366	Total Potassium (K)	2018/08/27					<100	mg/kg	5.1	40	92	70 - 130
9118366	Total Selenium (Se)	2018/08/27	109	75 - 125	98	75 - 125	<0.50	mg/kg	5.4	30		
9118366	Total Silver (Ag)	2018/08/27	114	75 - 125	102	75 - 125	<0.050	mg/kg	8.1	40	114	70 - 130
9118366	Total Sodium (Na)	2018/08/27					<100	mg/kg	7.9	40	97	70 - 130
9118366	Total Strontium (Sr)	2018/08/27	114	75 - 125	96	75 - 125	<0.10	mg/kg	2.9	40	106	70 - 130
9118366	Total Thallium (Tl)	2018/08/27	101	75 - 125	98	75 - 125	<0.050	mg/kg	1.4	30	93	70 - 130
9118366	Total Tin (Sn)	2018/08/27	102	75 - 125	101	75 - 125	<0.10	mg/kg	0.085	40	102	70 - 130
9118366	Total Titanium (Ti)	2018/08/27	NC	75 - 125	90	75 - 125	<1.0	mg/kg	5.3	40		
9118366	Total Tungsten (W)	2018/08/27					<0.50	mg/kg	19	30		
9118366	Total Uranium (U)	2018/08/27	112	75 - 125	100	75 - 125	<0.050	mg/kg	12	30	103	70 - 130
9118366	Total Vanadium (V)	2018/08/27	NC	75 - 125	97	75 - 125	<2.0	mg/kg	3.2	30	105	70 - 130
9118366	Total Zinc (Zn)	2018/08/27	NC	75 - 125	97	75 - 125	<1.0	mg/kg	26	30	104	70 - 130
9118366	Total Zirconium (Zr)	2018/08/27					<0.50	mg/kg	7.6	30		
9118424	Soluble (2:1) pH	2018/08/27			100	97 - 103			0.62	20		

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

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

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

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

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

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

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

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

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

Maxxam Job #: B863863  
Report Date: 2018/08/29

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



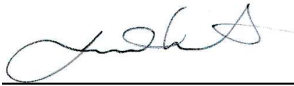
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Andy Lu, Ph.D., P.Chem., Scientific Specialist



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Jose Cueva, Supervisor, Organics-VOC & HC



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Jas Khatkar, BBY Organics



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Richard Cheng, Scientific Service Specialist



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Thomas Pinchin, Junior Project Manager

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014	Phone		Project Name	
Fax	(604) 436-3752	Fax		Site #	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Sampled By	MD



8863863\_COC



C650386-11-01

File Order #:  
560386  
Sect Manager  
Nahed Amer

Regulatory Criteria	Special Instructions	Analysis Requested										Turnaround Time (TAT) Required				
<p>Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form</p> <p>Samples must be kept cool (&lt; 10°C) from time of sampling until delivery to maxxam</p>		Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/VPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)						<p>Regular (Standard) TAT (will be applied if Rush TAT is not specified)</p> <p>Standard TAT = 5-7 Working days for most tests</p> <p>Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are &gt; 5 days - contact your Project Manager for details.</p> <p>Job Specific Rush TAT (if applies to entire submission)</p> <p>Date Required: _____ Time Required: _____</p> <p>Rush Confirmation Number _____ (call lab for #)</p>	



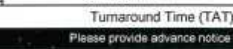
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/VPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)			# of Bottles	Comments
1	MW18-48 SA01	18/07/19		SOIL											1	RECEIVED IN WHITEHORSE
2	↓ 02														1	BY: <u>Syona@035</u>
3	↓ 03						X								1	2018-07-30
4	MW18-47 SA01														1	TEMP: 6 / 7 / 10
5	↓ 02														1	
6	↓ 03														1	
7	↓ 04						X								1	
8	↓ 05														1	
9	↓ 06														1	
10	MW18-38 SA01														1	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
<i>M. Deane</i>	18/07/19	2000	<i>[Signature]</i>	18/07/19	15:00	1	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
							<input checked="" type="checkbox"/>	5.5.6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

KE  
20180719

372

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name: #2792 STANTEC CONSULTING LTD	Company Name: ACCOUNTS PAYABLE	Company Name: Matthew Deane	Quotation #: B71770	Barcode:  B863863_COC	
Contact Name: Metrotower III Suite 500, 4730 Kingsway	Contact Name: BURNABY BC V5H 4M1	Address: (604) 436-3014 Fax: (604) 436-3752	P.O. #: 123221151	e Order #: 60386	
Address: BURNABY BC V5H 4M1	Address: (604) 436-3014 Fax: (604) 436-3752	Address: matthew.deane@stantec.com	Project #: 123221151	ct Manager: Nahed Amer	
Phone: (604) 436-3014 Fax: (604) 436-3752	Phone: (604) 436-3014 Fax: (604) 436-3752	Phone: matthew.deane@stantec.com	Project Name: MDD	Barcode:  CH560386-12-01	
Email: SAPinvoices@Stantec.com	Email: matthew.deane@stantec.com	Email: matthew.deane@stantec.com	Site #: MDD	Barcode:  CH560386-12-01	
Regulatory Criteria		Special Instructions		Analysis Requested	

Regulatory Criteria		Special Instructions		Analysis Requested		Turnaround Time (TAT) Required	
Regulated Drinking Water? (Y/N)		Metals Field Filtered? (Y/N)		LEPH/HEPH/PAH		Please provide advance notice for rush projects	
Dissolved Metals (with Hg)		BTEX/APH		Nutrients (TP, NH4, TKN)		Regular (Standard) TAT <input checked="" type="checkbox"/>	
Major Ions (Chloride, Fluoride, Nitrate, Orthophosphate, Sulphate)		Carbon (DOC)		Hold		(will be applied if Rush TAT is not specified)	

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form  
Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEPH/PAH	Dissolved Metals (with Hg)	BTEX/APH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Orthophosphate, Sulphate)	Carbon (DOC)	Hold	# of Bottles	Comments
1	MW18-38 SA02	18/07/28		SOIL									X	1	RECEIVED IN WHITEHORSE
2		03											X	1	BY: <u>Sufono@0855</u>
3		04											X	1	2018-07-30
4		05											X	1	TEMP: 6, 7, 10
5		06											X	1	
6		07					X						X	1	
7		08											X	1	
8	MW18-30 SA01												X	1	
9		02											X	1	
10		03											X	1	

RELINQUISHED BY: (Signature/Print) <u>M. Deane</u>	Date: (YY/MM/DD) <u>18/07/29</u>	Time: <u>2000</u>	RECEIVED BY: (Signature/Print) <u>[Signature]</u>	Date: (YY/MM/DD) <u>20/07/21</u>	Time: <u>15:00</u>	# Jars used and not submitted: <u>all</u>	Time Sensitive: <input checked="" type="checkbox"/>	Temperature (°C) on Receipt: <u>5.5</u>	Custody Seal Intact on Cooler: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
--	----------------------------------	-------------------	---	----------------------------------	--------------------	---	---	---	--

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372

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name	Matthew Deane	Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014	Phone		Project Name	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	<u>MD</u>



8863863\_COC



CA960386-13-01

Nahed Amer

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEP/H/EPH/PAH	Dissolved Metals (with Hg)	BTEX/PH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)	Turnaround Time (TAT) Required	
													# of Bottles	Comments
1	MW18-30 SA04	18/07/25		SOIL			X	X					3	RECEIVED IN WHITEHORSE BY: <u>Slyons @ 08:55</u>
2	05												1	
3	06												1	2018-07-30
4	07												1	TEMP: 6 / 7 / 10
5	08												3	
6	MW18-31 SA01												1	
7	02												1	
8	03												1	
9	04												1	
10	05												1	

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only
<u>Matthew Deane</u>	18/07/25	2000	<u>[Signature]</u>	2018/07/25	15:00	<u>11</u>	Time Sensitive <input checked="" type="checkbox"/> Temperature (°C) on Receipt <u>5, 5, 6</u> Custody Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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572



<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway BURNABY BC V5H 4M1	Address		Project #	123221161
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Project Name	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Site #	
				Sampled By	<i>MD</i>



is Order #:  
 60386  
 ct Manager  
 Nahed Amer

Regulatory Criteria		Special Instructions		Analysis Requested										Turnaround Time (TAT) Required	
				Regulated Drinking Water? (Y/N) Metals Field Filtered? (Y/N) LEPH/HEP/PAH Dissolved Metals (with Hg) BTEX/VPH Nutrients (TP, NH4, TKN) Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate) Carbon (DOC) <i>Hold</i>										Please provide advance notice for rush projects Regular (Standard) TAT (will be applied if Rush TAT is not specified) Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. <input checked="" type="checkbox"/>	
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam														Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number _____ (call lab for #)	
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LEPH/HEP/PAH	Dissolved Metals (with Hg)	BTEX/VPH	Nutrients (TP, NH4, TKN)	Major Ions (Chloride, Fluoride, Nitrate, Nitrite, Orthophosphate, Sulphate)	Carbon (DOC)		# of Bottles	Comments
1	MW18-31 SA66	18/07/29		Soil			X	X						3	RECEIVED IN WHITEHORSE BY: <i>Styond@0855</i>
2	↓ 07												X	1	
3	↓ 08												X	1	2018-07-30
4	MW18-39 SA61												X	1	TEMP: 6 / 7 / 10
5	↓ 02												X	1	
6	↓ 03												X	1	
7	↓ 04												X	1	
8	↓ 05												X	1	
9	↓ 06												X	1	
10	↓ 07												X	1	
* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only						
<i>[Signature]</i>		18/07/29	2000	<i>[Signature]</i>		22/07/31	15:00	<i>all</i>	Time Sensitive	Temperature (°C) on Receipt	Custody Seal intact on Cooler?				
									<input type="checkbox"/>	5.5, 6	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS												While Maxxam		Yellow Client	
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372

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway	Address		Project #	123221161
	BURNABY BC V5H 4M1			Project Name	
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Site #	
Email	SAPinvoices@stantec.com	Email	matthew.deane@stantec.com	Sampled By	MD



B863863\_COC



C#50391-02-01

Order #:  
60391  
Project Manager  
Nahed Amer

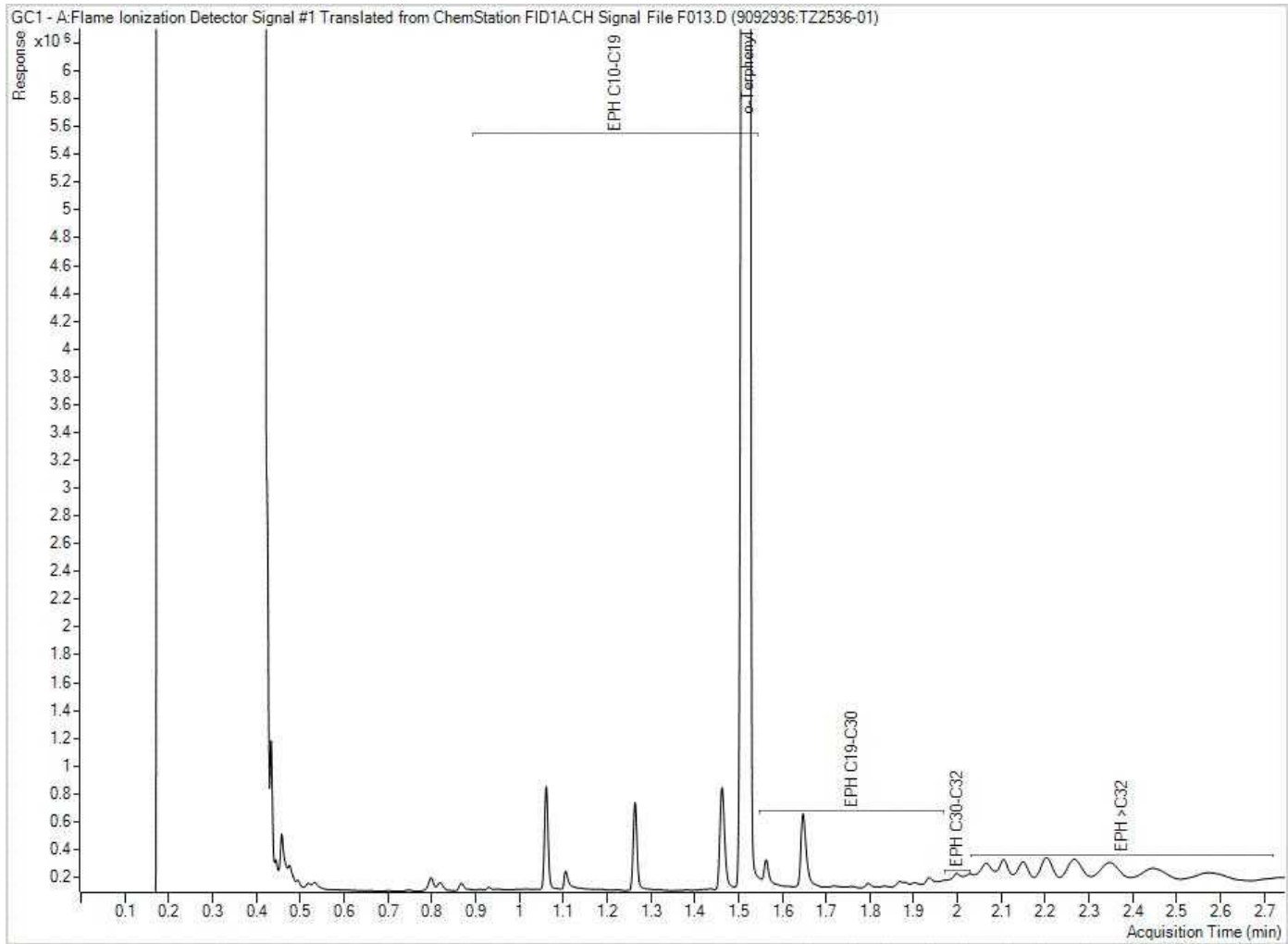
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Analysis Requested										# of Bottles	Comments								
							1	2	3	4	5	6	7	8	9	10			11	12	13	14	15	16	17	18
1	MW18-39 SA08	18/07/28		soil			X	X																	3	
2	↓ SA09	↓		↓																					1	RECEIVED IN WHITEHORSE
3	↓ SA10	↓		↓																					1	BY: sl4000@0855
4	↓ SA11	↓		↓																					3	2018-07-30
5	↓ SA12	↓		↓																					1	TEMP: 6, 7, 10
6	QC18-04	↓		↓			X	X																	3	
7	QC18-05	↓		↓			X	X																	3	
8																										
9																										
10																										

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only		
[Signature] M. Deane		18/07/29	2000	[Signature]		2018/07/31	15:00	mk	Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
									<input checked="" type="checkbox"/>	5°C	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

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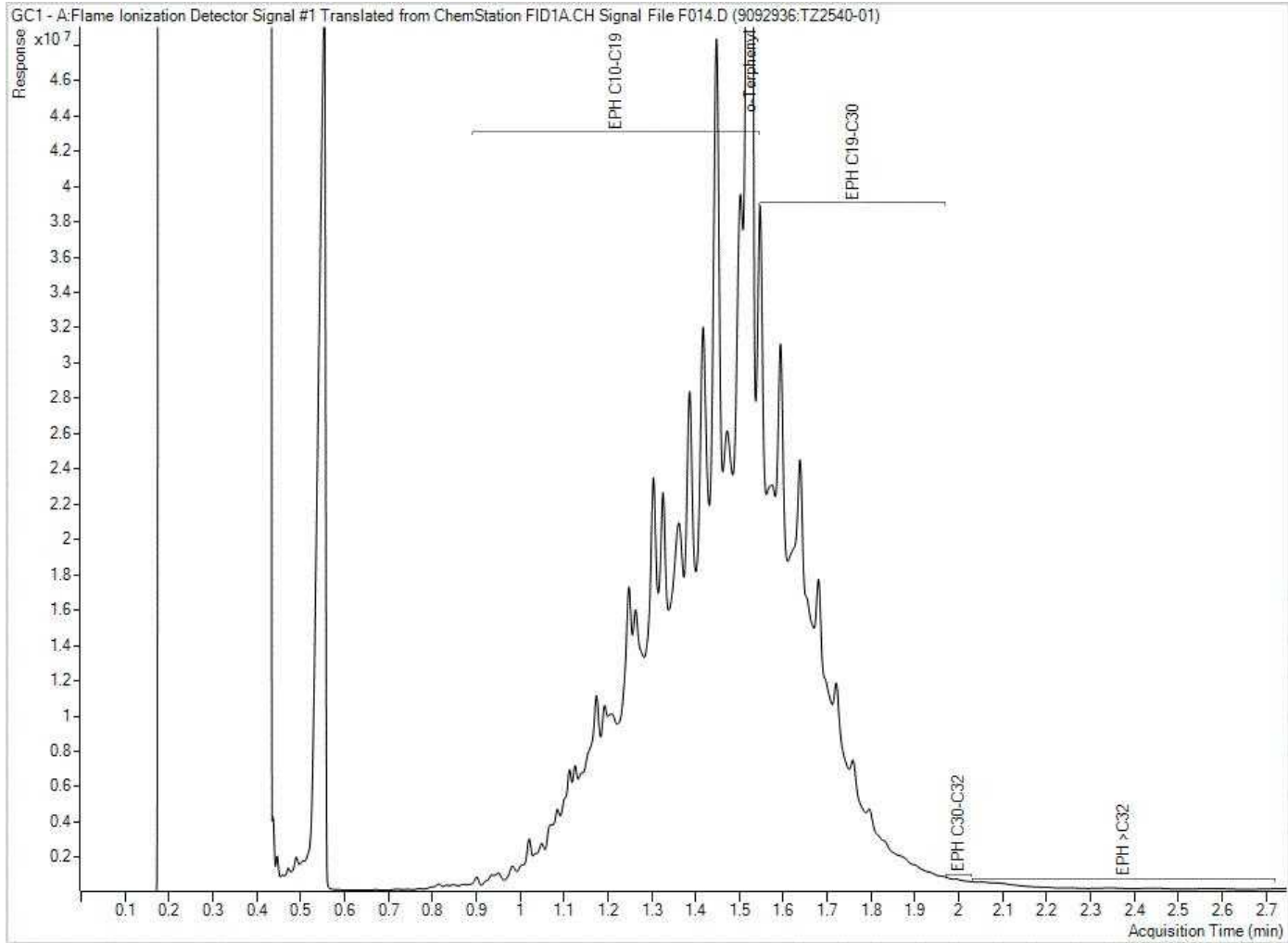
377?

EPH in Soil by GC/FID Chromatogram



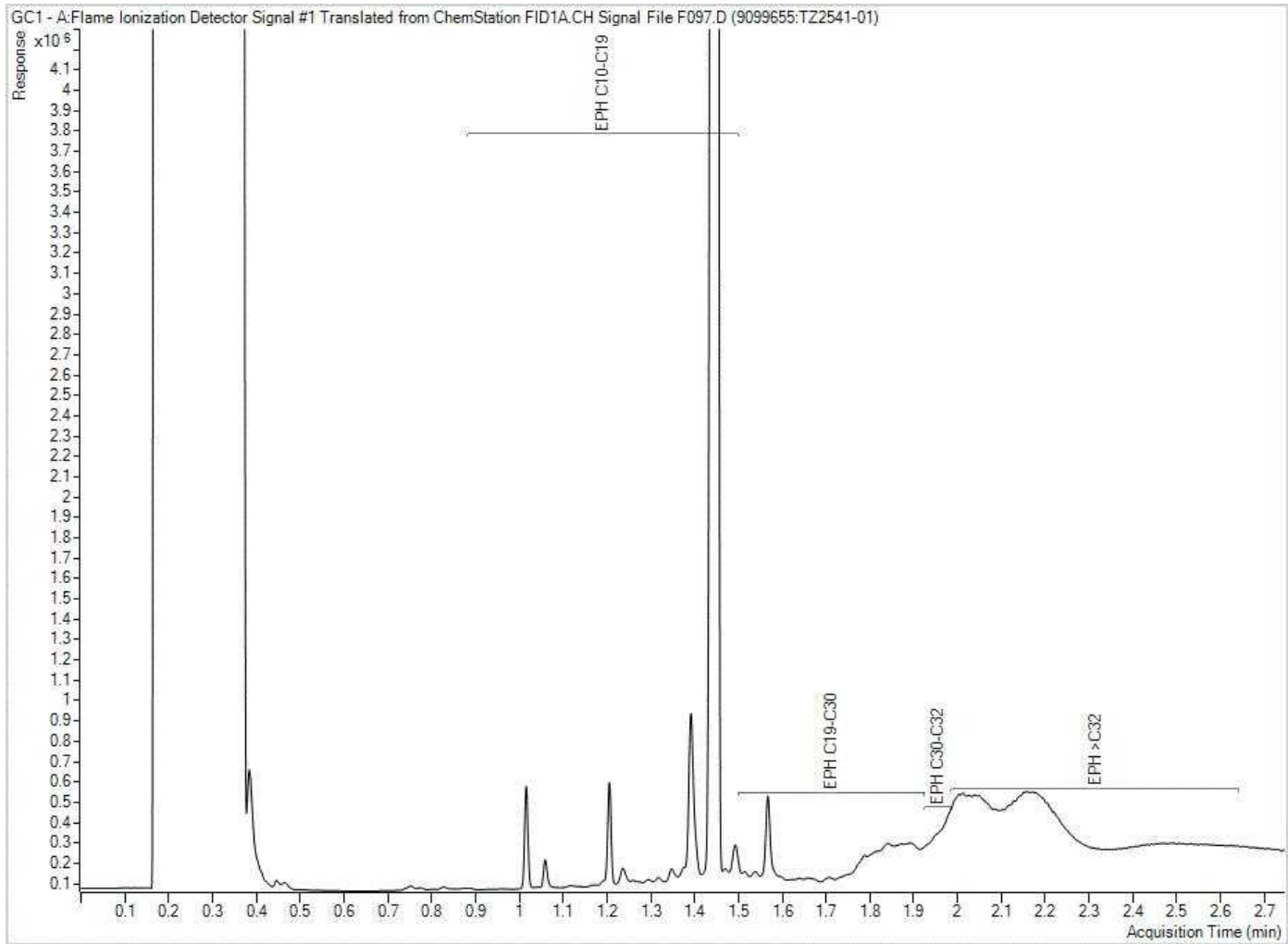
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



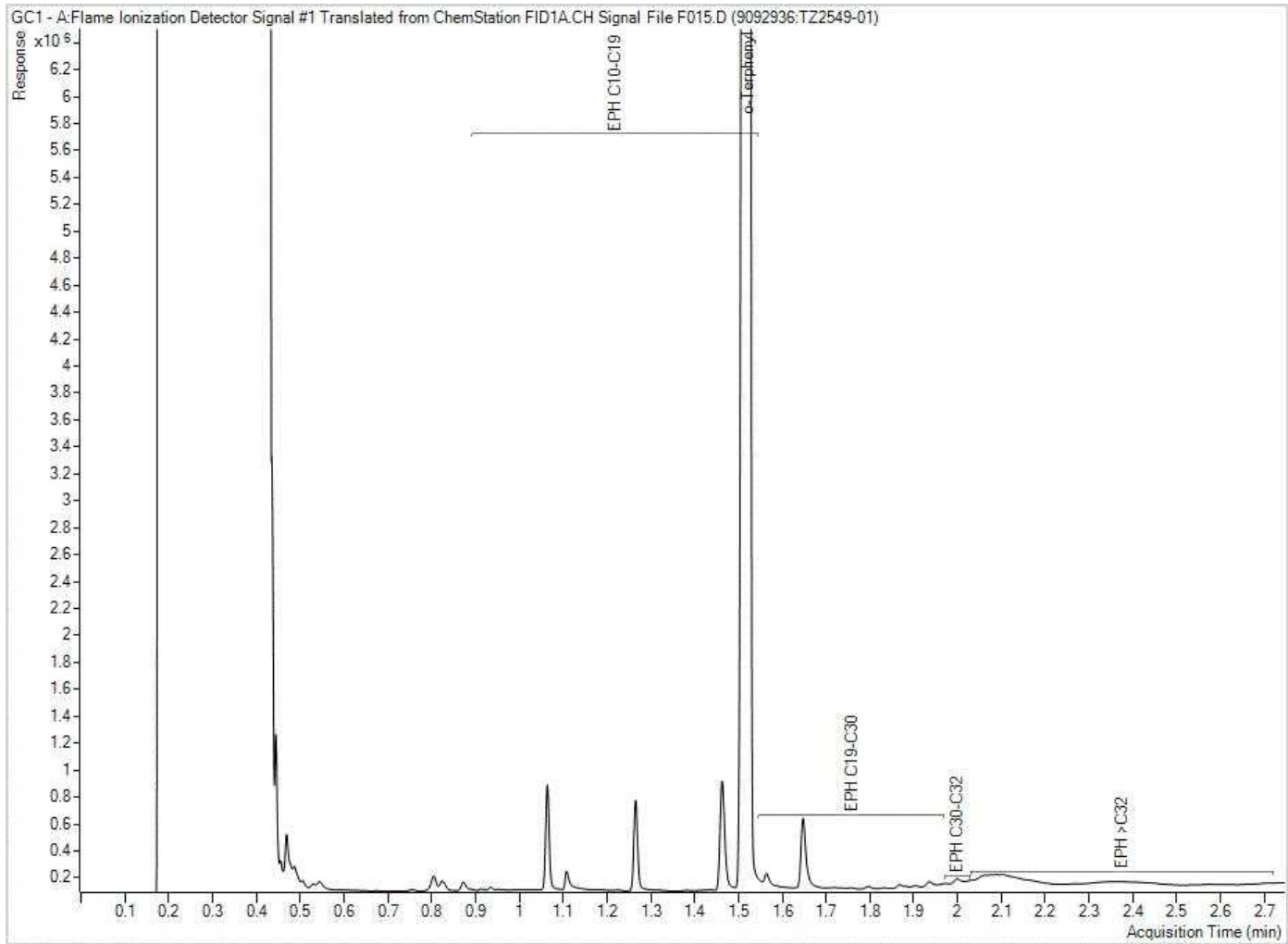
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EPH in Soil by GC/FID Chromatogram



