DRAFT

Phase Two Environmental Site Assessment

320 McRae Avenue, 1976 Scott Street,
311 and 315 Tweedsmuir Avenue
Ottawa, Ontario

Prepared for:

1213763 Ontario Inc.
33 Yonge Street, Suite 1000
Toronto, ON M5E 1G4

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1.0 EXECUTIVE SUMMARY

Pinchin Ltd. (Pinchin) was retained by 1213763 Ontario Inc. (Client) to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the property located at 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue in Ottawa, Ontario (hereafter referred to as the Site or Phase Two Property). The Phase Two Property is presently developed with a single-storey commercial/light industrial building complete with a two-storey office portion (Site Building A), as well as two, two-storey residential dwellings (Site Buildings B and C). In addition, it should be noted that a retail fuel outlet (RFO) was formerly located on the northeast portion of the Phase Two Property.

The Phase Two ESA was conducted at the request of the Client in relation to the future redevelopment of the Phase Two Property from mixed commercial/residential land use to residential land use. A Record of Site Condition (RSC) submittal to the Ontario Ministry of Environment, Conservation and Parks (MECP) is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA was conducted in accordance with the Province of Ontario's *Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act*, which was last amended by Ontario Regulation 274/20 on July 1, 2020 (O. Reg. 153/04).

The objectives of this Phase Two ESA were to assess the soil and groundwater quality in relation to 18 areas of potential environmental concern (APECs) and related potentially contaminating activities (PCAs) and contaminants of potential concern (COPCs) identified in a Phase One ESA completed by Pinchin in accordance with O. Reg. 153/04. The identified APECs, PCAs and COPCs are summarized in Tables 1 and 2 (all Tables are provided within Section 9.0).The Phase Two ESA was completed by Pinchin between May 19, 2020 and October 14, 2020 and consisted of the following:

- Initial investigation of the APECs; and
- Vertical delineation of groundwater impacts identified during the initial APECs investigation.

The initial APECs investigation included the advancement of 17 boreholes at the Phase Two Property, five of which were completed as groundwater monitoring wells to facilitate the sampling of groundwater and the assessment of groundwater flow. The boreholes were advanced to depths ranging from approximately 0.46 to 15.24 metres below ground surface (mbgs). Select soil samples collected from each of the borehole locations were submitted for laboratory analysis of volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs) fractions 1 through 4 (F1-F4), polycyclic aromatic hydrocarbons (PAHs) and metals. In addition, groundwater samples were collected from each of the newly-installed monitoring wells, with the exception of monitoring well MW114, which was dry during the duration of the investigation, as well as two previously-installed monitoring wells, and submitted for laboratory analysis of

VOCs, PHCs, PAHs, and metals. One additional groundwater monitoring well was installed to vertically delineate groundwater impacts and samples collected from this well were analyzed for VOCs, PHCs F1-F4, PAHs and mercury.

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *"Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition",* provided in the MECP document entitled, "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*" dated April 15, 2011 *(Table 7 Standards)* for coarse-textured soils and residential/parkland/institutional property use

The laboratory results for the submitted soil samples indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 7 Standards*, except for the following:

- The concentration of xylenes (4.6 micrograms per grams (µg/g) vs. the *Table 7 Standard* of 3.1 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F1 (110 µg/g vs. the *Table 7 Standard* of 55 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F3 (730 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F2 (220 µg/g vs. the *Table 7 Standard* of 98 µg/g) and PHCs F3 (4,500 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F3 (430 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of acenaphthylene (1.1 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (7.8 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (16 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (12 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (15 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(k)fluoranthene (5.6 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (11 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (2.0 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (32 µg/g vs. the *Table 7 Standard* of 0.69

µg/g), indeno(1,2,3-c,d)pyrene (6.5 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (1.4 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (0.86 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), and phenanthrene (24 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;

- The concentrations of benzo(a)anthracene (0.99 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (0.88 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (1.1 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), dibenzo(a,h)anthracene (0.16 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (2.2 µg/g vs. the *Table 7 Standard* of 0.69 µg/g) and indeno(1,2,3-c,d)pyrene (0.55 µg/g vs. the *Table 7 Standard* of 0.38 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of acenaphthylene (13 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (22 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (67 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (57 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (65 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(ghi)perylene (27 µg/g vs. the *Table 7 Standard* of 6.6 µg/g), benzo(k)fluoranthene (26 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (55 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (9.1 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (120 µg/g vs. the *Table 7 Standard* of 0.69 µg/g), indeno(1,2,3-c,d)pyrene (29 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (9.1 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (2.3 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), phenanthrene (75 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) and pyrene (120 µg/g vs. the *Table 7 Standard* of 78 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;
- The concentration of benzo(a)pyrene (0.32 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of barium (430 µg/g vs. the *Table 7 Standard* of 390 µg/g), reported for soil sample BH106 SS2, collected at borehole BH106 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;

- The concentration of lead (150 µg/g vs. the *Table 7 Standard* of 120 µg/g), reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentration of boron (hot water soluble) (2.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), reported for soil sample BH108 SS1, collected at borehole BH108 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), lead (350 µg/g vs. the *Table 7 Standard* of 120 µg/g) and molybdenum (7.9 µg/g vs. the *Table 7 Standard* of 6.9 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), cadmium (1.8 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (720 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (10 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (1,100 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*; and
- The concentrations of cadmium (1.4 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (470 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (1.3 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (460 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

The laboratory results for the submitted groundwater samples indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 7 Standards*, except for the following:

- The concentrations of benzene (23 micrograms per litre (µg/L) vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (66 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample MW-1, collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of benzene (21 µg/L vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (73 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*; and

- The concentration of PHCs F3 (540 µg/L vs. the *Table 7 Standard* of 500 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*.

With respect to the identified soil and groundwater parameter exceedances summarized above, remediation to meet the *Table 7 Standards* and/or the completion of a Risk Assessment in accordance with O. Reg. 153/04 will be required to develop Property Specific Standards for the parameters exceeding the *Table 7 Standards* before an RSC can be filed by the Qualified Person for the Phase Two Property.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

2.0 INTRODUCTION

A Phase Two ESA is defined as an “assessment of property conducted in accordance with the regulations by or under the supervision of a QP to determine the location and concentration of one or more contaminants in the land or water on, in or under the property”. Under O. Reg. 153/04, the purpose of a Phase Two ESA is as follows:

- To determine the location and concentration of contaminants in the land or water on, in or under the Phase Two Property;
- To obtain information about environmental conditions in the land or water on, in or under the Phase Two Property necessary to undertake a Risk Assessment, in accordance with O. Reg. 153/04, with respect to one or more contaminants of concern; and
- To determine if applicable Site Condition Standards and standards specified in a Risk Assessment for contaminants on, in or under the Phase Two Property were met as of the certification date by developing an understanding of the geological and hydrogeological conditions at the Phase Two Property and conducting one or more rounds of field sampling for all contaminants associated with any APEC identified in the Phase Two ESA sampling and analysis plan (SAP) and for any such contaminants identified during subsequent Phase Two ESA activities and analyses of environmental conditions at the Phase Two Property.

This Phase Two ESA was conducted at the request of the Client in relation to the future redevelopment of the Phase Two Property from mixed commercial/residential land use to a residential land use. An RSC submittal to the MECP is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA was conducted in accordance with O. Reg. 153/04.

The overall objectives of this Phase Two ESA were to assess the soil and groundwater quality in relation to APECs and related COPCs identified in a Phase One ESA completed by Pinchin, the findings of which were summarized in the report entitled “*Phase One Environmental Site Assessment*, *320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario*”, completed by Pinchin for the Client and dated April 30, 2020. The property assessed by the Pinchin Phase One ESA is referred to herein as the Phase One Property. The Phase Two ESA was conducted on the whole Phase One Property, and the Phase One Property and Phase Two Property have the same boundaries.

2.1 Site Description

This Phase Two ESA was completed for the property located at the municipal address of 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue in Ottawa, Ontario. The Phase Two Property is 1.29 acres (0.52 hectares) in size and is bounded by Scott Street to the north, Tweedsmuir Avenue and residential land uses to the west, McRae Avenue to the east and residential and commercial land uses to the south. A Key Map showing the Phase Two Property location is provided on Figure 1 and a detailed plan of the Phase Two Property and surrounding lands is provided on Figure 2 (all Figures are provided within Section 9.0).

The Phase Two Property is presently developed with a single-storey commercial/light industrial building complete with a two-storey office portion (Site Building A), as well as two, two-storey residential dwellings (Site Buildings B and C). In addition, it should be noted that a retail fuel outlet (RFO) was formerly located on the northeast portion of the Phase Two Property. The south portion of the Site Building A is presently occupied by Gifford Automotive Inc., an automotive repair facility. The remainder of the Site Building A is currently vacant and was most recently occupied by an automotive repair facility and storage lockers.

A summary of the pertinent details of the Phase Two Property is provided in the following table:

Detail	Source/Reference	Information
Legal Description	http://maps.ottawa.ca/geoottawa/ City of Ottawa	Plan 263, Lots 12-19, Lot 23 Tweedsmuir Ave E, Lots 24 and 25, City of Ottawa
Municipal Address	http://maps.ottawa.ca/geoottawa/ City of Ottawa, Client	320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue Ottawa, Ontario K1Z 5R8
Parcel Identification Number (PIN)	http://maps.ottawa.ca/geoottawa/ City of Ottawa	040210013, 040210014, 040210015, 040210021, 040210022, 040210023, 040210024, 040210025, 040210026
Current Owner	Client	1213763 Ontario Inc.
Owner Contact Information	Project Specific Agreement	Mr. Andrew Hanna c/o 1213763 Ontario Inc. 33 Yonge Street, Suite 1000 Toronto, ON M5E 1G4 Phone: 416-507-2809 andrew.hanna@gwlra.com
Current Occupant	Site Representative, observations during Pinchin's Site reconnaissance	Gifford Automotive (automotive repair/servicing facility)

Detail	Source/Reference	Information
Client Contact Information	Project Specific Agreement	Mr. Andrew Hanna c/o 1213763 Ontario Inc. 33 Yonge Street, Suite 1000 Toronto, ON M5E 1G4 Phone: 416-507-2809 andrew.hanna@gwlra.com
Site Area	http://maps.ottawa.ca/geoottawa/ City of Ottawa	0.52 hectares (1.29 acres)
Current Zoning	http://maps.ottawa.ca/geoottawa/ City of Ottawa	Various (TM – Traditional Mainstreet, O1 – Parks and Open Space, and GM – General Mixed-Use)

A legal survey showing the Phase Two Property is provided in Appendix A (all Appendices are provided in Section 10.0).

2.2 Property Ownership

The entirety of the Phase Two Property is currently owned by 1213763 Ontario Inc., located at 33 Yonge Street, Suite 1000, Toronto, Ontario. Contact information for the Phase Two Property owner is provided in the preceding section.

Pinchin was retained by Mr. Andrew Hanna c/o 1213763 Ontario Inc. to conduct the Phase Two ESA of the Phase Two Property. Contact information for Mr. Hanna is provided in the preceding section.

2.3 Current and Proposed Future Uses

The Phase Two Property is presently utilized for commercial and residential purposes and it is Pinchin's understanding that the Client intends to redevelop the Phase Two Property for residential land use.

Given that the future land use is changing to a more sensitive land use, there is a mandatory requirement that an RSC be filed as per Section 168.3.1 of the Province of Ontario's *Environmental Protection Act.*

2.4 Applicable Site Condition Standards

The Phase Two Property is currently a mixed commercial/residential property located within the City of Ottawa and the proposed future land use is residential. It is Pinchin's understanding that drinking water for the Phase Two Property and surrounding properties within 250 metres of the Phase Two Property is supplied by the City of Ottawa, and there are no known drinking water supply wells within 250 metres of the Phase Two Property. Source water is obtained by the City of Ottawa from the Ottawa River.

The results of the borehole drilling program indicated that the overburden was less than two metres thick over more than one-third of the Phase Two Property, classifying the Phase Two Property as a shallow soil property as defined in Section 43.1 of O. Reg. 153/04.

The Phase Two Property does not contain a water body nor is it located within 30 metres of a water body and the use of standards for properties situated within 30 metres of a water body is not required.

Section 41 of O. Reg. 153/04 states that a property is classified as an "environmentally sensitive area" if the pH of the surface soil (less than or equal to 1.5 mbgs) is less than 5 or greater than 9, if the pH of the subsurface soil (greater than 1.5 mbgs) is less than 5 or greater than 11, or if the property is an area of natural significance or is adjacent to or contains land within 30 metres of an area of natural significance. As part of a previous Phase II ESA completed by Pinchin in 2018 (2018 Pinchin Phase II ESA), a total of six representative soil samples collected from the boreholes advanced at the Phase Two Property were submitted for pH analysis. The pH values measured in the submitted soil samples were within the limits for non-sensitive sites. The Phase Two Property is also not an area of natural significance and it is not adjacent to, nor does it contain land within 30 metres of, an area of natural significance. As such, the Phase Two Property is not an environmentally sensitive area.

As discussed further in Section 6.4, based on the results of grain size analysis completed on representative soil samples collected during the 2018 Pinchin Phase II ESA and the observed stratigraphy at the borehole locations at the Phase Two Property, it is the QP's opinion that over two-thirds of the overburden at the Phase Two Property is coarse-textured as defined by O. Reg. 153/04. Therefore, the soil at the Phase Two Property has been considered coarse-textured for the purpose of establishing the applicable MECP Site Condition Standards.

Based on the above, the appropriate Site Condition Standards for the Phase Two Property are the Table 7 Standards for:

- Coarse-textured soils; and
- Residential/parkland/institutional property use.

As such, all analytical results have been compared to these *Table 7 Standards*.

3.0 BACKGROUND INFORMATION

3.1 Physical Setting

The Phase Two Property is located in the north/central portion of the City of Ottawa at an elevation of approximately 64 metres above mean sea level (mamsl). The topography of the Phase Two Property is generally flat with little relief. The properties surrounding the Phase Two Property are at an equivalent grade. There are no drainage features (e.g., open ditches or swales) present on-Site. Surface water (e.g., storm runoff) is inferred to run overland and drain into the on-Site municipal storm sewer catch basins.

There are no open water bodies or areas of natural significance located on-Site or within the area assessed by the Pinchin Phase One ESA (the Phase One Study Area). A plan showing the Phase One Study Area is presented on Figure 3. The nearest surface water body to the Phase Two Property is the Ottawa River located approximately 860 metres north of the Phase Two Property at an elevation of approximately 57 mamsl.

A review of the municipal plan for the City of Ottawa indicated that the Phase One Study Area is not located in whole or in part within a well head protection area or other designation identified by the City of Ottawa for the protection of groundwater.

The records review indicated that the Phase One Property and all other properties within the Phase One Study Area are not serviced by a municipal drinking water system.

3.2 Past Investigations

3.2.1 Summary of Previous Environmental Investigations by Pinchin and Others

Reports summarizing the following environmental investigations completed by Pinchin and others pertaining to the Phase Two Property were reviewed as part of the Pinchin Phase One ESA:

- Report entitled *"Phase I-II Environmental Site Assessment, 319 & 320 McRae Avenue, Ottawa, Ontario"* prepared by Paterson Group Inc. (Paterson) for 914168 Ontario Limited, and dated November 19, 2008 (the 2008 Paterson Phase I-II ESA Report);
- Report entitled *"Phase I Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street and 311 Tweedsmuir Avenue, Ottawa, Ontario"* prepared by Paterson for the Estate of Carson Unsworth c/o FoTenn Planning and Urban Design, and dated November 3, 2014 (the 2014 Paterson Phase I ESA Report);
- Report entitled *"Phase I – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared by Paterson for The Estate of Carson Unsworth, and dated January 28, 2016 (the 2016 Paterson Phase I ESA Report);
- Report entitled *"Phase II – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared by Paterson for The Estate of Carson Unsworth, and dated January 28, 2016 (the 2016 Paterson Phase II ESA Report);

- Report entitled *"Phase II – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared by Paterson Group Inc. for The Estate of Carson Unsworth, and dated April 21, 2017 (the 2017 Paterson Phase II ESA Report);
- Report entitled *"FINAL Phase I Environmental Site Assessment, 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared by Pinchin for the Client, and dated November 14, 2018 (the 2018 Pinchin Phase I ESA Report); and
- Report entitled *"FINAL Phase II Environmental Site Assessment, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared by Pinchin for the Client, and dated November 29, 2018 (the 2018 Pinchin Phase II ESA Report).

A summary of the salient information identified in the above-referenced reports prepared by others is provided below.

2008 Paterson Phase I-II ESA Report

The Phase I ESA portion of the 2008 Paterson Phase I-II ESA Report presented the findings of a Phase I ESA completed in general accordance with the Canadian Standards Association (CSA) document entitled *"Phase I Environmental Site Assessment"* (CSA Document Z768-01), dated November 2001, including a review of readily available historical records and reasonably ascertainable regulatory information, a Site reconnaissance, interviews, a review of previous environmental reports, an evaluation of information and reporting. In addition, the 2008 Paterson Phase I-II ESA Report included a review of a decommissioning report for the former on-Site RFO that was prepared by SEACOR Environmental Inc. (SEACOR) in 2003 (which was not provided for Pinchin's review).

The results of the Phase I ESA portion of the 2008 Paterson Phase I-II ESA Report indicated that the following environmental concerns were present at the Phase One Property:

- Former operations at the Site included a body shop, automotive repair/servicing facilities and an RFO. In addition, an abandoned in-ground hydraulic hoist was observed within one of the automotive repair/servicing facilities within Site Building A (unit not specified).

Based on the above-noted findings, a Phase II ESA was completed by Paterson.

The Phase II ESA portion of the 2008 Paterson Phase I-II ESA Report consisted of the advancement of eight boreholes at the Phase One Property, two of which were instrumented with groundwater monitoring wells, in order to address the above-noted environmental concerns identified within the Phase I ESA portion. The boreholes were completed to depths ranging from 1.0-7.9 mbgs, and petroleum hydrocarbon (PHC) contamination was observed within BH1. A total of 22 soil samples and 24 rock core samples were collected, from which two soil samples were submitted for laboratory analysis of PHCs, benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOCs) and/or metals. In addition, two groundwater samples were collected and submitted for laboratory analysis of PHCs, BTEX, VOCs and/or metals. The analytical results were compared to the then-applicable Table 1 (full depth background Site condition standards) Standards, as outlined in the document entitled *"Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"*, Ontario Ministry of the Environment (MOE), and dated March 9, 2004 (2004 Table 1 Standards). Exceedances in PHCs were found in both soil samples, and exceedances in various metal parameters were found in soil on the west portion of the Site (BH8). Paterson noted that the exceedances were also present when compared to Table 3 (industrial/commercial/community land use in a non-potable groundwater condition) within these standards (2004 Table 3 Standards). The groundwater sample collected within the former RFO area had a sheen and strong PHC odour and as such, was not submitted for analysis (assumed to exceed the applicable standards). The groundwater sample collected within Site Building A near the in-ground hydraulic hoist exceeded the 2004 Table 1 Standards for PHCs and BTEX.

Based on the above-noted findings, Paterson recommended that supplemental subsurface work be completed at the Phase One Property in order to delineate the extent of the soil and groundwater impacts identified within the 2008 Paterson Phase I-II ESA Report.

2014 and 2016 Paterson Phase I ESA Reports

The 2014 and 2016 Paterson Phase I ESA Reports presented the findings in general accordance with the CSA document entitled *"Phase I Environmental Site Assessment"* (CSA Document Z768-01), dated November 2001, including a review of readily available historical records and reasonably ascertainable regulatory information, a Site reconnaissance, interviews, a review of previous environmental reports, an evaluation of information and reporting. In addition, the 2014 and 2016 Paterson Phase I ESA Reports reviewed the above-noted reports identified within the 2008 Paterson Phase I-II ESA Report.

The 2014 and 2016 Paterson Phase I ESA Reports maintained the opinion that supplemental subsurface work should be completed at the Phase One Property in order to delineate the extent of the soil and groundwater impacts previously identified at the Site. In addition, Paterson recommended that the automotive-related tenants within Site Building A utilize better management practices in order to prevent the potential for further subsurface impacts at the Phase One Property.

2016 and 2017 Paterson Phase II ESA Reports

The 2016 and 2017 Paterson Phase II ESA Reports were completed at the Phase One Property in order to further investigate and delineate the soil and groundwater impacts that were previously identified by Paterson at the Phase One Property.

The 2016 and 2017 Paterson Phase II ESA Reports included the advancement of a total of 11 additional boreholes at the Phase One Property, five of which were completed as groundwater monitoring wells. A total of nine soil samples and nine groundwater samples (from existing and new groundwater monitoring wells) were collected and submitted for laboratory analysis of PHCs, BTEX, VOCs, polycyclic aromatic hydrocarbons (PAHs) and/or metals. The 2016 and 2017 Paterson Phase II ESA Reports identified the presence of soil impacted by PHCs, metals and arsenic beneath and in the vicinity of Site Building A. In addition, groundwater impacted with PHCs and BTEX were identified north of Site Building A (in the former RFO area).

Paterson indicated that impacted soil could be removed from the Phase One Property during redevelopment activities, and that if any soil were to remain on-Site during redevelopment activities, a confirmatory soil sampling program would be recommended to confirm that the soil complies with the *Table 7 Standards*. In addition, Paterson recommended multiple remedial options to treat impacted groundwater during Site redevelopment (i.e., removal, pump and treat, etc.).

2018 Pinchin Phase I ESA Report

The 2018 Pinchin Phase I ESA Report presented the findings in general accordance with the CSA document entitled *"Phase I Environmental Site Assessment"* (CSA Document Z768-01), dated November 2001 (and amended in 2016), including a review of readily available historical records and reasonably ascertainable regulatory information, a Site reconnaissance, interviews, a review of previous environmental reports, an evaluation of information and reporting. In addition, the 2018 Pinchin Phase I ESA Report reviewed the above-noted environmental reports previously prepared for the Phase One Property.

Based on the results of the Phase I ESA completed by Pinchin, the following actual or potential subsurface impacts were identified at the Phase One Property:

- An RFO was present on the north portion of the Site from at least 1965 until 2002. The RFO was reportedly decommissioned by SEACOR Environmental Inc. in 2002/2003; however, previous subsurface environmental work completed at the Site identified the presence of PHC-impacted soil and groundwater on the north portion of the Site;

- Automotive repair/servicing operations have been present within the on-Site multi-tenant commercial building since at least 1954. Two oil/water separators are inferred to be present within this building and are inferred to have been present for at least 40 years. In addition, an area of depressed concrete, indicative of a potential UST, was evident adjacent to the south elevation of Site Building A. Previous subsurface investigations completed at the Site identified the presence of soil impacted by PHCs, metals and arsenic beneath and in the vicinity of Site Building A. In addition, groundwater impacted with PHCs and benzene, toluene, ethylbenzene and xylenes were identified north of Site Building A;
- Based on Pinchin's review of a 1928 aerial photograph covering the Site and surrounding area, the northeast, east and southeast portions of the Phase One Property was covered with various fill piles and. In addition, previous subsurface investigations completed at the Phase One Property identified the presence of fill material with elevated concentrations of metals, arsenic and PAHs located throughout the Phase One Property;
- Based on Pinchin's review of aerial photographs for the Site and surrounding area, surrounding properties located approximately 15 metres east-northeast of the Phase One Property appeared to have been utilized for an industrial operation (i.e., commercial/light industrial building with exterior storage areas from approximately 1958 until 1976). In addition, one of these surrounding properties was occupied by Gervais Motors Ltd., an automotive repair/servicing operation, from at least 1984 until 1998. Furthermore, an RSC was filed for these properties, which included remedial work within 3 metres of the property boundaries. Based on the above-noted information and close proximity of these properties to the Phase One Property, it was Pinchin's opinion that these properties could result in potential subsurface impacts at the Phase One Property; and
- The 1948 Fire Insurance Plan reviewed by Pinchin indicated that a UST was located approximately 20 metres south of the Phase One Property. Based on the close proximity of this UST to the Site, it was Pinchin's opinion that this UST could result in potential subsurface impacts at the Phase One Property.

Based on the findings noted above, Pinchin recommended completing a Phase II ESA at the Phase One Property.

2018 Pinchin Phase II ESA Report

The Phase II ESA was completed at the Phase One Property by Pinchin between November 1, 2018 and November 14, 2018 and consisted of the advancement of 11 boreholes, five of which were completed as groundwater monitoring wells into the shallow bedrock encountered at the Phase One Property. In addition, Pinchin sampled existing groundwater monitoring wells (EXMW-1, EXMW-2, EXMW-3, EXMW-4, and EXMW-5) at the Phase One Property.

Select "worst case" soil samples collected during the borehole drilling program were submitted for laboratory analysis of PHCs (F1-F4), VOCs, PAHs and/or metals. Groundwater samples collected from the newly installed monitoring wells, as well as existing monitoring wells (EXMW-1, EXMW-2, EXMW-3, EXMW-4, and EXMW-5), were submitted for laboratory analysis of PHCs (F1-F4), VOCs, PAHs and/or metals.

Based on Site-specific information, the soil and groundwater quality was assessed based on the *Table 7 Standards*.

Reported concentrations in the soil samples submitted for analysis of PHCs (F1-F4), VOCs, PAHs and metals satisfied the *Table 7 Standards*, with the following exceptions:

- Soil sample SS-1 collected at borehole BH-7, which had concentrations of PHCs (F3) that exceeded the *Table 7 Standards*;
- Soil sample SS-1 collected at borehole BH-11, which had concentrations of PHCs (F3) and (F4) that exceeded the *Table 7 Standards*;
- Soil sample SS-2 collected at borehole MW-4, which had concentrations of metals including antimony, arsenic, barium, boron, cadmium, lead, copper, mercury and zinc that exceeded the *Table 7 Standards*;
- Soil sample SS-1 collected at borehole BH-7, which had concentrations of boron and lead that exceeded the *Table 7 Standards*;
- Soil sample SS-1 collected at borehole BH-8, which had concentrations of metals including boron, cadmium, lead, mercury and zinc that exceeded the *Table 7 Standards*; and
- Soil sample SS-1 collected at borehole BH-10, which had a concentration of lead that exceeded the *Table 7 Standards*.

Reported concentrations in groundwater samples submitted for analysis of PHCs (F1-F4), VOCs, PAHs and/or metals satisfied the *Table 7 Standards*, with the exception of groundwater sample MW-1, which exceeded the *Table 7 Standards* for PHCs (F1 and F2), benzene, xylene, and naphthalene, and groundwater sample EXMW-1 which exceeded the *Table 7 Standards* for mercury.

Based on the findings of this Phase II ESA, it was Pinchin's opinion that the soil impacts identified at the Phase One Property are potentially representative of the shallow fill material encountered across the Site. Furthermore, the groundwater impacts identified at MW-1 and EXMW-1, located on the north portion of the Phase One Property, are likely the result of the former operation of an RFO on this portion of the Phase One Property. Based on the above-noted findings, it was Pinchin's recommendation that the soil and groundwater impacts identified could be addressed upon redevelopment of the Phase One Property either by excavating the impacted soil or implementing a management plan.

Previous Environmental Report Summary

Based on Pinchin's review of the above-referenced reports prepared by others, the following could result in potential subsurface impacts, or are known subsurface impacts, at the Phase Two Property:

- An RFO was present on the north portion of the Phase Two Property from at least 1965 until 2002. The RFO was reportedly decommissioned by SEACOR Environmental Inc. in 2002/2003; however, previous subsurface environmental work completed at the Site identified the presence of PHC-impacted soil and groundwater in the north portion of the Site;
- An automotive repair/servicing operation was present within the north tenant space in Site Building A from approximately 1952 until early 2020. In addition, previous subsurface investigations completed at the Phase Two Property identified the presence of soil impacted by PHCs, metals and arsenic beneath and in the vicinity of Site Building A. Groundwater impacted with PHCs and benzene, toluene, ethylbenzene and xylenes was also identified north of Site Building A;
- An automotive repair/servicing operation has been present within the south portion of Site Building A since approximately 1968. In addition, previous subsurface investigations completed at the Phase Two Property identified the presence of soil impacted by PHCs, metals and arsenic beneath and in the vicinity of Site Building A. Groundwater impacted with PHCs and benzene, toluene, ethylbenzene and xylenes was also identified north of Site Building A;
- Auto Re-Bex, the automotive repair/servicing operation within the north portion of Site Building A, was also registered as an auto wrecking facility;
- Formerly two 1,100-litre (L) single-walled steel aboveground storage tanks (ASTs) containing new oil that were located within the north tenant space in Site Building A in 2018;
- One 1,008-L single-walled steel AST containing new oil located within the south tenant space in Site Building A in 2018;
- One 910-L single-walled steel AST containing waste oil that located within the north tenant space in Site Building A in 2018;

- One 910-L single-walled steel AST containing waste oil that located within the south tenant space in Site Building A in 2018;
- The north portion of Site Building A was formerly occupied by a commercial auto body shop (i.e., Willy's Body Shop);
- An oil/water separator that has been present within the north tenant space in Site Building A for at least 40 years (i.e., within the former Auto Re-Bex space);
- An oil/water separator that has been present within the south tenant space in Site Building A for at least 40 years (i.e., within Gifford's Automotive);
- An area of depressed concrete, indicative of a potential UST, was evident adjacent to the south elevation of Site Building A in 2018;
- An area of waste liquid chemical storage (i.e., waste antifreeze and other unknown automotive fluids) was observed adjacent to the southwest corner of Site Building A in 2018;
- Fill piles were observed to be present on-Site in a 1928 aerial photograph. In addition, as noted within the 2018 Pinchin Phase II ESA Report, various shallow soil impacts (various metal parameters) are located throughout the Phase Two Property and are likely associated with poor quality fill material;
- Surrounding properties located approximately 15 metres east-northeast of the Phase Two Property appeared to have been utilized by an industrial operation (i.e., commercial/light industrial building with exterior storage areas from approximately 1958 until 1976). In addition, an RSC was filed for these properties (i.e., 319 McRae Avenue and 1960 Scott Street), which included remedial work within 3 metres of the property boundaries and the removal of 4,420 metres^3 of impacted soil in August 2018 from 1960 Scott Street;
- A UST was evident approximately 20 metres south of the Phase Two Property in the 1948 FIP. This property is situated hydraulically upgradient in relation to the inferred groundwater flow direction at the Phase Two Property; and
- Otto's Subaru or Otto's Service Centre Ltd., an automotive repair/servicing operation, was located approximately 75 metres south-southeast of the Phase Two Property since the late 1980s and this property is situated hydraulically upgradient in relation to the inferred groundwater flow direction at the Phase Two Property.

3.2.2 Pinchin Phase One ESA Summary

From January 24, 202 through April 30, 2020, Pinchin conducted a Phase One ESA in support of the future filing of an RSC for the Phase Two Property. The Phase One ESA consisted of a Site visit, interviews with Site personnel, records review, evaluation of information, and preparation of a written report which was completed under the supervision of a QP. A plan showing the Phase One Study Area is attached as Figure 3.

The Phase One ESA was completed recently (i.e., within two months of the start of the Phase Two ESA) and in accordance with the requirements of O. Reg. 153/04. Therefore, the information provided within the Phase One ESA Report is considered adequate such that it can be relied upon for the purpose of this Phase Two ESA and future filing of an RSC.

Based on information obtained during the Phase One ESA, a total of 18 APECs and corresponding potentially contaminating activities (PCAs) and COPCs were identified that could potentially affect the environmental condition of the subsurface media on, in or under the Phase Two Property. The COPCs associated with each APEC were determined based on a review of the PCAs and substances associated with the related activities, and on several sources of information, including but not limited to, Pinchin's experience with environmental contamination and hazardous substances, common industry practices for analysis of such contaminants and point sources, literature reviews of COPCs and associated hazardous substances, and evaluations of contaminant mobility and susceptibility for migration in the subsurface.

Table 1 presents the APECs and their associated PCAs and COPCs. Identified on-Site and off-Site PCAs are summarized in Table 2 and their locations are shown on Figure 4 (on-Site PCAs) and Figure 5 (off-Site PCAs). APECs at the Phase Two Property are illustrated on Figure 6.

3.2.3 Use of Previous Analytical Data

The soil and groundwater data from the 2018 Pinchin Phase II ESA Report are considered to be of adequate quality and can be relied upon in assessing soil and groundwater conditions at the Site. The report including these data was reviewed, and no issues related to data quality were identified. Sampling procedures were acceptable and quality assurance/quality control (QA/QC) samples, consisting of trip blanks and field duplicate samples, were collected and analyzed at the frequency specified in O. Reg. 153/04 and no quality issues related to field sampling or laboratory methods were noted. The soil and groundwater analytical data summary tables from the 2018 Pinchin Phase II ESA Report are provided in Appendix B-1.

4.0 SCOPE OF INVESTIGATION

4.1 Overview of Site Investigation

The scope of work for this Phase Two ESA was prepared to address the APECs identified at the Phase Two Property and consisted of the following:

- Prepared a health and safety plan and arranged for the completion of underground utility locates prior to the commencement of drilling activities;
- Developed a detailed SAP prior to the advancement of the boreholes and the installation of the monitoring wells. The SAP was outlined in the document entitled *"Sampling and Analysis Plan for Phase Two Environmental Site Assessment, 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, dated May 13, 2020, which is provided in Appendix B-2. Based on Pinchin's knowledge of the surrounding properties and known hydrogeological conditions, boreholes were advanced at the Phase Two Property to maximum depths ranging between approximately 0.46 and 15.24 mbgs;
- Retained Strata Drilling Group Inc. (Strata) to advance boreholes and complete monitoring well installations using a Geomachine GM100™, Geoprobe 540™ or Geoprobe 420M™ drill rig. Strata is licensed by the MECP in accordance with Ontario Regulation 903 (as amended) (O. Reg. 903) to undertake borehole drilling/well installation activities. Strata advanced 17 boreholes at the Phase Two Property to investigate the potential for soil contaminants associated with the APECs identified in the Phase One ESA. Four of the advanced boreholes were instrumented with a monitoring well in accordance with O. Reg. 903 for the purpose of monitoring hydrogeological conditions and groundwater quality on-Site. In addition, one monitoring well was completed to vertically delineate groundwater impacts identified at the initial series monitoring wells;
- Collected soil samples at regular intervals within each borehole;
- Field screened soil samples for visual/olfactory evidence of impacts as well as for petroleum-derived vapours in soil headspace using a combustible gas indicator (CGI) calibrated to hexane and VOC-derived vapours in soil headspace using a photoionization detector (PID);
- Submitted a minimum of one "worst case" soil sample from each borehole for chemical analysis of:
  - PHCs F1-F4;

  - VOCs;
  - PAHs; and
  - Metals.
- Developed each of the newly-installed monitoring wells and redeveloped two previously-installed monitoring wells prior to the collection of groundwater samples;
- Submitted one representative groundwater sample from each of the newly-installed monitoring wells, except for monitoring well MW114 which remained dry for the duration of the Phase Two ESA, and two previously-installed monitoring wells for the chemical analysis of the following parameters:
  - PHCs F1-F4;
  - VOCs;
  - PAHs; and/or
  - Metals.
- Submitted two duplicate soil samples and three duplicate groundwater samples for chemical analysis of the above-noted parameters for quality assurance/quality control (QA/QC) purposes;
- Submitted three trip blanks for the groundwater sampling program for the chemical analysis of VOCs and PHCs F1 for QA/QC purposes;
- As part of the 2018 Pinchin Phase II ESA, Pinchin submitted two representative soil samples for the laboratory analysis of grain size and six representative soil samples for the laboratory analysis of pH in order to confirm the appropriate MECP Site Condition Standards;
- Conducted groundwater monitoring at each of the newly-installed groundwater monitoring wells and two previously-installed groundwater monitoring wells by measuring depth to groundwater from both top of casing and ground surface reference points, and assessing the presence/absence of non-aqueous phase liquid (NAPL), including light NAPL (LNAPL) and dense NAPL (DNAPL), using an oil/water interface probe;
- Retained an Ontario Land Surveyor (OLS) to survey the location and geodetic elevations of the newly-installed monitoring wells as well as the previously-installed monitoring wells;
- Compared the soil and groundwater analytical results to the applicable criteria stipulated in the *Table 7 Standards*; and

- Prepared a report (this report) documenting the findings of the Phase Two ESA which meets the reporting requirements listed in *Schedule E* and *Table 1 – Mandatory Requirements for Phase Two Environmental Site Assessment Reports* of O. Reg. 153/04.

4.2 Media Investigated

The scope of work for this Phase Two ESA was prepared to address the APECs and corresponding media at the Phase Two Property as identified through completion of the Phase One ESA.

The media of concern for the Phase Two ESA were soil and groundwater. Pinchin included the assessment of groundwater as part of the Phase Two ESA to investigate groundwater quality in relation to a former on-Site RFO (APEC-1 and APEC-2), current and historical on-Site automotive repair operations (APECs-3, 4, 5, 11, 12 and 13) and potential subsurface contamination migrating from off-Site PCAs (APECs-16, 17and 18). Note that due to the historical industrial land use at the Phase Two Property, the Phase Two Property is an enhanced investigation property requiring mandatory sampling and analysis of groundwater. Pinchin did not conduct sediment sampling as part of this Phase Two ESA as there are no surface water bodies and, therefore no sources of sediment, present on-Site.

For assessing the soil at the Phase Two Property for the presence of COPCs, a total of 15 boreholes were advanced at the Phase Two Property for the purpose of collecting soil samples. Select “worst case” samples collected from each of the boreholes were submitted for laboratory analysis of the COPCs.

For assessing the groundwater at the Phase Two Property for the presence of COPCs, groundwater monitoring wells were installed in five of 15 boreholes completed at the Phase Two Property to permit the collection of groundwater samples, including one monitoring well installed for vertical delineation of groundwater impacts identified during the initial series of wells. Groundwater samples, comprising samples collected from each of the newly installed monitoring wells that contained groundwater (i.e., MW110, MW201, MW202 and MW203) as well as two previously installed monitoring wells, (i.e., MW-1 and MW-3) were submitted to the analytical laboratory for analysis of the COPCs..

4.3 Phase One Conceptual Site Model

A conceptual site model (CSM) has been created to provide a summary of the findings of the Phase One ESA. The Phase One CSM is summarized in Figures 1 through 6 which illustrate the following features within the Phase One Study Area, where present:

- Existing buildings and structures;
- Water bodies located in whole or in part within the Phase One Study Area;
- Areas of natural significance located in whole or in part within the Phase One Study Area;

- Drinking water wells located at the Phase One Property;
- Land use of adjacent properties;
- Roads within the Phase One Study Area;
- PCAs within the Phase One Study Area, including the locations of tanks; and
- APECs at the Phase One Property.

The following provides a narrative summary of the Phase One CSM:

- The Phase One Property is an irregular-shaped parcel of land approximately 1.29 acres (0.52 hectares) in size, located on the southwest corner of the intersection between McRae Avenue and Scott Street in the City of Ottawa. The Phase One Property is improved with a single-storey multi-tenant light industrial building (Site Building A) that occupies the east and southeast portions of the Phase One Property, as well as two, two-storey residential dwellings located on the northwest portion of the Phase One Property. Site Building A has been utilized for various commercial and light industrial uses since construction (constructed in various phases in the 1950s, 1960s and 1970s), most notably for commercial auto body and automotive repair/servicing in the north portion since 1952 and automotive repair/servicing in the south portion since 1968;
- No water bodies were identified within the Phase One Study Area. The nearest water body is the Ottawa River, which is located approximately 860 metres northwest of the Phase One Property;
- No areas of natural significance were identified within the Phase One Study Area;
- No drinking water wells were located on the Phase One Property;
- The adjacent and surrounding properties consist of vacant, residential, commercial and light industrial land uses. The properties located north of the Phase One Property consist of Scott Street followed by transit roadways, commercial buildings and associated parking areas; the properties located east of the Phase One Property consist of McRae Avenue followed by a multi-tenant commercial building and land under development, residential dwellings, Clifton Road and additional residential dwellings; the properties located south of the Phase One Property consist of a residential dwelling followed by a parking lot, commercial/light industrial building (i.e., Otto's Subaru) and Richmond Road; and the properties located west of the Phase One Property consist of residential dwellings and Tweedsmuir Avenue followed by additional residential dwellings and commercial buildings;

- A total of 34 PCAs were identified within the Phase One Study Area, consisting of 15 PCAs at the Phase One Property and 19 PCAs within the Phase One Study Area, outside of the Phase One Property. As shown on Figure 5, three of the off-Site PCAs are a former industrial storage yard and contaminated property located 15 metres east of the Phase One Property, a former UST located 20 metres south of the Phase One Property (as observed on an FIP), and a current automotive repair/servicing operation located approximately 75 metres south of the Phase One Property (225 Richmond Road). Groundwater flow within the Phase One Study Area is inferred to be to the north towards the Ottawa River and these off-Site PCAs are inferred to be upgradient or transgradient of the Phase One Property. Given the close proximity of these PCAs to the Phase One Property and/or their location relative to the inferred groundwater flow direction, these three off-Site PCAs are considered to result in APECs at the Phase One Property. All other PCAs identified within the Phase One Study Area do not represent APECs at the Phase One Property given their distance from the Phase One Property, the inferred groundwater flow direction, the nature of operations, the results of previous subsurface environmental work completed at the Phase One Property and/or the observations made during Pinchin's Site reconnaissance. Figure 6 provides a detailed summary of the APECs and associated PCAs and COPCs;
- Underground utilities at the Phase One Property provide potable water, natural gas, electrical, telephone, cable and sewer services to the Site Buildings. These services enter the Site Buildings through subsurface conduits, with the exception of pressurized natural gas lines which connect to meters located on the exterior of the Site Buildings. Storm sewer catch basins located in the parking lots of the Phase One Property connect to the municipal storm sewer line. Plans were not available to confirm the depths of these utilities but they are estimated to be located approximately 2 to 3 mbgs;
- The Phase One Property and the surrounding properties located within the Phase One Study Area are located within alluvial deposits consisting of stratified gravel, sand, silt and clay. Bedrock is expected to consist of sedimentary rocks consisting of limestone, dolomite, shale, argillite, sandstone, quartzite, and/or grit. During previous on-Site environmental investigations, the soil stratigraphy was observed to consist of fill material comprised of sand and gravel to depths between 0.1 and 3.2 mbgs. Shallow bedrock was encountered at depths between 0.8 and 3.2 mbgs; and
- The Phase One Property is relatively flat with little relief. Local groundwater flow has been inferred to be towards the north towards the Ottawa River. Regional groundwater flow is also inferred to be to the north towards the Ottawa River.

There were no deviations from the Phase One ESA requirements specified in O. Reg. 153/04 or absence of information that have resulted in uncertainty that would affect the validity of the Phase One CSM.

4.4 Deviations from Sampling and Analysis Plan

The following deviations from the SAP occurred during the completion of the Phase Two ESA investigation activities:

- An additional groundwater monitoring well (MW201) was installed adjacent to monitoring well MW-1 for the purpose of collecting additional groundwater samples for vertical delineation purposes. Groundwater samples collected from this well were submitted for laboratory analysis of PHCs F1-F4, VOCs, PAHs and mercury;
- An additional groundwater monitoring well (MW202) was installed in the vicinity of former monitoring well EXMW-2 (buried or destroyed) as a replacement for monitoring well MW114, which was dry for the duration of the Phase Two ESA. Groundwater samples collected from this well were submitted for laboratory analysis of VOCs, PHCs, PAHs and metals;
- An additional groundwater monitoring well (MW203) was installed in the vicinity of former BH104 to assess groundwater quality within APEC-6 as a result of the identification of soil at borehole BH104 with concentrations of PHCs F1 and xylenes exceeding the *Table 7 Standards*. Groundwater samples collected from this well was submitted for laboratory analysis of VOCs, PHCs, PAHs and metals;
- Monitoring well MW106 was not installed as the sampling of existing monitoring well EXMW-4 was considered adequate to assess APEC-11 (on-Site oil/water separator) in the north interior portion of Site Building A;
- Monitoring well MW110 replaced proposed MW116 and was moved to the south portion of the Phase Two Property as the sampling of existing monitoring well MW-5 was considered adequate to assess APEC-13 (potential UST) near the southeast corner of Site Building A. Furthermore, monitoring well MW110 was advanced to a depth of 9.14 mbgs as opposed to 7.62 mbgs as stipulated in the SAP; and
- Existing monitoring well EXMW-1 was not sampled as it was buried/destroyed. Monitoring well MW201 was sampled in lieu of EXMW-1 for vertical delineation of mercury impacts at EXMW-1.