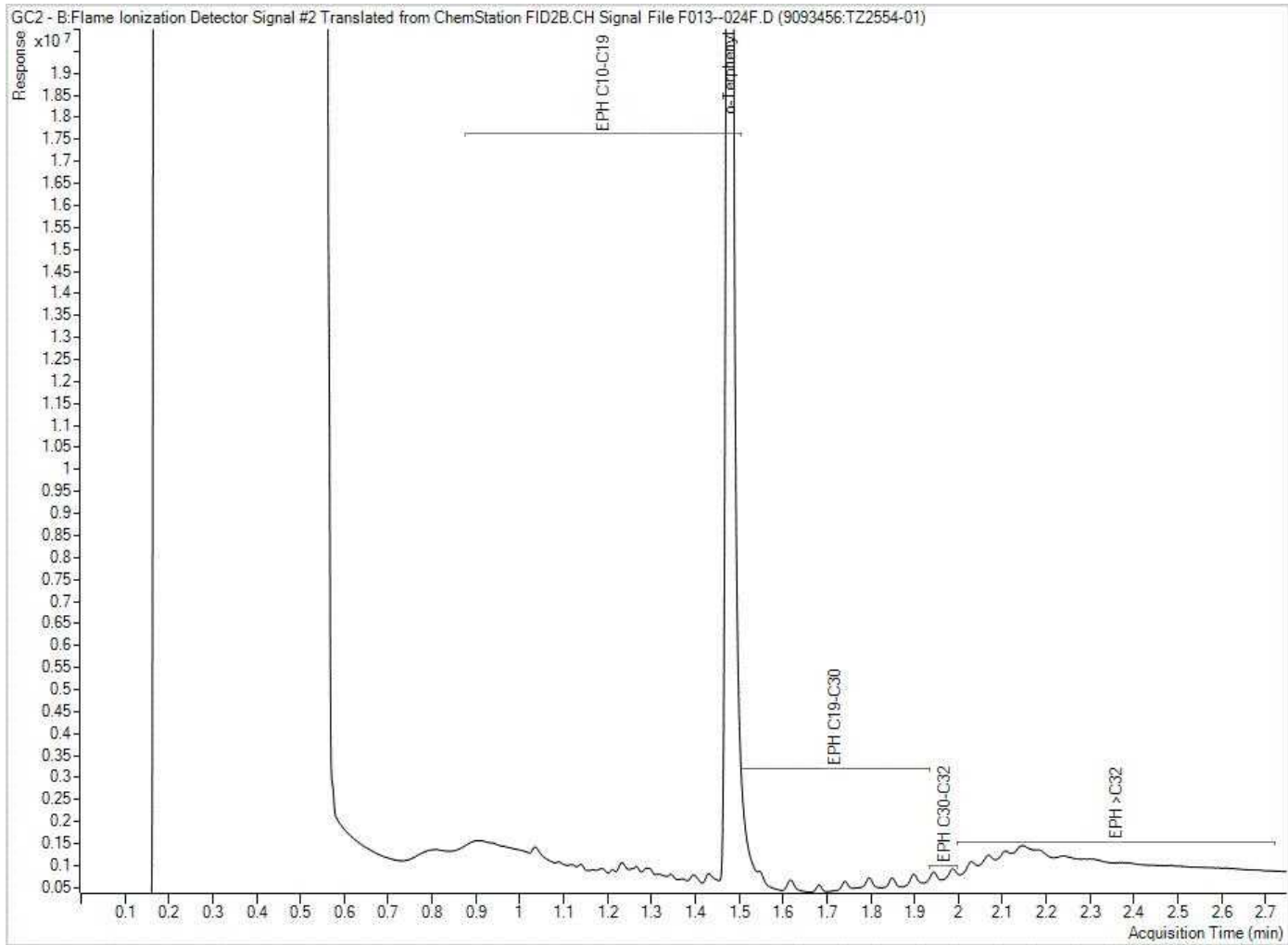
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EPH in Soil by GC/FID Chromatogram



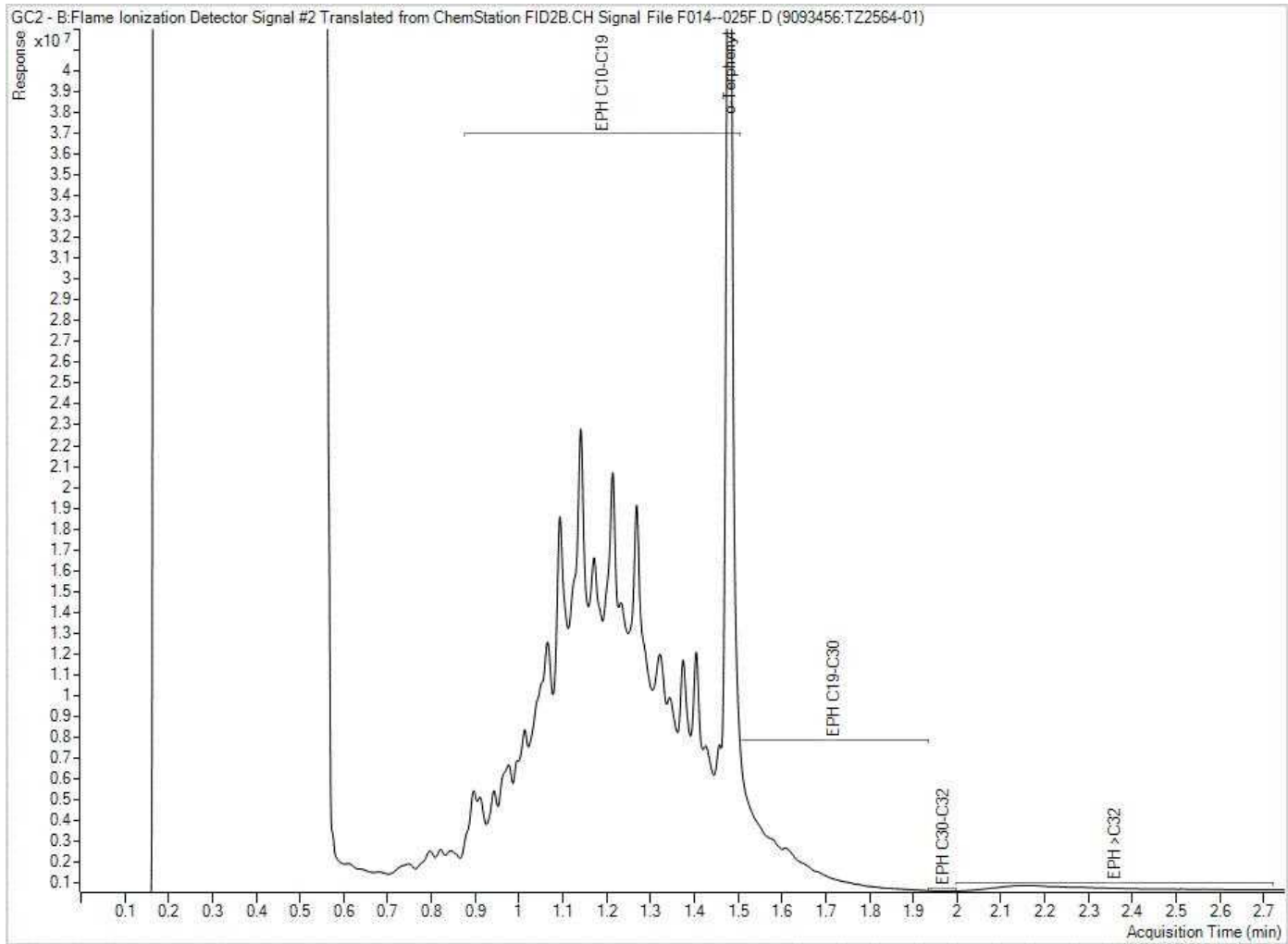
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Soil by GC/FID Chromatogram



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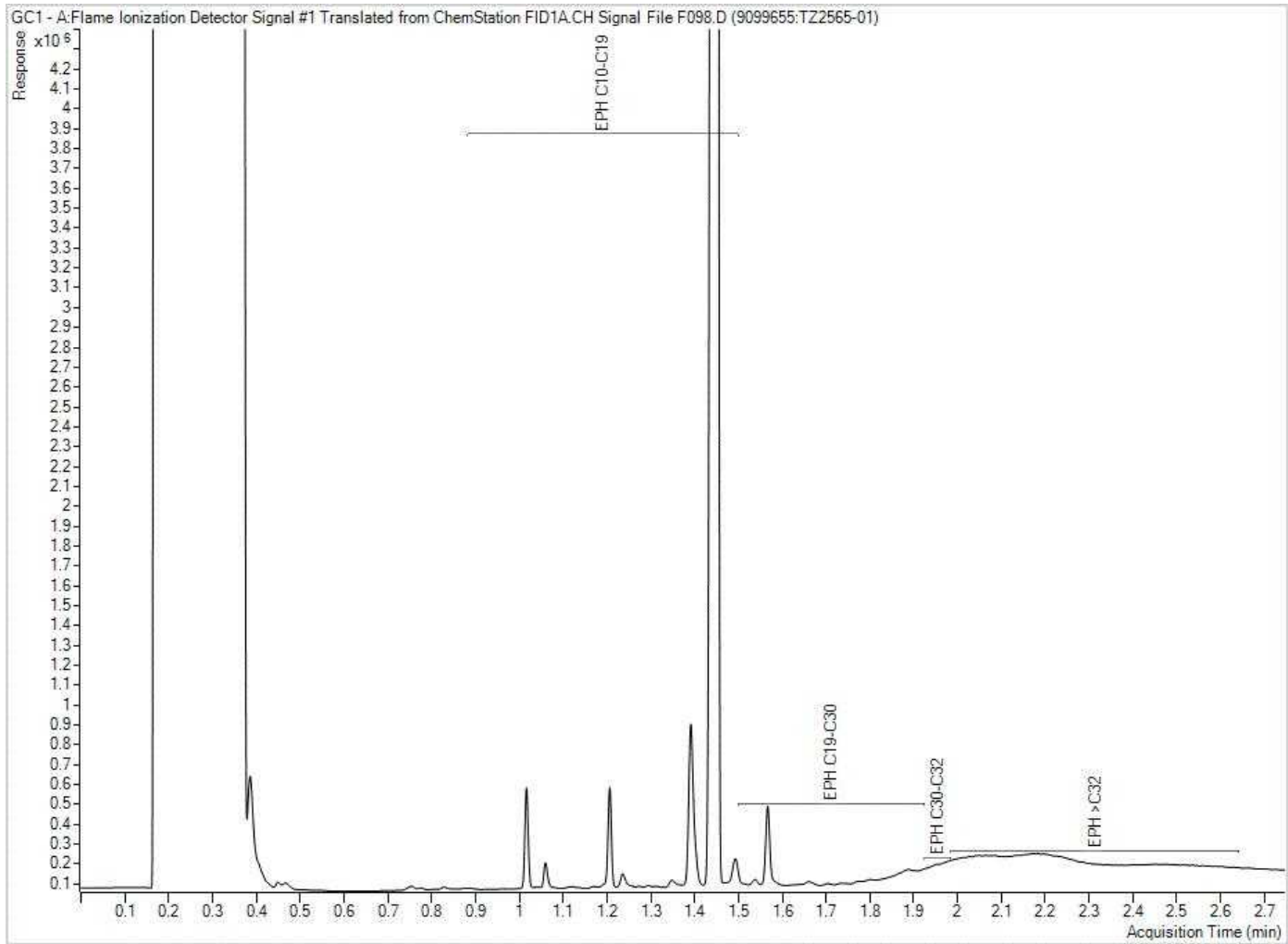
EPH in Soil by GC/FID Chromatogram



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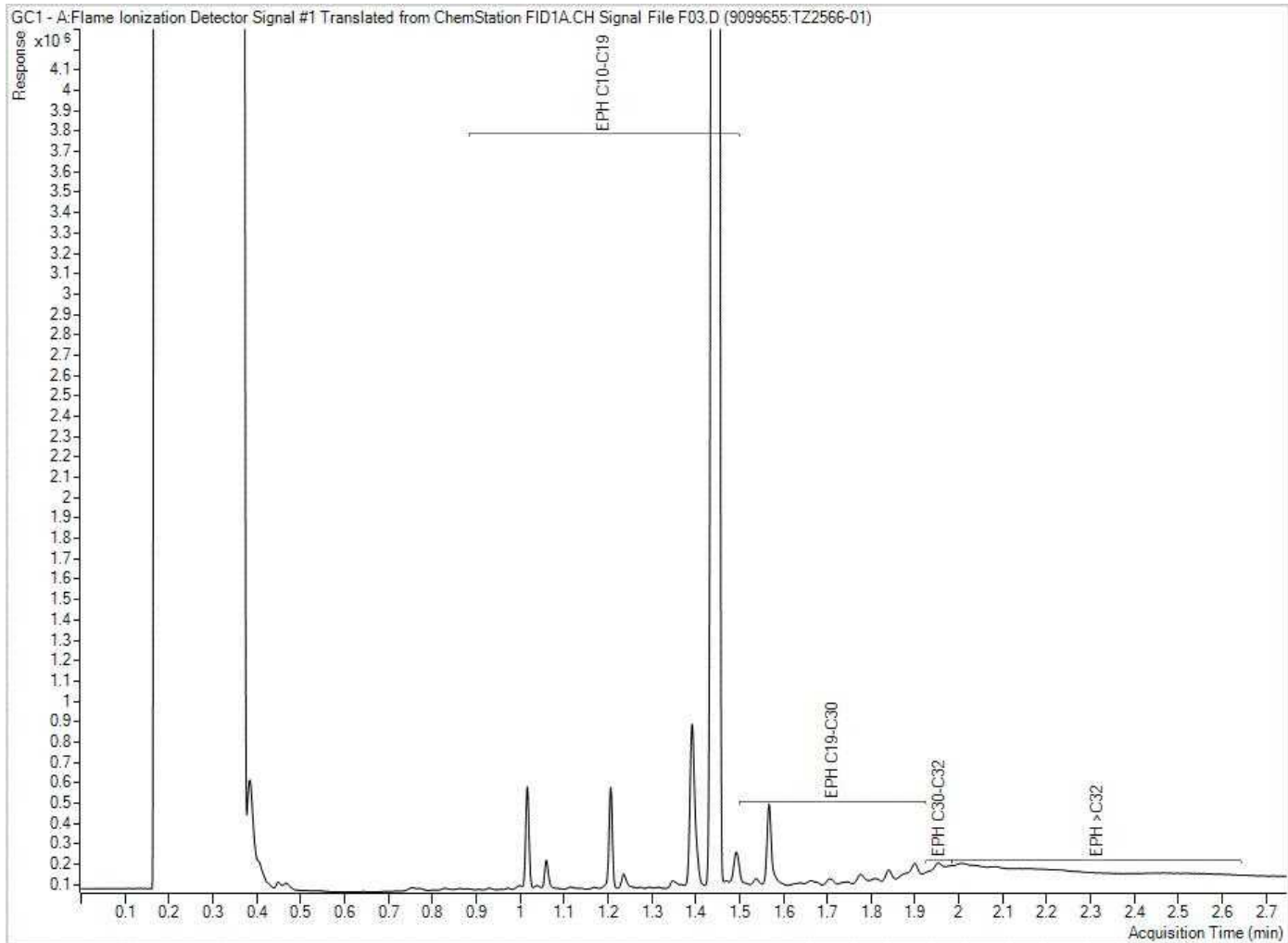


EPH in Soil by GC/FID Chromatogram



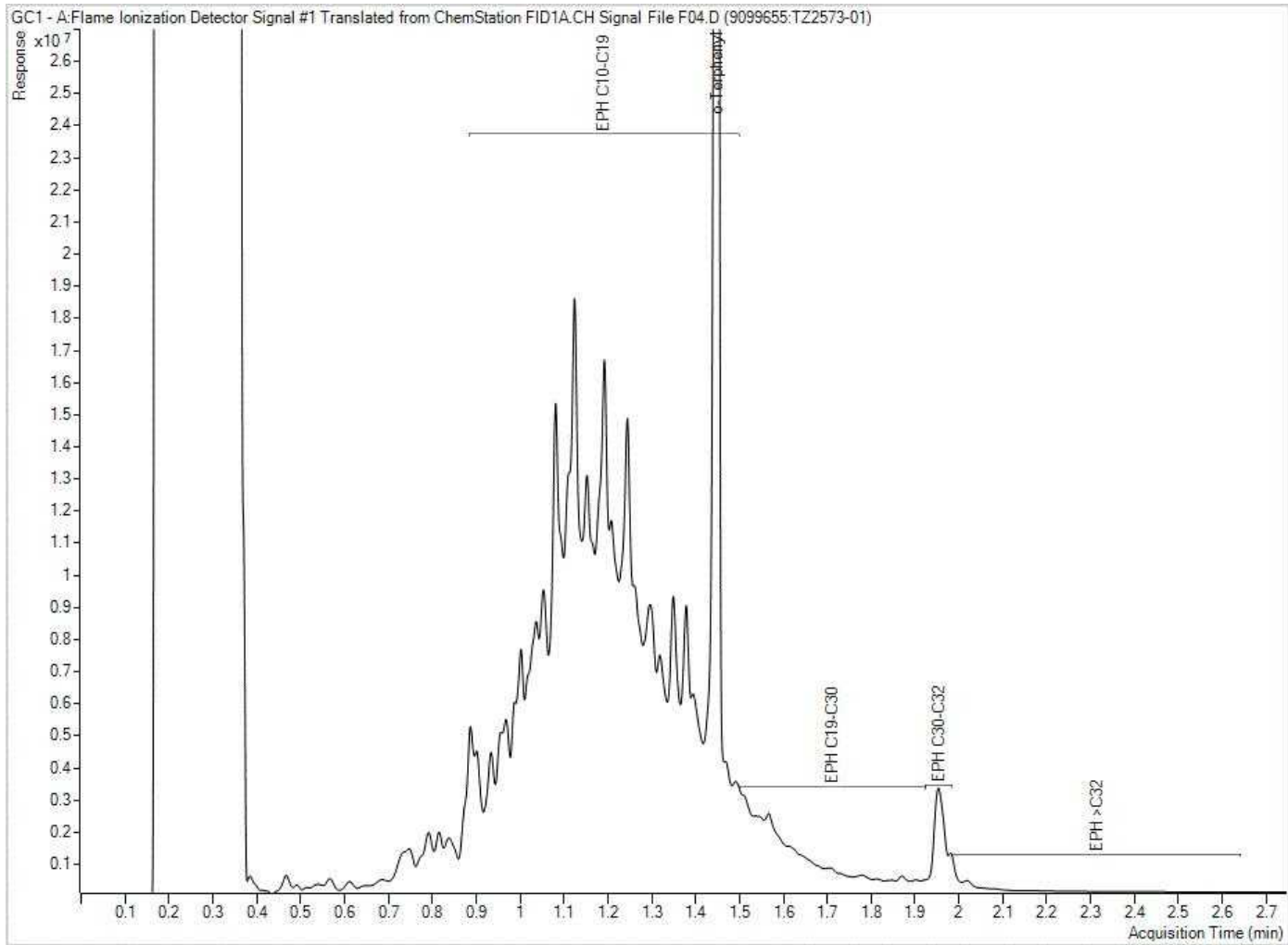
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



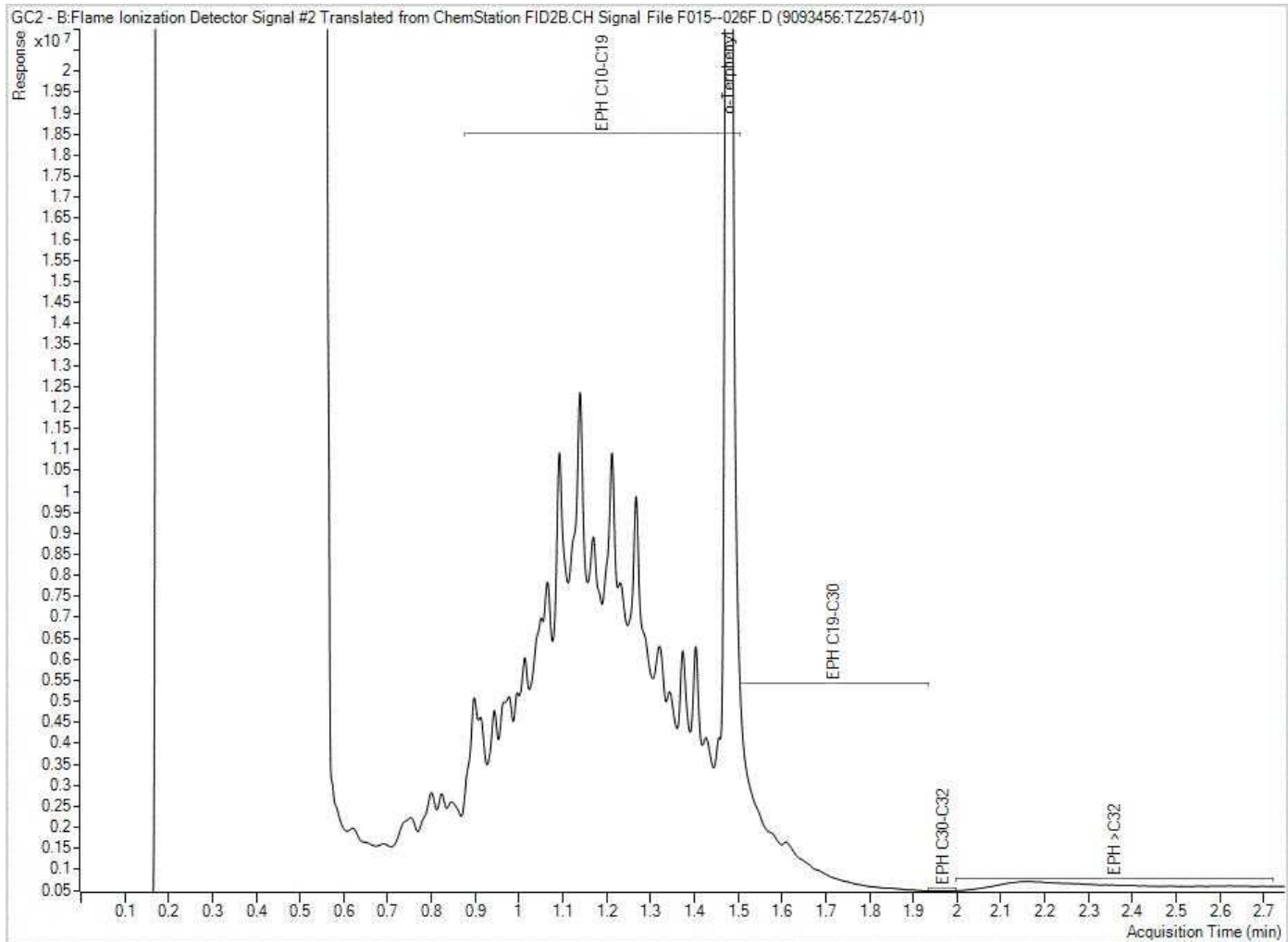
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH in Soil by GC/FID Chromatogram