No additional scope of work items were added to the Phase Two ESA or other notable constraints and limitations with respect to the SAP were documented during the field activities, and as such Pinchin has conducted the Phase Two ESA in a manner generally consistent with the SAP provided in Appendix B-2.

It is the QP's opinion that the above-noted deviations from the SAP did not affect the investigation of the APECs for COPCs and had no impact on the overall findings and conclusions of the Phase Two ESA.

4.5 Impediments

Pinchin had full access to the Phase Two Property throughout the completion of the Phase Two ESA, with the following exception:

- The north portion of the Site was used a construction storage yard for the duration of the investigation, impeding mobility and access.

It is the QP's opinion that the impediments to full access to the Phase Two Property did not affect the investigation of the APECs for COPCs and had no impact on the overall findings and conclusions of the Phase Two ESA.

5.0 INVESTIGATION METHOD

5.1 General

The Phase Two ESA field work was conducted in accordance with Pinchin's standard operating procedures (SOPs) as provided in the SAP, which have been developed in accordance with the procedures and protocols provided in the MECP document entitled "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*", dated December 1996, in the Association of Professional Geoscientists of Ontario document entitled *"Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)"*, dated April 2011, and in O. Reg. 153/04.

In addition, Pinchin's SOP for groundwater sampling using low-flow purging and sampling procedures follows the United States Environmental Protection Agency Region I document entitled *"Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells"* dated January 19, 2010 (Low Flow Sampling Protocol).

No deviations from Pinchin's SOPs occurred during the Phase Two ESA.

5.2 Drilling and Excavating

Pinchin retained Strata to advance a total of 15 boreholes (BH101 through BH115) at the Phase Two Property between May 14 and 21, 2020 to investigate the potential presence of COPCs associated with the APECs identified in the Phase One ESA. Two of the advanced boreholes (MW110 and MW114) were completed as monitoring wells in accordance with O. Reg. 903 for the purpose of monitoring hydrogeological conditions and groundwater quality on-Site. The boreholes were drilled to a maximum depth of 9.14 mbgs using a Geomachine GM100™, Geoprobe 540™ or Geoprobe 420M™ drill rig. Upon completion of the drilling and monitoring well installations, Strata completed and filed a Water Well Record with the MECP for the well cluster in accordance with O. Reg. 903.

Following completion of the initial Phase Two ESA scope of work described above, monitoring wells were completed to further investigate the potential presence of COPCs associated with the APECs identified in the Phase One ESA or to delineate identified groundwater impacts as follows:

- MW201 – Completed within APEC-1 and 2 to vertically delineate groundwater at MW-1 with concentrations of benzene and ethylbenzene exceeding the *Table 7 Standards*;
- MW202 – Completed to assess groundwater quality within APEC-16 in lieu of monitoring well MW114, which was dry for the duration of the Phase Two ESA; and
- MW203 – Completed to assess groundwater quality within APEC-6 as a result of the identification of soil at borehole BH104 with concentrations of PHCs F1 and xylenes exceeding the *Table 7 Standards*.

The additional monitoring well installations were completed by Strata on between August 24 and 28, 2020. The boreholes were drilled to a maximum depth of 15.24 mbgs using a Geomachine GM100™ or 420M™ drill rig. Upon completion of the drilling and monitoring well installations, Strata completed and filed a Water Well Record with the MECP for the additional well cluster in accordance with O. Reg. 903.

Measures taken to minimize the potential for cross-contamination during the borehole drilling programs included:

- The use of dedicated, disposable polyvinyl chloride (PVC) soil sample liners for soil sample collection during direct-push drilling;
- The extraction of soil samples from the interior of the sampling device (where possible), rather than from areas in contact with the sampler walls;
- The cleaning of all non-dedicated drilling and soil sampling equipment (i.e., spatulas used for sample collection) before initial use and between sample and borehole locations; and
- The use of dedicated and disposable nitrile gloves for all soil sample handling.

Soil samples were collected at continuous intervals during direct-push drilling at a general frequency of one soil sample for every 0.75 metres drilled.

No excavating activities (e.g., test pitting) were completed as part of the Phase Two ESA.

5.3 Soil Sampling

Soil samples were collected in the boreholes at continuous intervals using either 3.2 or 5.1 centimetre (cm) inner diameter (ID) direct push soil samplers with dedicated single-use sample liners.

Discrete soil samples were collected from the dedicated sample liners by Pinchin personnel using a stainless-steel spatula. Dedicated and disposable nitrile gloves were worn during the collection of each soil sample. A portion of each sample was placed in a resealable plastic bag for field screening and a portion was containerized in laboratory-supplied glass sampling jars. Following sample collection, the sample jars were placed into dedicated coolers with ice for storage pending transport to Bureau Veritas Laboratories (BV Labs) in Mississauga, Ontario. Formal chain of custody records were maintained between Pinchin and the staff at BV Labs.

Subsurface soil conditions were logged on-Site by Pinchin personnel at the time of borehole drilling. Based on the soil samples recovered during the borehole drilling program, the soil stratigraphy at the drilling locations generally consists of fill material comprised of sand and gravel, and trace silt with organic material and occasional coal, brick, and glass debris or sand, to a maximum depth of approximately 2.59 mbgs, where refusal on limestone bedrock was encountered. Moist to wet soil conditions were not observed in any of the boreholes advanced.

No odours or staining were observed in the soil samples collected during the borehole drilling program, with the exception of soil sample SS1 collected at borehole BH104 at a depth of 0.15 to 0.76 mbgs which exhibited PHC-like odours and black staining, and soil sample SS3 collected at borehole BH109 at a depth of 1.22 to 1.83 mbgs which exhibited black staining.

A detailed description of the subsurface stratigraphy encountered during the borehole drilling program is documented in the borehole logs included in Appendix C.

5.4 Field Screening Measurements

Soil samples were collected at each of the sampling intervals during the drilling activities and analyzed in the field for VOC-derived and petroleum-derived vapour concentrations in soil headspace with an RKI Eagle 2™ equipped with a PID and a CGI operated in methane elimination mode. The soil samples collected for field-screening purposes were placed in resealable plastic bags. The plastic bags were stored in a warm environment for a minimum of five minutes and agitated in order to release organic vapours within the soil pore space prior to analysis with the PID and CGI.

Based on a review of the operator's manual, the RKI Eagle 2™ PID has an accuracy/precision of up to 0.1 parts per million (ppm). The PID was calibrated prior to field use by the equipment supplier Maxim Environmental and Safety (Maxim) according to Maxim's standard operating procedures. In addition, the

PID calibration was tested at the beginning of each day of drilling activities (beginning on the second day of drilling) against a Maxim-provided isobutylene gas standard with a concentration of 100 ppm. The gas standard was stored in a gas cylinder and delivered to the PID via a regulator valve. An in-field re-calibration of the PID was conducted (using the gas standard in accordance with the operator's manual instructions) if the calibration check indicated that the PID's calibration had drifted by more than +/- 10%.

Based on a review of the operator's manual, the RKI Eagle 2™ has an accuracy/precision of up to +/- 25 ppm, or +/- 5% of the reading (whichever is greater). The CGI was calibrated prior to field use by Maxim according to Maxim's standard operating procedures. In addition, the CGI calibration was tested at the beginning of each day of drilling activities (beginning on the second day of drilling) against a Maxim-provided hexane gas standard with a concentration of 1,650 ppm. The gas standard was stored in a gas cylinder and delivered to the CGI via a regulator valve. An in-field re-calibration of the CGI was conducted (using the gas standard in accordance with the operator's manual instructions) if the calibration check indicated that the CGI's calibration had drifted by more than +/- 10%.

In general, the soil samples with the highest measured vapour concentrations (i.e., "worst case") from a given borehole were submitted for laboratory analysis. Sample depth and visual and olfactory observations of potential contaminants were also used in conjunction with the vapour concentrations in making the final selection of "worst case" soil samples for laboratory analysis.

5.5 Groundwater Monitoring Well Installation

Following soil sampling, Strata installed a groundwater monitoring well in boreholes MW110, MW114, MW201, MW202 and MW203, under the full-time monitoring of a Pinchin field representative.

The monitoring wells were constructed with 51-millimetre (2-inch) or 32-millimetre (1.25-inch) inner diameter (ID) flush-threaded schedule 40 PVC risers followed by a 3.1 metre length of No. 10 slot PVC screen. Each well screen was sealed at the bottom using a threaded cap and each riser was sealed at the top with a lockable J-plug cap. Silica sand was placed around and above the screened interval to form a filter pack around the well screen. A layer of bentonite was placed above the silica sand and was extended to just below the ground surface. A 10.2 cm ID Schedule 40 PVC outer casing, approximately 15.2 cm in length, was installed in each well around the top of the riser and into the top of the bentonite seal. A bentonite seal was then placed between the riser and outer casing. A protective flush-mount cover was installed at the ground surface over each riser pipe and outer casing and cemented in place.

All monitoring wells were installed in accordance with O. Reg. 903. The monitoring well construction details are provided in Table 4 and on the borehole logs in Appendix C. Upon completion of the monitoring well installations, Strata completed and filed a Water Well Record with the MECP for the well clusters for both the initial and delineation wells.

Existing monitoring wells MW-1 and MW-3 were redeveloped on various dates between May 25, 2020 and June 8, 2020, monitoring well MW110 was developed on July 1, 2020 and monitoring wells MW201, MW202, and MW203 were developed between August 31 and September 1, 2020 in accordance with Pinchin's SOP for well development by purging the wells dry between one and three times using dedicated inertial pumps comprised of Waterra™ polyethylene tubing and a foot valve. The well development activities were completed a minimum of 24 hours prior to the groundwater sampling activities.

Measures taken to minimize the potential for cross-contamination during well installation and well development included the following:

- The use of dedicated and disposable nitrile gloves for handling well materials during well installation and during well development; and
- The use of dedicated inertial pumps for each well.

5.6 Groundwater Field Measurements of Water Quality Parameters

Water quality parameters were measured during the low-flow purging and sampling procedure completed on June 8, July 2 and September 2, 2020 at monitoring wells MW-1, MW-3, MW110, MW201, MW202 and MW203.

Measurements of the water quality parameters oxidation-reduction potential, dissolved oxygen, temperature, specific conductance, pH and turbidity were made during purging using a flow-through cell and a Horiba U-52™ water quality meter (Horiba Water Quality Meter). The Horiba Water Quality Meter was calibrated prior to use by the equipment supplier (Maxim) in accordance with the manufacturer's specifications and again prior to purging.

Field-measured parameters were recorded from the Horiba Water Quality Meter at regular intervals in order to determine stabilized groundwater geochemical conditions and hence representative groundwater sampling conditions, in general accordance with the criteria stipulated in the Low Flow Sampling Protocol.

It should be noted that representative groundwater sampling conditions were determined by Pinchin personnel utilizing the field parameter stabilization criteria noted within the Low Flow Sampling Protocol as well as additional factors including total purge time and purge volume.

5.7 Groundwater Sampling

All monitoring wells installed by Pinchin as part of the Phase Two ESA and two existing monitoring wells (i.e., MW-1 and MW-3 installed by Pinchin) were sampled. The monitoring wells were sampled a minimum of 24 hours after the completion of well development activities (see Section 5.5). All monitoring wells were sampled in accordance with the Low Flow Sampling Protocol as described below.

Well purging was completed using a Geotech™ submersible bladder pump and Geotech™ controller powered by a 12-Volt battery. Compressed air was delivered to the bladder pump unit via 47-millimetre (3/16-inch) ID polyethylene tubing. Groundwater was returned to the surface from the bladder pump via dedicated 0.64-cm (1/4-inch) ID polyethylene tubing. A Horiba Water Quality Meter connected to a flow-through cell was used to monitor water quality parameters during groundwater purging to assess whether water quality parameter stabilization was achieved prior to sample collection. The flow rate of the bladder pump was adjusted to minimize drawdown of the water table and the introduction of sediment into the samples.

Once field parameter stabilization was achieved, groundwater samples were collected at each well using the bladder pump and dedicated polyethylene tubing by pumping groundwater directly into new laboratory-supplied sample bottles at a pumping rate of less than 0.5 litres per minute.

Groundwater samples for metals analyses were field-filtered prior to preservation using dedicated 0.45 micron in-line filters. As appropriate, laboratory sample bottles were pre-filled by BV Labs with preservatives intended to preserve the collected groundwater samples prior to analysis.

Following sample collection, the sample bottles were placed into dedicated coolers with ice for storage pending transport to BV Labs. Formal chain of custody records were maintained between Pinchin and the staff at BV Labs.

5.8 Sediment Sampling

Sediment sampling was not completed as part of this Phase Two ESA.

5.9 Analytical Testing

All collected soil and groundwater samples were delivered to BV Labs for analysis. BV Labs is an independent laboratory accredited by the Canadian Association for Laboratory Accreditation. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at BV Labs. BV Labs conducted the laboratory analysis in accordance with the MECP document entitled *"Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act"* dated March 9, 2004 and revised on July 1, 2011 (*Analytical Protocol)*.

5.10 Residue Management Procedures

Pinchin notes that at the time of writing, the drums of excess soil cuttings, purge water and equipment cleaning fluids have not been removed from the Phase Two Property. Pinchin will assist the Client in arranging for disposal of these materials by MECP-approved waste haulers at MECP-approved waste management facilities.

5.11 Elevation Surveying

On October 14, 2020, Annis, O'Sullivan, Vollebekk (AOV), an OLS, surveyed the horizontal positioning and the vertical elevation of each of the on-Site monitoring wells locations relative to the elevation of a local geodetic benchmark. The geodetic elevations were derived by AOV from GPS observations and are referred to the CGVD28 geodetic datum. This geodetic reference was used to establish a local survey benchmark, which was the top of a fire hydrant spindle adjacent to the southeast Phase Two Property boundary (referenced at 65.23 mamsl).

A summary of the well elevation survey data is provided in Table 4. A plan of survey of the Phase Two Property showing the locations and elevations of each monitoring well and borehole, as provided by AOV, is attached in Appendix A.

5.12 Quality Assurance and Quality Control Measures

The QA/QC protocols that were followed during borehole drilling and soil and groundwater sampling so that representative samples were obtained are described in the following subsections.

5.12.1 Sample Containers, Preservation, Labelling, Handling and Custody of Samples

Soil and groundwater samples were containerized within laboratory-prepared sample containers in accordance with the *Analytical Protocol*.

The following soil sample containers and preservatives were used:

- VOCs and PHCs F1: 40 millilitre (mL) glass vials with septum-lids, pre-charged with methanol preservative; and
- PHCs F2-F4, PAHs and metals: 120 or 250 mL unpreserved clear glass wide-mouth jars with a Teflon^{TM}–lined lid.

The following groundwater sample containers and preservatives were used:

- VOCs and PHCs F1: 40 mL clear glass vials with septum-lids, pre-charged with sodium bisulphate preservative;

- PHCs F2-F4: 250 mL amber glass bottles with Teflon™–lined lids, pre-charged with sodium bisulphate preservative;
- PAHs: 250 mL unpreserved amber glass bottles with Teflon™–lined lids;
- Metals (excluding hexavalent chromium and mercury): 125 mL acid-rinsed HDPE bottles, pre-charged with nitric acid preservative;
- Hexavalent chromium: 125 mL acid-rinsed HDPE bottles, pre-charged with ammonium sulphate/ammonium hydroxide preservative; and
- Mercury: 125 mL clear glass bottles with Teflon™–lined lids, pre-charged with hydrochloric acid preservative.

Groundwater samples submitted for metals analyses (including hexavalent chromium and mercury) were field-filtered using dedicated 0.45 micron filters.

Trip blank water samples for VOC parameter analysis were provided by BV Labs in 40 mL clear glass vials filled with VOC-free water.

Each soil, groundwater and QA/QC sample was labelled with a unique sample identifier along with the company name, sampling date, Pinchin project number and analysis required.

Each sample was placed in a cooler on ice immediately upon collection and prior to submission to BV Labs for analysis. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at BV Labs.

5.12.2 Equipment Cleaning Procedures

Dedicated, single-use PVC sample liners were used for each soil sample collected, which precluded the need for drilling equipment cleaning during soil sample collection. Equipment utilized in soil sample collection and handling (i.e., spatulas used to remove soil from the sample liners) was cleaned with a solution of Alconox™ detergent and potable water followed by a distilled water rinse prior to initial use and between samples.

During groundwater sampling activities, the Geotech™ bladder pump used for purging and sampling was cleaned before initial use and between well locations by flushing with a solution of Alconox™ detergent and potable water followed by flushing with distilled water. New bladders were also installed in the pump before initial use and between well locations. During groundwater monitoring activities, the oil/water interface probe used to measure water levels and the Horiba Water Quality Meter used for groundwater field parameter measurements were cleaned with a solution of Alconox™ detergent and potable water followed by a distilled water rinse prior to initial use and between well locations.

5.12.3 Field Quality Control Measures

A total of two field duplicate soil samples were collected by Pinchin during the Phase Two ESA for analysis of one or more of the COPCs. The frequency of field duplicate soil sample analysis complied with the requirement that one field duplicate soil sample is analyzed for every ten regular soil samples submitted for analysis of the COPCs. The soil sample field duplicate pairings and corresponding analytical schedules are summarized as follows:

- Soil sample "BH101 SS1" and its corresponding field duplicate "DUP-1" were submitted for laboratory analysis of PHCs, VOCs, PAHs and metals; and
- Soil sample "MW110 SS2" and its corresponding field duplicate "DUP-2" were submitted for laboratory analysis of PHCs, VOCs, PAHs and metals.

A total of three field duplicate groundwater samples were collected by Pinchin during the Phase Two ESA for analysis of the COPCs. The frequency of field duplicate groundwater sample analysis complied with the requirement that one field duplicate groundwater sample is analyzed for every ten regular groundwater samples submitted for analysis of the COPCs. The groundwater sample field duplicate pairing and corresponding analytical schedules are summarized as follows:

- Groundwater sample "MW-1" and its corresponding field duplicate "DUP-3" were submitted for laboratory analysis of PHCs, VOCs and PAHs;
- Groundwater sample "MW201" and its corresponding field duplicate "DUP-201" were submitted for laboratory analysis of PHCs, VOCs and PAHs; and
- Groundwater sample "MW202" and its corresponding field duplicate "DUP-202" were submitted for laboratory analysis of metals.

Three laboratory-prepared trip blanks were analyzed for VOC parameters to comply with the requirement that one trip blank is analyzed for each submission of groundwater samples for VOC parameter analysis.

The calibrations of the RKI Eagle™ 2 used for field screening and the Horiba Water Quality Meter used for water quality parameter measurements were checked by the equipment supplier (Maxim) prior to use in the field by Pinchin.

Maxim completed calibration checks in accordance with the equipment manufacturers' specifications and/or Maxims SOPs.

5.12.4 QA/QC Sampling Program Deviations

There were no deviations from the QA/QC sampling program outlined in the SAP.

6.0 REVIEW AND EVALUATION

6.1 Geology

Based on the stratigraphic information obtained from the soil samples recovered during the drilling activities completed as part of the Phase Two ESA, the concrete or asphalt-covered ground surface at the Phase Two Property is underlain by granular soil fill materials comprised of sand and gravel, and trace silt with organic material and occasional coal, brick, and glass fragments, to a maximum depth of approximately 2.6 mbgs, where refusal on limestone bedrock was encountered. Moist to wet soil conditions were not observed in any of the boreholes advanced.

The water table is located within the limestone formation at a depth of approximately 4 to 8 mbgs and this uppermost water bearing unit represents an unconfined aquifer. The Phase Two ESA investigation did not extend further than approximately 15.2 mbgs, and therefore the total thickness of this aquifer was not determined. No aquitards or additional aquifers were encountered during the borehole drilling program for the Phase Two ESA.

The following table provides a summary of the primary geologic units observed during borehole drilling at the Phase Two Property:

Geologic Unit	Estimated Thickness (metres)	Top Elevation (mamsl)	Bottom Elevation (mamsl)	Properties
Sand and Gravel (Granular Fill	0 – 2.6	62.9 – 64.6 (Ground Surface)	62.1 – 63.4	Unsaturated
Unconfined Aquifer (limestone)	2.6 – >15.2	62.1 – 63.4	>48.2	Saturated below 4 to 8 mbgs on October 14, 2020 (water table)

Cross-sections summarizing the subsurface geological conditions have been provided as Figures 8B to 8C, with the cross-section lines shown on Figure 8A.

The APECs investigated by the Phase Two ESA identified surface soil impacted with VOCs, PHCs, PAHs and metals parameters. Impacts on groundwater quality, if any, from these contaminants would be expected in the shallow groundwater zone and, as such, the water table groundwater quality (unconfined aquifer within the limestone formation) was assessed during the Phase Two ESA.

Groundwater impacts were identified at the water table within the unconfined aquifer at monitoring well MW-1. To vertically delineate these impacts, one additional monitoring well (MW201) was installed deeper within the unconfined aquifer. No groundwater impacts were identified within this deeper well and an assessment of deeper groundwater quality within the unconfined aquifer was not required.

6.2 Groundwater Elevations and Flow Direction

The wells screens in each monitoring well installed by Pinchin were of a consistent length (i.e., 3.05 metres) and the well screens in the monitoring well installed by others was also 3.05 metres in length. All monitoring wells were installed at depth intervals intended to investigate groundwater quality in the shallow groundwater zone within the unconfined aquifer. Given that PHCs were a COPC for groundwater at the Phase Two Property the monitoring wells were installed at the Phase Two Property such that the well screens intersected the water table, with the exception of monitoring well MW201 which was installed for vertical delineation purposes.

The following summarizes the findings of a groundwater monitoring event completed on May 5, 2020:

The depths to groundwater measured within monitoring wells MW-1 and MW-3 installed within the unconfined aquifer ranged from 3.92 mbgs at monitoring well MW-3 to 5.12 mbgs at monitoring well MW-1;

- The calculated groundwater elevations within the groundwater monitoring ranged between 58.15 mamsl at MW-1 and 59.50 mamsl at MW-3; and
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

The following summarizes the findings of a groundwater monitoring event completed on August 6, 2020:

The depths to groundwater measured within monitoring wells MW-1 and MW-3 installed within the unconfined aquifer ranged from 3.93 mbgs at monitoring well MW-3 to 5.11 mbgs at monitoring well MW-1;

- The calculated groundwater elevations within the groundwater monitoring ranged between 58.16 mamsl at MW-1 and 59.49 mamsl at MW-3; and
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

The following summarizes the findings of a groundwater monitoring event completed on August 31, 2020:

- The depths to groundwater measured monitoring wells MW201, MW202 and MW203 installed within the unconfined aquifer ranged from 4.62 mbgs at monitoring well MW202 to 8.07 mbgs at monitoring well MW201;
- The calculated groundwater elevations within the groundwater monitoring wells installed within the unconfined aquifer ranged between 55.16 mamsl at MW201 and 58.33 mamsl at MW202; and
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

The following summarizes the findings of a groundwater monitoring event completed on September 2, 2020:

- The depths to groundwater measured monitoring wells MW201, MW202 and MW203 installed within the unconfined aquifer ranged from 4.77 mbgs at monitoring well MW202 to 8.08 mbgs at monitoring well MW201;
- The calculated groundwater elevations within the groundwater monitoring wells installed within the unconfined aquifer ranged between 55.15 mamsl at MW201 and 58.18 mamsl at MW202; and
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

The following summarizes the findings of a groundwater monitoring event completed on October 14, 2020:

- The depths to groundwater measured in all on-Site monitoring wells installed within the unconfined aquifer ranged from 3.80 mbgs at monitoring well MW-3 to 8.10 mbgs at monitoring well MW201;
- The calculated groundwater elevations within the groundwater monitoring wells installed within the unconfined aquifer ranged between 55.13 mamsl at MW201 and 59.62 mamsl at MW-3; and
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

The surveyed ground surface elevations adjacent to each well and measured distance between the ground surface elevations and tops of the well riser pipes were used to calculate the top of casing elevations for each well. The measured depths to groundwater and calculated groundwater elevation measurements, and the results of NAPL monitoring for all monitoring events are summarized in Tables 5 and 6, respectively.

The inferred groundwater flow vectors and calculated groundwater elevation contour intervals at the Phase Two Property based on depth to groundwater measurements on October 14, 2020 are shown on Figure 9. The groundwater elevation contours were created by manual interpolation with a 0.5 metre contour spacing.

All depth to groundwater measurements in each of the on-Site groundwater monitoring wells were used to calculate the groundwater elevation contours, with the exception of monitoring well MW201. The groundwater elevation data for monitoring well MW201were omitted as this monitoring well was a deep monitoring well installed for vertical delineation purposes and was not screened to intersect the water table. As shown on Figure 9, the calculated groundwater surface elevation contours indicate that groundwater flow across the Phase Two Property is variable, with flow in the northern portion to the east/southeast, flow in the central portion to the northwest and flow in the southern portion to the west/southwest. The variability is groundwater flow direction may be due to fractures in the bedrock influencing groundwater flow direction.

The groundwater depth data collected over the course of all monitoring events indicate that the temporal fluctuations in the unconfined water table appear to be minimal. Also, based on the measured depths to groundwater, it is unlikely that the groundwater flow regime would be influenced by the buried utilities present at the Phase Two Property.

6.3 Groundwater Hydraulic Gradients

6.3.1 Groundwater Horizontal Hydraulic Gradients

The plotted groundwater surface elevation contours (as shown on Figures 9) were utilized to estimate horizontal hydraulic gradient values for the unconfined aquifer at the Phase Two Property. The horizontal hydraulic gradient can be estimated by dividing the difference between two groundwater contour values by the distance between the two plotted groundwater contours. The distance between select groundwater contours can be determined by drawing a straight line which transects each contour in a perpendicular fashion on the plotted groundwater contour figure.

By utilizing groundwater contours which are closely spaced, the estimated maximum horizontal hydraulic gradient for the unconfined aquifer at the Phase Two Property is approximately 0.054.

By utilizing groundwater contours which are more distantly spaced, the estimated minimum horizontal gradient for the unconfined aquifer at the Phase Two Property is approximately 0.025.

By utilizing the two most distant (highest and lowest) groundwater elevation contours plotted at the Phase Two Property, a normalized horizontal hydraulic gradient value for the unconfined aquifer at the Phase Two Property using groundwater surface elevations measured on October 14, 2020, was estimated to be approximately 0.040.

6.3.2 Groundwater Vertical Hydraulic Gradients

Water levels obtained from nested monitoring well pair MW-1 and MW201on October 14, 2020 used to calculate vertical hydraulic gradients for the unconfined aquifer at the Phase Two Property. The calculated vertical hydraulic gradient for this well pair was 0.46 in a downwards direction on October 14, 2020.

6.4 Fine-Medium Soil Texture

Two soil samples collected as part of the 2018 Pinchin Phase II ESA from boreholes advanced at the Phase Two Property were submitted for 75 micron single-sieve grain size analysis. The soil samples selected for analysis were considered to be representative of the primary stratigraphic unit observed at the borehole locations, which was sand and gravel. One soil sample was classified as coarse-textured (85% coarse-grained soil) and one sample was classified as medium and fine textured (47% coarse-grained soil).

Based on these grain size analysis results and the observed stratigraphy at the borehole locations at the Phase Two Property, it is the QP's opinion that over two-thirds of the overburden at the Phase Two Property is coarse-textured as defined by O. Reg. 153/04. Therefore, the soil at the Phase Two Property was interpreted to be coarse-textured for the purpose of determining the MECP Site Condition Standards applicable to the Phase Two Property.

6.5 Soil Field Screening

Soil vapour headspace concentrations measured in the soil samples collected as part of this Phase Two ESA are presented in the borehole logs. Soil vapour headspace values measured with the CGI in methane elimination mode ranged from 5 ppm by volume (ppm_v) in several of the collected soil samples to a maximum of 1,500 ppm_v in soil sample BH104 SS1 collected from borehole BH104 at a depth of approximately 0 to 0.76 mbgs. Soil vapour headspace values measured with the PID ranged from 0.0 ppm_v in several of the collected soil samples to a maximum of 973 ppm_v in soil sample BH104 SS1 collected from borehole BH104 at a depth of approximately 0 to 0.76 mbgs

One most apparent "worst case" soil sample, based on vapour concentrations as well as visual and/or olfactory considerations recovered from each borehole was submitted for laboratory analysis of VOCs, PHCs (F1-F4), PAHs and/or metals.

6.6 Soil Quality

A total of 15 boreholes were advanced at the Phase Two Property at the locations shown on Figure 7 in order to assess for the presence of subsurface impacts resulting from the APECs identified in the Pinchin Phase One ESA. Select soil samples were collected from each of the advanced boreholes and submitted for laboratory analysis of the COPCs. The soil sample locations, depths and laboratory analyses are summarized in Table 3 and in the borehole logs.

The soil sample analytical results were compared to the *Table 7 Standards* and the following subsections provide a discussion of the findings.

6.6.1 VOCs

The soil sample analytical results for VOCs, along with the corresponding *Table 7 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of VOCs in the soil samples submitted for analysis were below the *Table 7 Standards*, except for the following:

- The concentration of xylenes (4.6 micrograms per grams (µg/g) vs. the *Table 7 Standard* of 3.1 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

6.6.2 PHCs F1-F4

The soil sample analytical results for PHCs F1-F4, along with the corresponding *Table 7 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of PHCs F1- F4 in the soil samples submitted for analysis were below the *Table 7 Standards*, except for the following:

- The concentration of PHCs F1 (110 µg/g vs. the *Table 7 Standard* of 55 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F3 (730 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards;*
- The concentration of PHCs F2 (220 µg/g vs. the *Table 7 Standard* of 98 µg/g) and PHCs F3 (4,500 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*; and
- The concentration of PHCs F3 (430 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

6.6.3 PAHs

The soil sample analytical results for PAHs, along with the corresponding *Table 7 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of PAHs in the soil samples submitted for analysis were below the *Table 7 Standards*, except for the following:

- The concentrations of acenaphthylene (1.1 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (7.8 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (16 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (12 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (15 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(k)fluoranthene (5.6 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (11 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (2.0 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (32 µg/g vs. the *Table 7 Standard* of 0.69 µg/g), indeno(1,2,3-c,d)pyrene (6.5 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (1.4 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (0.86 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), and phenanthrene (24 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of benzo(a)anthracene (0.99 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (0.88 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (1.1 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), dibenzo(a,h)anthracene (0.16 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (2.2 µg/g vs. the *Table 7 Standard* of 0.69 µg/g) and indeno(1,2,3-c,d)pyrene (0.55 µg/g vs. the *Table 7 Standard* of 0.38 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of acenaphthylene (13 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (22 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (67 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (57 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (65 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(ghi)perylene (27 µg/g vs. the *Table 7 Standard* of 6.6 µg/g), benzo(k)fluoranthene (26 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (55 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (9.1 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (120 µg/g vs. the *Table 7 Standard* of 0.69 µg/g), indeno(1,2,3-c,d)pyrene (29 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (9.1 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (2.3 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), phenanthrene (75 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) and

pyrene (120 µg/g vs. the *Table 7 Standard* of 78 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*; and

- The concentration of benzo(a)pyrene (0.32 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

6.6.4 Metals

The soil sample analytical results for metals parameters, along with the corresponding *Table 7 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of metals in the soil samples submitted for analysis were below the *Table 7 Standards*, except for the following:

- The concentration of barium (430 µg/g vs. the *Table 7 Standard* of 390 µg/g), reported for soil sample BH106 SS2, collected at borehole BH106 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;
- The concentration of lead (150 µg/g vs. the *Table 7 Standard* of 120 µg/g), reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentration of boron (hot water soluble) (2.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), reported for soil sample BH108 SS1, collected at borehole BH108 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards;*
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), lead (350 µg/g vs. the *Table 7 Standard* of 120 µg/g) and molybdenum (7.9 µg/g vs. the *Table 7 Standard* of 6.9 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), cadmium (1.8 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (720 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (10 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (1,100 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*; and

- The concentrations of cadmium (1.4 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (470 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (1.3 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (460 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

6.6.5 General Comments on Soil Quality

The soil sample results show no evidence of chemical or biological transformations of chemical parameters in the subsurface.

6.7 Groundwater Quality

Groundwater samples were collected from monitoring wells MW-1, MW-3, MW110, MW201, MW202 and MW203, and submitted for analysis of the COPCs to assess for the presence of subsurface impacts within the APECs identified in the Pinchin Phase One ESA and for the delineation of identified impacts. The locations of the monitoring wells are shown on Figure 7. The groundwater sample collection depths and laboratory analysis are summarized in Table 7. All groundwater samples collected for metals analysis were filtered in the field using dedicated, disposable 0.45 micron in-line filters prior to preservation in accordance with the *Analytical Protocol*.

The groundwater sample analytical results were compared to the *Table 7 Standards* and the following subsections provide a discussion of the findings.

6.7.1 VOCs

The groundwater analytical results for VOCs, along with the corresponding *Table 7 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of VOCs in the groundwater samples submitted for analysis were below the *Table 7 Standards*, except for the following:

- The concentrations of benzene (23 micrograms per litre (µg/L) vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (66 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample MW-1, collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*; and
- The concentrations of benzene (21 µg/L vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (73 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*.

6.7.2 PHCs F1-F4

The groundwater analytical results for PHCs F1-F4, along with the corresponding *Table 7 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of PHCs F1-F4 in the groundwater samples submitted for analysis met the *Table 7 Standards*, except for the following:

- The concentration of PHCs F3 (540 µg/L vs. the *Table 7 Standard* of 500 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*.

6.7.3 PAHs

The groundwater analytical results for PAHs, along with the corresponding *Table 7 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of PAHs in the groundwater samples submitted for analysis met the *Table 7 Standards*.

6.7.4 Metals

The groundwater analytical results for metals parameters, along with the corresponding *Table 7 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of metals parameters in the groundwater samples submitted for analysis met the *Table 7 Standards*.

6.7.5 General Comments on Groundwater Quality

The groundwater sample results show no evidence of chemical or biological transformations of chemical parameters in the subsurface.

6.8 Sediment Quality

Sediment sampling was not completed as part of this Phase Two ESA.

6.9 Quality Assurance and Quality Control Results

QA/QC comprises technical activities that are used to measure or assess the effect of errors or variability in sampling and analysis. It may also include specification of acceptance criteria for the data and corrective actions to be taken when they are exceeded. QA/QC also includes checks performed to evaluate laboratory analytical quality, checks designed to assess the combined influence of field sampling and laboratory analysis and checks to specifically evaluate the potential for cross contamination during sampling and sample handling.

The QA/QC samples collected and submitted for analysis by Pinchin during the Phase Two ESA consisted of the following:

- Field duplicate soil and groundwater samples to assess the suitability of field sampling methods and laboratory performance; and
- Trip blank water samples to assess whether ambient conditions during transport of groundwater sample containers from the analytical laboratory to the Phase Two Property and back to the analytical laboratory may have biased the groundwater sample results with respect to volatile constituents.

In addition to the above, laboratory quality control activities and sample checks employed by BV Labs included:

- Method blanks - where a clean sample is processed simultaneously with and under the same conditions (i.e., using the same reagents and solvents) as the samples being analyzed. These are used to confirm whether the instrument, reagents and solvents used are contaminant free;
- Laboratory duplicates - where two samples obtained from the sample container are analyzed. These are used to evaluate laboratory precision;
- Surrogate spike samples - where a known mass of compound not found in nature (e.g., deuterated compounds such as toluene-d8) but that has similar characteristics to the analyzed compounds is added to a sample at a known concentration. These are used to assess the recovery efficiency;
- Matrix spike samples - where a known mass of target analyte is added to a matrix sample with known concentrations. These are used to evaluate the influence of the matrix on a method’s recovery efficiency; and
- Use of standard or certified reference materials - a reference material where the content or concentration has been established to a very high level of certainty (usually by a national regulatory agency). These are used to assess accuracy.

The results of the QA/QC samples are discussed in the following subsections.

6.9.1 Soil Duplicate Results

During borehole soil sampling activities, a total of two separate soil duplicate sample pairs were submitted for laboratory analysis. The field duplicate samples were collected by vertically splitting the soil cores into two equal halves, with one half collected as the regular sample and the other half collected as the field duplicate sample. The sample pairings and corresponding laboratory analyses are as follows:

- Soil sample "BH101 SS1" and its corresponding field duplicate "DUP-1" were submitted for laboratory analysis of PHCs, VOCs, PAHs and metals; and
- Soil sample "MW110 SS2" and its corresponding field duplicate "DUP-2" were submitted for laboratory analysis of PHCs, VOCs, PAHs and metals.

The quality of the analytical results was evaluated by calculating relative percent differences (RPDs) for the parameters analyzed for the original and field duplicate samples. The RPD for each parameter was calculated using the following equation:

$$\text{RPD} = \frac{(\text{Original Concentration} - \text{Duplicate Concentration}) \text{ X } 100}{(\text{Original Concentration} + \text{Duplicate Concentration})/2}$$

An RPD was not calculated unless the parameter concentration in both the original and duplicate sample had detectable concentrations above the corresponding practical quantitation limit for the parameter, which is equal to five times the lowest laboratory reportable detection limit (RDL).

The calculated RPDs for the original and field duplicate soil samples have been compared to performance standards provided in the *Analytical Protocol.* Pinchin notes that although these performance standards only strictly apply to laboratory duplicate samples, they have been considered suitable for comparison to the field duplicate soil sample results as well.

The calculated RPDs values met the performance standards with the exception of the following:

- The RPD values for soil sample pairing BH101 SS1/DUP-1, collected from borehole BH101 at a depth of 0 to 0.76 mbgs, exceeded the corresponding performance standard of 30% for the analytical results reported for xylenes (RPD of 85%) and lead (RPD of 38%).

The primary cause of the elevated RPD values and discrepancies observed in the analytical results for soil sample pairings BH101 SS1/DUP-1 is inferred to be heterogeneity in the matrix of the fill materials from which the samples were collected. Pinchin notes that fill materials are generally more variable in terms of parameter concentrations in comparison to native, undisturbed soil deposits. As such, the observed variances in RPDs for these sample pairings are not expected to reflect deficiencies in sampling or analytical methods. Furthermore, all parameter concentrations in the soil sample pairing are below the corresponding *Table 7 Standards* so the apparent lack of precision is not considered a concern. Based on Pinchin's review of the calculated RPD values for the remainder of the collected soil duplicate sample pairings, the level of observed variance in the reported analytical results is considered acceptable for the purpose of meeting the data quality objectives of this Phase Two ESA.

6.9.2 Groundwater Sample Duplicate Results

During groundwater sampling activities, a total of three separate groundwater duplicate sample pairs were submitted for laboratory analysis. The sample pairings and corresponding laboratory analyses are as follows:

- Groundwater sample "MW-1" and its corresponding field duplicate "DUP-3" were submitted for laboratory analysis of PHCs, VOCs and PAHs;
- Groundwater sample "MW201" and its corresponding field duplicate "DUP-201" were submitted for laboratory analysis of PHCs, VOCs and PAHs; and
- Groundwater sample "MW202" and its corresponding field duplicate "DUP-202" were submitted for laboratory analysis of metals.

The calculated RPDs for the original and field duplicate groundwater samples have been compared to performance standards provided in the *Analytical Protocol.* Pinchin notes that although these performance standards only strictly apply to laboratory duplicate samples, they have been considered suitable for comparison to the field duplicate groundwater sample results as well.

The calculated RPDs values met the performance standards with the exception of the following:

- The RPD values for groundwater sample pairing MW-1/DUP-3, collected from monitoring well MW-1, exceeded the corresponding performance standard of 30% for the analytical results reported for PHCs F3 (92%).

The primary cause of the elevated RPD values and discrepancies observed in the analytical results for groundwater sample pairing MW-1/DUP-3 is inferred to be the result of different levels of sediment in the sample pairing. Although every effort was made during groundwater sampling to minimize the sediment content of the samples, minor amounts of sediment were observed in each of the samples and were included in the analysis as per the *Analytical Protocol*. The inclusion of sediment in the sample analysis has likely resulted in varying levels of positive sediment bias, which has resulted in the apparent lack of precision in the analytical results. Based on Pinchin's review of the calculated RPD values for the remainder of the collected groundwater duplicate sample pairings, the level of observed variance in the reported analytical results is considered acceptable for the purpose of meeting the data quality objectives of this Phase Two ESA.

6.9.3 Groundwater Trip Blank Results

Trip blank samples, consisting of VOC-free water contained within a set of VOC sample vials, were prepared by BV Labs and accompanied the VOC groundwater sample containers during transportation to the Phase Two Property and were stored in the coolers with the VOC groundwater samples in the field and during transportation back to BV Labs. A total of three trip blank samples (one for each laboratory submission) were submitted to BV Labs for chemical analysis of VOCs during the groundwater sampling activities completed as part of this Phase Two ESA.

As indicated in Table 7, the concentrations of the VOC parameters analyzed in the trip blank samples were below the laboratory RDLs. These findings indicate that ambient conditions during the transportation of the sample containers to and from the Phase Two Property, and during groundwater sampling, did not positively bias the VOCs parameter analytical results for the groundwater samples.

6.9.4 Deviations from Analytical Protocol

There were no deviations from the holding times, preservation methods, storage requirements and container types specified in the *Analytical Protocol* during the completion of the Phase Two ESA.

6.9.5 Laboratory Certificates of Analysis

Pinchin has reviewed the laboratory Certificates of Analysis provided by BV Labs for the samples submitted during the Phase Two ESA and confirms the following:

- All laboratory Certificates of Analysis contain a complete record of the sample submission and analysis and meet the requirements of Section 47(3) of O. Reg. 153/04;
- A laboratory Certificate of Analysis has been received for each sample submitted for analysis during the Phase Two ESA;
- All laboratory Certificates of Analysis have been included in full in Appendix D; and
- All of the analytical data reported in the Certificates of Analysis have been summarized, in full, in Tables 3 and 7.

6.9.6 Laboratory Comments Regarding Sample Analysis

BV Labs routinely conducts internal QA/QC analyses in order to satisfy regulatory QA/QC requirements. The results of the BV Labs QA/QC analyses for the submitted soil samples are summarized in the laboratory Certificates of Analyses provided in Appendix D. Also included in Appendix D are all correspondences between the laboratory and staff at Pinchin.

The following summarizes comments noted by BV Labs on the laboratory Certificates of Analysis for the submitted soil samples:

- Laboratory Certificate C0C5456 – The RDLs for PAHs in soil samples BH107 SS4, BH113 SS2 and MW114 SS1 were raised as a result of a required sample dilution due to the sample matrices. Given that detectable concentrations above the RDLs were reported for these samples or the RDLs reported for these soil samples were below the *Table 7 Standards*, there is no impact on the overall interpretation of the analytical data.

The following summarizes comments noted by BV Labs on the laboratory Certificates of Analysis for the submitted groundwater samples:

- Laboratory Certificates C0E0707 and C0N4811 – BV Labs indicated that all groundwater sample vials submitted for laboratory analysis of VOCs and PHCs F1 contained visible sediment. Based on Pinchin's field observations, the volume of sediment in the submitted groundwater sample containers was a trace to minor amount. Given that these parameters are volatile constituents and are not expected to sorb to soil particles, the presence of trace to minor amounts sediment in the sample vials is not anticipated to result in significant sample bias. Furthermore, Pinchin notes that all reported concentrations of PHCs F1 for the submitted groundwater samples were below the corresponding *Table 7 Standard*. As such, the presence of sediment does not alter the conclusion that the concentrations of PHCs F1 in the submitted groundwater samples are below the *Table 7 Standards*; and
- Laboratory Certificates C0E0707 and C0N4811 – BV Labs indicated that all groundwater sample containers submitted for laboratory analysis of PHCs F2-F4 and PAHs contained visible sediment that was included in the laboratory extraction. Based on Pinchin's field observations, the volume of sediment in the submitted groundwater sample containers was a trace to minor amount. These parameters have a tendency to sorb to soil particles. As such, the reported concentrations of PHCs F2-F4 and PAHs in the submitted groundwater samples may have been positively biased. However, Pinchin notes that all reported concentrations of PHCs F2-F4 and PAHs for the submitted groundwater samples were below the corresponding *Table 7 Standards*, with the exception of sample DUP-3 (field duplicate of MW-1) which had a concentration of PHCs F3 above the corresponding *Table 7 Standard*. Given that the concentration of PHCs F3 was below the RDL in the MW-1 sample, the elevated PHCs F3 concentration reported for sample DUP-3 is interpreted to be the result of sediment bias and unlikely to be representative of actual groundwater conditions. However, until resampling is undertaken to confirm the

sediment, the groundwater at monitoring well MW-1 will be considered to exceed the *Table 7 Standards* for PHCs.