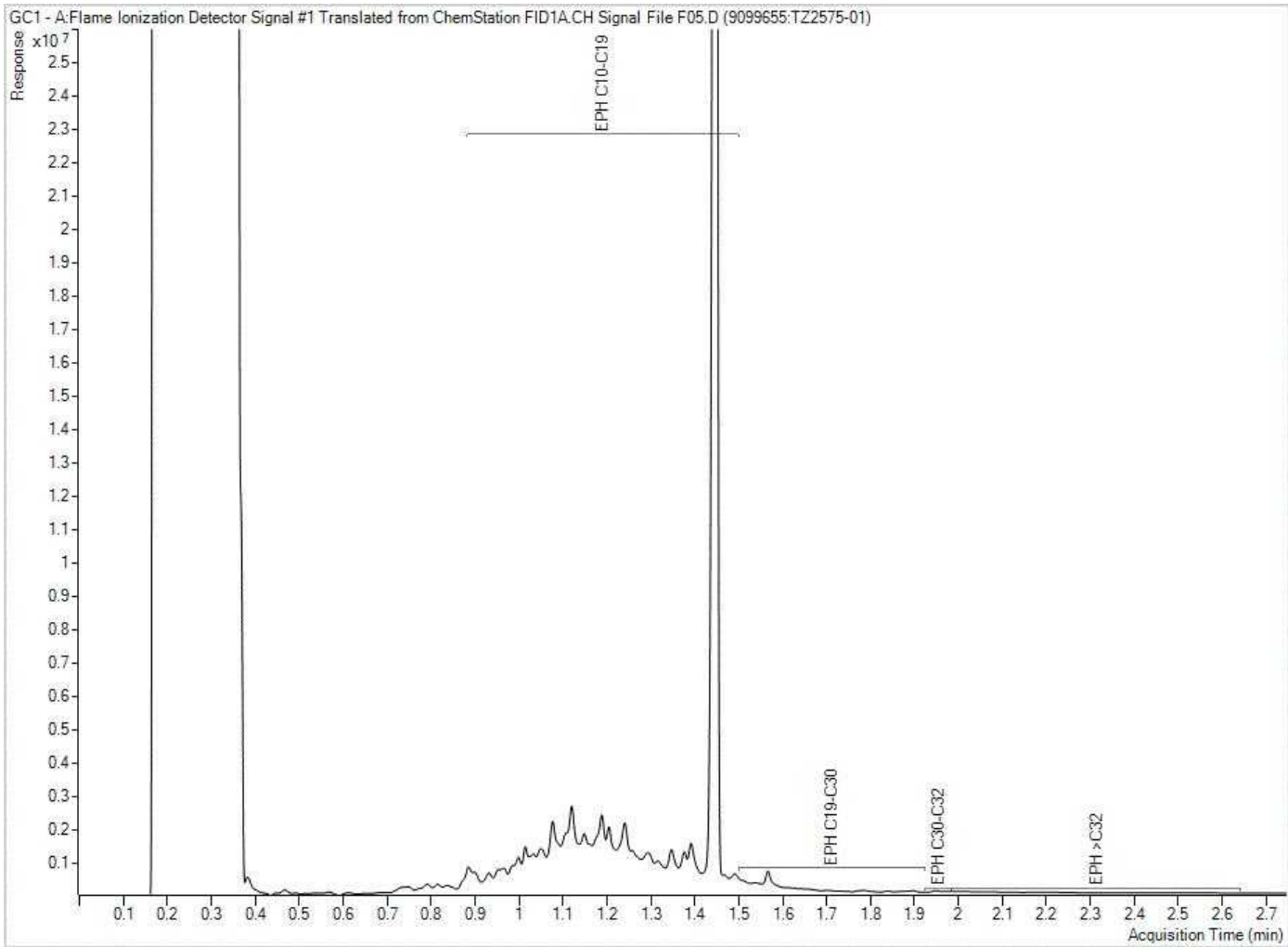
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EPH in Soil by GC/FID Chromatogram



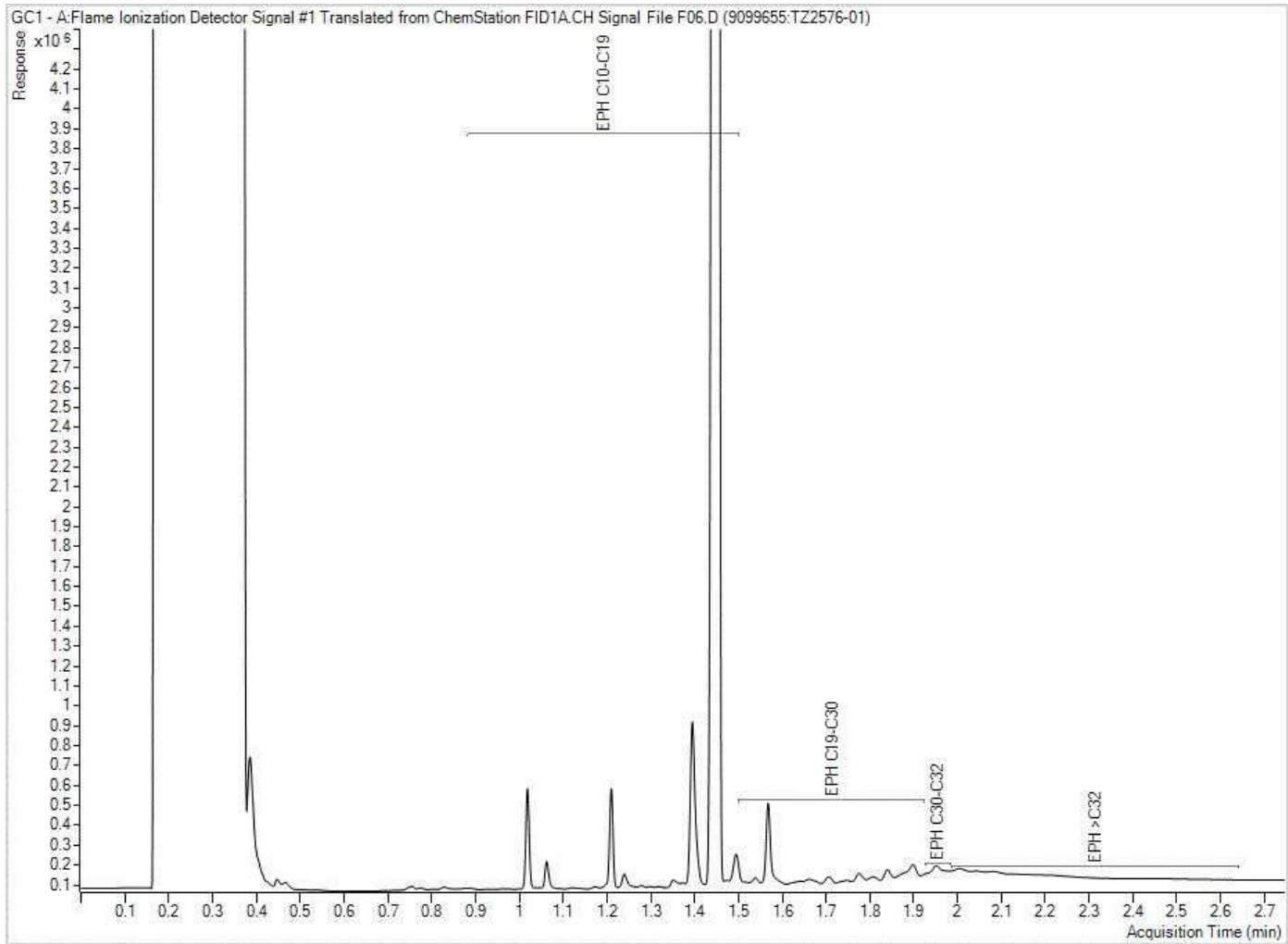
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EPH in Soil by GC/FID Chromatogram



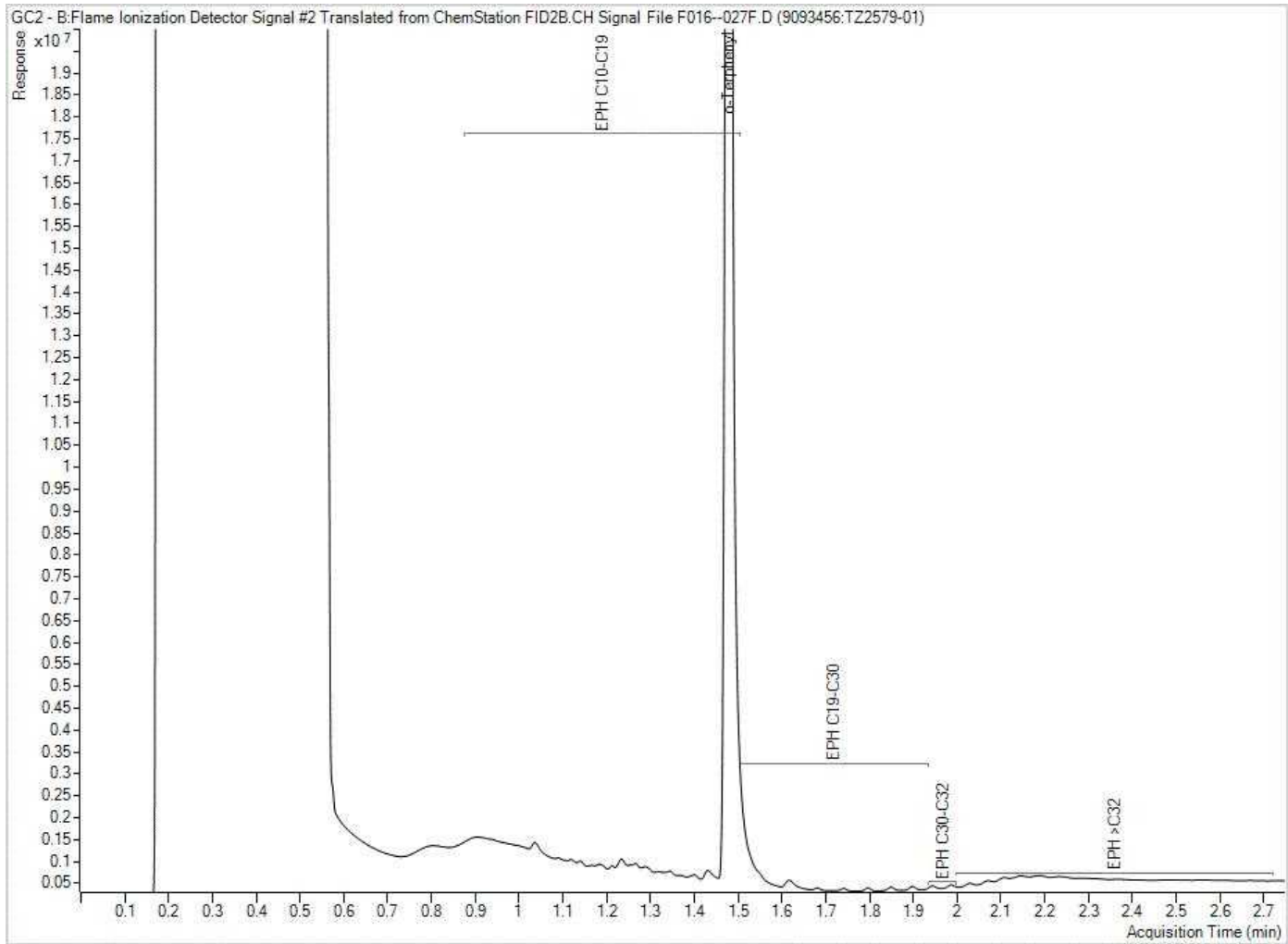
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EPH in Soil by GC/FID Chromatogram



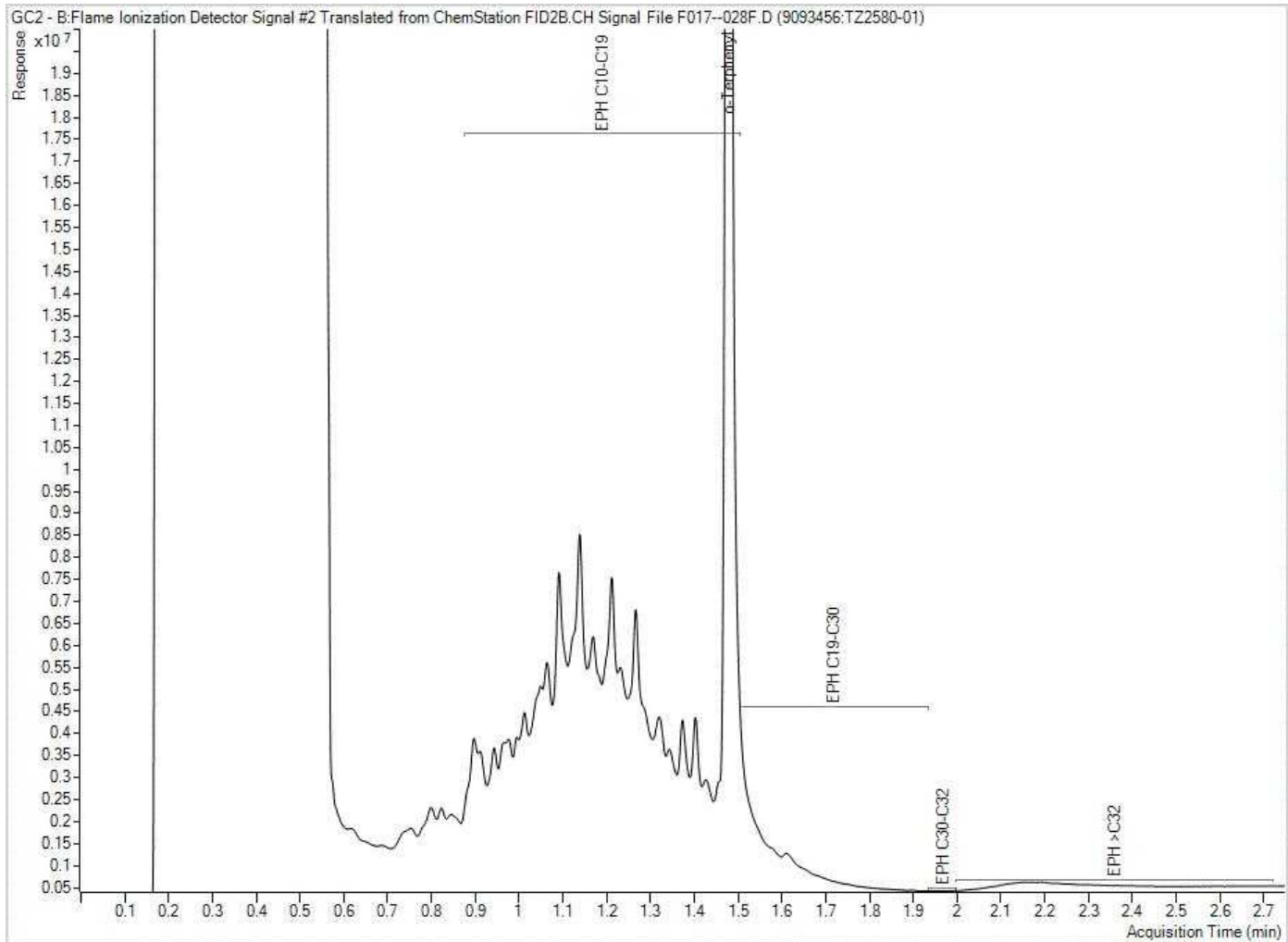
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EPH in Soil by GC/FID Chromatogram



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

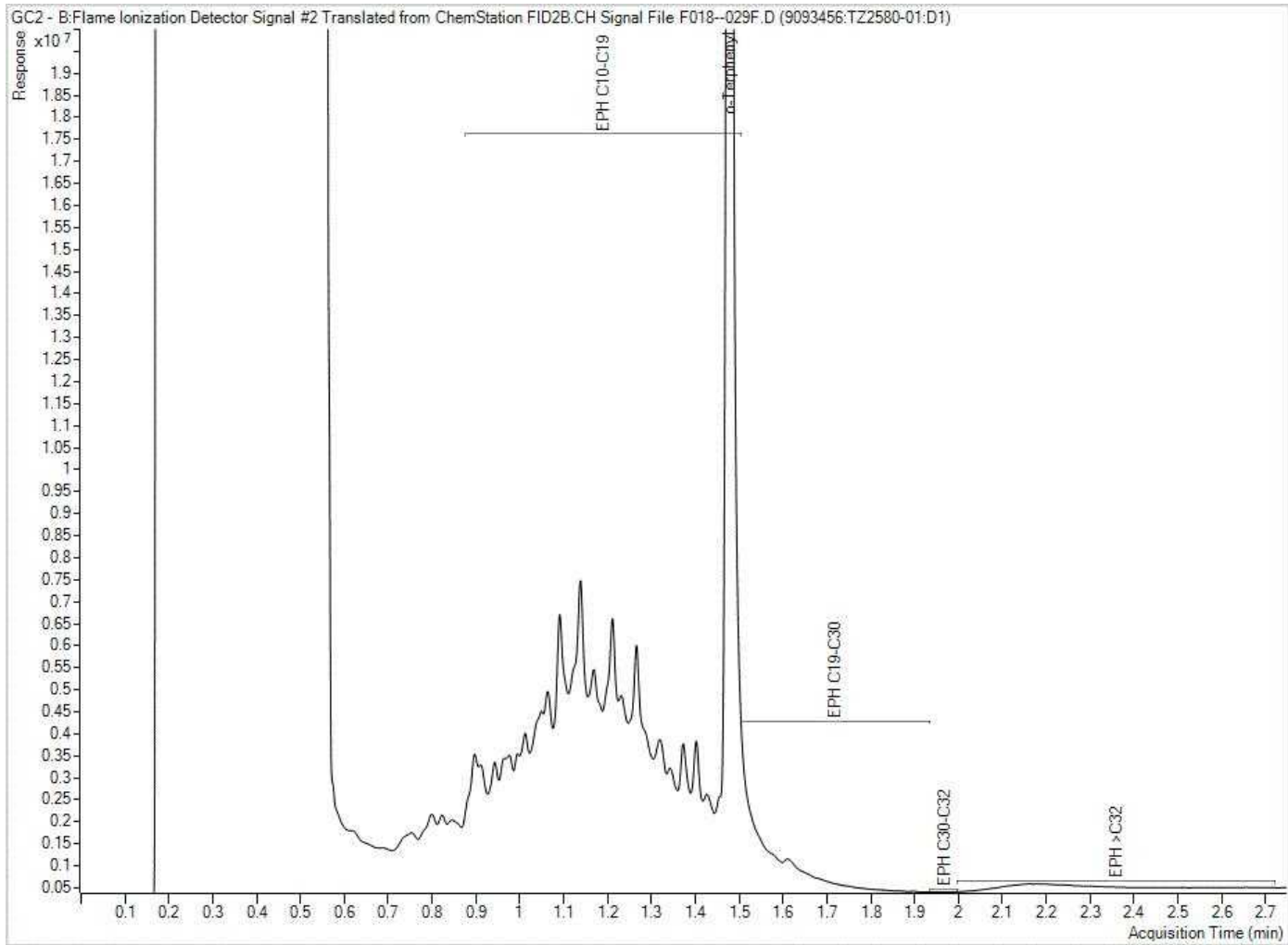
EPH in Soil by GC/FID Chromatogram



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EPH in Soil by GC/FID Chromatogram



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Your P.O. #: 1232  
 Your Project #: 123221161  
 Site#: B863863  
 Your C.O.C. #: B863863-ONTV-01-01

**Attention: Stantec Reporting**

Maxxam Analytics  
 Burnaby (Stantec)  
 4606 Canada Way  
 Burnaby, BC  
 CANADA V5G 1K5

**Report Date: 2018/08/17**  
 Report #: R5360981  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K5403**  
**Received: 2018/08/13, 10:28**

Sample Matrix: Soil  
 # Samples Received: 2

<b>Analyses</b>	<b>Quantity</b>	<b>Date Extracted</b>	<b>Date Analyzed</b>	<b>Laboratory Method</b>	<b>Reference</b>
Total Organic Carbon in Soil	2	N/A	2018/08/16	CAM SOP-00468	BCMOE TOC Aug 2014

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

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Your Project #: 123221161  
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**Received: 2018/08/13, 10:28**

Encryption Key

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

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**RESULTS OF ANALYSES OF SOIL**

<b>Maxxam ID</b>		HLM634	HLM635		
<b>Sampling Date</b>		2018/07/28	2018/07/28		
<b>COC Number</b>		B863863-ONTV-01-01	B863863-ONTV-01-01		
	<b>UNITS</b>	<b>TZ2564-MW18-31 SA06</b>	<b>TZ2574-MW18-39 SA08</b>	<b>RDL</b>	<b>QC Batch</b>
Total Organic Carbon	mg/kg	1500	<500	500	5680650
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

**TEST SUMMARY**

**Maxxam ID:** HLM634  
**Sample ID:** TZ2564-MW18-31 SA06  
**Matrix:** Soil

**Collected:** 2018/07/28  
**Shipped:**  
**Received:** 2018/08/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5680650	N/A	2018/08/16	Charles Opoku-Ware

**Maxxam ID:** HLM635  
**Sample ID:** TZ2574-MW18-39 SA08  
**Matrix:** Soil

**Collected:** 2018/07/28  
**Shipped:**  
**Received:** 2018/08/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon in Soil	COMB	5680650	N/A	2018/08/16	Charles Opoku-Ware

**GENERAL COMMENTS**

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

Package 1	17.7°C
-----------	--------

**Results relate only to the items tested.**

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Method Blank		RPD		QC Standard	
			Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5680650	Total Organic Carbon	2018/08/16	<500	mg/kg	0.33	35	103	75 - 125



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

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

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

### VALIDATION SIGNATURE PAGE

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

---

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

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.





Sent to: Maxxam Campobello  
 6740 Campobello Road  
 Mississauga, ON, L5N 2L8  
 Tel: (905) 817-5700

MAXXAM INTERLAB CHAIN OF CUSTODY RECORD

Page 01 of 01

COC # B863863-ONTV-01-01

REPORT INFORMATION							ANALYSIS REQUESTED										ADDITIONAL SAMPLE INFORMATION																																																																
Company: Maxxam																	13-Aug-18 10:28 Nazeema Rahaman B8K5403 J.L. ENV-1081																																																																
Address: 4606 Canada Way, Burnaby, British Columbia, V5G 1K5																																																																																	
Contact Name: Nahed Amer																																																																																	
Email: NAmer@maxxam.ca																																																																																	
Phone:																																																																																	
Maxxam Project #: B863863																																																																																	
Client Invoice To: STANTEC CONSULTING LTD (2792)																	ADDITIONAL SAMPLE INFORMATION																																																																
Client Report To: STANTEC CONSULTING LTD (2792) Incl. on Report? Yes / No																																																																																	
#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	TOC Seal Subcontract																																																																										
1	T22564-MW18-31 SA06	SOIL	2018/07/28		MD	1	X													(P-01)																																																													
2	T22574-MW18-39 SA08	SOIL	2018/07/28		MD	1	X													(P-01)																																																													
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SITE #:										Please inform Maxxam immediately if you are not accredited for the requested test(s). **Please return a copy of this form with the report.**			National Excel (N001) BEC Excel Export (A043) Stantec Equus (N047) Golder (Q001)			<input type="checkbox"/> Rush Required  2018/08/21 <input type="checkbox"/> Date Required <i>Please inform us if rush charges will be incurred.</i>																																																																	
PROJECT #:																																																																																	
PO/A/E, TASK ORDER/SERVICE ORDER, LINE ITEM:																																																																																	
COOLER ID: 1 melted ice							COOLER ID:			COOLER ID:			RECEIVING LAB USE ONLY																																																																				
<table border="1"> <tr><td>Custody Seal Present</td><td>YES</td><td>NO</td><td>Temp: (°C)</td><td>17</td><td>18</td><td>18</td></tr> <tr><td>Custody Seal Intact</td><td>✓</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Cooling Media Present</td><td>✓</td><td></td><td></td><td></td><td></td><td></td></tr> </table>							Custody Seal Present	YES	NO	Temp: (°C)	17	18	18	Custody Seal Intact	✓						Cooling Media Present	✓						<table border="1"> <tr><td>Custody Seal Present</td><td>YES</td><td>NO</td><td>Temp: (°C)</td><td></td><td></td><td></td></tr> <tr><td>Custody Seal Intact</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Cooling Media Present</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			Custody Seal Present	YES	NO	Temp: (°C)				Custody Seal Intact							Cooling Media Present							<table border="1"> <tr><td>Custody Seal Present</td><td>YES</td><td>NO</td><td>Temp: (°C)</td><td></td><td></td><td></td></tr> <tr><td>Custody Seal Intact</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Cooling Media Present</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			Custody Seal Present	YES	NO	Temp: (°C)				Custody Seal Intact							Cooling Media Present							<table border="1"> <tr><td>Maxxam Job #</td><td></td><td></td></tr> </table>			Maxxam Job #		
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1. NHAJIM, BEGEM TOMAN							2018-08-10			15:40			[Signature]			2018/08/13			10:28																																																														
2.																																																																																	

Your Project #: 123221161

**Attention: Matthew Deane**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

Your C.O.C. #: 561112-02-01, 561112-01-01, 561112-03-01

**Report Date: 2018/08/22**  
Report #: R2607953  
Version: 2 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B865299**

**Received: 2018/08/02, 09:00**

Sample Matrix: Soil  
# Samples Received: 8

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/MTBE LH VH F1 in Soil - Field Pres. (1)	2	N/A	2018/08/09	BBY8SOP-00010/11/12	BCMOE BCLM Jul 2017
Moisture	4	2018/08/03	2018/08/07	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	3	2018/08/04	2018/08/07	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Moisture	1	2018/08/21	2018/08/22	BBY8SOP-00017	BCMOE BCLM Dec2000 m
PAH in Soil by GC/MS (SIM)	3	2018/08/04	2018/08/08	BBY8SOP-00022	BCMOE BCLM Jul2017m
PAH in Soil by GC/MS (SIM)	4	2018/08/04	2018/08/11	BBY8SOP-00022	BCMOE BCLM Jul2017m
Total PAH and B(a)P Calculation (2)	3	N/A	2018/08/09	BBY WI-00033	Auto Calc
Total PAH and B(a)P Calculation (2)	4	N/A	2018/08/11	BBY WI-00033	Auto Calc
EPH less PAH in Soil By GC/FID (3)	3	N/A	2018/08/09	BBY WI-00033	Auto Calc
EPH less PAH in Soil By GC/FID (3)	4	N/A	2018/08/13	BBY WI-00033	Auto Calc
EPH in Soil by GC/FID	3	2018/08/04	2018/08/08	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	4	2018/08/04	2018/08/10	BBY8SOP-00029	BCMOE BCLM Jul 2016
EPH in Soil by GC/FID	1	2018/08/21	2018/08/22	BBY8SOP-00029	BCMOE BCLM Jul 2016
Volatile HC-BTEX for Soil (4)	2	N/A	2018/08/10	BBY WI-00033	Auto Calc

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CANADA V5H 4M1

Your C.O.C. #: 561112-02-01, 561112-01-01, 561112-03-01

**Report Date: 2018/08/22**  
Report #: R2607953  
Version: 2 - Revision

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B865299**

**Received: 2018/08/02, 09:00**  
agent.

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

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

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

(1) The extraction date for VOC, BTEX, VH, or F1 samples that are field preserved with methanol equals the date sampled, unless otherwise stated.

(2) Total PAHs in Soil include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

Total PAHs in Sediment include: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenz(a,h)anthracene.

(3) LEPH = EPH (C10 to C19) - (Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Benzo(b)fluoranthene + Benzo(k)fluoranthene + Dibenz(a,h)anthracene + Indeno(1,2,3-cd)pyrene + Pyrene)

(4) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====

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Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**PHYSICAL TESTING (SOIL)**

<b>Maxxam ID</b>		UA0222		UA0226		UA0230		
<b>Sampling Date</b>		2018/08/01 13:00		2018/08/01 09:00		2018/08/01 10:00		
<b>COC Number</b>		561112-02-01		561112-02-01		561112-02-01		
	<b>UNITS</b>	<b>MW18-51 SA03</b>	<b>QC Batch</b>	<b>MW18-52 SA03</b>	<b>QC Batch</b>	<b>MW18-53 SA03</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>								
Moisture	%	23	9091447	11	9088124	9.9	0.30	9091447
RDL = Reportable Detection Limit								

<b>Maxxam ID</b>		UA0241		UA0242	UA0242		UA0245		
<b>Sampling Date</b>		2018/08/01 11:00		2018/08/01 11:00	2018/08/01 11:00		2018/08/01 14:00		
<b>COC Number</b>		561112-01-01		561112-01-01	561112-01-01		561112-01-01		
	<b>UNITS</b>	<b>MW18-49 SA03</b>	<b>QC Batch</b>	<b>MW18-49 SA04</b>	<b>MW18-49 SA04 Lab-Dup</b>	<b>QC Batch</b>	<b>MW18-50 SA03</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>									
Moisture	%	6.5	9088124	15	15	9111912	19	0.30	9088124
RDL = Reportable Detection Limit									
Lab-Dup = Laboratory Initiated Duplicate									

<b>Maxxam ID</b>		UA0250		UA0254		
<b>Sampling Date</b>		2018/08/01 17:00		2018/08/01 16:30		
<b>COC Number</b>		561112-03-01		561112-03-01		
	<b>UNITS</b>	<b>MW18-54 SA02</b>	<b>QC Batch</b>	<b>MW18-55 SA02</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Physical Properties</b>						
Moisture	%	6.6	9091447	12	0.30	9088124
RDL = Reportable Detection Limit						

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**TOTAL PETROLEUM HYDROCARBONS (SOIL)**

<b>Maxxam ID</b>		UA0242		
<b>Sampling Date</b>		2018/08/01 11:00		
<b>COC Number</b>		561112-01-01		
	<b>UNITS</b>	<b>MW18-49 SA04</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Hydrocarbons</b>				
EPH (C10-C19)	mg/kg	<100	100	9112238
EPH (C19-C32)	mg/kg	<100	100	9112238
<b>Surrogate Recovery (%)</b>				
O-TERPHENYL (sur.)	%	84		9112238
RDL = Reportable Detection Limit				

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**CSR BTEX/VPH IN SOIL - FIELD PRESERVED (SOIL)**

Maxxam ID		UA0226	UA0241		
Sampling Date		2018/08/01 09:00	2018/08/01 11:00		
COC Number		561112-02-01	561112-01-01		
	UNITS	MW18-52 SA03	MW18-49 SA03	RDL	QC Batch
<b>Calculated Parameters</b>					
VPH (VH6 to 10 - BTEX)	mg/kg	<10	68	10	9090507
<b>Volatiles</b>					
Methyl-tert-butylether (MTBE)	mg/kg	<0.10	<0.10	0.10	9096200
Benzene	mg/kg	<0.0050	<0.0050	0.0050	9096200
Toluene	mg/kg	<0.020	<0.020	0.020	9096200
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	9096200
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	9096200
o-Xylene	mg/kg	<0.040	<0.040	0.040	9096200
Styrene	mg/kg	<0.030	<0.030	0.030	9096200
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	9096200
VH C6-C10	mg/kg	<10	68	10	9096200
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene (sur.)	%	102	98		9096200
4-Bromofluorobenzene (sur.)	%	92	100		9096200
D10-ETHYLBENZENE (sur.)	%	102	103		9096200
D4-1,2-Dichloroethane (sur.)	%	103	100		9096200
RDL = Reportable Detection Limit					

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		UA0222		UA0226		UA0230		
Sampling Date		2018/08/01 13:00		2018/08/01 09:00		2018/08/01 10:00		
COC Number		561112-02-01		561112-02-01		561112-02-01		
	UNITS	MW18-51 SA03	QC Batch	MW18-52 SA03	QC Batch	MW18-53 SA03	RDL	QC Batch
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	mg/kg	<0.050	9091242	<0.050	9091242	<0.050	0.050	9091242
High Molecular Weight PAH's	mg/kg	<0.050	9091242	<0.050	9091242	<0.050	0.050	9091242
Total PAH	mg/kg	<0.050	9091242	<0.050	9091242	<0.050	0.050	9091242
<b>Polycyclic Aromatics</b>								
Naphthalene	mg/kg	<0.010	9096057	<0.010	9094591	<0.010	0.010	9096057
1-Methylnaphthalene	mg/kg	<0.050	9096057	<0.050	9094591	<0.050	0.050	9096057
2-Methylnaphthalene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Acenaphthylene	mg/kg	<0.0050	9096057	<0.0050	9094591	<0.0050	0.0050	9096057
Acenaphthene	mg/kg	<0.0050	9096057	<0.0050	9094591	<0.0050	0.0050	9096057
Fluorene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Phenanthrene	mg/kg	<0.010	9096057	<0.010	9094591	<0.010	0.010	9096057
Anthracene	mg/kg	<0.0040	9096057	<0.0040	9094591	<0.0040	0.0040	9096057
Acridine	mg/kg	<0.050	9096057	<0.050	9094591	<0.050	0.050	9096057
Fluoranthene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Pyrene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(a)anthracene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Chrysene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(b&j)fluoranthene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(b)fluoranthene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(k)fluoranthene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(a)pyrene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Dibenz(a,h)anthracene	mg/kg	<0.020	9096057	<0.020	9094591	<0.020	0.020	9096057
Benzo(g,h,i)perylene	mg/kg	<0.050	9096057	<0.050	9094591	<0.050	0.050	9096057
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/kg	<100	9091248	<100	9091248	<100	100	9091248
HEPH (C19-C32 less PAH)	mg/kg	<100	9091248	<100	9091248	<100	100	9091248
<b>Hydrocarbons</b>								
EPH (C10-C19)	mg/kg	<100	9096047	<100	9094587	<100	100	9096047
EPH (C19-C32)	mg/kg	<100	9096047	<100	9094587	<100	100	9096047
<b>Surrogate Recovery (%)</b>								
D10-ANTHRACENE (sur.)	%	72	9096057	86	9094591	87		9096057
RDL = Reportable Detection Limit								

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		UA0222		UA0226		UA0230		
Sampling Date		2018/08/01 13:00		2018/08/01 09:00		2018/08/01 10:00		
COC Number		561112-02-01		561112-02-01		561112-02-01		
	UNITS	MW18-51 SA03	QC Batch	MW18-52 SA03	QC Batch	MW18-53 SA03	RDL	QC Batch
D8-ACENAPHTHYLENE (sur.)	%	79	9096057	82	9094591	84		9096057
D8-NAPHTHALENE (sur.)	%	93	9096057	86	9094591	96		9096057
TERPHENYL-D14 (sur.)	%	88	9096057	87	9094591	91		9096057
O-TERPHENYL (sur.)	%	89	9096047	88	9094587	87		9096047
RDL = Reportable Detection Limit								



Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

Maxxam ID		UA0241		UA0245	UA0250		UA0254		
Sampling Date		2018/08/01 11:00		2018/08/01 14:00	2018/08/01 17:00		2018/08/01 16:30		
COC Number		561112-01-01		561112-01-01	561112-03-01		561112-03-01		
	<b>UNITS</b>	<b>MW18-49 SA03</b>	<b>QC Batch</b>	<b>MW18-50 SA03</b>	<b>MW18-54 SA02</b>	<b>QC Batch</b>	<b>MW18-55 SA02</b>	<b>RDL</b>	<b>QC Batch</b>

Calculated Parameters									
Low Molecular Weight PAH's	mg/kg	0.77	9091242	<0.050	<0.050	9091242	<0.050	0.050	9091242
High Molecular Weight PAH's	mg/kg	<0.050	9091242	<0.050	<0.050	9091242	<0.050	0.050	9091242
Total PAH	mg/kg	0.77	9091242	<0.050	<0.050	9091242	<0.050	0.050	9091242

Polycyclic Aromatics									
Naphthalene	mg/kg	0.053 (1)	9094591	<0.010	<0.010	9096057	<0.010	0.010	9094591
1-Methylnaphthalene	mg/kg	<0.050	9094591	<0.050	<0.050	9096057	<0.050	0.050	9094591
2-Methylnaphthalene	mg/kg	0.037 (1)	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Acenaphthylene	mg/kg	0.025 (1)	9094591	<0.0050	<0.0050	9096057	<0.0050	0.0050	9094591
Acenaphthene	mg/kg	0.074 (1)	9094591	<0.0050	<0.0050	9096057	<0.0050	0.0050	9094591
Fluorene	mg/kg	0.27	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Phenanthrene	mg/kg	0.30	9094591	<0.010	<0.010	9096057	<0.010	0.010	9094591
Anthracene	mg/kg	0.0090 (1)	9094591	<0.0040	<0.0040	9096057	<0.0040	0.0040	9094591
Acridine	mg/kg	<0.050	9094591	<0.050	<0.050	9096057	<0.050	0.050	9094591
Fluoranthene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Pyrene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(a)anthracene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Chrysene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(b&j)fluoranthene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(b)fluoranthene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(k)fluoranthene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(a)pyrene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Indeno(1,2,3-cd)pyrene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Dibenz(a,h)anthracene	mg/kg	<0.020	9094591	<0.020	<0.020	9096057	<0.020	0.020	9094591
Benzo(g,h,i)perylene	mg/kg	<0.050	9094591	<0.050	<0.050	9096057	<0.050	0.050	9094591

Calculated Parameters									
LEPH (C10-C19 less PAH)	mg/kg	1800	9091248	<100	<100	9091248	<100	100	9091248
HEPH (C19-C32 less PAH)	mg/kg	170	9091248	<100	<100	9091248	<100	100	9091248

Hydrocarbons									
EPH (C10-C19)	mg/kg	1800	9094587	<100	<100	9096047	<100	100	9094587
EPH (C19-C32)	mg/kg	170	9094587	<100	<100	9096047	<100	100	9094587

RDL = Reportable Detection Limit  
(1) Tentatively identified result and may be potentially biased high due to matrix interference.

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

**LEPH & HEPH WITH PAH FOR CSR IN SOIL (SOIL)**

<b>Maxxam ID</b>		UA0241		UA0245	UA0250		UA0254		
<b>Sampling Date</b>		2018/08/01 11:00		2018/08/01 14:00	2018/08/01 17:00		2018/08/01 16:30		
<b>COC Number</b>		561112-01-01		561112-01-01	561112-03-01		561112-03-01		
	<b>UNITS</b>	<b>MW18-49 SA03</b>	<b>QC Batch</b>	<b>MW18-50 SA03</b>	<b>MW18-54 SA02</b>	<b>QC Batch</b>	<b>MW18-55 SA02</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Surrogate Recovery (%)</b>									
D10-ANTHRACENE (sur.)	%	91	9094591	78	87	9096057	85		9094591
D8-ACENAPHTHYLENE (sur.)	%	83	9094591	82	84	9096057	83		9094591
D8-NAPHTHALENE (sur.)	%	81	9094591	96	97	9096057	86		9094591
TERPHENYL-D14 (sur.)	%	91	9094591	92	92	9096057	85		9094591
O-TERPHENYL (sur.)	%	88	9094587	89	89	9096047	88		9094587

RDL = Reportable Detection Limit

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### GENERAL COMMENTS

Version 2: Report reissued to include results for EPH on sample MW18-49 SA04 as per request from Matthew Deane on 2018/08/21  
Sample analyzed past hold time. Analysis performed with client's consent.

Sample UA0242 [MW18-49 SA04] : Sample analyzed past method specified hold time for Moisture. Sample analyzed past method specified hold time for EPH in Soil by GC/FID.

**Results relate only to the items tested.**

Maxxam Job #: B865299  
Report Date: 2018/08/22

**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9094587	O-TERPHENYL (sur.)	2018/08/08	86	60 - 140	87	60 - 140	87	%		
9094591	D10-ANTHRACENE (sur.)	2018/08/08	83	50 - 140	85	50 - 140	86	%		
9094591	D8-ACENAPHTHYLENE (sur.)	2018/08/08	80	50 - 140	82	50 - 140	85	%		
9094591	D8-NAPHTHALENE (sur.)	2018/08/08	85	50 - 140	85	50 - 140	88	%		
9094591	TERPHENYL-D14 (sur.)	2018/08/08	83	50 - 140	85	50 - 140	90	%		
9096047	O-TERPHENYL (sur.)	2018/08/10	87	60 - 140	86	60 - 140	88	%		
9096057	D10-ANTHRACENE (sur.)	2018/08/10	84	50 - 140	82	50 - 140	83	%		
9096057	D8-ACENAPHTHYLENE (sur.)	2018/08/10	80	50 - 140	79	50 - 140	80	%		
9096057	D8-NAPHTHALENE (sur.)	2018/08/10	92	50 - 140	89	50 - 140	93	%		
9096057	TERPHENYL-D14 (sur.)	2018/08/10	90	50 - 140	88	50 - 140	89	%		
9096200	1,4-Difluorobenzene (sur.)	2018/08/09	101	70 - 130	102	70 - 130	106	%		
9096200	4-Bromofluorobenzene (sur.)	2018/08/09	93	70 - 130	92	70 - 130	92	%		
9096200	D10-ETHYLBENZENE (sur.)	2018/08/09	102	60 - 130	98	60 - 130	118	%		
9096200	D4-1,2-Dichloroethane (sur.)	2018/08/09	98	70 - 130	91	70 - 130	107	%		
9112238	O-TERPHENYL (sur.)	2018/08/22	77	60 - 140	74	60 - 140	86	%		
9088124	Moisture	2018/08/07					<0.30	%	5.5	20
9091447	Moisture	2018/08/07					<0.30	%	7.3	20
9094587	EPH (C10-C19)	2018/08/08	98	60 - 140	99	70 - 130	<100	mg/kg	NC	40
9094587	EPH (C19-C32)	2018/08/08	100	60 - 140	101	70 - 130	<100	mg/kg	NC	40
9094591	1-Methylnaphthalene	2018/08/08	83	50 - 140	85	50 - 140	<0.050	mg/kg	NC	50
9094591	2-Methylnaphthalene	2018/08/08	81	50 - 140	81	50 - 140	<0.020	mg/kg	NC	50
9094591	Acenaphthene	2018/08/08	78	50 - 140	82	50 - 140	<0.0050	mg/kg	NC	50
9094591	Acenaphthylene	2018/08/08	79	50 - 140	81	50 - 140	<0.0050	mg/kg	NC	50
9094591	Acridine	2018/08/08	98	50 - 140			<0.050	mg/kg		
9094591	Anthracene	2018/08/08	80	50 - 140	83	50 - 140	<0.0040	mg/kg	NC	50
9094591	Benzo(a)anthracene	2018/08/08	88	50 - 140	80	50 - 140	<0.020	mg/kg	NC	50
9094591	Benzo(a)pyrene	2018/08/08	77	50 - 140	82	50 - 140	<0.020	mg/kg	NC	50
9094591	Benzo(b&j)fluoranthene	2018/08/08	82	50 - 140	81	50 - 140	<0.020	mg/kg	NC	50
9094591	Benzo(b)fluoranthene	2018/08/08	84	50 - 140	78	50 - 140	<0.020	mg/kg	NC	50
9094591	Benzo(g,h,i)perylene	2018/08/08	82	50 - 140	67	50 - 140	<0.050	mg/kg	NC	50
9094591	Benzo(k)fluoranthene	2018/08/08	74	50 - 140	86	50 - 140	<0.020	mg/kg	NC	50

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9094591	Chrysene	2018/08/08	93	50 - 140	83	50 - 140	<0.020	mg/kg	NC	50
9094591	Dibenz(a,h)anthracene	2018/08/08	83	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50
9094591	Fluoranthene	2018/08/08	80	50 - 140	81	50 - 140	<0.020	mg/kg	NC	50
9094591	Fluorene	2018/08/08	77	50 - 140	78	50 - 140	<0.020	mg/kg	NC	50
9094591	Indeno(1,2,3-cd)pyrene	2018/08/08	82	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50
9094591	Naphthalene	2018/08/08	81	50 - 140	81	50 - 140	<0.010	mg/kg	NC	50
9094591	Phenanthrene	2018/08/08	80	50 - 140	79	50 - 140	<0.010	mg/kg	NC	50
9094591	Pyrene	2018/08/08	82	50 - 140	85	50 - 140	<0.020	mg/kg	NC	50
9096047	EPH (C10-C19)	2018/08/10	99	60 - 140	98	70 - 130	<100	mg/kg	NC	40
9096047	EPH (C19-C32)	2018/08/10	101	60 - 140	101	70 - 130	<100	mg/kg	NC	40
9096057	1-Methylnaphthalene	2018/08/10	98	50 - 140	96	50 - 140	<0.050	mg/kg	NC	50
9096057	2-Methylnaphthalene	2018/08/10	95	50 - 140	93	50 - 140	<0.020	mg/kg	NC	50
9096057	Acenaphthene	2018/08/10	79	50 - 140	78	50 - 140	<0.0050	mg/kg	NC	50
9096057	Acenaphthylene	2018/08/10	77	50 - 140	76	50 - 140	<0.0050	mg/kg	NC	50
9096057	Acridine	2018/08/10	100	50 - 140			<0.050	mg/kg		
9096057	Anthracene	2018/08/10	81	50 - 140	80	50 - 140	<0.0040	mg/kg	NC	50
9096057	Benzo(a)anthracene	2018/08/10	75	50 - 140	75	50 - 140	<0.020	mg/kg	NC	50
9096057	Benzo(a)pyrene	2018/08/10	76	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50
9096057	Benzo(b&j)fluoranthene	2018/08/10	74	50 - 140	75	50 - 140	<0.020	mg/kg	NC	50
9096057	Benzo(b)fluoranthene	2018/08/10	69	50 - 140	71	50 - 140	<0.020	mg/kg	NC	50
9096057	Benzo(g,h,i)perylene	2018/08/10	75	50 - 140	74	50 - 140	<0.050	mg/kg	NC	50
9096057	Benzo(k)fluoranthene	2018/08/10	86	50 - 140	88	50 - 140	<0.020	mg/kg	NC	50
9096057	Chrysene	2018/08/10	79	50 - 140	78	50 - 140	<0.020	mg/kg	NC	50
9096057	Dibenz(a,h)anthracene	2018/08/10	77	50 - 140	76	50 - 140	<0.020	mg/kg	NC	50
9096057	Fluoranthene	2018/08/10	84	50 - 140	82	50 - 140	<0.020	mg/kg	NC	50
9096057	Fluorene	2018/08/10	76	50 - 140	75	50 - 140	<0.020	mg/kg	NC	50
9096057	Indeno(1,2,3-cd)pyrene	2018/08/10	76	50 - 140	74	50 - 140	<0.020	mg/kg	NC	50
9096057	Naphthalene	2018/08/10	90	50 - 140	87	50 - 140	<0.010	mg/kg	NC	50
9096057	Phenanthrene	2018/08/10	77	50 - 140	76	50 - 140	<0.010	mg/kg	NC	50
9096057	Pyrene	2018/08/10	87	50 - 140	84	50 - 140	<0.020	mg/kg	NC	50
9096200	Benzene	2018/08/09	90	60 - 140	107	70 - 130	<0.0050	mg/kg	3.7	40

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**QUALITY ASSURANCE REPORT(CONT'D)**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9096200	Ethylbenzene	2018/08/09	91	60 - 140	108	70 - 130	<0.010	mg/kg	1.3	40
9096200	m & p-Xylene	2018/08/09	87	60 - 140	103	70 - 130	<0.040	mg/kg	1.9	40
9096200	Methyl-tert-butylether (MTBE)	2018/08/09					<0.10	mg/kg	NC	40
9096200	o-Xylene	2018/08/09	89	60 - 140	105	70 - 130	<0.040	mg/kg	NC	40
9096200	Styrene	2018/08/09					<0.030	mg/kg	NC	40
9096200	Toluene	2018/08/09	82	60 - 140	98	70 - 130	<0.020	mg/kg	4.3	40
9096200	VH C6-C10	2018/08/09			106	70 - 130	<10	mg/kg	NC	40
9096200	Xylenes (Total)	2018/08/09					<0.040	mg/kg	1.9	40
9111912	Moisture	2018/08/22					<0.30	%	1.3	20
9112238	EPH (C10-C19)	2018/08/22	81	60 - 140	77	70 - 130	<100	mg/kg	NC	40
9112238	EPH (C19-C32)	2018/08/22	83	60 - 140	78	70 - 130	<100	mg/kg	NC	40

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

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

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

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

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

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

Maxxam Job #: B865299  
Report Date: 2018/08/22

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Sampler Initials: MD

### VALIDATION SIGNATURE PAGE

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



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Jose Cueva, Supervisor, Organics-VOC & HC



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Rob Reinert, B.Sc., Scientific Spécialist