The results of the QA/QC analyses were reviewed by the project staff at BV Labs and observed to be within the laboratory's internal requirements. Pinchin has also reviewed the laboratory Certificates of Analysis and has confirmed that the results of the analyses are acceptable for the purpose of meeting the data quality objectives of this Phase Two ESA.

The following general comments apply to the laboratory Certificates of Analysis received from BV Labs as part of this Phase Two ESA:

- The custody seal was present and intact on all submissions; and
- The temperatures of the submitted soil and groundwater samples upon receipt ranged from approximately 2 to 8 ºC, the sample submission for groundwater samples MW-1 and its corresponding duplicate (DUP-3), and MW-3. These samples were collected during June 2020 when high ambient air and ground temperatures were present. The groundwater samples were placed in coolers with ice immediately after sample collection and were delivered to BV Labs within hours of sampling. As such, it is possible that there was insufficient time between sample collection and delivery to the laboratory for the groundwater samples to be cooled to temperatures below 8 ºC. Given these factors, it is the QP's opinion that the elevated sample temperatures reported by BV Labs for these samples did not bias the analytical results.

6.9.7 QA/QC Sample Summary

The overall evaluation of the QA/QC sample results indicates no issues with respect to field collection methods and laboratory performance, and no apparent bias due to ambient conditions at the Phase Two Property and during transportation of the sample containers/samples to and from the analytical laboratory.

As such, it is the QP's opinion that the soil and groundwater analytical data obtained during the Phase Two ESA are representative of actual Site conditions and are appropriate for meeting the objective of assessing whether the soil and groundwater at the Phase Two Property meets the applicable MECP Site Condition Standards.

6.10 Phase Two Conceptual Site Model

The Phase Two Conceptual Site Model will be included in a revised version of this report once soil remediation has been completed.

7.0 CONCLUSIONS

Pinchin completed a Phase Two ESA at the Phase Two Property in accordance with the requirements stipulated in O. Reg. 153/04 for the purpose of filing an RSC. The RSC is required by the Client in relation to the future redevelopment of the Phase Two Property from a mixed commercial/residential to residential land use.

The Phase Two ESA completed by Pinchin included the advancement of 18 boreholes at the Phase Two Property, five of which were completed as groundwater monitoring wells to facilitate the sampling of groundwater, and the resampling of two existing groundwater monitoring well installed by Pinchin in 2018.

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *Table 7 Standards* for residential land use and coarse-textured soils. Soil samples were collected from each of the borehole locations and submitted for laboratory analysis of VOCs, PHCs, PAHs and metals. In addition, groundwater samples were collected from four newly-installed monitoring wells, as well as two previously-installed monitoring wells, and submitted for laboratory analysis of VOCs, PHCs, PAHs and/or metals.

The laboratory results for the soil samples submitted during the Phase Two ESA indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 7 Standards*, with the exception of the following:

- The concentration of xylenes (4.6 µg/g vs. the *Table 7 Standard* of 3.1 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F1 (110 µg/g vs. the *Table 7 Standard* of 55 µg/g) reported for soil sample BH104 SS1, collected at borehole BH104 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F3 (730 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F2 (220 µg/g vs. the *Table 7 Standard* of 98 µg/g) and PHCs F3 (4,500 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;
- The concentration of PHCs F3 (430 µg/g vs. the *Table 7 Standard* of 300 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;

- The concentrations of acenaphthylene (1.1 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (7.8 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (16 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (12 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (15 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(k)fluoranthene (5.6 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (11 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (2.0 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (32 µg/g vs. the *Table 7 Standard* of 0.69 µg/g), indeno(1,2,3-c,d)pyrene (6.5 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (1.4 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (0.86 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), and phenanthrene (24 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of benzo(a)anthracene (0.99 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (0.88 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (1.1 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), dibenzo(a,h)anthracene (0.16 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (2.2 µg/g vs. the *Table 7 Standard* of 0.69 µg/g) and indeno(1,2,3-c,d)pyrene (0.55 µg/g vs. the *Table 7 Standard* of 0.38 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of acenaphthylene (13 µg/g vs. the *Table 7 Standard* of 0.15 µg/g), anthracene (22 µg/g vs. the *Table 7 Standard* of 0.67 µg/g), benzo(a)anthracene (67 µg/g vs. the *Table 7 Standard* of 0.5 µg/g), benzo(a)pyrene (57 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), benzo(b)fluoranthene (65 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), benzo(ghi)perylene (27 µg/g vs. the *Table 7 Standard* of 6.6 µg/g), benzo(k)fluoranthene (26 µg/g vs. the *Table 7 Standard* of 0.78 µg/g), chrysene (55 µg/g vs. the *Table 7 Standard* of 7 µg/g), dibenzo(a,h)anthracene (9.1 µg/g vs. the *Table 7 Standard* of 0.1 µg/g), fluoranthene (120 µg/g vs. the *Table 7 Standard* of 0.69 µg/g), indeno(1,2,3-c,d)pyrene (29 µg/g vs. the *Table 7 Standard* of 0.38 µg/g), 1- & 2-methylnaphthalene (9.1 µg/g vs. the *Table 7 Standard* of 0.99 µg/g), naphthalene (2.3 µg/g vs. the *Table 7 Standard* of 0.6 µg/g), phenanthrene (75 µg/g vs. the *Table 7 Standard* of 6.2 µg/g) and pyrene (120 µg/g vs. the *Table 7 Standard* of 78 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;

- The concentration of benzo(a)pyrene (0.32 µg/g vs. the *Table 7 Standard* of 0.3 µg/g), reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentration of barium (430 µg/g vs. the *Table 7 Standard* of 390 µg/g), reported for soil sample BH106 SS2, collected at borehole BH106 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*;
- The concentration of lead (150 µg/g vs. the *Table 7 Standard* of 120 µg/g), reported for soil sample BH107 SS4, collected at borehole BH107 from a depth of 1.83 to 2.59 mbgs, exceeded the *Table 7 Standards*;
- The concentration of boron (hot water soluble) (2.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), reported for soil sample BH108 SS1, collected at borehole BH108 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), lead (350 µg/g vs. the *Table 7 Standard* of 120 µg/g) and molybdenum (7.9 µg/g vs. the *Table 7 Standard* of 6.9 µg/g) reported for soil sample BH109 SS3, collected at borehole BH109 from a depth of 1.22 to 1.83 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of boron (hot water soluble) (1.6 µg/g vs. the *Table 7 Standard* of 1.5 µg/g), cadmium (1.8 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (720 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (10 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (1,100 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample BH113 SS2, collected at borehole BH113 from a depth of 0.61 to 1.22 mbgs, exceeded the *Table 7 Standards*; and
- The concentrations of cadmium (1.4 µg/g vs. the *Table 7 Standard* of 1.2 µg/g), lead (470 µg/g vs. the *Table 7 Standard* of 120 µg/g), mercury (1.3 µg/g vs. the *Table 7 Standard* of 0.27 µg/g), and zinc (460 µg/g vs. the *Table 7 Standard* of 340 µg/g) reported for soil sample MW114 SS1, collected at borehole MW114 from a depth of 0 to 0.76 mbgs, exceeded the *Table 7 Standards*.

The laboratory results for all groundwater samples submitted during the Phase Two ESA indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 7 Standards*, with the exception of the following:

- The concentrations of benzene (23 µg/L vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (66 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample MW-1, collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*;
- The concentrations of benzene (21 µg/L vs. the *Table 7 Standard* of 0.5 µg/L) and ethylbenzene (73 µg/L vs. the *Table 7 Standard* of 54 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*; and
- The concentration of PHCs F3 (540 µg/L vs. the *Table 7 Standard* of 500 µg/L) reported for groundwater sample DUP-3 (field duplicate of sample MW-1), collected from monitoring well MW-1 at a depth interval of approximately 4.5 to 7.6 mbgs, exceeded the *Table 7 Standards*.

The maximum reported soil and groundwater concentrations for the parameters analyzed are summarized in Tables 8 and 9, respectively.

With respect to the identified soil and groundwater parameter exceedances summarized above, remediation to meet the *Table 7 Standards* and/or the completion of a Risk Assessment in accordance with O. Reg. 153/04 will be required to develop Property Specific Standards for the parameters exceeding the *Table 7 Standards* before an RSC can be filed by the Qualified Person for the Phase Two Property.

7.1 Signatures

This Phase Two ESA was undertaken under the supervision of Robert MacKenzie, B.Sc., P.Geo., QP_{ESA} in accordance with the requirements of O. Reg. 153/04 to support the filing of an RSC for the Phase Two Property.

7.2 Terms and Limitations

This Phase Two ESA was performed for 1213763 Ontario Inc. (Client) in order to investigate potential environmental impacts at 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue in Ottawa, Ontario (Site). The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property. This Phase Two ESA does not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples have been analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on a property. Performance of this Phase Two ESA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the Site, and recognizes reasonable limits on time and cost.

This Phase Two ESA was performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This report was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized proposal for this project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

8.0 REFERENCES

The following documents provided information used in this report:

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- Paterson Group Inc. *"Phase I-II Environmental Site Assessment, 319 & 320 McRae Avenue, Ottawa, Ontario"*. November 19, 2008.
- Paterson Group Inc. *"Phase I Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street and 311 Tweedsmuir Avenue, Ottawa, Ontario"*. November 3, 2014.
- Paterson Group Inc. *"Phase I – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*. January 28, 2016.
- Paterson Group Inc. *"Phase II – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*. January 28, 2016.
- Paterson Group Inc. *"Phase II – Environmental Site Assessment, Commercial and Residential Properties, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*. April 21, 2017.
- Pinchin Ltd. *"FINAL Phase I Environmental Site Assessment, 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*. November 14, 2018.
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- Pinchin Ltd. *"Phase One Environmental Site Assessment, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*. April 30, 2020.
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230236.006 RSC Phase Two ESA McRae Scott & Tweedsmuir Ottawa ON GWL

Template: Master Report for RSC Phase Two ESA Report – Impacted Site, EDR, February 24, 2020

9.0 FIGURES AND TABLES

PINCHIN

PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND
311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

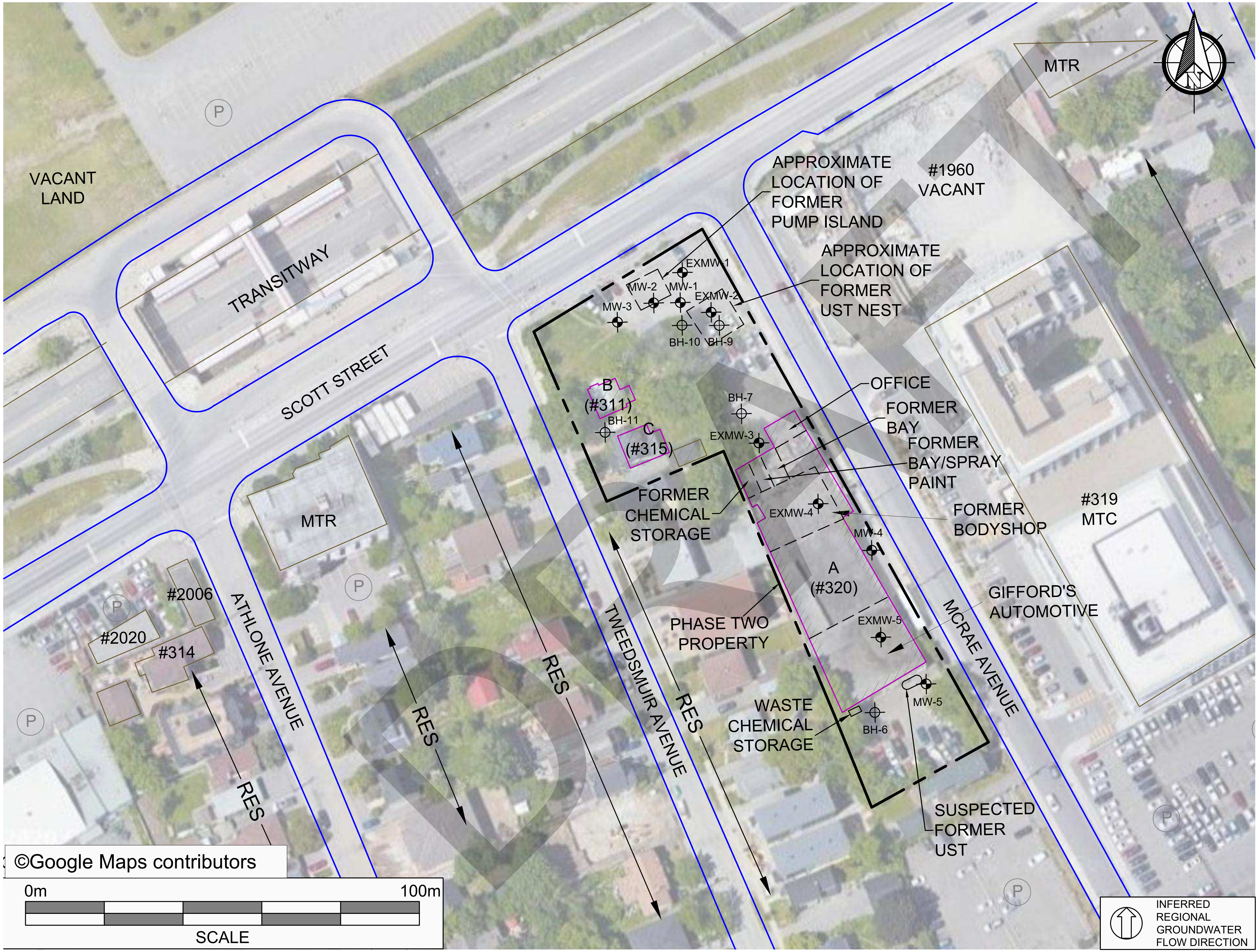
FIGURE NAME
KEY MAP

FIGURE NO.
1

SCALE
AS SHOWN

PROJECT NO.
230236.006

DATE
NOVEMBER 2020



LEGEND

- ⌐ ¬ PHASE TWO PROPERTY BOUNDARY
- ▨ SITE BUILDING
- RES RESIDENTIAL
- MTR MULTI-TENANT RESIDENTIAL
- COM COMMERCIAL
- UST UNDERGROUND STORAGE TANK
- Ⓟ PARKING
- ⌖ BOREHOLE
- ⌖ MONITORING WELL

PINCHIN

PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
PHASE TWO PROPERTY

SCALE AS SHOWN	PROJECT NO. 230236.006
DATE NOVEMBER 2020	FIGURE NO. 2

LEGEND

🟧 INDUSTRIAL/COMMERCIAL/COMMUNITY LAND USE

🟩 RESIDENTIAL/PARKLAND/INSITUTIONAL LAND USE

— PHASE TWO PROPERTY BOUNDARY

- - PHASE ONE STUDY AREA BOUNDARY

COM	COMMERCIAL
MTC	MULTI-TENANT COMMERCIAL
MTR	MULTI-TENANT RESIDENTIAL
RES	RESIDENTIAL
RFO	RETAIL FUEL OUTLET
UST	UNDERGROUND STORAGE TANK

PINCHIN

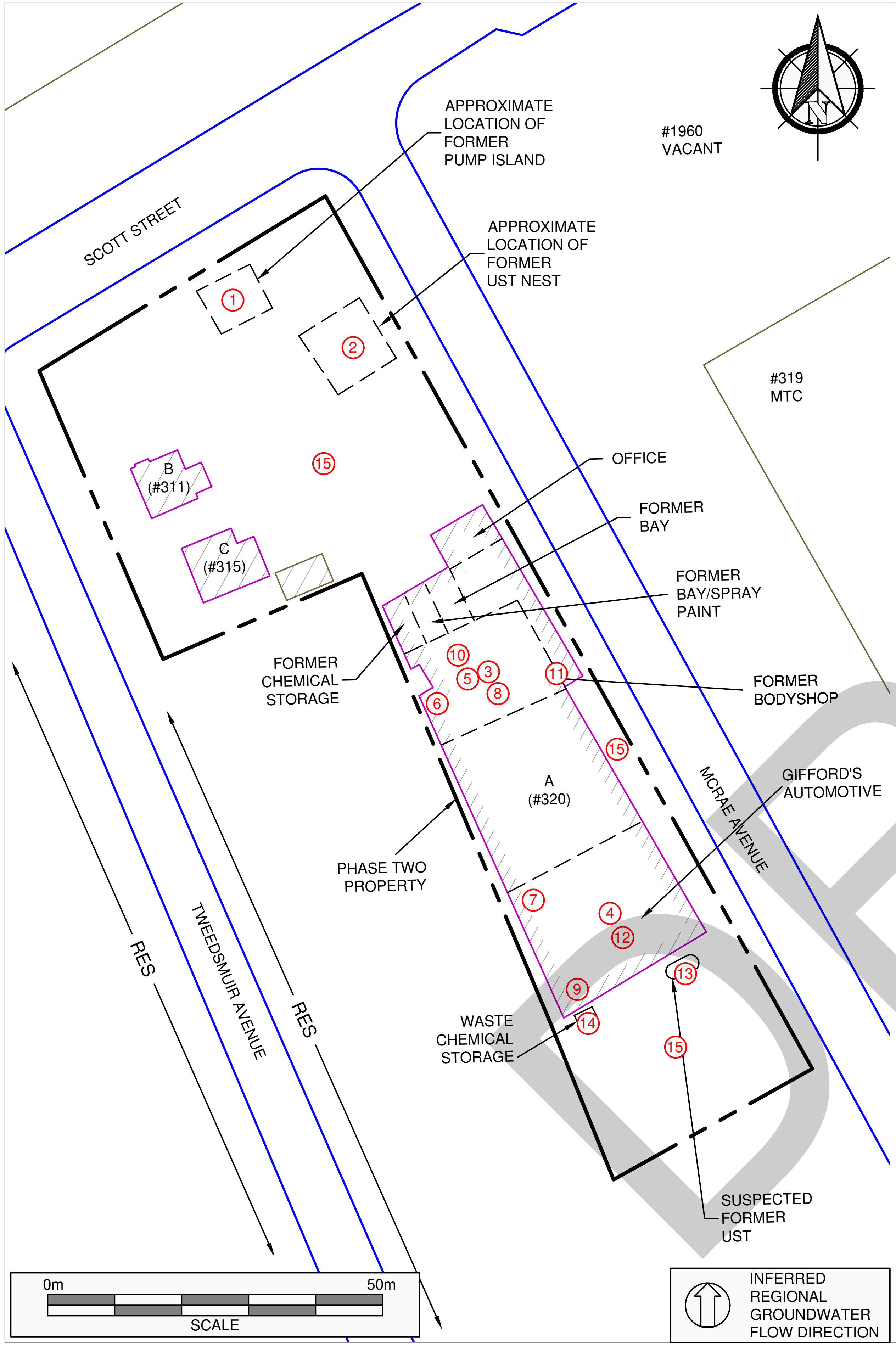
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
PHASE ONE STUDY AREA

SCALE AS SHOWN	PROJECT NO. 230236.006
DATE NOVEMBER 2020	FIGURE NO. 3



PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-1	Underground storage tanks associated with a retail fuel outlet located (RFO) in the northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil and Groundwater
PCA-2	Pump island associated with a retail fuel outlet located in the northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	Yes	Soil and Groundwater
PCA-3	An automotive repair/servicing operation within the north tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	Yes	Soil and Groundwater
PCA-4	An automotive repair/servicing operation within the south tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	Yes	Soil and Groundwater
PCA-5	Automotive wrecking facility associated with automotive repair/servicing operation within the north portion of the Site Building A.	Item 49 - Salvage Yard, including Automobile Wrecking	On-Site	Yes	Soil and Groundwater
PCA-6	Two former 1,100-L single-walled steel aboveground storage tanks (ASTs) containing new oil within the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil
PCA-7	One 1,008-L single-walled steel AST containing new oil within the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil
PCA-8	One 910-L single-walled steel AST containing waste oil within the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil
PCA-9	One 910-L single-walled steel AST containing waste oil within the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil
PCA-10	Former commercial autobody shop within the north portion of Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	Yes	Soil and Groundwater
PCA-11	An oil/water separator within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	Yes	Soil and Groundwater
PCA-12	An oil/water separator within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	Yes	Soil and Groundwater
PCA-13	Potential UST adjacent to the south elevation of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Yes	Soil and Groundwater
PCA-14	Waste liquid storage (i.e., waste antifreeze and other unknown automotive fluids) adjacent to the southwest corner of Site Building A.	Other - Hazardous Waste Generation	On-Site	Yes	Soil
PCA-15	Importation of fill material to Phase One Property.	Item 30 - Importation of Fill Material of Unknown Quality	On-Site	Yes	Soil

LEGEND

▬	PHASE TWO PROPERTY BOUNDARY
RES	RESIDENTIAL
APEC	AREA OF ENVIRONMENTAL CONCERN
PCA	POTENTIALLY CONTAMINATING ACTIVITY
MTC	MULTI-TENANT COMMERCIAL
UST	UNDERGROUND STORAGE TANK
(#)	PCA CONTRIBUTES TO AN APEC
(#)	PCA DOES NOT CONTRIBUTE TO AN APEC