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name: #2792 STANTEC CONSULTING LTD	Contact Name: ACCOUNTS PAYABLE	Company Name: Matthew Deane	Quotation #: B71770	Bottle Order #: 561112	
Contact Name: METROTOWER III SUITE 500, 4730 KINGSWAY	Address: BURNABY BC V5H 4M1	Address:	P.O. #:	561112	
Address:	Phone: (604) 436-3014 Fax: (604) 436-3752	Address:	Project #: 123221161	Project Manager: Nahed Amer	
Phone:	Email: SAPinvoices@stantec.com	Address:	Project Name:	Chain of Custody Record: 8865299_COC	
Email:		Address:	Site #:	561112	
		Address:	Sampled By: MD	Chain of Custody Record: 8865299_COC	

Regulatory Criteria	Special Instructions	Analysis Requested	Turnaround Time (TAT) Required
			Please provide advance notice for rush projects
			<b>Regular (Standard) TAT</b> <input checked="" type="checkbox"/>
			(will be applied if Rush TAT is not specified)
			Standard TAT = 5-7 Working days for most tests.
			Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
			<b>Job Specific Rush TAT (if applies to entire submission)</b> <input type="checkbox"/>
			Date Required: _____ Time Required: _____
			Rush Confirmation Number: _____ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested	# of Bottles	Comments
1	MW18-51 SA03	18/08/01	1300	SOIL	X			1	RECEIVED IN WHITEHORSE BY: Alyona@0900
2	↓ 04		↓				X	1	
3	MW18-52 SA01		900				X	1	2018-08-02
4	↓ 02		↓				X	1	
5	↓ 03		↓		X	X		3	TEMP: 8 / 10 / 19
6	↓ 04		↓				X	1	
7	MW18-53 SA01		1000				X	1	
8	↓ 02		↓				X	1	
9	↓ 03		↓		X			1	
10	↓ 04		↓				X	1	

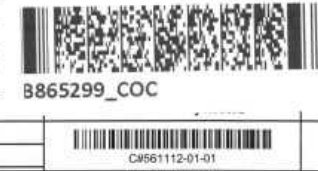
RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Time Sensitive	Temperature (°C) on Receipt	Lab Use Only
M. Deane	18/08/01	2000	KEVIN CHOI	2018/08/03	14:50	NA	<input checked="" type="checkbox"/>	7.7, 6	Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input type="checkbox"/> No

\* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS.  
\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

672



<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway	Address		Project #	123221161
	BURNABY BC V5H 4M1			Project Name	
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Site #	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Sampled By	MD



Bottle Order #: 561112  
Project Manager: Naled Arner

Regulatory Criteria	Special Instructions	Analysis Requested

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

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

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

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	LHA/PAH	MOBID	BTEX/UPH	Analysis Requested	# of Bottles	Comments
1	MW18-49 SA01	18/08/01	1100	SOIL							1	RECEIVED IN WHITEHORSE
2	↓ 02	↓	↓	↓							1	BY: <u>Styom@0900</u>
3	↓ 03	↓	↓	↓			X	X			3	2018-08-02
4	↓ 04	↓	↓	↓							1	
5	MW18-50 SA01	↓	1400	↓							1	TEMP: 8/10/19
6	↓ 02	↓	↓	↓							1	
7	↓ 03	↓	↓	↓			X				1	
8	↓ 04	↓	↓	↓							1	
9	MW18-51 SA01	↓	1300	↓							1	
10	↓ SA02	↓	↓	↓							1	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# Jars used and not submitted	Lab Use Only	
<u>M. Deane</u>	18/08/01	2000	<u>KEVIN (P. Deane)</u>	2018/08/03	14:50	1/1	Time Sensitive <input checked="" type="checkbox"/>	Temperature (°C) on Receipt: 7.1/2
							Custody: Seal Intact on Cooler? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

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Maxxam Analytics International Corporation o/a Maxxam Analytics  
 4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:800-563-6266 Fax:(604) 731 2386 www.maxxam.ca

<b>INVOICE TO:</b>		<b>Report Information</b>		<b>Project Information</b>	
Company Name	#2792 STANTEC CONSULTING LTD	Company Name		Quotation #	B71770
Contact Name	ACCOUNTS PAYABLE	Contact Name	Matthew Deane	P.O. #	
Address	Metrotower III Suite 500, 4730 Kingsway	Address		Project #	123221161
	BURNABY BC V5H 4M1			Project Name	
Phone	(604) 436-3014 Fax: (604) 436-3752	Phone		Site #	
Email	SAPinvoices@Stantec.com	Email	matthew.deane@stantec.com	Sampled By	MD



Bottle Order #:  
56112  
Project Manager



Nahed Amer

Regulatory Criteria	Special Instructions	Analysis Requested

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

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

**Job Specific Rush TAT (if applies to entire submission)**  
 Date Required: \_\_\_\_\_ Time Required: \_\_\_\_\_

Rush Confirmation Number \_\_\_\_\_ (call lab for #)

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

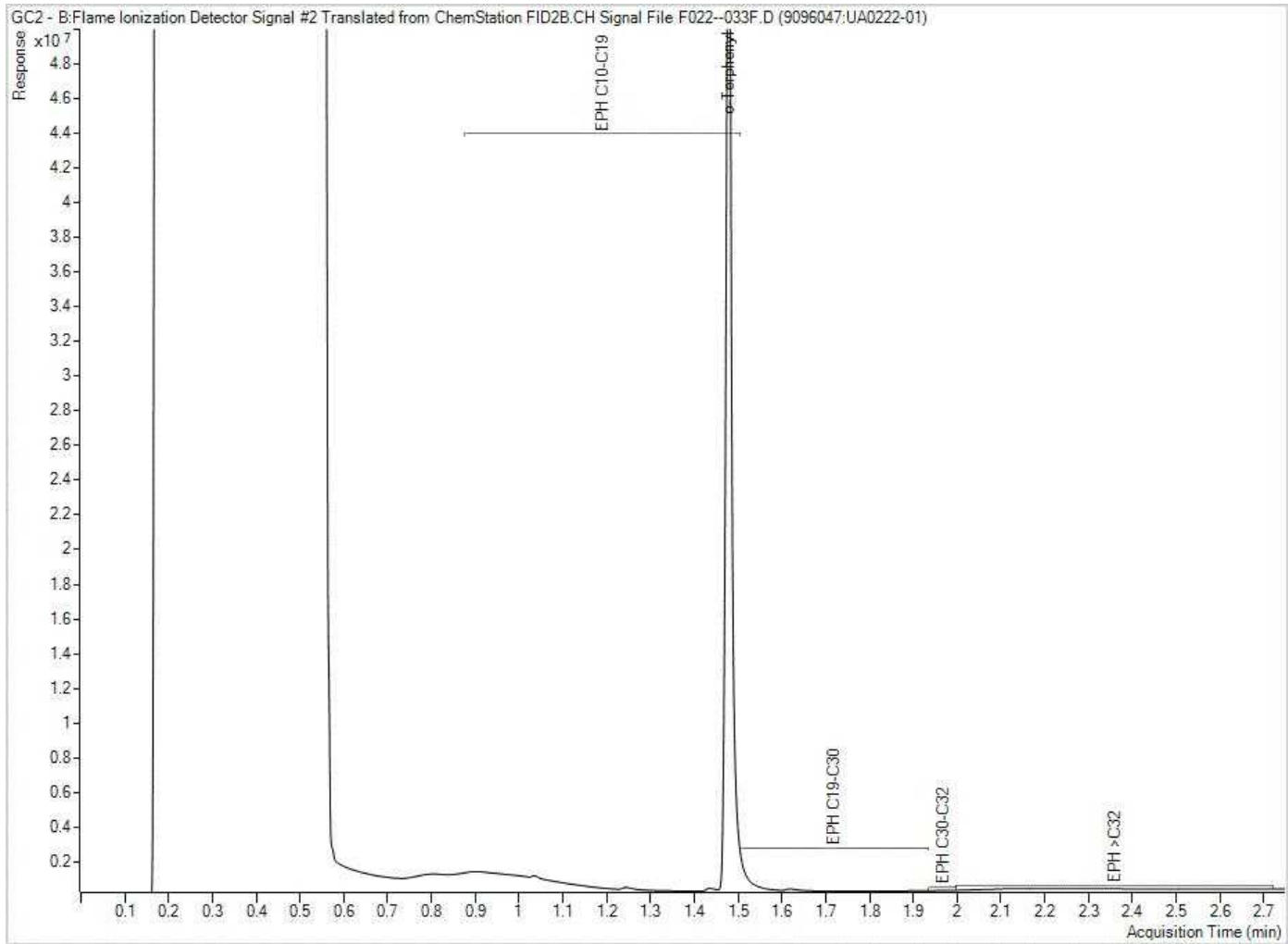
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Analysis Requested	# of Bottles	Comments
1	MN18-34 SA01	18/08/01	1700	SOIL				1	
2	02	18/08/01				X		1	RECEIVED IN WHITEHORSE
3	03						X	1	BY: slyano@0900
4	04						X	1	2018-08-02
5	MN18-55 SA01		1630				X	1	TEMP: 8 / 10 / 9
6	02					X		1	
7	03						X	1	
8	04						X	1	
9									
10									

<b>* RELINQUISHED BY: (Signature/Print)</b>	<b>Date: (YY/MM/DD)</b>	<b>Time</b>	<b>RECEIVED BY: (Signature/Print)</b>	<b>Date: (YY/MM/DD)</b>	<b>Time</b>	<b># Jars used and not submitted</b>	<b>Lab Use Only</b>
<i>[Signature]</i>	18/08/01	2000	<i>[Signature]</i>	20/08/01	19:30	WP	Time Sensitive <input type="checkbox"/> Temperature (°C) on Receipt: 7.7 C Custody Seal Intact on Cooler? <input type="checkbox"/> Yes <input type="checkbox"/> No

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

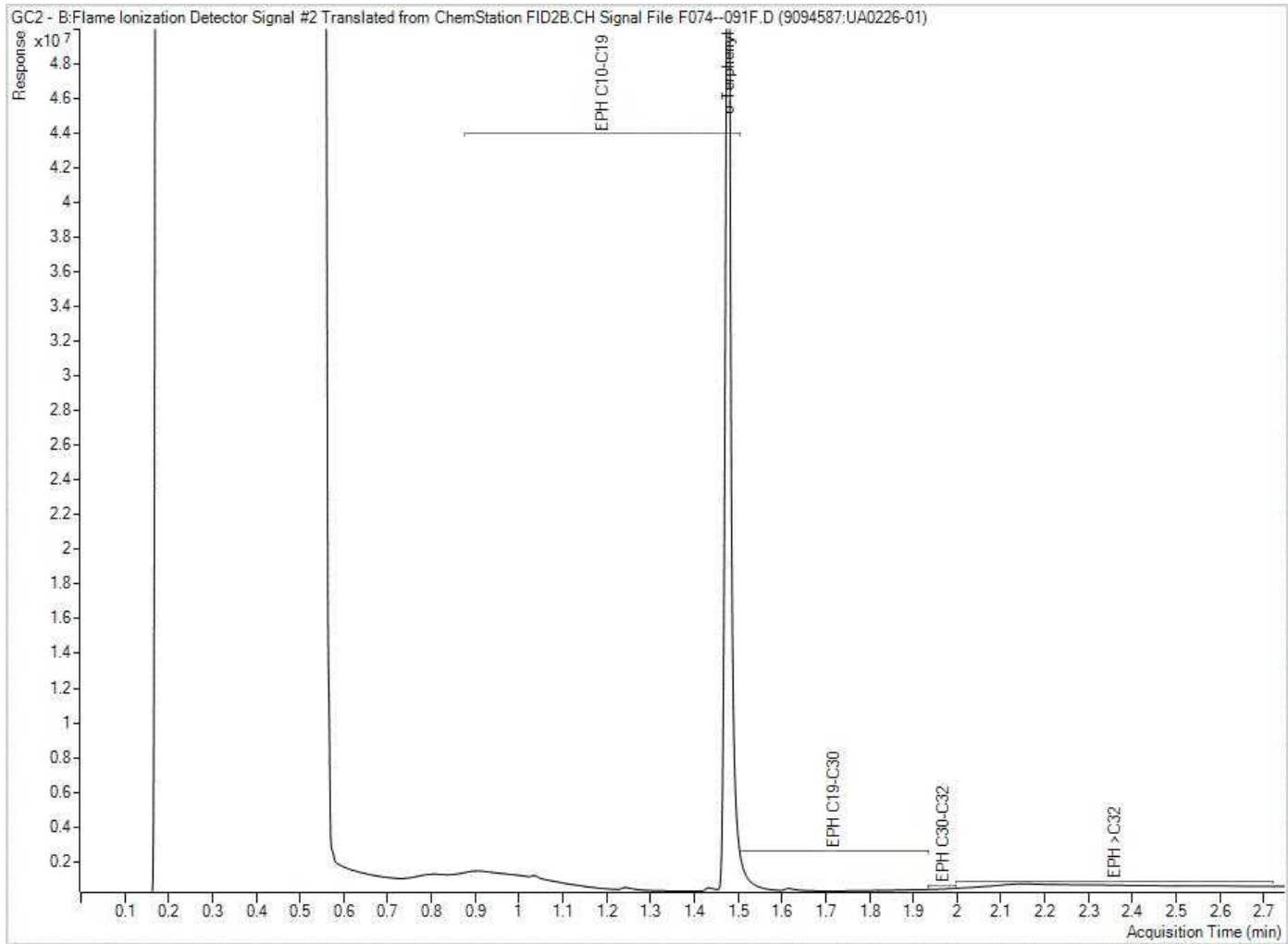
\* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

EPH in Soil by GC/FID Chromatogram



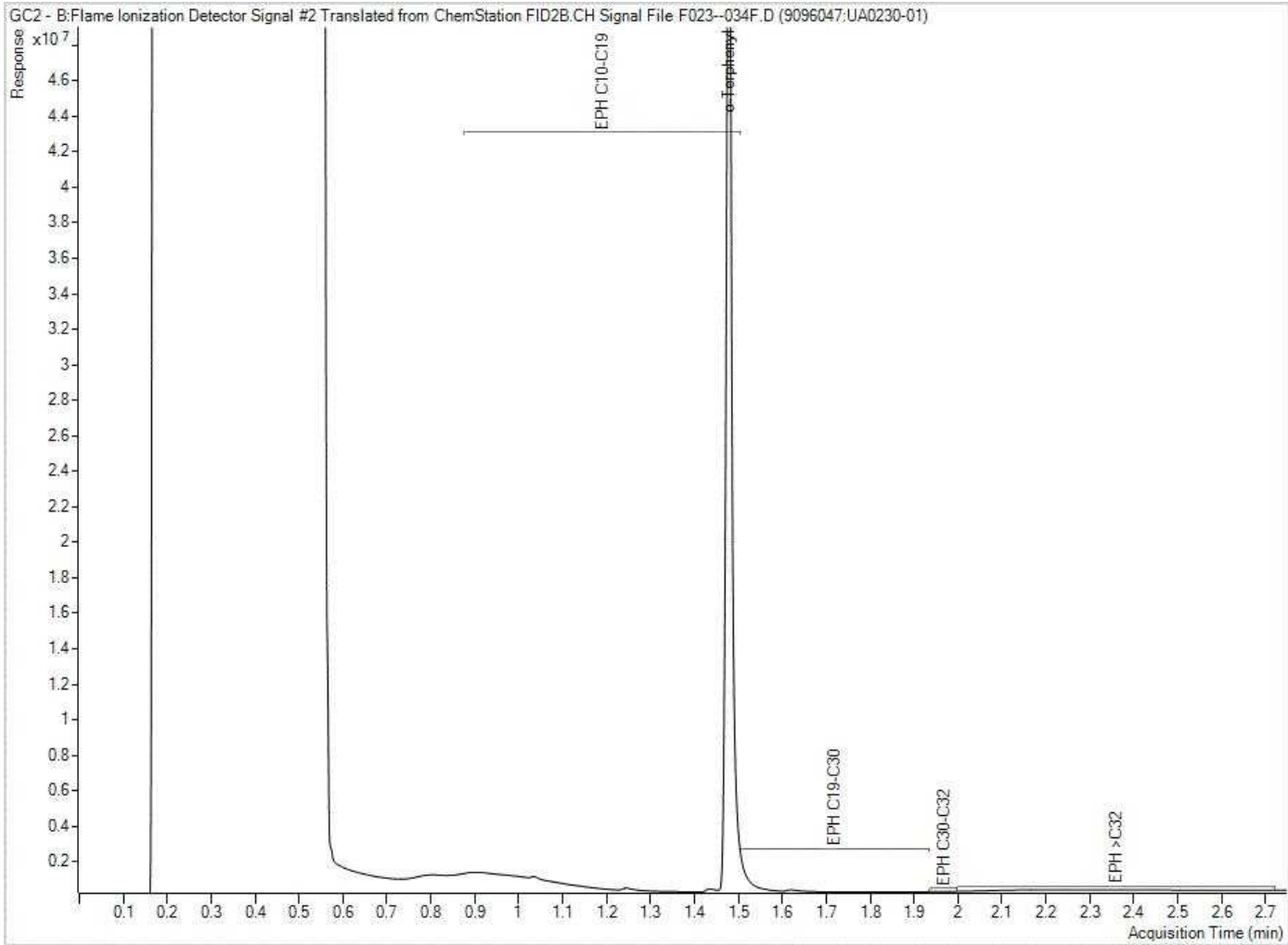
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



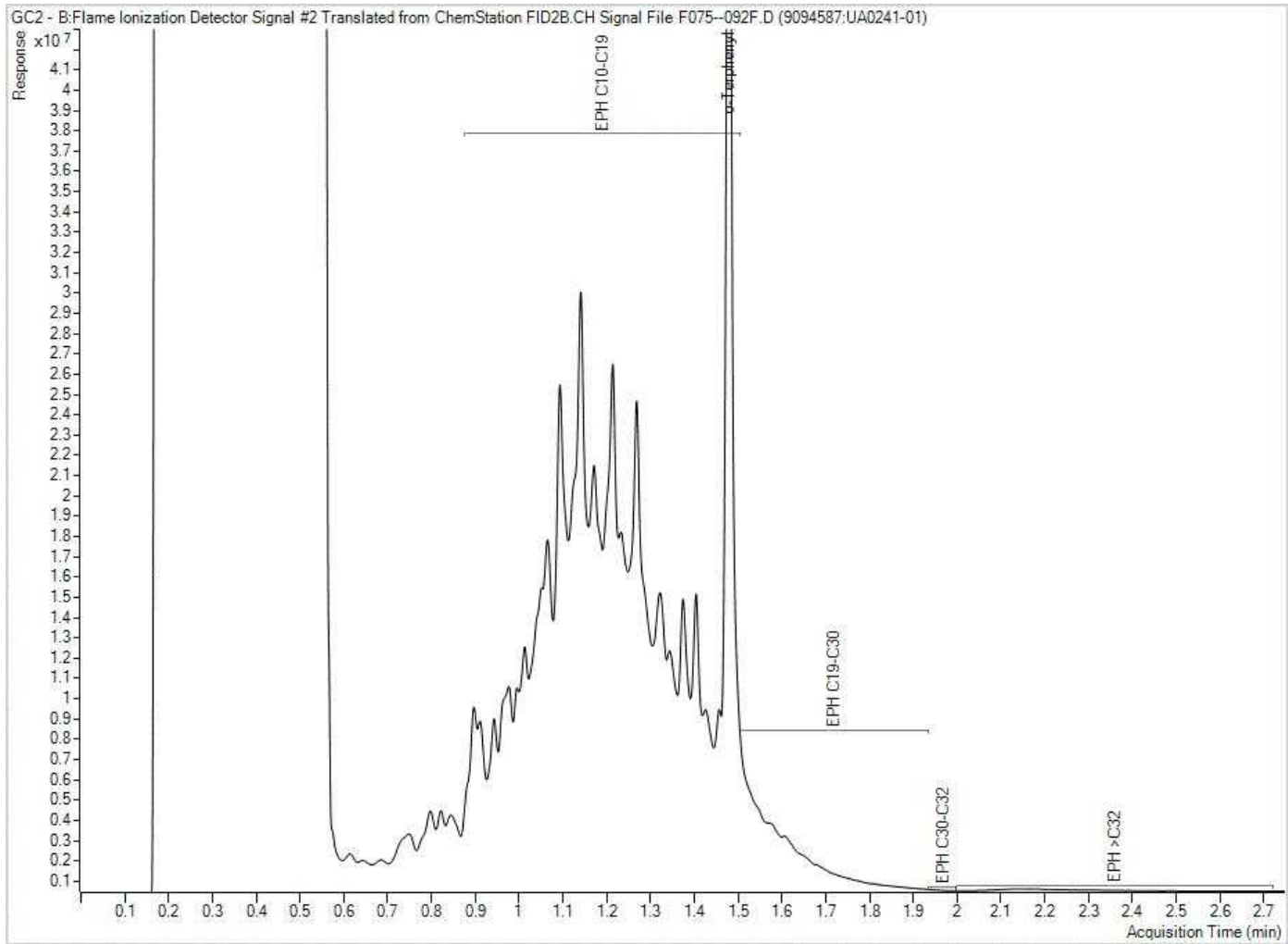
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



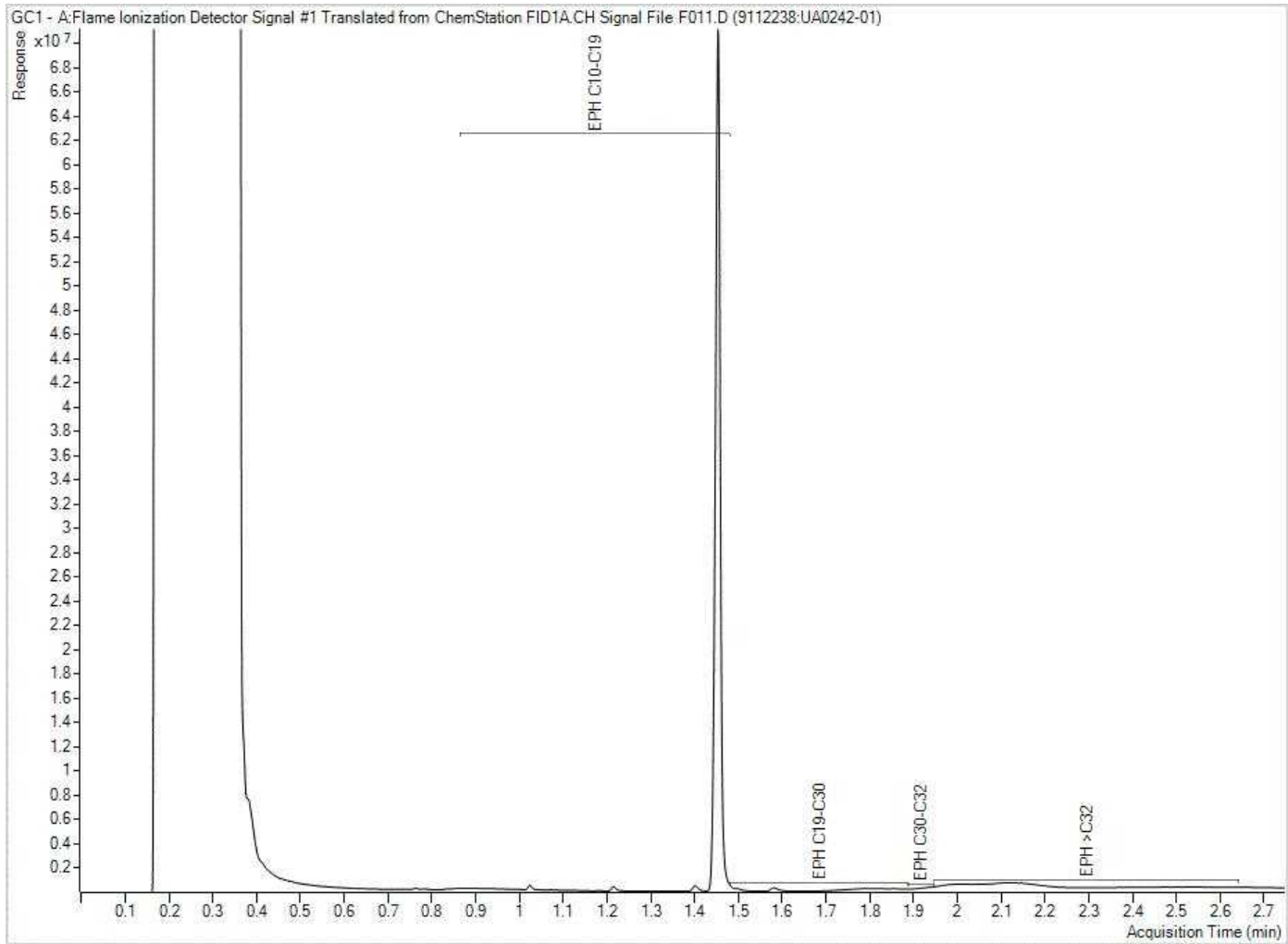
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



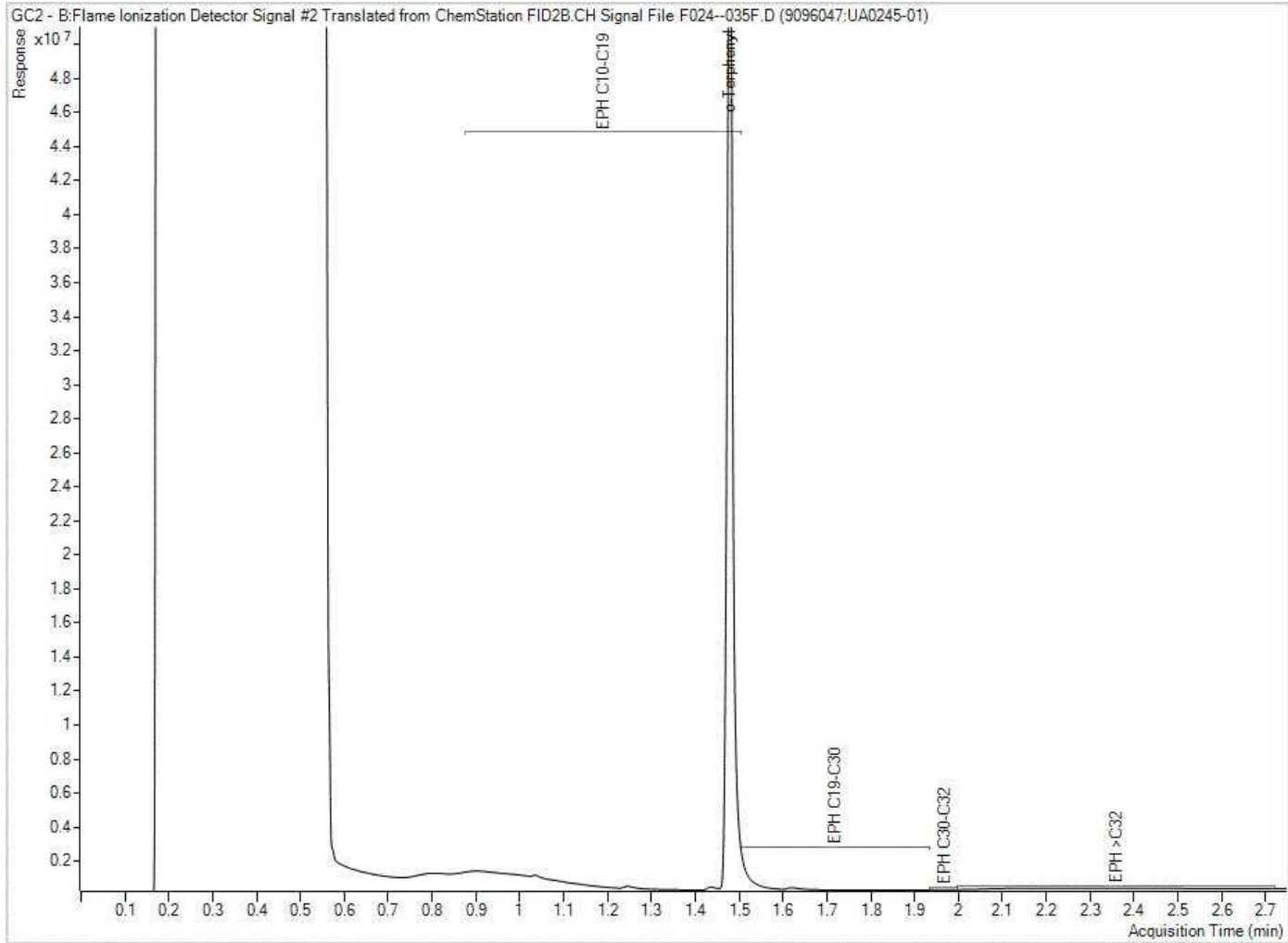
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH in Soil by GC/FID Chromatogram



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

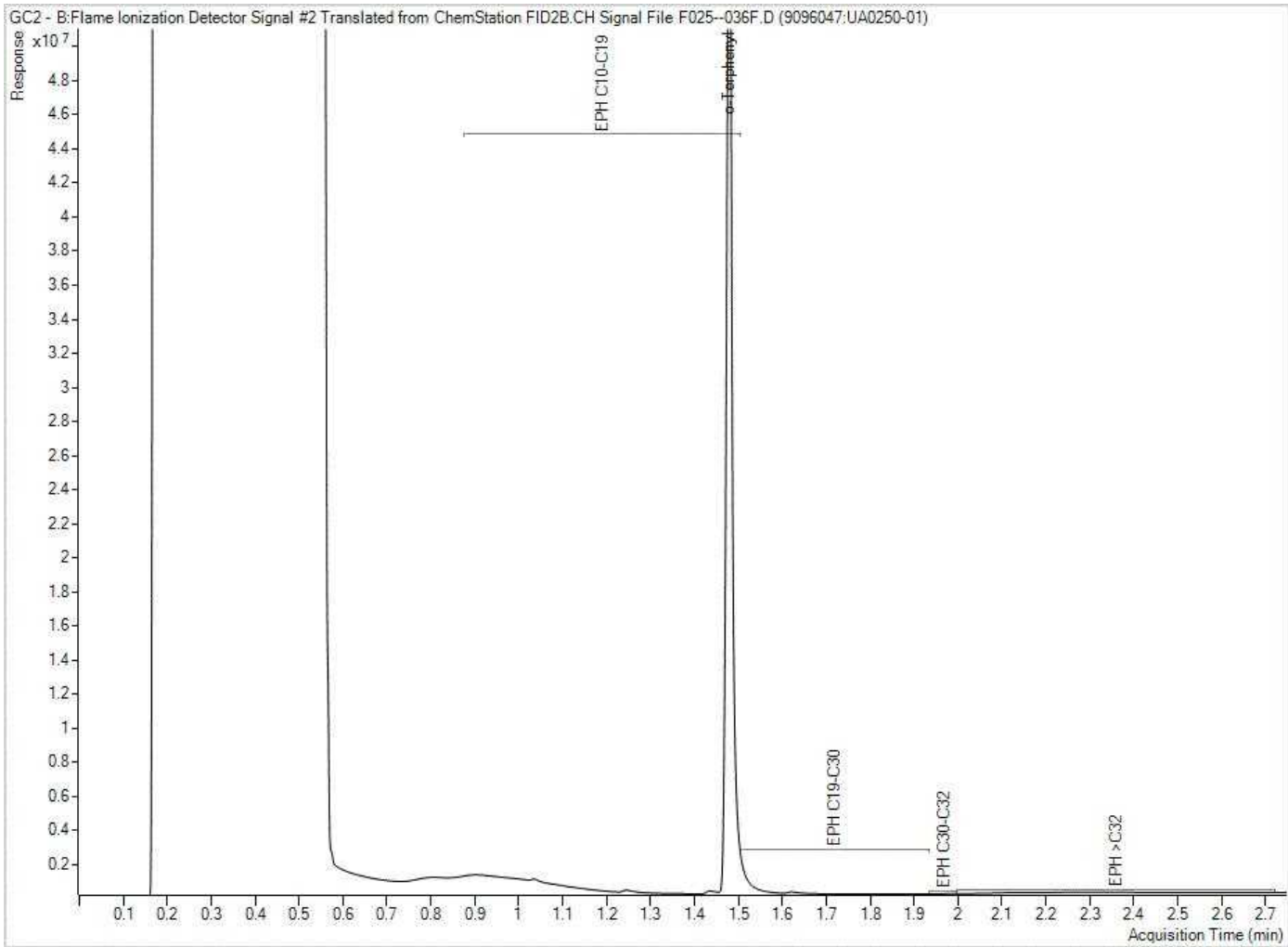
EPH in Soil by GC/FID Chromatogram



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

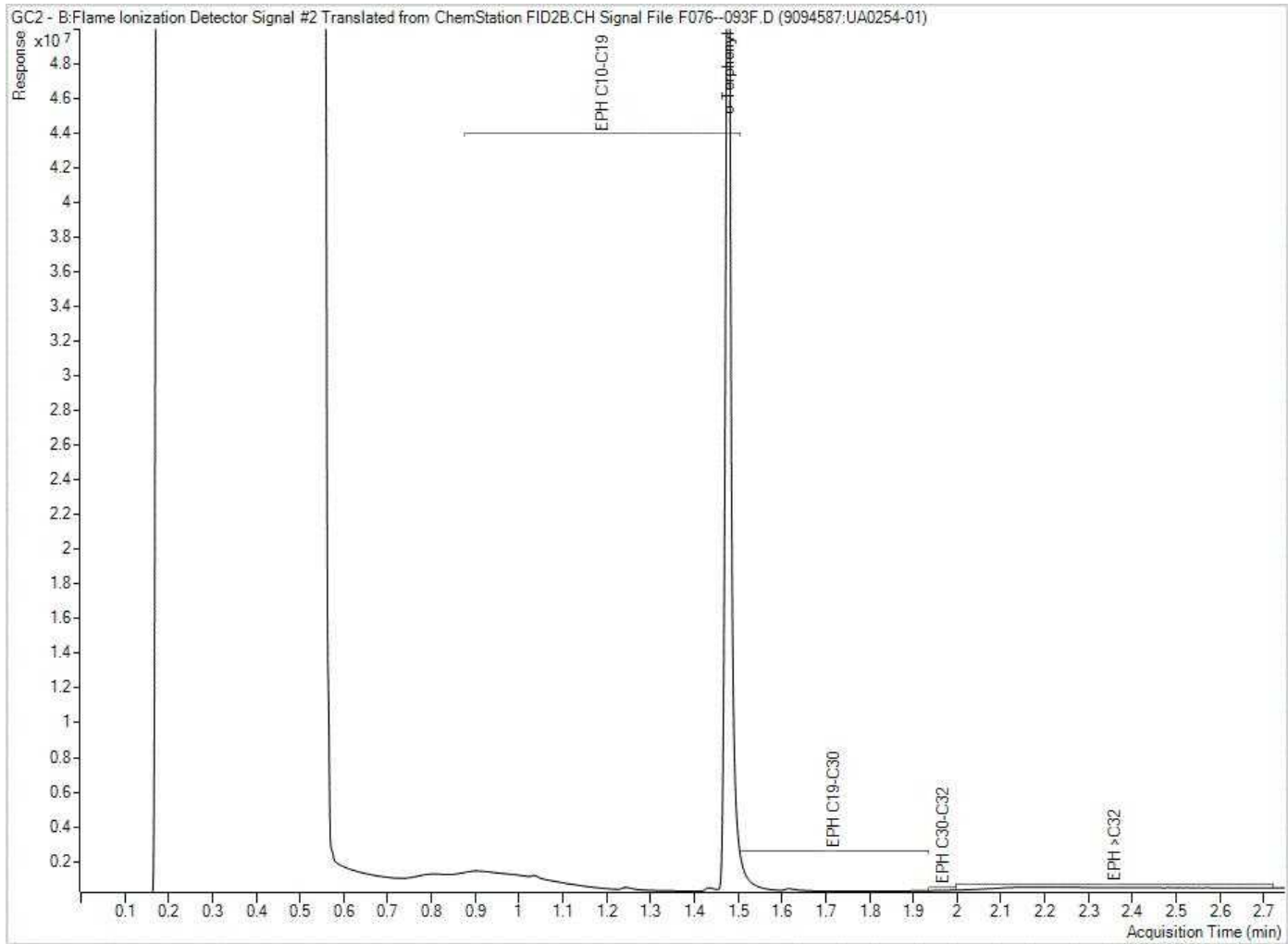


EPH in Soil by GC/FID Chromatogram



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

EPH in Soil by GC/FID Chromatogram



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

Your Project #: 123221161  
Your C.O.C. #: 33897

**Attention: Matthew Deane**

Stantec Consulting Ltd  
Burnaby - Air  
500 - 4730 Kingsway  
Burnaby, BC  
CANADA V5H 0C6

**Report Date: 2018/08/24**  
Report #: R5371935  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K3578**

**Received: 2018/08/10, 10:40**

Sample Matrix: AIR  
# Samples Received: 5

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
BTEX Fractionation in Air (TO-15mod)	5	N/A	2018/08/16	BRL SOP-00304	EPA TO-15 m
Canister Pressure (TO-15)	5	N/A	2018/08/16	BRL SOP-00304	EPA TO-15 m
Volatile Organics in Air (ug/m3)	5	N/A	2018/08/20	BRL SOP-00304	EPA TO-15 m
Volatile Compounds in Air (SUMMA) (1)	5	N/A	2018/08/16	BRL SOP-00304	EPA TO-15 m
VPH analysis in Air (2)	2	N/A	2018/08/16	BRL SOP-00304	EPA TO-15 m
VPH analysis in Air (2)	2	N/A	2018/08/17	BRL SOP-00304	EPA TO-15 m
VPH analysis in Air (2)	1	N/A	2018/08/20	BRL SOP-00304	EPA TO-15 m

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

Your Project #: 123221161  
Your C.O.C. #: 33897

**Attention: Matthew Deane**

Stantec Consulting Ltd  
Burnaby - Air  
500 - 4730 Kingsway  
Burnaby, BC  
CANADA V5H 0C6

**Report Date: 2018/08/24**  
Report #: R5371935  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B8K3578**

**Received: 2018/08/10, 10:40**

(1) Air sampling canisters have been cleaned in accordance with U.S. EPA Method TO14A. At the end of the cleaning, evacuation, and pressurization cycles, one canister was selected and was pressurized with Zero Air. This canister was then analyzed via TO14A on a GC/MS. The canister must have been found to contain <0.2 ppbv concentration of all target analytes in order for the batch to have been considered clean. Each canister also underwent a leak check prior to shipment.

Please Note: SUMMA® canister samples will be retained by Maxxam for a period of 5 calendar days or as contractually agreed from the date of this report, after which time they will be cleaned for reuse. If you require a longer sample storage period, please contact your service representative.

(2) Total VPHs as toluene and dodecane. VPH excludes benzene, ethylbenzene, n-hexane, n-decane, styrene, toluene, and xylenes (m, p,o).

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Cristina (Maria) Bacchus, Project Manager

Email: CBacchus@maxxam.ca

Phone# (905)817-5763

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

**RESULTS OF ANALYSES OF AIR**

<b>Maxxam ID</b>		HLC289	HLC290	HLC291	HLC292	HLC293	
<b>Sampling Date</b>		2018/07/31	2018/07/31	2018/07/31	2018/07/31	2018/07/30	
<b>COC Number</b>		33897	33897	33897	33897	33897	
	<b>UNITS</b>	<b>VP18-34/1412</b>	<b>VP18-35/1012</b>	<b>VP18-39/1473</b>	<b>VP18-30/1205</b>	<b>VP18-43/1775</b>	<b>QC Batch</b>
<b>Volatile Organics</b>							
Pressure on Receipt	psig	(-2.5)	(-2.9)	(-2.2)	(-2.3)	(-2.2)	5685177
QC Batch = Quality Control Batch							

**VOLATILE ORGANICS BY GC/MS (AIR)**

Maxxam ID		HLC289		HLC290		HLC291		HLC292		
Sampling Date		2018/07/31		2018/07/31		2018/07/31		2018/07/31		
COC Number		33897		33897		33897		33897		
	UNITS	VP18-34/1412	RDL	VP18-35/1012	RDL	VP18-39/1473	RDL	VP18-30/1205	RDL	QC Batch
<b>Volatile Organics</b>										
1,3-Butadiene	ppbv	<0.50	0.50	<0.50	0.50	1.78	0.50	<0.50	0.50	5688307
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	5688307
1,2-Dichloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	5688307
Ethylene Dibromide	ppbv	<0.050	0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	5688307
Benzene	ppbv	1.27	0.18	1.55	0.18	0.79	0.18	0.32	0.18	5688307
Toluene	ppbv	17.4	0.20	3.40	0.20	17.3	0.20	2.56	0.20	5688307
Ethylbenzene	ppbv	7.83	0.20	1.99	0.20	<5.1 (1)	5.1	1.47	0.20	5688307
Methylcyclohexane	ppbv	1.97	0.50	<2.0 (1)	2.0	387	0.50	64.8	0.50	5688307
p+m-Xylene	ppbv	35.2	0.37	6.53	0.37	15.0	0.37	5.96	0.37	5688307
o-Xylene	ppbv	16.6	0.20	3.09	0.20	7.54	0.20	3.82	0.20	5688307
Styrene	ppbv	<0.80 (2)	0.80	<0.20	0.20	<0.20	0.20	<0.20	0.20	5688307
1,3,5-Trimethylbenzene	ppbv	14.2	0.50	1.14	0.50	2.34	0.50	1.55	0.50	5688307
1,2,4-Trimethylbenzene	ppbv	50.2	0.50	2.53	0.50	9.93	0.50	3.55	0.50	5688307
Cumene (Isopropylbenzene)	ppbv	<39 (1)	39	<0.50	0.50	<12 (1)	12	<0.50	0.50	5688307
Hexane	ppbv	4.71	0.30	1.65	0.30	6.30	0.30	1.13	0.30	5688307
Decane	ppbv	77.2	0.50	<38 (1)	38	<37 (1)	37	<5.0 (1)	5.0	5688307
Naphthalene	ppbv	2.37	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	5688307
Total Xylenes	ppbv	51.8	0.60	9.62	0.60	22.5	0.60	9.79	0.60	5688307
<b>Surrogate Recovery (%)</b>										
Bromochloromethane	%	102		98		97		92		5688307
D5-Chlorobenzene	%	102		89		79		90		5688307
Difluorobenzene	%	103		98		90		93		5688307
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
(1) Increased DL due to interference from hydrocarbons.										
(2) Increased DL due to interference from o-xylene.										

**VOLATILE ORGANICS BY GC/MS (AIR)**

Maxxam ID		HLC293		
Sampling Date		2018/07/30		
COC Number		33897		
	UNITS	VP18-43/1775	RDL	QC Batch
<b>Volatile Organics</b>				
1,3-Butadiene	ppbv	<0.50	0.50	5688307
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	5688307
1,2-Dichloroethane	ppbv	<0.10	0.10	5688307
Ethylene Dibromide	ppbv	<0.050	0.050	5688307
Benzene	ppbv	0.52	0.18	5688307
Toluene	ppbv	4.17	0.20	5688307
Ethylbenzene	ppbv	3.13	0.20	5688307
Methylcyclohexane	ppbv	1.80	0.50	5688307
p+m-Xylene	ppbv	15.2	0.37	5688307
o-Xylene	ppbv	6.62	0.20	5688307
Styrene	ppbv	<0.30 (1)	0.30	5688307
1,3,5-Trimethylbenzene	ppbv	3.24	0.50	5688307
1,2,4-Trimethylbenzene	ppbv	10.0	0.50	5688307
Cumene (Isopropylbenzene)	ppbv	0.51	0.50	5688307
Hexane	ppbv	2.18	0.30	5688307
Decane	ppbv	14.2	0.50	5688307
Naphthalene	ppbv	<0.50	0.50	5688307
Total Xylenes	ppbv	21.8	0.60	5688307
<b>Surrogate Recovery (%)</b>				
Bromochloromethane	%	93		5688307
D5-Chlorobenzene	%	95		5688307
Difluorobenzene	%	97		5688307
RDL = Reportable Detection Limit QC Batch = Quality Control Batch (1) Increased DL due to interference from o-xylene.				

**CALCULATED VOLATILE ORGANICS (AIR)**

Maxxam ID		HLC289		HLC290		HLC291		HLC292		
Sampling Date		2018/07/31		2018/07/31		2018/07/31		2018/07/31		
COC Number		33897		33897		33897		33897		
	UNITS	VP18-34/1412	RDL	VP18-35/1012	RDL	VP18-39/1473	RDL	VP18-30/1205	RDL	QC Batch
<b>Calculated Parameters</b>										
1,3-Butadiene	ug/m3	<1.1	1.1	<1.1	1.1	3.9	1.1	<1.1	1.1	5673111
Methyl t-butyl ether (MTBE)	ug/m3	<0.72	0.72	<0.72	0.72	<0.72	0.72	<0.72	0.72	5673111
1,2-Dichloroethane	ug/m3	<0.40	0.40	<0.40	0.40	<0.40	0.40	<0.40	0.40	5673111
Ethylene Dibromide	ug/m3	<0.38	0.38	<0.38	0.38	<0.38	0.38	<0.38	0.38	5673111
Benzene	ug/m3	4.05	0.57	4.94	0.57	2.54	0.57	1.03	0.57	5673111
Toluene	ug/m3	65.6	0.75	12.8	0.75	65.1	0.75	9.65	0.75	5673111
Ethylbenzene	ug/m3	34.0	0.87	8.65	0.87	<22	22	6.40	0.87	5673111
Methylcyclohexane	ug/m3	7.9	2.0	<8.0	8.0	1550	2.0	260	2.0	5673111
p+m-Xylene	ug/m3	153	1.6	28.3	1.6	65.0	1.6	25.9	1.6	5673111
o-Xylene	ug/m3	71.9	0.87	13.4	0.87	32.7	0.87	16.6	0.87	5673111
Styrene	ug/m3	<3.4	3.4	<0.85	0.85	<0.85	0.85	<0.85	0.85	5673111
1,3,5-Trimethylbenzene	ug/m3	69.5	2.5	5.6	2.5	11.5	2.5	7.6	2.5	5673111
1,2,4-Trimethylbenzene	ug/m3	247	2.5	12.4	2.5	48.7	2.5	17.4	2.5	5673111
Cumene (Isopropylbenzene)	ug/m3	<190	190	<2.5	2.5	<59	59	<2.5	2.5	5673111
Hexane	ug/m3	16.6	1.1	5.8	1.1	22.2	1.1	4.0	1.1	5673111
Decane	ug/m3	449	2.9	<220	220	<220	220	<29	29	5673111
Naphthalene	ug/m3	12.4	2.6	<2.6	2.6	<2.6	2.6	<2.6	2.6	5673111
Total Xylenes	ug/m3	225	2.6	41.8	2.6	97.7	2.6	42.5	2.6	5673111
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										



**CALCULATED VOLATILE ORGANICS (AIR)**

Maxxam ID		HLC293		
Sampling Date		2018/07/30		
COC Number		33897		
	UNITS	VP18-43/1775	RDL	QC Batch
<b>Calculated Parameters</b>				
1,3-Butadiene	ug/m3	<1.1	1.1	5673111
Methyl t-butyl ether (MTBE)	ug/m3	<0.72	0.72	5673111
1,2-Dichloroethane	ug/m3	<0.40	0.40	5673111
Ethylene Dibromide	ug/m3	<0.38	0.38	5673111
Benzene	ug/m3	1.66	0.57	5673111
Toluene	ug/m3	15.7	0.75	5673111
Ethylbenzene	ug/m3	13.6	0.87	5673111
Methylcyclohexane	ug/m3	7.2	2.0	5673111
p+m-Xylene	ug/m3	66.1	1.6	5673111
o-Xylene	ug/m3	28.7	0.87	5673111
Styrene	ug/m3	<1.3	1.3	5673111
1,3,5-Trimethylbenzene	ug/m3	15.9	2.5	5673111
1,2,4-Trimethylbenzene	ug/m3	49.2	2.5	5673111
Cumene (Isopropylbenzene)	ug/m3	2.5	2.5	5673111
Hexane	ug/m3	7.7	1.1	5673111
Decane	ug/m3	82.4	2.9	5673111
Naphthalene	ug/m3	<2.6	2.6	5673111
Total Xylenes	ug/m3	94.8	2.6	5673111
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

**VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)**

Maxxam ID		HLC289		HLC290			HLC291		
Sampling Date		2018/07/31		2018/07/31			2018/07/31		
COC Number		33897		33897			33897		
	UNITS	VP18-34/1412	RDL	VP18-35/1012	RDL	QC Batch	VP18-39/1473	RDL	QC Batch
<b>Volatile Organics</b>									
Aliphatic >C5-C6	ug/m3	38.2	5.0	7.6	5.0	5688325	49.8	5.0	5688325
Aliphatic >C6-C8	ug/m3	81.5	5.0	1240	5.0	5688325	4950	5.0	5688325
Aliphatic >C8-C10	ug/m3	1300	5.0	6650	5.0	5688325	117000	120	5688325
Aliphatic >C10-C12	ug/m3	2770	5.0	4470	5.0	5688325	16100	5.0	5688325
Aliphatic >C12-C16	ug/m3	197	5.0	1640	5.0	5688325	2580	5.0	5688325
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	5.0	<5.0	5.0	5688325	<5.0	5.0	5688325
Aromatic >C8-C10	ug/m3	1370	5.0	110	5.0	5688325	584	5.0	5688325
Aromatic >C10-C12	ug/m3	1240	5.0	462	5.0	5688325	1550	5.0	5688325
Aromatic >C12-C16	ug/m3	238	5.0	309	5.0	5688325	745	5.0	5688325
VPHv (C6-C13)	ug/m3	18200	50	73300	30	5691600	733000	200	5694782
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									

Maxxam ID		HLC292	HLC293		
Sampling Date		2018/07/31	2018/07/30		
COC Number		33897	33897		
	UNITS	VP18-30/1205	VP18-43/1775	RDL	QC Batch
<b>Volatile Organics</b>					
Aliphatic >C5-C6	ug/m3	<5.0	10.4	5.0	5688325
Aliphatic >C6-C8	ug/m3	430	50.1	5.0	5688325
Aliphatic >C8-C10	ug/m3	1840	346	5.0	5688325
Aliphatic >C10-C12	ug/m3	469	392	5.0	5688325
Aliphatic >C12-C16	ug/m3	355	32.7	5.0	5688325
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	<5.0	5.0	5688325
Aromatic >C8-C10	ug/m3	48.3	82.8	5.0	5688325
Aromatic >C10-C12	ug/m3	95.4	166	5.0	5688325
Aromatic >C12-C16	ug/m3	10.2	11.8	5.0	5688325
VPHv (C6-C13)	ug/m3	12400	2240	10	5688334
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

### GENERAL COMMENTS

Sample HLC289 [VP18-34/1412] : VPH was analyzed at a 5X dilution. The DL was adjusted accordingly.