PINCHIN

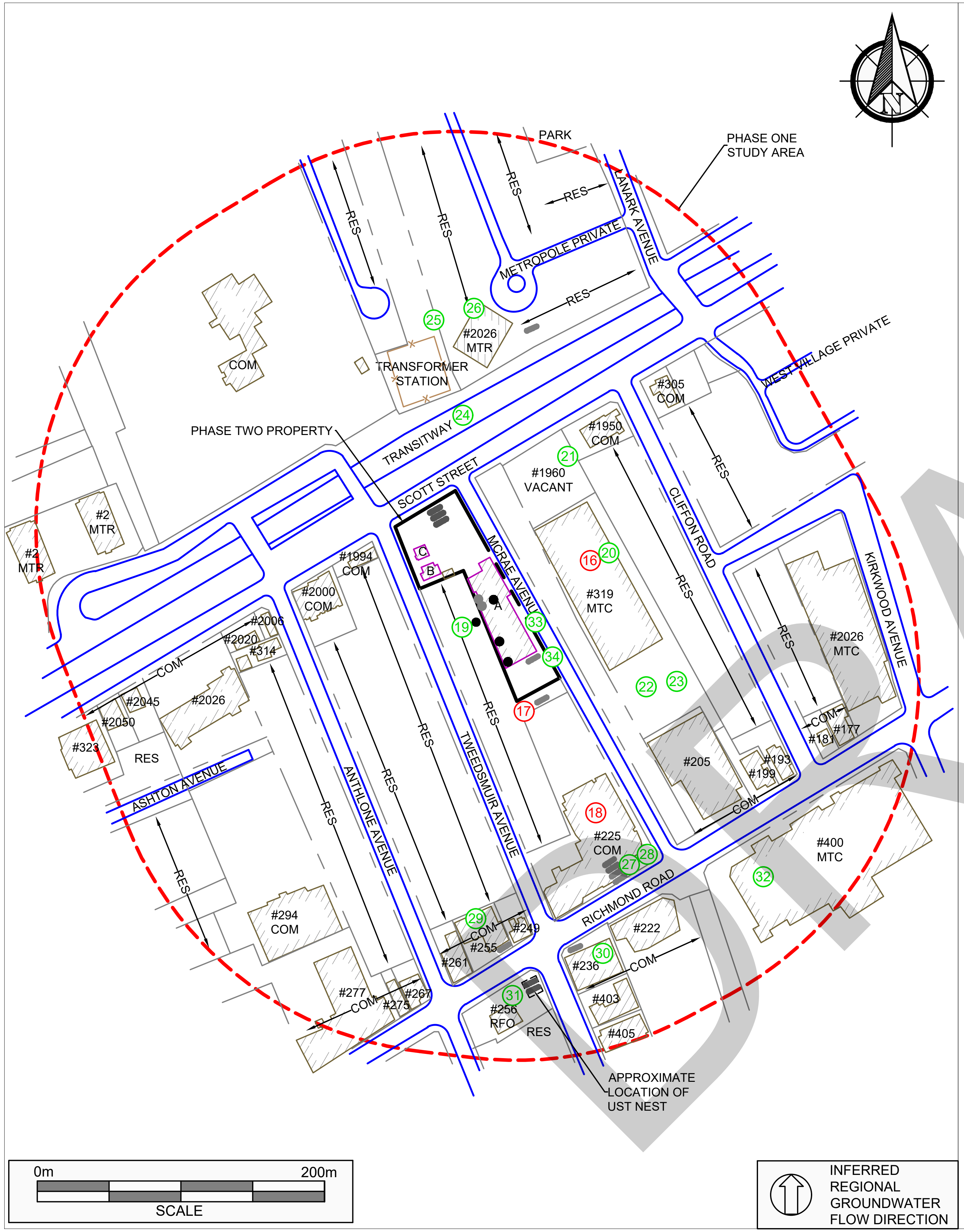
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
POTENTIALLY CONTAMINATING ACTIVITIES - ON-SITE

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	4



PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-16	Former industrial operation (i.e., commercial/light industrial building and associated exterior storage areas) located at 319 McCrae Avenue, east of the Phase One Property.	Other - Industrial Operations	Off-Site	Yes	Groundwater
PCA-17	Fuel UST south of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	Yes	Groundwater
PCA-18	An automotive repair/servicing operation (Otto's Subaru or Otto's Service Centre Ltd.), south of the Phase One Property.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	Yes	Groundwater
PCA-19	Spill of a small quantity of furnace oil at residence at 325 Tweedsmuir Avenue, west of the Phase One Property.	Other - Spill	Off-Site	No	Groundwater
PCA-20	Spill of hydraulic oil (approximately 375 L) at 319 McRae Ave, east of the Phase One Property.	Other - Spill	Off-Site	No	Groundwater
PCA-21	Gervais Motors Ltd., an automotive repair/servicing operation, that was located at 1960 Scott Street from 1984 until 1998.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	No	Groundwater
PCA-22	Fuel storage tank located at 359 McRae Avenue, southeast of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-23	Leak of heating oil from a UST (approximately 50 L) at 359 McRae Avenue, southeast of the Phase One Property.	Other - Spill	Off-Site	No	Groundwater
PCA-24	A railway line formerly located northwest of the Phase One Property.	Item 46 - Rail Yards, Tracks and Spurs	Off-Site	No	Groundwater
PCA-25	A rail yard formerly located north-northeast of the Phase One Property.	Item 46 - Rail Yards, Tracks and Spurs	Off-Site	No	Groundwater
PCA-26	Fuel UST within former rail yard located north-northeast of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-27	A former RFO located at 225 Richmond Road, south of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-28	Automotive repair/servicing operation located at 225 Richmond Road, south of the Phase One Property.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	No	Groundwater
PCA-29	Former RFO located at 255 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-30	Former RFO located at 236 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-31	Former RFO located at 256 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Groundwater
PCA-32	Former large-scale printing operation (Crain Printers) at 190 Richmond Road, southeast of the Phase One Property.	Item 31 - Ink Manufacturing, Processing and Bulk Storage	Off-Site	No	Groundwater
PCA-33	Pole-mounted oil-cooled transformer located adjacent to the east of Gifford's Automotive (south portion of Site Building A).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Soil
PCA-34	Pole-mounted oil-cooled transformer located adjacent to the southeast corner of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Soil

LEGEND

━	PHASE TWO PROPERTY BOUNDARY
╍	PHASE ONE STUDY AREA BOUNDARY
COM	COMMERCIAL
MTC	MULTI-TENANT COMMERCIAL
MTR	MULTI-TENANT RESIDENTIAL
RES	RESIDENTIAL
RFO	RETAIL FUEL OUTLET
UST	UNDERGROUND STORAGE TANK
APEC	AREA OF ENVIRONMENTAL CONCERN
PCA	POTENTIALLY CONTAMINATING ACTIVITY
▬	UNDERGROUND STORAGE TANK
●	ABOVEGROUND STORAGE TANK
▬	FORMER UNDERGROUND STORAGE TANK
●	FORMER ABOVEGROUND STORAGE TANK
(#)	PCA CONTRIBUTES TO AN APEC
(#)	PCA DOES NOT CONTRIBUTE TO AN APEC

PINCHIN

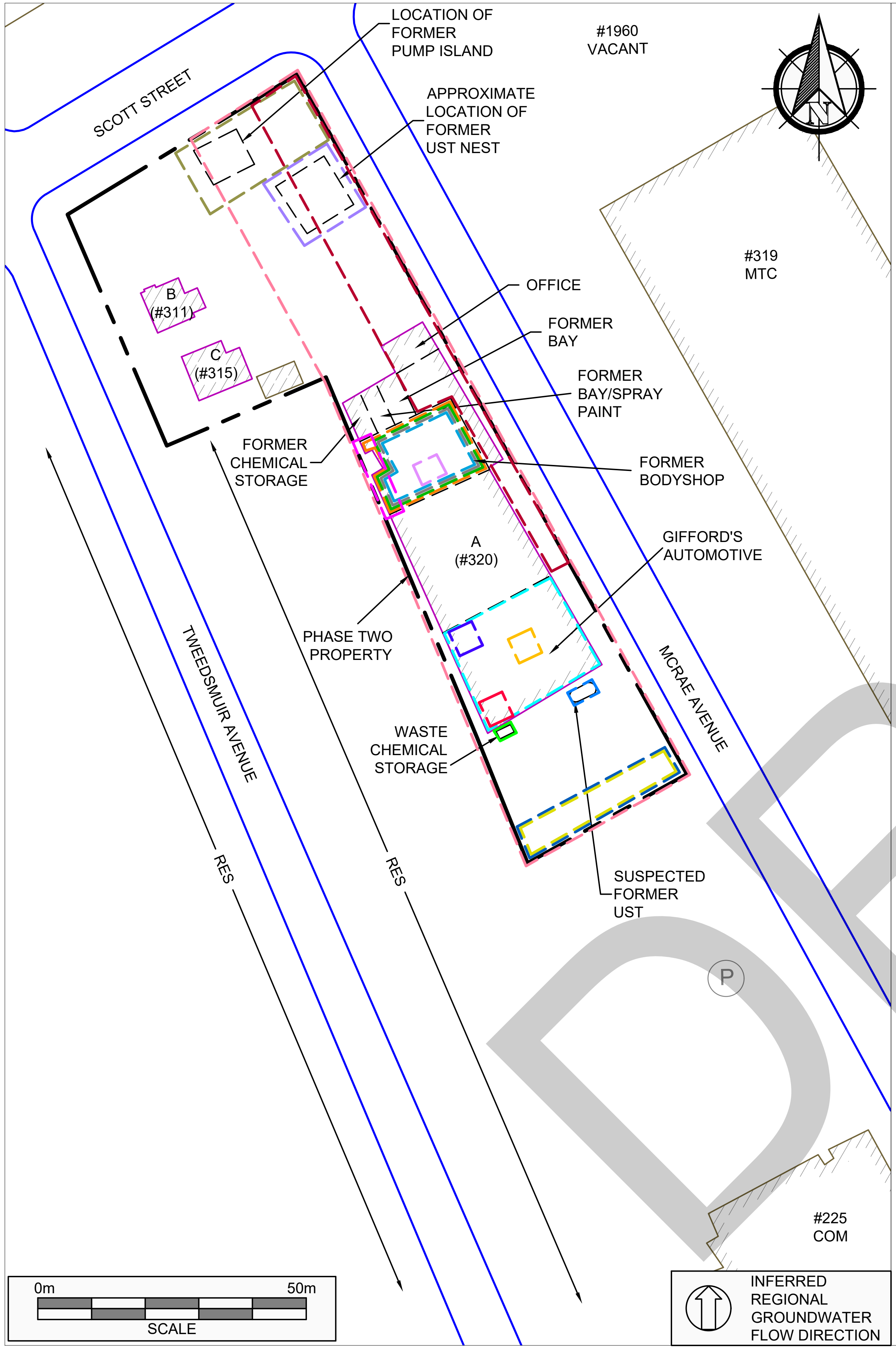
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
POTENTIALLY CONTAMINATING ACTIVITIES - OFF-SITE

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	5



Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1	Northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-2	Northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-3	North tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-4	South tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-5	North tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-6	Along the west wall of the north tenant space in Site Building A	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-7	Along the north wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-8	Along the south wall of the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-9	Along the south wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-10	Within the north tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-11	Within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-12	Within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-13	Adjacent to the southeast corner of the exterior of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-14	Adjacent to the southwest corner of the exterior of Site Building A.	Other – Hazardous Waste Generation	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-15	Southeast, east and northeast portions of the Phase One Property.	Item 58 - Waste Disposal and Waste Management, including Thermal Treatment, Landfilling and Transfer of Waste, Other Than Use of Biosoils as Soil Conditioners	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-16	Approximately 15 m east of the Phase One Property	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-17	Approximately 20 m south of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-18	Approximately 75 m south of the Phase One Property	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

LEGEND

▬	PHASE TWO PROPERTY BOUNDARY
MTC	MULTI-TENANT COMMERCIAL
RES	UNDERGROUND STORAGE TANK
COM	UNDERGROUND STORAGE TANK
UST	UNDERGROUND STORAGE TANK
APEC	AREA OF ENVIRONMENTAL CONCERN

☐ APEC-1
☐ APEC-2
☐ APEC-3
☐ APEC-4
☐ APEC-5
☐ APEC-6
☐ APEC-7
☐ APEC-8
☐ APEC-9
☐ APEC-10
☐ APEC-11
☐ APEC-12
☐ APEC-13
☐ APEC-14
☐ APEC-15
☐ APEC-16
☐ APEC-17
☐ APEC-18

PINCHIN

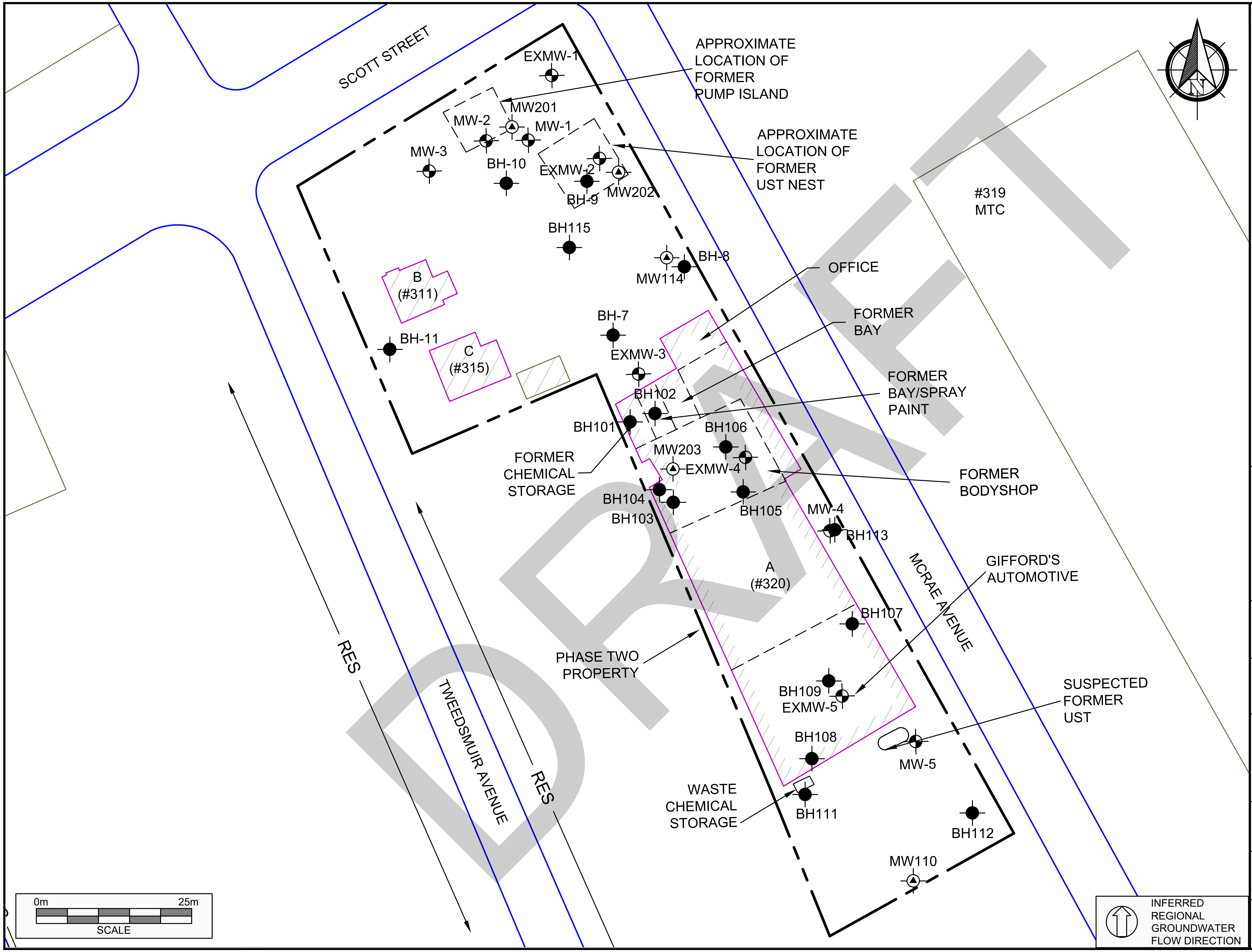
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	6



LEGEND

- PHASE TWO PROPERTY BOUNDARY

RES	RESIDENTIAL
MTC	MULTI-TENANT COMMERCIAL
UST	UNDERGROUND STORAGE TANK
●	BOREHOLE (PINCHIN, 2018 AND 2020)
◬	MONITORING WELL (PINCHIN, 2020)
▨	SITE BUILDING
◐	EXISTING MONITORING WELL

PINCHIN

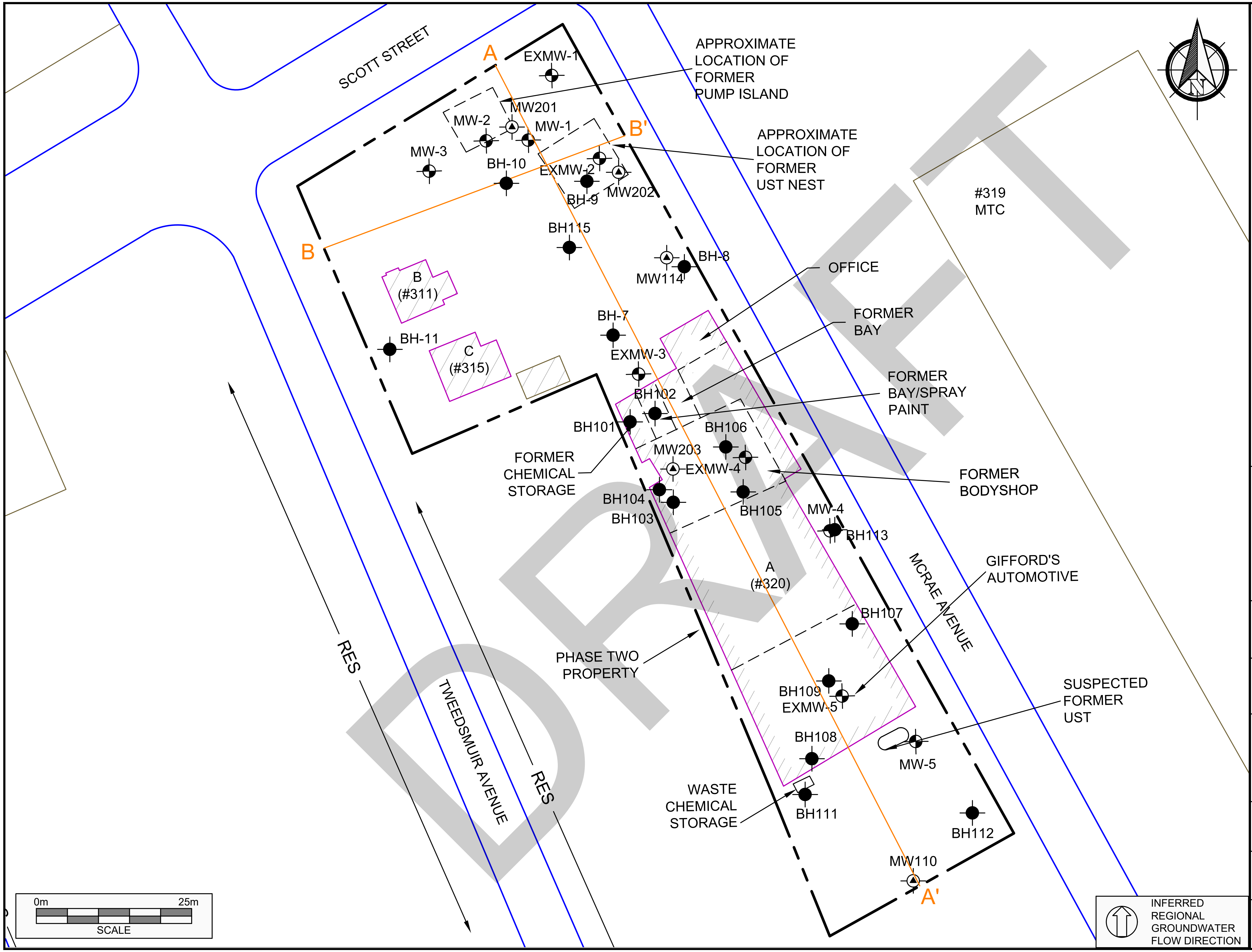
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
BOREHOLE AND MONITORING WELL LOCATION PLAN

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	7



LEGEND

—	PHASE TWO PROPERTY BOUNDARY
RES	RESIDENTIAL
MTC	MULTI-TENANT COMMERCIAL
UST	UNDERGROUND STORAGE TANK
●	BOREHOLE (PINCHIN, 2018 AND 2020)
⊕	MONITORING WELL (PINCHIN, 2020)
▨	SITE BUILDING
⊕	EXISTING MONITORING WELL
A A'	CROSS SECTION LINE

PINCHIN

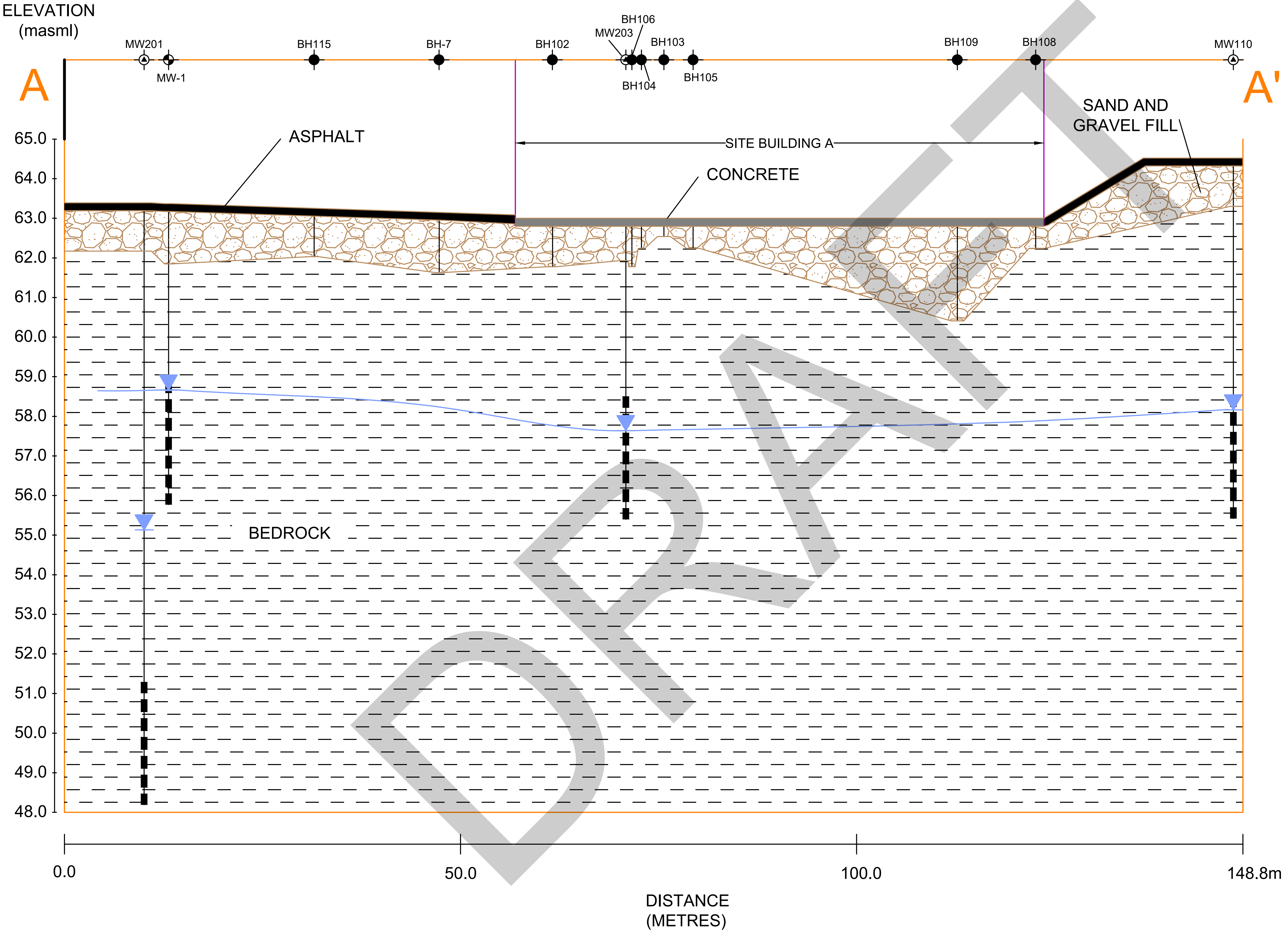
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
CROSS-SECTION LINES

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	8A



LEGEND

━ PHASE TWO PROPERTY BOUNDARY
● BOREHOLE (PINCHIN, 2018 AND 2020)
◎ MONITORING WELL (PINCHIN, 2020)
| SITE BUILDING
● EXISTING MONITORING WELL
■ ASPHALT
■ CONCRETE
▨ SAND AND GRAVEL FILL
▤ BEDROCK
WELL CASING/ BENTONITE
▼ MEASURED GROUNDWATER ELEVATION
■ WELL SCREEN
mamsl METRES ABOVE MEAN SEA LEVEL

PINCHIN

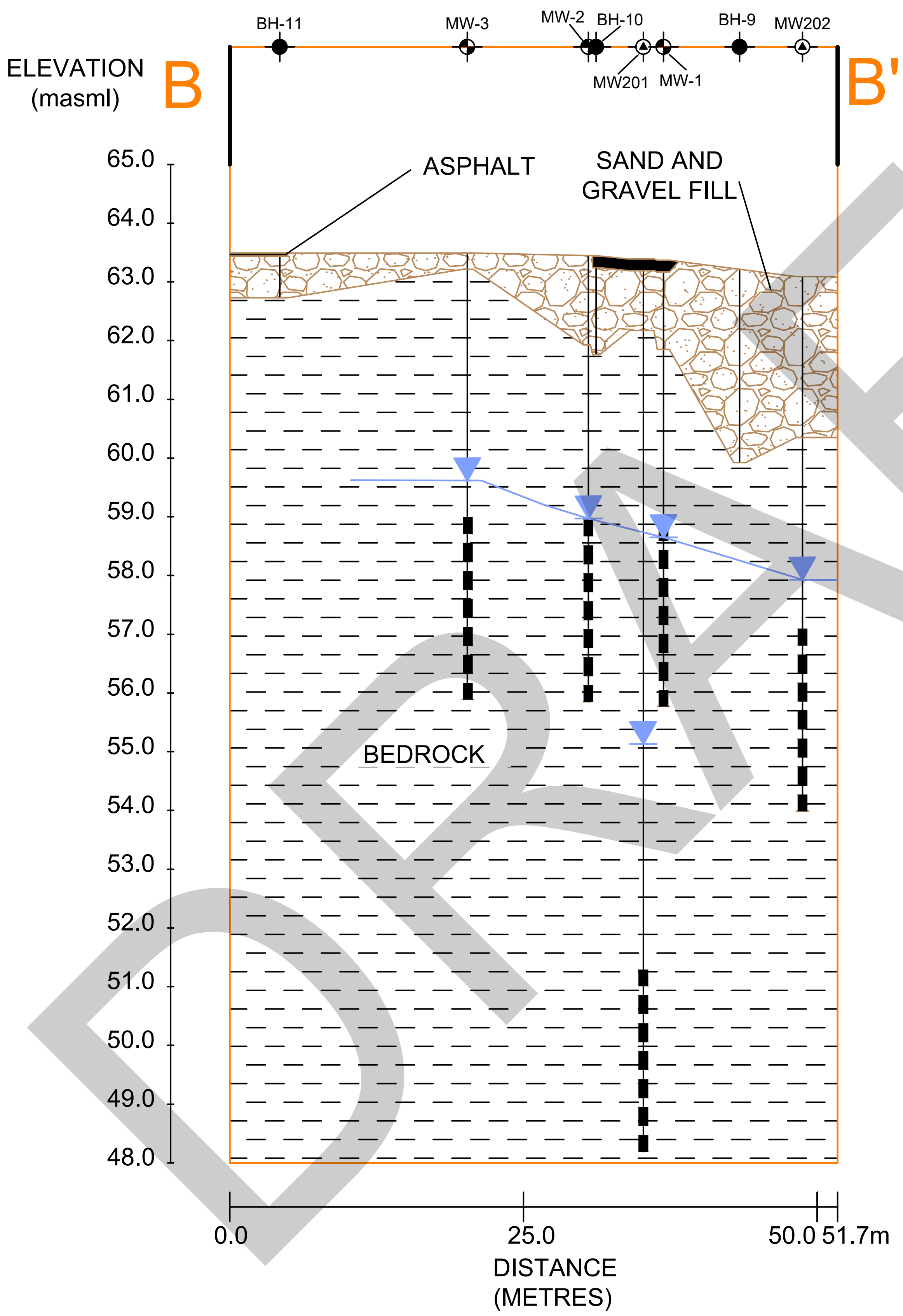
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
CROSS SECTION DETAIL A-A'

SCALE AS SHOWN	PROJECT NO. 230236.006
DATE NOVEMBER 2020	FIGURE NO. 8B



LEGEND

— PHASE TWO PROPERTY BOUNDARY

● BOREHOLE (PINCHIN, 2018 AND 2020)

⊕ MONITORING WELL (PINCHIN, 2020)

◆ EXISTING MONITORING WELL

■ ASPHALT

▨ CONCRETE

▨ SAND AND GRAVEL FILL

▤ BEDROCK

WELL CASING/ BENTONITE

▼ MEASURED GROUNDWATER ELEVATION

■ WELL SCREEN

mamsl METRES ABOVE MEAN SEA LEVEL

PINCHIN

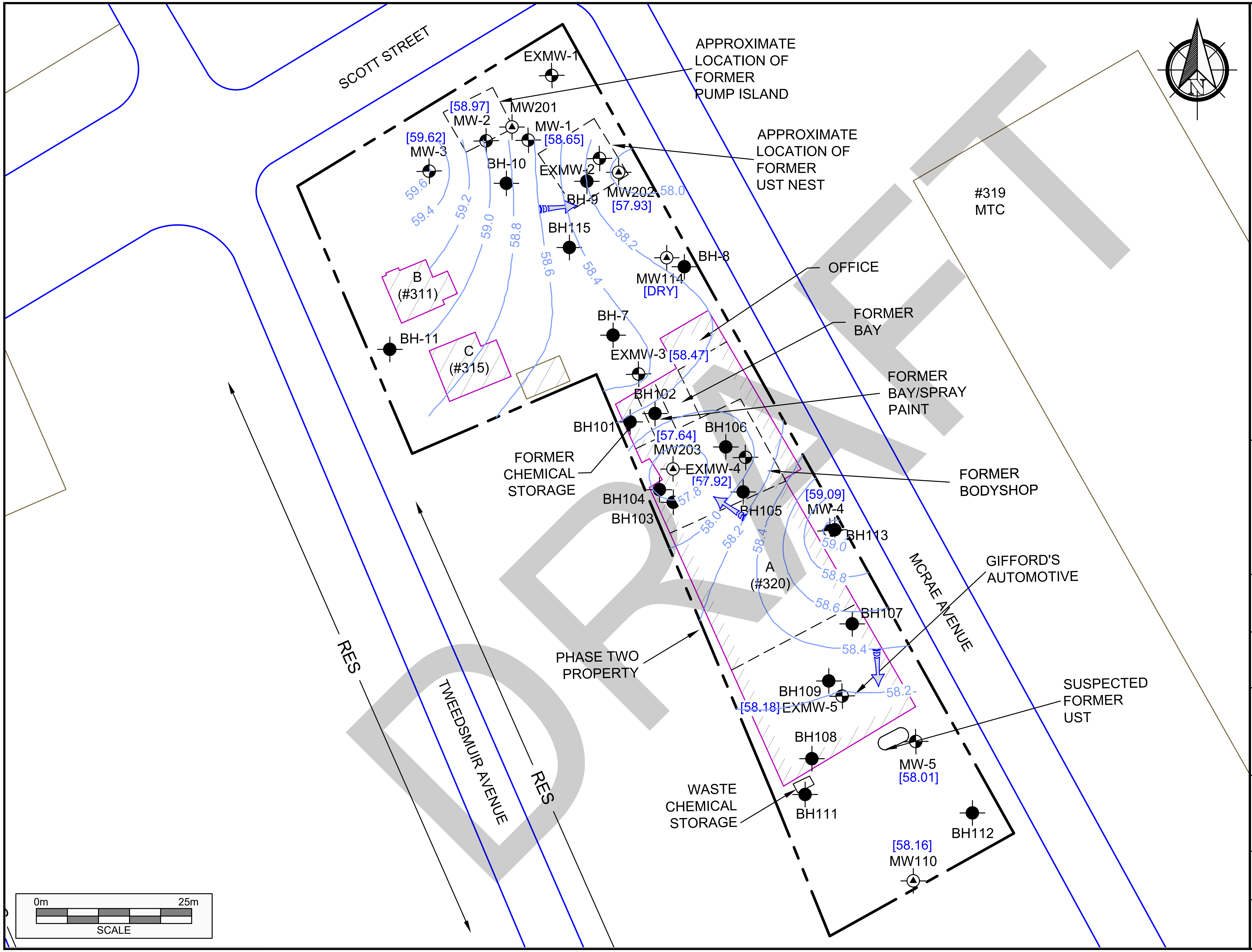
PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
CROSS SECTION DETAIL B-B'

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	8C



LEGEND

▬	PHASE TWO PROPERTY BOUNDARY
RES	RESIDENTIAL
MTC	MULTI-TENANT COMMERCIAL
UST	UNDERGROUND STORAGE TANK
●	BOREHOLE (PINCHIN, 2018 AND 2020)
⊕	MONITORING WELL (PINCHIN, 2020)
▨	SITE BUILDING
⊕	EXISTING MONITORING WELL
58.5	GROUNDWATER CONTOUR ELEVATION
[#]	GROUNDWATER ELEVATION
⇐	INFERRED GROUNDWATER FLOW DIRECTION

PINCHIN

PROJECT NAME
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
GROUNDWATER ELEVATIONS AND INFERRED GROUNDWATER FLOW DIRECTION (OCTOBER 14, 2020)

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
NOVEMBER 2020	9

Table 1 - Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1	Northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-2	Northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-3	North tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-4	South tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-5	North tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-6	Along the west wall of the north tenant space in Site Building A	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-7	Along the north wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-8	Along the south wall of the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-9	Along the south wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-10	Within the north tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-11	Within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-12	Within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-13	Adjacent to the southeast corner of the exterior of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-14	Adjacent to the southwest corner of the exterior of Site Building A.	Other – Hazardous Waste Generation	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-15	Southeast, east and northeast portions of the Phase One Property.	Item 58 - Waste Disposal and Waste Management, including Thermal Treatment, Landfilling and Transfer of Waste, Other Than Use of Biosoils as Soil Conditioners	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-16	Approximately 15 m east of the Phase One Property	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-17	Approximately 20 m south of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-18	Approximately 75 m south of the Phase One Property	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

Notes:

1 - Areas of potential environmental concern means the area on, in or under a phase one property where one or more contaminants are potentially present, as determined through the phase one environmental site assessment, including through,

(a) identification of past or present uses on, in or under the phase one property, and

(b) identification of potentially contaminating activity.

2 - Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a phase one study area

3 - When completing this column, identify all contaminants of potential concern using the Method Groups as identified in the Protocol for in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, as specified below:

List of Method Groups:

ABNs	PCBs	Metals	Electrical Conductivity
CPs	PAHs	As, Sb, Se	Cr (VI)
1,4-Dioxane	THMs	Na	Hg
Dioxins/Furans, PCDDs/PCDFs	VOCs	B-HWS	Methyl Mercury
OCs	BTEX	Cl-	Low or high pH,
PHCs	Ca, Mg	CN-	SAR

4 - When submitting a record of site condition for filing, a copy of this table must be attached

Table 2 - Table of Potentially Contaminating Activities

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Distance from Phase One Property (metres)	Location Relative to Inferred Groundwater Flow Direction[1]	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-1	Underground storage tanks associated with a retail fuel outlet located (RFO) in the northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-2	Pump island associated with a retail fuel outlet located in the northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-3	An automotive repair/servicing operation within the north tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-4	An automotive repair/servicing operation within the south tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-5	Automotive wrecking facility associated with automotive repair/servicing operation within the north portion of the Site Building A.	Item 49 - Salvage Yard, including Automobile Wrecking	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-6	Two former 1,100-L single-walled steel aboveground storage tanks (ASTs) containing new oil within the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-7	One 1,008-L single-walled steel AST containing new oil within the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-8	One 910-L single-walled steel AST containing waste oil within the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-9	One 910-L single-walled steel AST containing waste oil within the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-10	Former commercial autobody shop within the north portion of Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Distance from Phase One Property (metres)	Location Relative to Inferred Groundwater Flow Direction[1]	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-11	An oil/water separator within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-12	An oil/water separator within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-13	Potential UST adjacent to the south elevation of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-14	Waste liquid storage (i.e., waste antifreeze and other unknown automotive fluids) adjacent to the southwest corner of Site Building A.	Other - Hazardous Waste Generation	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-15	Importation of fill material to Phase One Property.	Item 30 - Importation of Fill Material of Unknown Quality	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-16	Former industrial operation (i.e., commercial/light industrial building and associated exterior storage areas) located at 319 McCrae Avenue, east of the Phase One Property.	Other - Industrial Operations	Off-Site	15	Transgradient	Yes	Groundwater
PCA-17	Fuel UST south of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	20	Upgradient	Yes	Groundwater
PCA-18	An automotive repair/servicing operation (Otto's Subaru or Otto's Service Centre Ltd.), south of the Phase One Property.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	75	Upgradient	Yes	Groundwater
PCA-19	Spill of a small quantity of furnace oil at residence at 325 Tweedsmuir Avenue, west of the Phase One Property.	Other - Spill	Off-Site	10	Transgradient	No	Groundwater

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Distance from Phase One Property (metres)	Location Relative to Inferred Groundwater Flow Direction[1]	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-20	Spill of hydraulic oil (approximately 375 L) at 319 McRae Ave, east of the Phase One Property	Other - Spill	Off-Site	15	Transgradient	No	Groundwater
PCA-21	Gervais Motors Ltd., an automotive repair/servicing operation, that was located at 1960 Scott Street from 1984 until 1998.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	15	Transgradient	No	Groundwater
PCA-22	Fuel storage tank located at 359 McRae Avenue, southeast of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	35	Transgradient	No	Groundwater
PCA-23	Leak of heating oil from a UST (approximately 50 L) at 359 McRae Avenue, southeast of the Phase One Property.	Other - Spill	Off-Site	35	Transgradient	No	Groundwater
PCA-24	A railway line formerly located northwest of the Phase One Property.	Item 46 - Rail Yards, Tracks and Spurs	Off-Site	40	Downgradient	No	Groundwater
PCA-25	A rail yard formerly located north-northeast of the Phase One Property.	Item 46 - Rail Yards, Tracks and Spurs	Off-Site	70	Downgradient	No	Groundwater
PCA-26	Fuel UST within former rail yard located north-northeast of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	125	Downgradient	No	Groundwater
PCA-27	A former RFO located at 225 Richmond Road, south of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	120	Upgradient	No	Groundwater
PCA-28	Automotive repair/servicing operation located at 225 Richmond Road, south of the Phase One Property.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	120	Upgradient	No	Groundwater

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Distance from Phase One Property (metres)	Location Relative to Inferred Groundwater Flow Direction[1]	Contributing to an APEC at the Site (Yes/No)	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-29	Former RFO located at 255 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	145	Transgradient	No	Groundwater
PCA-30	Former RFO located at 236 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	170	Transgradient	No	Groundwater
PCA-31	Former RFO located at 256 Richmond Road, southwest of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	195	Transgradient	No	Groundwater
PCA-32	Former large-scale printing operation (Crain Printers) at 190 Richmond Road, southeast of the Phase One Property.	Item 31 - Ink Manufacturing, Processing and Bulk Storage	Off-Site	210	Transgradient	No	Groundwater
PCA-33	Pole-mounted oil-cooled transformer located adjacent to the east of Gifford's Automotive (south portion of Site Building A).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	2	Transgradient	No	Soil
PCA-34	Pole-mounted oil-cooled transformer located adjacent to the southeast corner of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	5	Up/transgradient	No	Soil

Notes:

APEC – Area of Potential Environmental Concern

PCA – Potentially Contaminating Activity

1 – Location of PCA relative to the Phase One Property in relation to the inferred groundwater flow direction in the Phase One Study Area

TABLE 3
SOIL BULK ANALYTICAL RESULTS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Sample Designation	*BH101 SS1*	*DUP-1*	*BH102 SS2*	*BH103 SS1*	*BH104 SS1*	*BH105 SS1*	*BH106 SS2*	***MECP Table 7 SCS***
Sample Collection Date (dd/mm/yyyy)	*19/05/2020*	*19/05/2020*	*19/05/2020*	*19/05/2020*	*19/05/2020*	*19/05/2020*	*19/05/2020*	
Sample Depth (mbgs)	*0-0.76*	*0-0.76*	*0.61-1.22*	*0-0.46*	*0-0.76*	*0-0.76*	*0.76-1.22*	
Sample Location	*BH101*	*BH101*	*BH102*	*BH103*	*BH104*	*BH105*	*BH106*	
Laboratory Certificate of Analysis No.	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	
Date of Analysis (dd/mm/yyyy)	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	
Volatile Organic Compounds								
Acetone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16
Benzene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.21
Bromodichloromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	13
Bromoform	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.27
Bromomethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Carbon Tetrachloride	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Chlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	2.4
Chloroform	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Dibromochloromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	9.4
1,2-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.4
1,3-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	4.8
1,4-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.083
Dichlorodifluoromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	16
1,1-Dichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.5
1,2-Dichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
1,1-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
cis-1,2-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.4
trans-1,2-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.084
1,2-Dichloropropane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
1,3-Dichloropropene (Total)	<0.050	<0.050	<0.050	<0.050	<0.10	<0.050	<0.050	0.05
Ethylbenzene	<0.020	<0.020	<0.020	1.3	0.060	<0.020	<0.020	2
Ethylene Dibromide	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Hexane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	2.8
Methyl Ethyl Ketone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16
Methyl Isobutyl Ketone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.7
Methyl t-Butyl Ether (MTBE)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.75
Methylene Chloride	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.1
Styrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.7
1,1,1,2-Tetrachloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.058
1,1,2,2-Tetrachloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Tetrachloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.28
Toluene	0.047	0.14	<0.020	0.10	0.034	<0.020	<0.020	2.3
1,1,1-Trichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.38
1,1,2-Trichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Trichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.061
Trichlorofluoromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	4
Vinyl Chloride	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.02
Xylenes (Total)	0.077	0.19	<0.020	1.7	**4.6**	<0.020	<0.020	3.1
Petroleum Hydrocarbons (PHCs)								
PHCs F1 (C_6 - C_{10})	<10	<10	<10	<10	**110**	<10	<10	55
PHCs F2 ($>C_{10}$ - C_{16})	<10	<10	<10	<10	<10	<10	<10	98
PHCs F3 ($>C_{16}$ - C_{34})	<50	68	<50	<50	<50	<50	<50	300
PHCs F4 ($>C_{34}$ - C_{50})	<50	<50	<50	<50	<50	<50	<50	2800
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	7.9
Acenaphthylene	0.013	0.014	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.15
Anthracene	0.0078	0.0085	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.67
Benzo(a)anthracene	0.038	0.042	<0.0050	<0.0050	<0.0050	0.0055	<0.0050	0.5
Benzo(a)pyrene	0.046	0.049	<0.0050	<0.0050	<0.0050	0.0069	<0.0050	0.3
Benzo(b)fluoranthene	0.067	0.071	<0.0050	0.0057	<0.0050	0.010	<0.0050	0.78
Benzo(ghi)perylene	0.038	0.040	<0.0050	<0.0050	<0.0050	0.0058	<0.0050	6.6
Benzo(k)fluoranthene	0.023	0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.78
Chrysene	0.036	0.040	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	7
Dibenzo(a,h)anthracene	0.0088	0.0095	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.1
Fluoranthene	0.077	0.083	<0.0050	0.0052	<0.0050	0.012	<0.0050	0.69
Fluorene	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	62
Indeno(1,2,3-cd)pyrene	0.037	0.040	<0.0050	<0.0050	<0.0050	0.0058	<0.0050	0.38
1- & 2-Methylnaphthalene	<0.0071	<0.0071	<0.0071	0.012	<0.0071	<0.0071	<0.0071	0.99
Naphthalene	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.6
Phenanthrene	0.032	0.034	<0.0050	0.0075	<0.0050	<0.0050	<0.0050	6.2
Pyrene	0.064	0.069	<0.0050	0.0052	<0.0050	0.011	<0.0050	78
Metals								
Antimony		0.61	<0.20	<0.20	<0.20	<0.20	<0.20	7.5
Arsenic	2.8	2.5	1.4	<1.0	<1.0	1.9	<1.0	18
Barium	110	110	160	70	30	84	**430**	390
Beryllium	0.47	0.46	0.45	0.24	<0.20	0.45	0.21	4
Boron (Total)	12	11	16	8.2	<5.0	9.6	7.9	120
Boron (Hot Water Soluble)	0.89	0.80	0.34	0.11	0.083	0.55	0.19	1.5
Cadmium	0.29	0.23	<0.10	<0.10	<0.10	<0.10	<0.10	1.2
Chromium (Total)	23	23	19	40	11	21	12	160
Chromium (Hexavalent)	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	8
Cobalt	7.1	7.4	8.6	6.6	4.5	6.5	4.7	22
Copper	16	15	12	9.5	6.2	9.0	8.2	140
Lead	41	28	13	6.9	7.6	9.9	4.7	120
Mercury	0.075	0.060	<0.050	<0.050	<0.050	0.062	<0.050	0.27
Molybdenum	1.5	1.5	<0.50	<0.50	<0.50	1.2	<0.50	6.9
Nickel	16	15	17	8.5	5.6	14	9.0	100
Selenium	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4
Silver	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	20
Thallium	0.21	0.20	0.24	0.085	0.084	0.095	0.23	1
Uranium	0.67	0.63	0.55	0.45	0.44	0.66	0.29	23
Vanadium	35	35	22	20	18	41	16	86
Zinc	72	59	19	32	14	33	14	340