Sample HLC290 [VP18-35/1012] : VPH was analyzed at a 2.5X dilution. The DL was adjusted accordingly.

Sample HLC291 [VP18-39/1473] : VPH and Aliphatic C8-C10 was analyzed at a 23.5X dilution. The DL was adjusted accordingly.

**Results relate only to the items tested.**

### QUALITY ASSURANCE REPORT

QA/QC											
Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits			
5688307	NS2	Spiked Blank	Bromochloromethane	2018/08/16		79	%	60 - 140			
			D5-Chlorobenzene	2018/08/16		97	%	60 - 140			
			Difluorobenzene	2018/08/16		82	%	60 - 140			
			1,3-Butadiene	2018/08/16		109	%	70 - 130			
			Methyl t-butyl ether (MTBE)	2018/08/16		101	%	70 - 130			
			1,2-Dichloroethane	2018/08/16		116	%	70 - 130			
			Ethylene Dibromide	2018/08/16		122	%	70 - 130			
			Benzene	2018/08/16		112	%	70 - 130			
			Toluene	2018/08/16		122	%	70 - 130			
			Ethylbenzene	2018/08/16		100	%	70 - 130			
			p+m-Xylene	2018/08/16		100	%	70 - 130			
			o-Xylene	2018/08/16		100	%	70 - 130			
			Styrene	2018/08/16		108	%	70 - 130			
			1,3,5-Trimethylbenzene	2018/08/16		100	%	70 - 130			
			1,2,4-Trimethylbenzene	2018/08/16		96	%	70 - 130			
			Hexane	2018/08/16		93	%	70 - 130			
			Naphthalene	2018/08/16		95	%	70 - 130			
			Total Xylenes	2018/08/16		100	%	70 - 130			
			5688307	NS2	Method Blank	Bromochloromethane	2018/08/16		106	%	60 - 140
						D5-Chlorobenzene	2018/08/16		106	%	60 - 140
Difluorobenzene	2018/08/16					111	%	60 - 140			
1,3-Butadiene	2018/08/16	<0.50					ppbv				
Methyl t-butyl ether (MTBE)	2018/08/16	<0.20					ppbv				
1,2-Dichloroethane	2018/08/16	<0.10					ppbv				
Ethylene Dibromide	2018/08/16	<0.050					ppbv				
Benzene	2018/08/16	<0.18					ppbv				
Toluene	2018/08/16	<0.20					ppbv				
Ethylbenzene	2018/08/16	<0.20					ppbv				
Methylcyclohexane	2018/08/16	<0.50					ppbv				
p+m-Xylene	2018/08/16	<0.37					ppbv				
o-Xylene	2018/08/16	<0.20					ppbv				
Styrene	2018/08/16	<0.20					ppbv				
1,3,5-Trimethylbenzene	2018/08/16	<0.50					ppbv				
1,2,4-Trimethylbenzene	2018/08/16	<0.50					ppbv				
Cumene (Isopropylbenzene)	2018/08/16	<0.50					ppbv				
Hexane	2018/08/16	<0.30					ppbv				
Decane	2018/08/16	<0.50					ppbv				
Naphthalene	2018/08/16	<0.50					ppbv				
Total Xylenes	2018/08/16	<0.60		ppbv							
5688307	NS2	RPD	1,3-Butadiene	2018/08/16	NC		%	25			
			Methyl t-butyl ether (MTBE)	2018/08/16	NC		%	25			
			1,2-Dichloroethane	2018/08/16	NC		%	25			
			Ethylene Dibromide	2018/08/16	NC		%	25			
			Benzene	2018/08/16	0.41		%	25			
			Toluene	2018/08/16	0.36		%	25			
			Ethylbenzene	2018/08/16	0.053		%	25			
			p+m-Xylene	2018/08/16	0.70		%	25			
			o-Xylene	2018/08/16	0.47		%	25			
			Styrene	2018/08/16	NC		%	25			
			1,3,5-Trimethylbenzene	2018/08/16	0.32		%	25			
			1,2,4-Trimethylbenzene	2018/08/16	0.61		%	25			
			Cumene (Isopropylbenzene)	2018/08/16	0.95		%	25			
Decane	2018/08/16	NC		%	25						
Naphthalene	2018/08/16	NC		%	25						

**QUALITY ASSURANCE REPORT(CONT'D)**

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5688325	NS2	Method Blank	Total Xylenes	2018/08/16	0.64		%	25
			Aliphatic >C5-C6	2018/08/16	<5.0		ug/m3	
			Aliphatic >C6-C8	2018/08/16	<5.0		ug/m3	
			Aliphatic >C8-C10	2018/08/16	<5.0		ug/m3	
			Aliphatic >C10-C12	2018/08/16	<5.0		ug/m3	
			Aliphatic >C12-C16	2018/08/16	<5.0		ug/m3	
			Aromatic >C7-C8 (TEX Excluded)	2018/08/16	<5.0		ug/m3	
			Aromatic >C8-C10	2018/08/16	<5.0		ug/m3	
			Aromatic >C10-C12	2018/08/16	<5.0		ug/m3	
			Aromatic >C12-C16	2018/08/16	<5.0		ug/m3	
5688325	NS2	RPD	Aliphatic >C5-C6	2018/08/16	NC		%	25
			Aliphatic >C6-C8	2018/08/16	0.19		%	25
			Aliphatic >C8-C10	2018/08/16	0.93		%	25
			Aliphatic >C10-C12	2018/08/16	0.63		%	25
			Aliphatic >C12-C16	2018/08/16	0.27		%	25
			Aromatic >C7-C8 (TEX Excluded)	2018/08/16	NC		%	25
			Aromatic >C8-C10	2018/08/16	0.55		%	25
			Aromatic >C10-C12	2018/08/16	0.57		%	25
5688334	NS2	Method Blank	Aromatic >C12-C16	2018/08/16	8.1		%	25
			VPHv (C6-C13)	2018/08/16	<10		ug/m3	
5688334	NS2	RPD	VPHv (C6-C13)	2018/08/16	3.1		%	25
5691600	NS2	Method Blank	VPHv (C6-C13)	2018/08/17	<10		ug/m3	
5694782	NS2	Method Blank	VPHv (C6-C13)	2018/08/20	<10		ug/m3	

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

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

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

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

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

**VALIDATION SIGNATURE PAGE**

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



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Maureen Smith, Supervisor, Volatiles

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Your Project #: 123221161  
 Site Location: WHITEHORSE  
 Your C.O.C. #: G134603

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD  
 Metrotower III  
 Suite 500, 4730 Kingsway  
 BURNABY, BC  
 CANADA V5H 4M1

**Report Date: 2018/11/08**  
 Report #: R2647992  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B896179**

**Received: 2018/10/31, 09:16**

Sample Matrix: Water  
 # Samples Received: 8

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
PAH in Water by GC/MS (SIM)	8	2018/11/07	2018/11/07	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1)	8	N/A	2018/11/07	BBY WI-00033	Auto Calc
EPH (Low Level) in Water by GC/FID	8	2018/11/07	2018/11/07	BBY8SOP-00029	BCMOE BCLM Mar 2017
EPH less PAH in Water by GC/FID (2)	8	N/A	2018/11/08	BBY WI-00033	Auto Calc

**Remarks:**

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

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

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

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

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

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.

(2) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)

HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)

Your Project #: 123221161  
Site Location: WHITEHORSE  
Your C.O.C. #: G134603

**Attention: Carey Sibbald**

STANTEC CONSULTING LTD  
Metrotower III  
Suite 500, 4730 Kingsway  
BURNABY, BC  
CANADA V5H 4M1

**Report Date: 2018/11/08**  
Report #: R2647992  
Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B896179**  
**Received: 2018/10/31, 09:16**

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Nahed Amer, Project Manager

Email: NAmer@maxxam.ca

Phone# (604) 734 7276

=====  
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

Maxxam ID		UR6306		UR6307		UR6308		
Sampling Date		2018/10/30 16:45		2018/10/30 10:15		2018/10/30 12:15		
COC Number		G134603		G134603		G134603		
	<b>UNITS</b>	<b>MW18-31@16:45</b>	<b>RDL</b>	<b>MW18-31@10:15</b>	<b>RDL</b>	<b>MW18-31@12:15</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>								
Low Molecular Weight PAH's	ug/L	4.2	0.20	3.3	0.23	4.0	0.20	9212023
High Molecular Weight PAH's	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9212023
Total PAH	ug/L	4.2	0.20	3.3	0.23	4.0	0.20	9212023
<b>Polycyclic Aromatics</b>								
Naphthalene	ug/L	0.57 (1)	0.20	0.50 (1)	0.20	0.54 (1)	0.20	9218098
Acenaphthene	ug/L	0.63 (1)	0.10	0.50 (1)	0.10	0.62 (1)	0.10	9218098
Fluorene	ug/L	2.0	0.10	1.6	0.10	1.9 (1)	0.10	9218098
Phenanthrene	ug/L	0.89	0.10	0.70	0.10	0.87	0.10	9218098
Anthracene	ug/L	0.026 (1)	0.020	0.024 (1)	0.020	0.027 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	<0.10	0.10	<0.10	0.10	9218098
<b>Calculated Parameters</b>								
LEPH (C10-C19 less PAH)	mg/L	0.56	0.11	0.51	0.11	0.55	0.11	9213178
<b>Ext. Pet. Hydrocarbon</b>								
EPH (C10-C19)	mg/L	0.56 (2)	0.11	0.51 (2)	0.11	0.55 (2)	0.11	9218103
EPH (C19-C32)	mg/L	<0.50 (2)	0.50	<0.50 (2)	0.50	<0.50 (2)	0.50	9218103
<b>Surrogate Recovery (%)</b>								
D10-ANTHRACENE (sur.)	%	89		88		88		9218098
D8-ACENAPHTHYLENE (sur.)	%	94		91		92		9218098
D8-NAPHTHALENE (sur.)	%	79		74		74		9218098
TERPHENYL-D14 (sur.)	%	75		76		76		9218098
O-TERPHENYL (sur.)	%	99		101		102		9218103
RDL = Reportable Detection Limit								
(1) Tentatively identified result and may be potentially biased high due to matrix interference.								
(2) Detection limits raised due to insufficient sample volume.								

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

Maxxam ID		UR6309		UR6310	UR6311	UR6312		
Sampling Date		2018/10/30 14:15		2018/10/29 17:55	2018/10/29 15:55	2018/10/29 13:55		
COC Number		G134603		G134603	G134603	G134603		
	<b>UNITS</b>	<b>MW18-31@14:15</b>	<b>RDL</b>	<b>MW16-09@17:55</b>	<b>MW16-09@15:55</b>	<b>MW16-09@13:55</b>	<b>RDL</b>	<b>QC Batch</b>

Calculated Parameters								
Low Molecular Weight PAH`s	ug/L	3.9	0.24	7.9	7.0	7.8	0.20	9212023
High Molecular Weight PAH`s	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	0.10	9212023
Total PAH	ug/L	3.9	0.24	7.9	7.0	7.8	0.20	9212023

Polycyclic Aromatics								
Naphthalene	ug/L	0.54 (1)	0.20	1.1	0.95	1.1	0.20	9218098
Acenaphthene	ug/L	0.62 (1)	0.10	0.23 (1)	0.17 (1)	0.17 (1)	0.10	9218098
Fluorene	ug/L	1.9	0.10	0.75	0.71	0.75	0.10	9218098
Phenanthrene	ug/L	0.84	0.10	0.36	0.35	0.40	0.10	9218098
Anthracene	ug/L	0.024 (1)	0.020	<0.020 (1)	<0.020 (1)	<0.020 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	<0.10	<0.10	<0.10	0.10	9218098

Calculated Parameters								
LEPH (C10-C19 less PAH)	mg/L	0.56	0.11	0.31	0.31	0.32	0.11	9213178

Ext. Pet. Hydrocarbon								
EPH (C10-C19)	mg/L	0.56 (2)	0.11	0.31 (2)	0.31 (2)	0.32 (2)	0.11	9218103
EPH (C19-C32)	mg/L	<0.50 (2)	0.50	<0.50 (2)	<0.50 (2)	<0.50 (2)	0.50	9218103

Surrogate Recovery (%)								
D10-ANTHRACENE (sur.)	%	88		88	89	90		9218098
D8-ACENAPHTHYLENE (sur.)	%	91		92	92	94		9218098
D8-NAPHTHALENE (sur.)	%	73		80	77	79		9218098
TERPHENYL-D14 (sur.)	%	75		77	76	77		9218098
O-TERPHENYL (sur.)	%	102		102	103	102		9218103

RDL = Reportable Detection Limit  
(1) Tentatively identified result and may be potentially biased high due to matrix interference.  
(2) Detection limits raised due to insufficient sample volume.

Maxxam Job #: B896179  
Report Date: 2018/11/08

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

**LEPH & HEPH WITH LL EPH IN WATER (WATER)**

<b>Maxxam ID</b>		UR6313		
<b>Sampling Date</b>		2018/10/29 11:55		
<b>COC Number</b>		G134603		
	<b>UNITS</b>	<b>MW16-09@11:55</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Calculated Parameters</b>				
Low Molecular Weight PAH's	ug/L	15	0.35	9212023
High Molecular Weight PAH's	ug/L	<0.10	0.10	9212023
Total PAH	ug/L	15	0.35	9212023
<b>Polycyclic Aromatics</b>				
Naphthalene	ug/L	2.0	0.20	9218098
Acenaphthene	ug/L	0.27 (1)	0.10	9218098
Fluorene	ug/L	1.4	0.10	9218098
Phenanthrene	ug/L	0.90	0.10	9218098
Anthracene	ug/L	0.063 (1)	0.020	9218098
Acridine	ug/L	<0.10	0.10	9218098
<b>Calculated Parameters</b>				
LEPH (C10-C19 less PAH)	mg/L	4.8	0.11	9213178
<b>Ext. Pet. Hydrocarbon</b>				
EPH (C10-C19)	mg/L	4.8 (2)	0.11	9218103
EPH (C19-C32)	mg/L	0.60 (2)	0.50	9218103
<b>Surrogate Recovery (%)</b>				
D10-ANTHRACENE (sur.)	%	92		9218098
D8-ACENAPHTHYLENE (sur.)	%	98		9218098
D8-NAPHTHALENE (sur.)	%	77		9218098
TERPHENYL-D14 (sur.)	%	82		9218098
O-TERPHENYL (sur.)	%	105		9218103
RDL = Reportable Detection Limit				
(1) Tentatively identified result and may be potentially biased high due to matrix interference.				
(2) Detection limits raised due to insufficient sample volume.				

Maxxam Job #: B896179  
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Sampler Initials: BCS

### GENERAL COMMENTS

Sample UR6306 [MW18-31@16:45] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6307 [MW18-31@10:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6308 [MW18-31@12:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6309 [MW18-31@14:15] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6310 [MW16-09@17:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6311 [MW16-09@15:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6312 [MW16-09@13:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

Sample UR6313 [MW16-09@11:55] : Sample was decanted. Results maybe biased low for EPH/PAH. PAH Detection limits raised due to insufficient sample volume.

**Results relate only to the items tested.**

Maxxam Job #: B896179  
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**QUALITY ASSURANCE REPORT**

STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

QC Batch	Parameter	Date	Spiked Blank		Method Blank	
			% Recovery	QC Limits	Value	UNITS
9218098	D10-ANTHRACENE (sur.)	2018/11/07	85	50 - 140	98	%
9218098	D8-ACENAPHTHYLENE (sur.)	2018/11/07	83	50 - 140	81	%
9218098	D8-NAPHTHALENE (sur.)	2018/11/07	73	50 - 140	74	%
9218098	TERPHENYL-D14 (sur.)	2018/11/07	74	50 - 140	89	%
9218103	O-TERPHENYL (sur.)	2018/11/07	92	50 - 130	94	%
9218098	Acenaphthene	2018/11/07	88	50 - 140	<0.050	ug/L
9218098	Acridine	2018/11/07	98	50 - 140	<0.050	ug/L
9218098	Anthracene	2018/11/07	87	50 - 140	<0.010	ug/L
9218098	Fluorene	2018/11/07	88	50 - 140	<0.050	ug/L
9218098	Naphthalene	2018/11/07	88	50 - 140	<0.10	ug/L
9218098	Phenanthrene	2018/11/07	85	50 - 140	<0.050	ug/L
9218103	EPH (C10-C19)	2018/11/07	114	70 - 130	<0.050	mg/L
9218103	EPH (C19-C32)	2018/11/07	124	70 - 130	<0.20	mg/L

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

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


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

Maxxam Job #: B896179  
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STANTEC CONSULTING LTD  
Client Project #: 123221161  
Site Location: WHITEHORSE  
Sampler Initials: BCS

### VALIDATION SIGNATURE PAGE

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



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



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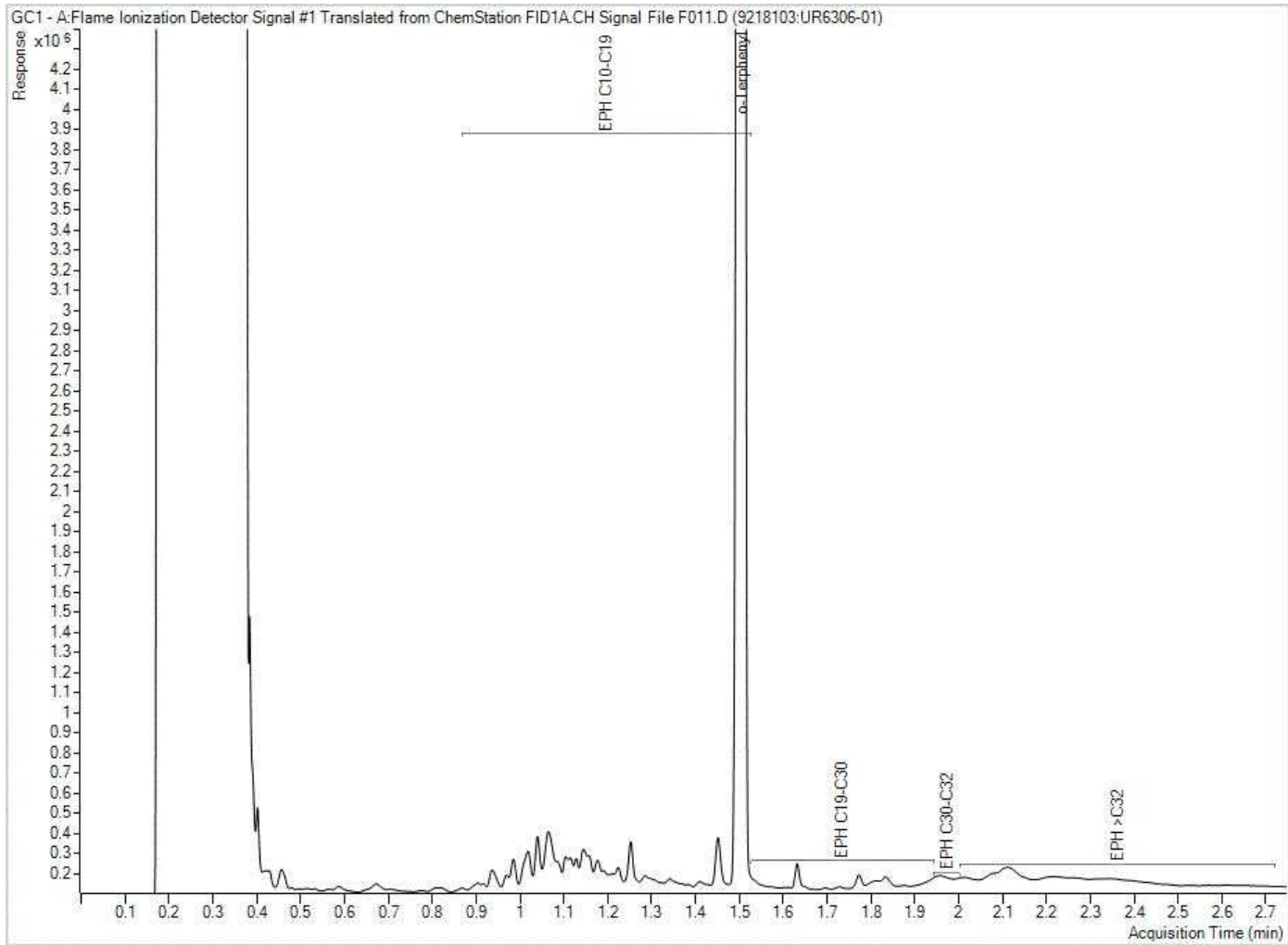
Jose Cueva, Supervisor, Organics-VOC & HC

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



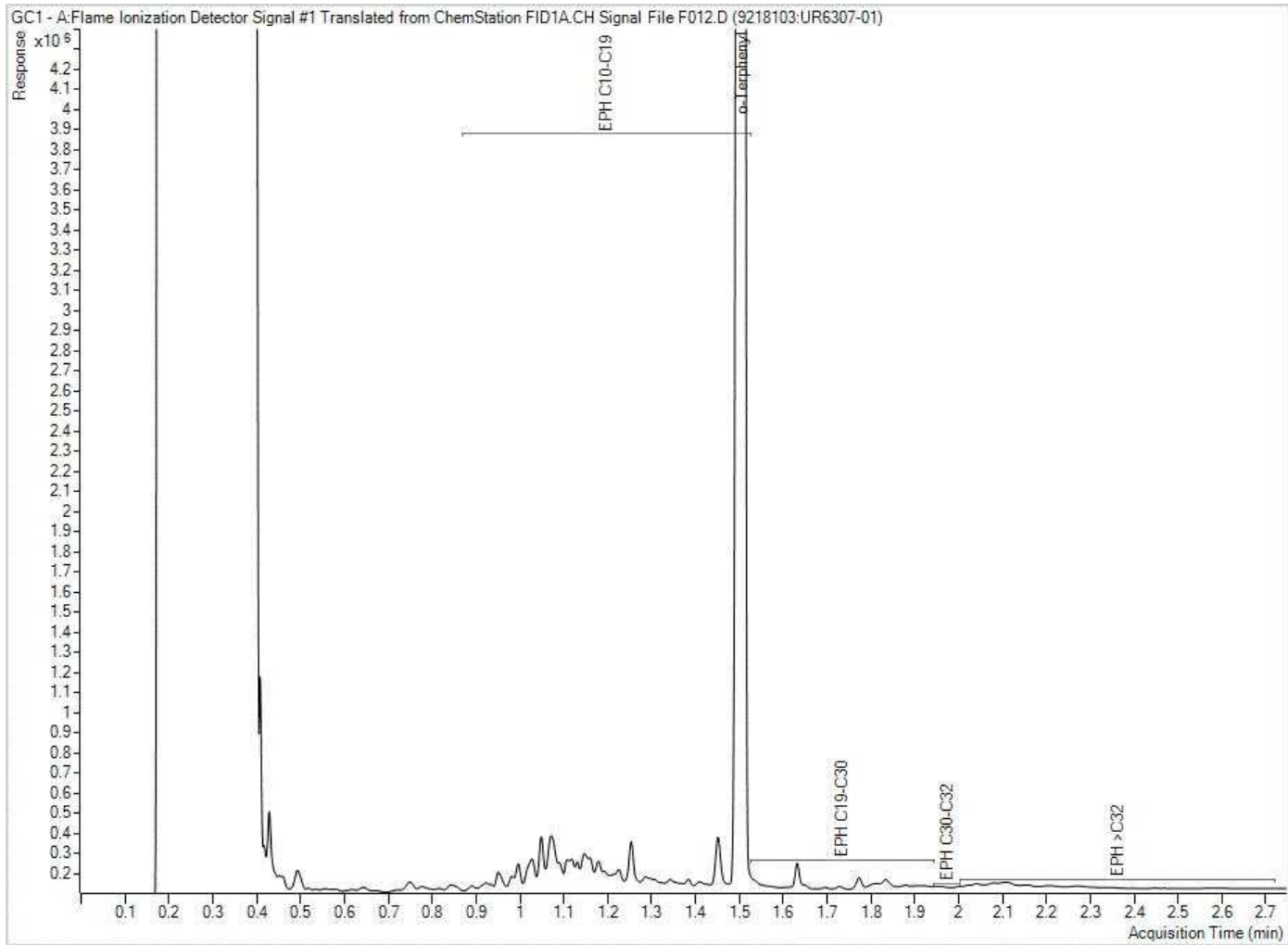
EPH (Low Level) in Water by GC/FID Chromatogram



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

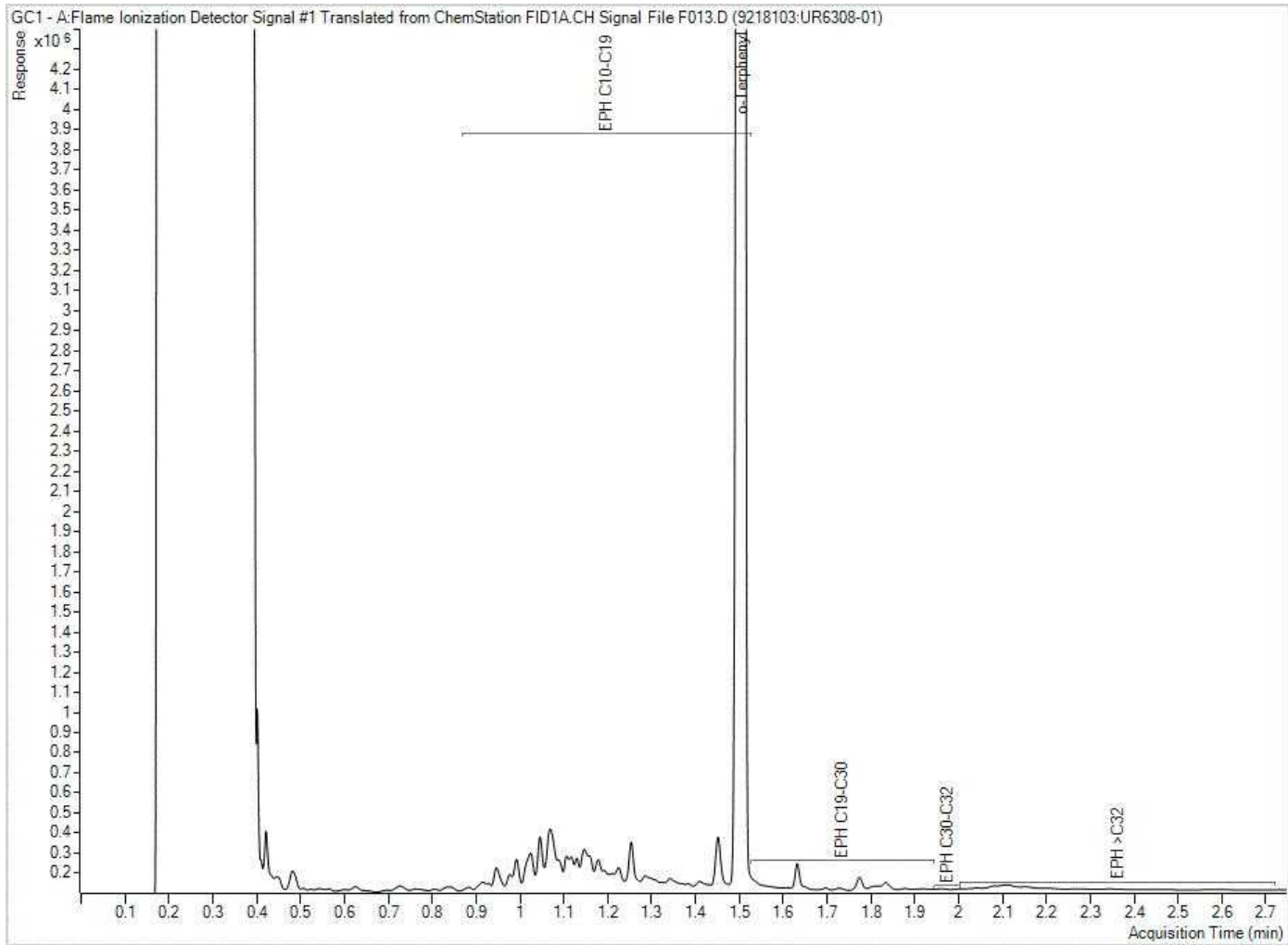


EPH (Low Level) in Water by GC/FID Chromatogram



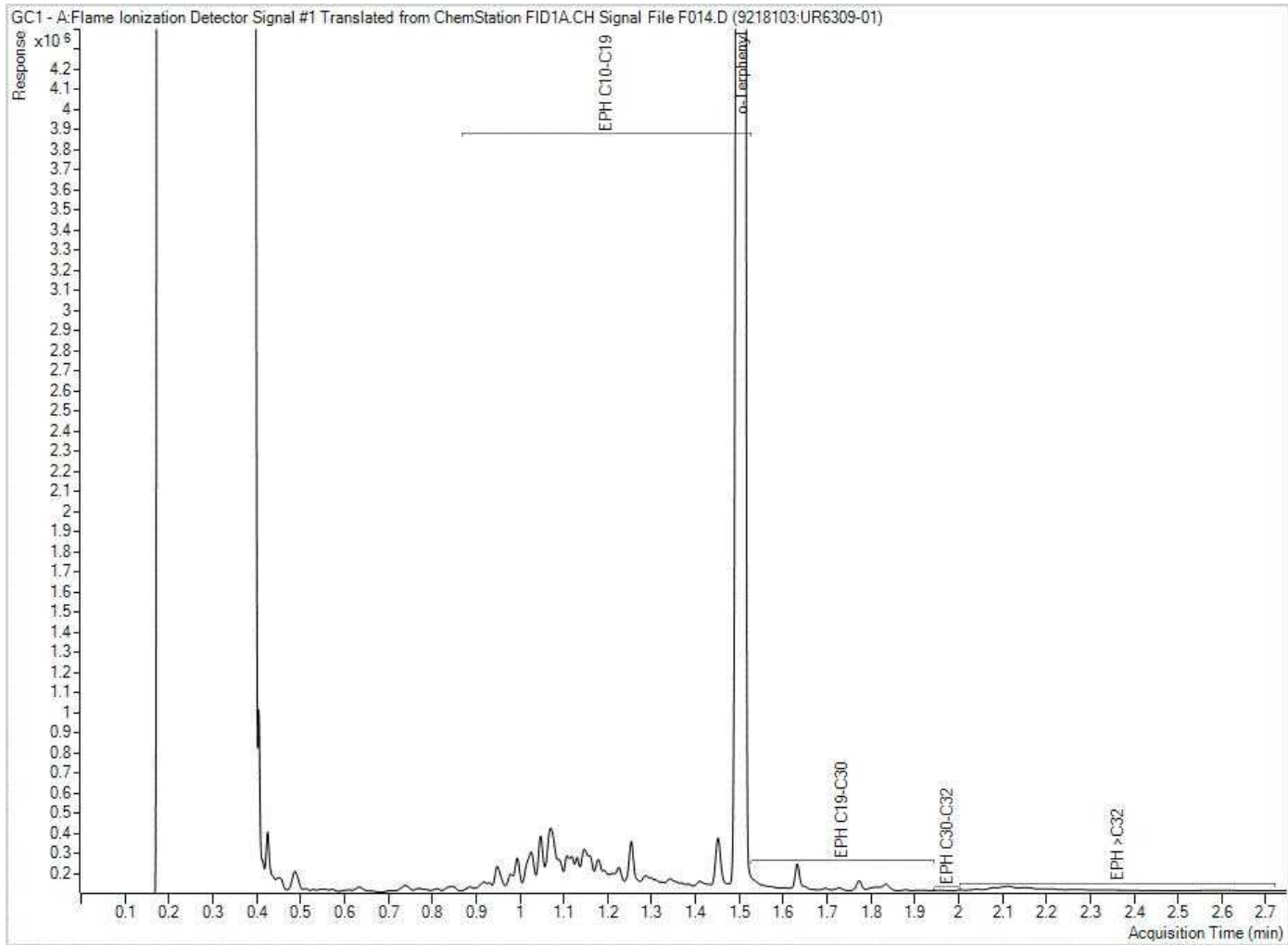
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



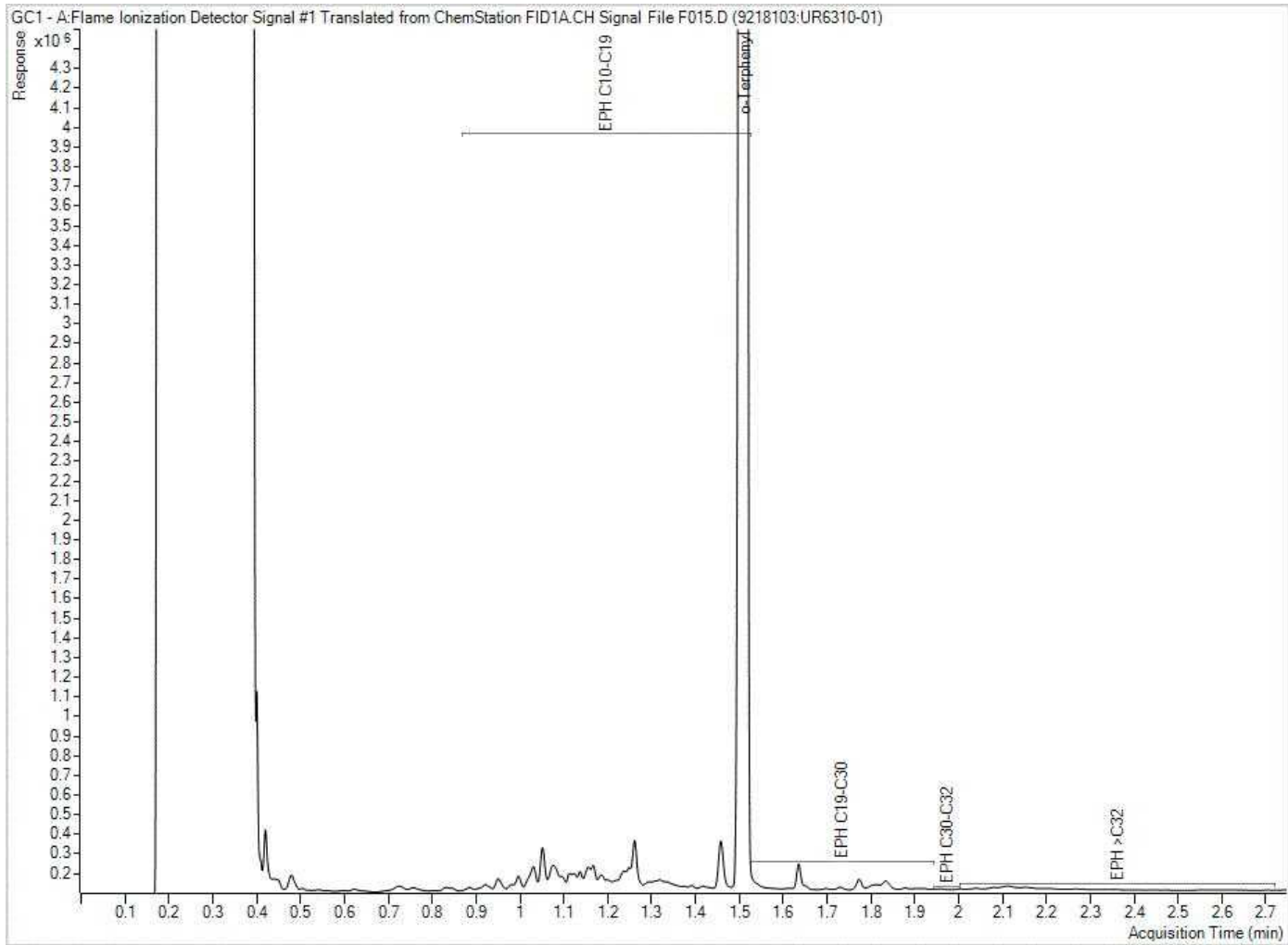
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

EPH (Low Level) in Water by GC/FID Chromatogram



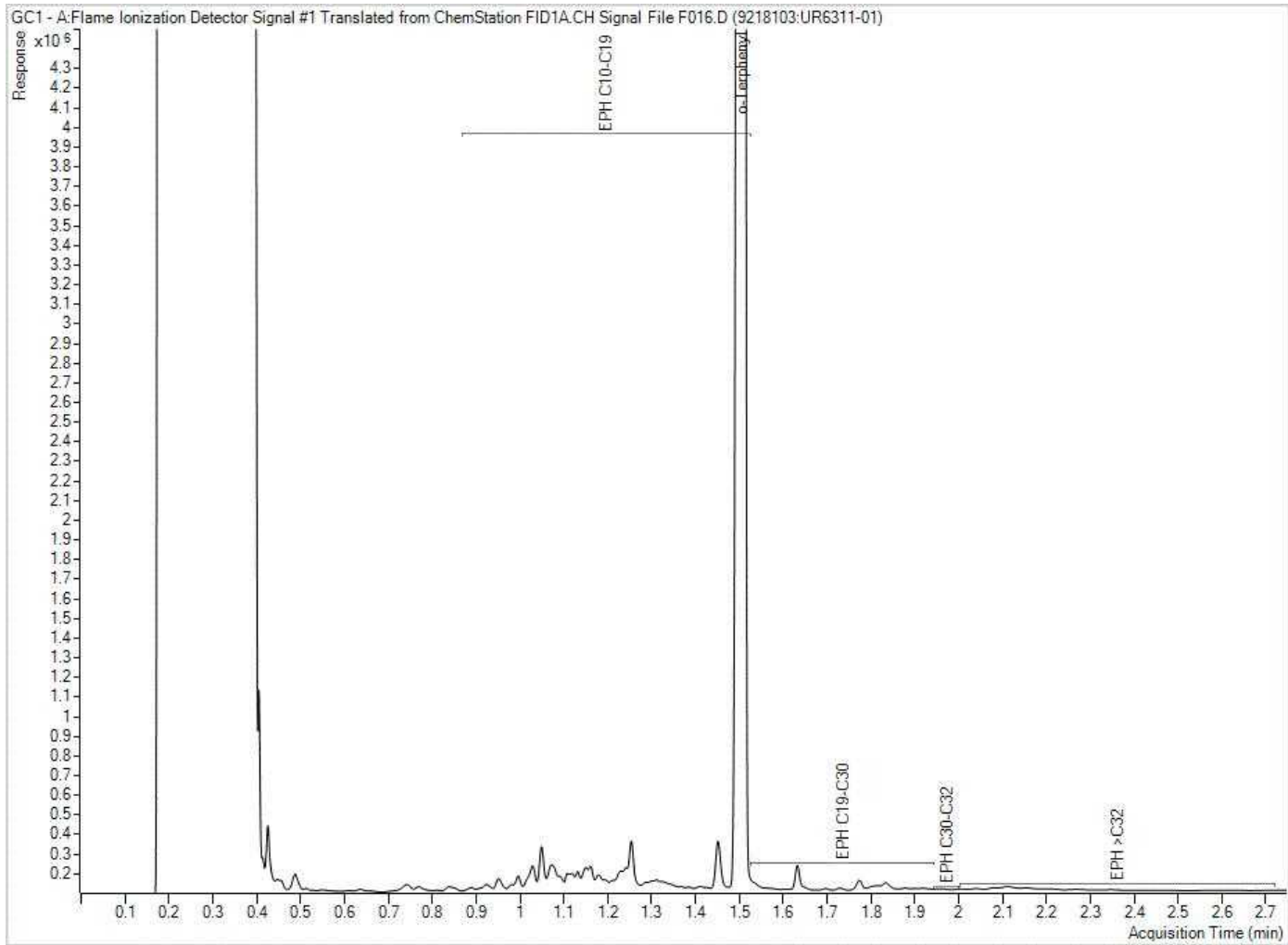
**Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.**

EPH (Low Level) in Water by GC/FID Chromatogram



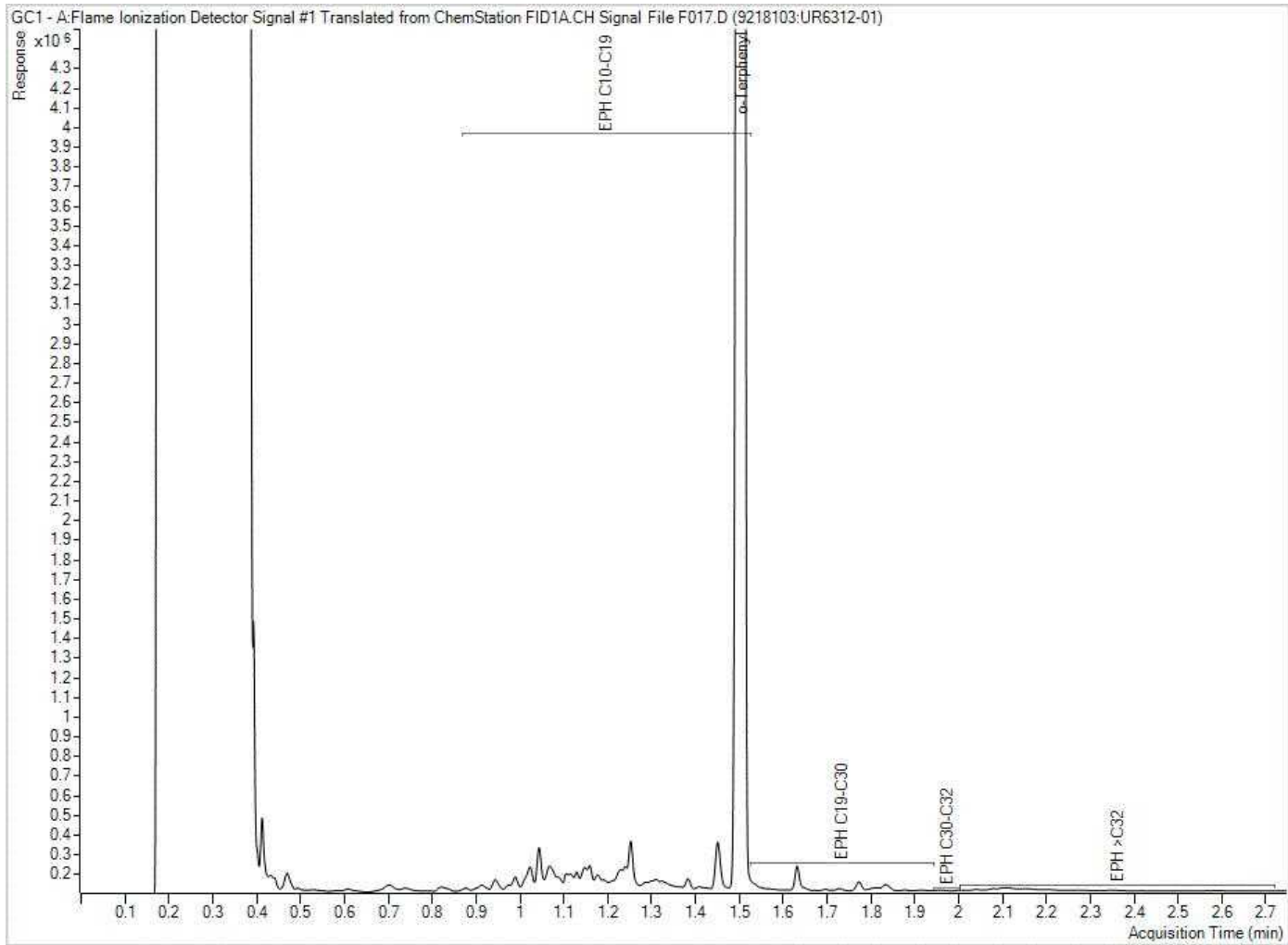
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EPH (Low Level) in Water by GC/FID Chromatogram



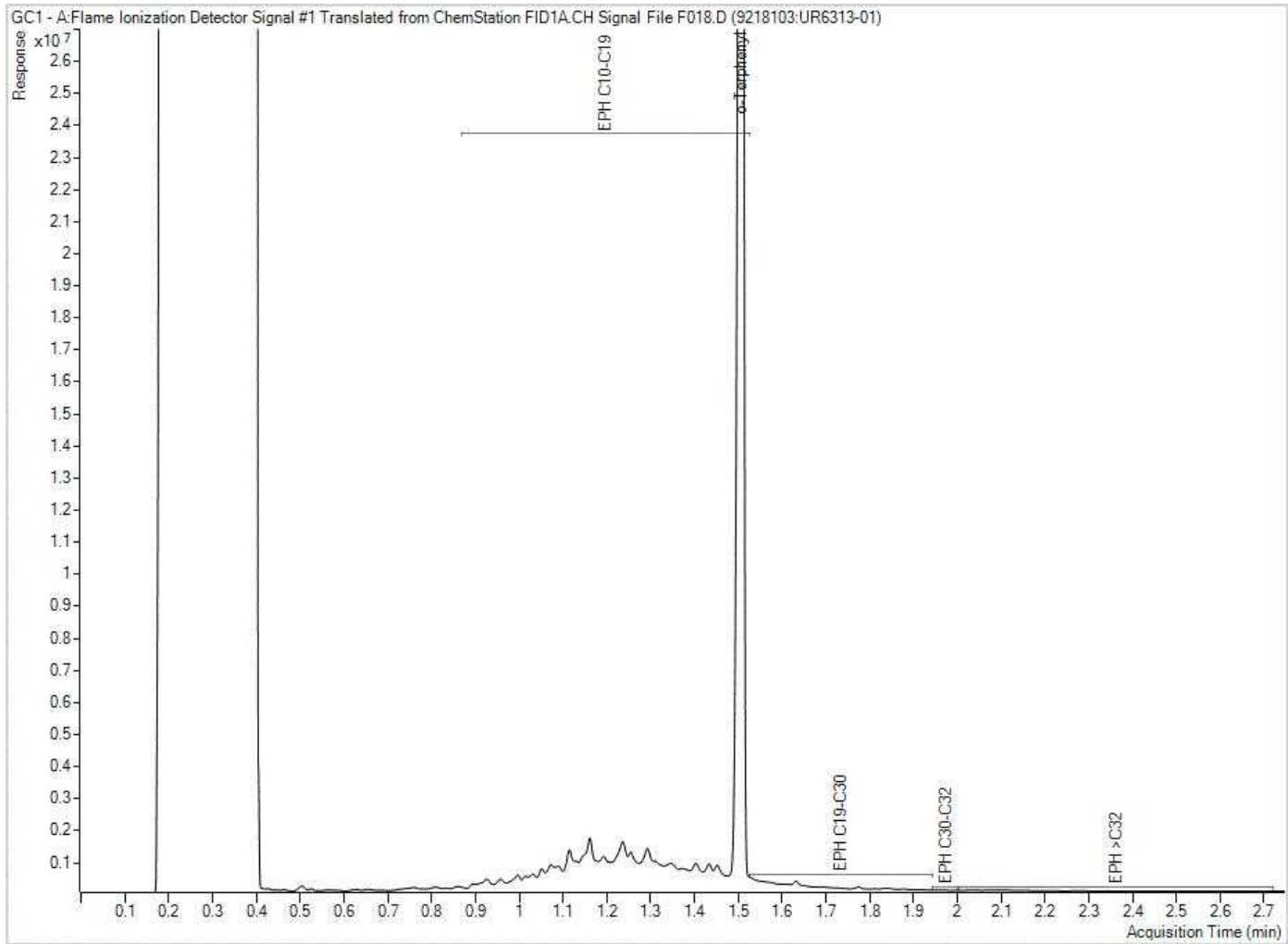
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EPH (Low Level) in Water by GC/FID Chromatogram



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