Notes:

MECP Table 7 SCS	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Coarse-Textured Soils
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units In Micrograms Per Gram, Unless Otherwise Noted
mbgs	Metres Below Ground Surface

TABLE 3
SOIL BULK ANALYTICAL RESULTS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Sample Designation	*BH107 SS4*	*BH108 SS1*	*BH109 SS3*	*MW110 SS2*	*DUP-2*	*BH111 SS1*	*BH112 SS2*	***MECP Table 7 SCS***
Sample Collection Date (dd/mm/yyyy)	*20/05/2020*	*20/05/2020*	*20/05/2020*	*20/05/2020*	*20/05/2020*	*14/05/2020*	*14/05/2020*	
Sample Depth (mbgs)	*1.83-2.59*	*0-0.76*	*1.22-1.83*	*0.61-1.22*	*0.61-1.22*	*0-0.76*	*0.76-1.52*	
Sample Location	*BH107*	*BH108*	*BH109*	*MW110*	*MW110*	*BH111*	*BH112*	
Laboratory Certificate of Analysis No.	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	*C0C5456*	
Date of Analysis (dd/mm/yyyy)	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	*23/05/2020-31/05/2020*	
Volatile Organic Compounds								
Acetone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16
Benzene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.21
Bromodichloromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	13
Bromoform	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.27
Bromomethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Carbon Tetrachloride	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Chlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	2.4
Chloroform	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Dibromochloromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	9.4
1,2-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.4
1,3-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	4.8
1,4-Dichlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.083
Dichlorodifluoromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	16
1,1-Dichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.5
1,2-Dichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
1,1-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
cis-1,2-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	3.4
trans-1,2-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.084
1,2-Dichloropropane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
1,3-Dichloropropene (Total)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Ethylbenzene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	2
Ethylene Dibromide	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Hexane	<0.050	0.063	0.11	<0.050	<0.050	<0.050	<0.050	2.8
Methyl Ethyl Ketone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	16
Methyl Isobutyl Ketone	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.7
Methyl t-Butyl Ether (MTBE)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.75
Methylene Chloride	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.1
Styrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.7
1,1,1,2-Tetrachloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.058
1,1,2,2-Tetrachloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Tetrachloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.28
Toluene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	2.3
1,1,1-Trichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.38
1,1,2-Trichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05
Trichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.061
Trichlorofluoromethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	4
Vinyl Chloride	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.02
Xylenes (Total)	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	3.1
Petroleum Hydrocarbons (PHCs)								
PHCs F1 (C_6 - C_{10})	<10	<10	<10	<10	<10	<10	<10	55
PHCs F2 ($>C_{10}$ - C_{16})	21	<10	<10	<10	<10	<10	<10	98
PHCs F3 ($>C_{16}$ - C_{34})	**730**	66	220	<50	<50	<50	<50	300
PHCs F4 ($>C_{34}$ - C_{50})	200	<50	90	<50	<50	<50	<50	2800
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	1.5	0.0083	0.10	<0.0050	<0.0050	<0.0050	<0.0050	7.9
Acenaphthylene	**1.1**	0.015	0.097	0.016	<0.0050	<0.0050	<0.0050	0.15
Anthracene	**7.8**	0.027	0.41	0.012	<0.0050	<0.0050	<0.0050	0.67
Benzo(a)anthracene	**16**	0.089	**0.99**	0.054	<0.0050	<0.0050	<0.0050	0.5
Benzo(a)pyrene	**12**	0.087	**0.88**	0.059	<0.0050	<0.0050	<0.0050	0.3
Benzo(b)fluoranthene	**15**	0.12	**1.1**	0.085	<0.0050	<0.0050	<0.0050	0.78
Benzo(ghi)perylene	5.7	0.063	0.54	0.047	<0.0050	<0.0050	<0.0050	6.6
Benzo(k)fluoranthene	**5.6**	0.042	0.39	0.029	<0.0050	<0.0050	<0.0050	0.78
Chrysene	**11**	0.080	0.75	0.049	<0.0050	<0.0050	<0.0050	7
Dibenzo(a,h)anthracene	**2.0**	0.016	**0.16**	0.011	<0.0050	<0.0050	<0.0050	0.1
Fluoranthene	**32**	0.17	**2.2**	0.091	<0.0050	<0.0050	<0.0050	0.69
Fluorene	3.3	0.012	0.18	<0.0050	<0.0050	<0.0050	<0.0050	62
Indeno(1,2,3-cd)pyrene	**6.5**	0.063	**0.55**	0.047	<0.0050	<0.0050	<0.0050	0.38
1- & 2-Methylnaphthalene	**1.4**	<0.0071	0.095	<0.0071	<0.0071	<0.0071	<0.0071	0.99
Naphthalene	**0.86**	0.012	0.062	<0.0050	<0.0050	<0.0050	<0.0050	0.6
Phenanthrene	**24**	0.090	1.5	0.033	<0.0050	<0.0050	<0.0050	6.2
Pyrene	24	0.15	1.7	0.085	<0.0050	<0.0050	<0.0050	78
Metals								
Antimony	5.9	1.8	3.9	<0.20	<0.20	<0.20	<0.20	7.5
Arsenic	2.1	7.1	9.8	<1.0	<1.0	<1.0	<1.0	18
Barium	150	190	180	99	82	130	51	390
Beryllium	0.32	0.66	0.41	0.30	0.31	0.37	<0.20	4
Boron (Total)	12	16	16	9.3	9.8	6.7	<5.0	120
Boron (Hot Water Soluble)	0.85	**2.6**	**1.6**	0.21	0.21	0.32	<0.050	1.5
Cadmium	0.25	0.42	0.53	<0.10	<0.10	<0.10	<0.10	1.2
Chromium (Total)	20	27	33	15	14	21	16	160
Chromium (Hexavalent)	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	8
Cobalt	6.1	12	8.6	4.9	4.9	7.0	5.0	22
Copper	59	26	140	10	12	14	6.4	140
Lead	**150**	100	**350**	3.5	3.4	3.3	2.1	120
Mercury	<0.050	0.19	0.19	<0.050	<0.050	<0.050	<0.050	0.27
Molybdenum	2.1	2.8	**7.9**	<0.50	<0.50	<0.50	<0.50	6.9
Nickel	11	19	76	10	9.4	12	7.0	100
Selenium	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.4
Silver	<0.20	0.87	0.22	<0.20	<0.20	<0.20	<0.20	20
Thallium	0.11	0.21	0.11	0.16	0.16	0.13	0.068	1
Uranium	0.60	0.69	0.64	0.46	0.48	0.53	0.43	23
Vanadium	21	38	31	23	22	37	23	86
Zinc	120	220	310	28	18	34	20	340

Notes:

MECP Table 7 SCS	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Coarse-Textured Soils
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units In Micrograms Per Gram, Unless Otherwise Noted
mbgs	Metres Below Ground Surface

TABLE 3
SOIL BULK ANALYTICAL RESULTS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Sample Designation	*BH113 SS2*	*MW114 SS1*	*BH115 SS2*	**MECP Table 7 SCS**
Sample Collection Date (dd/mm/yyyy)	*14/05/2020*	*14/05/2020*	*14/05/2020*	
Sample Depth (mbgs)	*0.61-1.22*	*0-0.76*	*0.61-1.22*	
Sample Location	*BH113*	*MW114*	*BH115*	
Laboratory Certificate of Analysis No.	*C0C5456*	*C0C5456*	*C0C5456*	
Date of Analysis (dd/mm/yyyy)	*23/05/2020-31/05/2020*	*23/05/2020-01/06/2020*	*23/05/2020 - 31/05/2020*	
Volatile Organic Compounds				
Acetone	<0.50	<0.50	<0.50	16
Benzene	<0.020	<0.020	<0.020	0.21
Bromodichloromethane	<0.050	<0.050	<0.050	13
Bromoform	<0.050	<0.050	<0.050	0.27
Bromomethane	<0.050	<0.050	<0.050	0.05
Carbon Tetrachloride	<0.050	<0.050	<0.050	0.05
Chlorobenzene	<0.050	<0.050	<0.050	2.4
Chloroform	<0.050	<0.050	<0.050	0.05
Dibromochloromethane	<0.050	<0.050	<0.050	9.4
1,2-Dichlorobenzene	<0.050	<0.050	<0.050	3.4
1,3-Dichlorobenzene	<0.050	<0.050	<0.050	4.8
1,4-Dichlorobenzene	<0.050	<0.050	<0.050	0.083
Dichlorodifluoromethane	<0.050	<0.050	<0.050	16
1,1-Dichloroethane	<0.050	<0.050	<0.050	3.5
1,2-Dichloroethane	<0.050	<0.050	<0.050	0.05
1,1-Dichloroethylene	<0.050	<0.050	<0.050	0.05
cis-1,2-Dichloroethylene	<0.050	<0.050	<0.050	3.4
trans-1,2-Dichloroethylene	<0.050	<0.050	<0.050	0.084
1,2-Dichloropropane	<0.050	<0.050	<0.050	0.05
1,3-Dichloropropene (Total)	<0.050	<0.050	<0.050	0.05
Ethylbenzene	<0.020	<0.020	<0.020	2
Ethylene Dibromide	<0.050	<0.050	<0.050	0.05
Hexane	0.15	0.090	<0.050	2.8
Methyl Ethyl Ketone	<0.50	<0.50	<0.50	16
Methyl Isobutyl Ketone	<0.50	<0.50	<0.50	1.7
Methyl t-Butyl Ether (MTBE)	<0.050	<0.050	<0.050	0.75
Methylene Chloride	<0.050	<0.050	<0.050	0.1
Styrene	<0.050	<0.050	<0.050	0.7
1,1,1,2-Tetrachloroethane	<0.050	<0.050	<0.050	0.058
1,1,2,2-Tetrachloroethane	<0.050	<0.050	<0.050	0.05
Tetrachloroethylene	<0.050	<0.050	<0.050	0.28
Toluene	0.038	0.035	0.030	2.3
1,1,1-Trichloroethane	<0.050	<0.050	<0.050	0.38
1,1,2-Trichloroethane	<0.050	<0.050	<0.050	0.05
Trichloroethylene	<0.050	<0.050	<0.050	0.061
Trichlorofluoromethane	<0.050	<0.050	<0.050	4
Vinyl Chloride	<0.020	<0.020	<0.020	0.02
Xylenes (Total)	0.31	0.04	<0.020	3.1
Petroleum Hydrocarbons (PHCs)				
PHCs F1 (C_6 - C_{10})	<10	<10	<10	55
PHCs F2 (>C_{10} - C_{16})	**220**	<10	<10	98
PHCs F3 (>C_{16} - C_{34})	**4500**	**430**	<50	300
PHCs F4 (>C_{34} - C_{50})	990	2500	63	2800
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	5.8	<0.050	<0.0050	7.9
Acenaphthylene	**13**	0.051	<0.0050	0.15
Anthracene	**22**	0.064	<0.0050	0.67
Benzo(a)anthracene	**67**	0.30	0.0092	0.5
Benzo(a)pyrene	**57**	**0.32**	0.0086	0.3
Benzo(b)fluoranthene	**65**	0.43	0.013	0.78
Benzo(ghi)perylene	**27**	0.26	0.0057	6.6
Benzo(k)fluoranthene	**26**	0.15	<0.0050	0.78
Chrysene	**55**	0.25	0.0097	7
Dibenzo(a,h)anthracene	**9.1**	0.059	<0.0050	0.1
Fluoranthene	**120**	0.57	0.023	0.69
Fluorene	10	<0.050	<0.0050	62
Indeno(1,2,3-cd)pyrene	**29**	0.26	0.0058	0.38
1- & 2-Methylnaphthalene	**9.1**	<0.071	<0.0071	0.99
Naphthalene	**2.3**	<0.050	<0.0050	0.6
Phenanthrene	**75**	0.22	0.015	6.2
Pyrene	**120**	0.49	0.019	78
Metals				
Antimony	4.3	6.6	<0.20	7.5
Arsenic	18	9.4	1.2	18
Barium	330	300	90	390
Beryllium	0.41	0.42	0.31	4
Boron (Total)	14	11	9.1	120
Boron (Hot Water Soluble)	**1.6**	1.4	0.18	1.5
Cadmium	**1.8**	**1.4**	<0.10	1.2
Chromium (Total)	45	21	15	160
Chromium (Hexavalent)	<0.18	<0.18	<0.18	8
Cobalt	9.2	7.9	5.2	22
Copper	65	46	9.6	140
Lead	**720**	**470**	6.8	120
Mercury	**10**	**1.3**	<0.050	0.27
Molybdenum	2.2	1.4	0.76	6.9
Nickel	22	21	12	100
Selenium	1.2	0.74	<0.50	2.4
Silver	0.48	0.38	<0.20	20
Thallium	0.18	0.24	0.12	1
Uranium	0.87	0.74	0.49	23
Vanadium	32	24	22	86
Zinc	**1100**	**460**	24	340

Notes:

MECP Table 7 SCS	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Coarse-Textured Soils
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units In Micrograms Per Gram, Unless Otherwise Noted
mbgs	Metres Below Ground Surface

TABLE 4

GROUNDWATER MONITORING WELL ELEVATIONS AND CONSTRUCTION DETAILS

1213763 Ontario Inc.

320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Monitoring Well	*Ground Surface Elevation (mamsl)*	*Top of Pipe Elevation (mamsl)*	*Well Construction Details*						
			Total Well Depth (mbgs)	*Stick-Up Height (metres)*	*Well Diameter (centimetres)*	*Screen Slot Size*	*Monitoring Well Screen Interval (mbgs)*	*Screen Length (metres)*	*Sealant Thickness (metres)*
MW-1	63.37	63.27	7.62	-0.10	5.1	10	4.5-7.6	3.1	4.3
MW-2	63.45	63.37	7.62	-0.08	5.1	10	4.5-7.6	3.1	4.3
MW-3	63.49	63.42	7.62	-0.07	5.1	10	4.5-7.6	3.1	4.3
MW-4	63.10	62.99	7.62	-0.11	5.1	10	4.5-7.6	3.1	4.3
MW-5	64.11	64.01	7.62	-0.10	5.1	10	4.5-7.6	3.1	4.3
MW110	64.52	64.37	9.14	-0.15	5.1	10	6.0-9.1	3.1	5.5
MW114	62.92	62.76	7.62	-0.16	5.1	10	4.5-7.6	3.1	3.1
MW201	63.39	63.23	15.24	-0.16	5.1	10	12.1-15.2	3.1	11.0
MW202	63.09	62.95	9.14	-0.14	5.1	10	6.0-9.1	3.1	4.9
MW203	63.00	62.89	7.62	-0.11	3.2	10	4.5-7.6	3.1	4.3
EXMW-1	NA	NA	7.75	NA	NA	NA	4.6-7.7	3.1	4.1
EXMW-2	NA	NA	NA	NA	NA	NA	NA	3.1	NA
EXMW-3	63.14	63.07	7.87	-0.07	3.2	10	4.8-7.9	3.1	3.1
EXMW-4	62.93	62.89	7.01	-0.04	3.2	10	3.9-7.0	3.1	3.3
EXMW-5	64.60	64.52	7.09	-0.08	3.2	10	4.0-7.1	3.1	3.6

Notes:

mamsl	Metres Above Mean Sea Level
mbgs	Metres Below Ground Surface
NA	Not Available

TABLE 5
GROUNDWATER MONITORING - WATER LEVELS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Monitoring Well	*Ground Surface Elevation (mamsl)*	*Top of Pipe Elevation (mamsl)*	*Stick-Up Height (metres)*	*Date of Monitoring (dd/mm/yyyy)*	*Calculated Depth to Groundwater from Surface (mbgs)*	*Measured Depth to Groundwater from Top of Pipe (metres)*	*Groundwater Elevation (mamsl)*	*Visual/Olfactory Observations*
MW-1	63.37	63.27	-0.10	25/05/2020	5.02	5.12	58.15	PHC-like odour
				06/08/2020	5.01	5.11	58.16	PHC-like odour
				14/10/2020	4.72	4.62	58.65	-
MW-2	63.45	63.37	-0.08	14/10/2020	4.32	4.40	58.97	-
MW-3	63.49	63.42	-0.07	25/05/2020	3.85	3.92	59.50	No sheen or odours
				06/08/2020	3.86	3.93	59.49	No sheen or odours
				14/10/2020	3.73	3.80	59.62	-
MW-4	63.10	62.99	-0.11	14/10/2020	3.79	3.90	59.09	-
MW-5	64.11	64.01	-0.10	14/10/2020	5.90	6.00	58.01	-
MW110	64.52	64.37	-0.15	14/10/2020	6.06	6.21	58.16	No sheen or odours
MW114	62.92	62.76	-0.16	14/10/2020	-	DRY	-	-
MW201	63.39	63.23	-0.16	31/08/2020	7.91	8.07	55.16	No sheen or odours
				02/09/2020	7.92	8.08	55.15	No sheen or odours
				14/10/2020	7.94	8.10	55.13	-
MW202	63.09	62.95	-0.14	31/08/2020	4.48	4.62	58.33	No sheen or odours
				02/09/2020	4.63	4.77	58.18	No sheen or odours
				14/10/2020	4.88	5.02	57.93	-
MW203	63.00	62.89	-0.11	31/08/2020	4.82	4.93	57.96	No sheen or odours
				02/09/2020	5.04	4.93	57.96	No sheen or odours
				14/10/2020	5.14	5.25	57.64	-
EXMW-3	63.14	63.07	-0.07	14/10/2020	4.53	4.60	58.47	-
EXMW-4	62.93	62.89	-0.04	14/10/2020	4.93	4.97	57.92	-
EXMW-5	64.60	64.52	-0.08	14/10/2020	6.26	6.34	58.18	-

Notes:

mamsl	Metres Above Mean Sea Level
mbgs	Metres Below Ground Surface

TABLE 6
GROUNDWATER MONITORING - NON-AQUEOUS PHASE LIQUIDS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Monitoring Well	*Top of Pipe Elevation (mamsl)*	*Date of Monitoring (dd/mm/yyyy)*	*LNAPL*					*DNAPL*				
			Measured Depth to Top of LNAPL from Top of Pipe (metres)	*Measured Depth to Bottom of LNAPL from Top of Pipe (metres)*	*LNAPL Thickness (metres)*	*Top of LNAPL Elevation (mamsl)*	*Bottom of LNAPL Elevation (mamsl)*	*Measured Depth to Top of DNAPL from Top of Pipe (metres)*	*Measured Depth to Bottom of DNAPL from Top of Pipe (metres)*	*DNAPL Thickness (metres)*	*Top of DNAPL Elevation (mamsl)*	*Bottom of DNAPL Elevation (mamsl)*
MW-1	63.27	25/05/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		06/08/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	63.37	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-3	63.42	25/05/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		06/08/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	62.99	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-5	64.01	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW110	64.37	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW114	62.76	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW201	63.23	31/08/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		09/02/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW202	62.95	31/08/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		09/02/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW203	62.89	31/08/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
		14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EXMW-3	63.07	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EXMW-4	62.89	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
EXMW-5	64.52	14/10/2020	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

DNAPL	Dense Non-Aqueous Phase Liquid
LNAPL	Light Non-Aqueous Phase Liquid
mamsl	Metres Above Mean Sea Level
mbgs	Metres Below Ground Surface
ND	Not Detected

TABLE 7
GROUNDWATER ANALYTICAL RESULTS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Sample Designation	*MW-1*	*DUP-3*	*MW-3*	*MW110*	*MW201*	*DUP-201*	***MECP Table 7 SCS***
Sample Collection Date (dd/mm/yyyy)	*06/08/2020*	*06/08/2020*	*06/08/2020*	*07/02/2020*	*09/09/2020*	*09/09/2020*	
Sample Depth (mbgs)	*4.5 - 7.6*	*4.5 - 7.6*	*4.5 - 7.6*	*6.0 - 9.1*	*12.1 - 15.2*	*12.1 - 15.2*	
Sample Location	*MW-1*	*MW-1*	*MW-3*	*MW110*	*MW201*	*MW201*	
Laboratory Certificate of Analysis No.	*C0E0707*	*C0E0707*	*C0E0707*	*C0G4922*	*C0N4811*	*C0N4811*	
Date of Analysis (dd/mm/yyyy)	*11/06/2020 - 12/06/2020*	*11/06/2020 - 12/06/2020*	*11/06/2020 - 12/06/2020*	*07/07/2020 - 09/07/2020*	*14/09/2020 - 16/09/2020*	*14/09/2020 - 16/09/2020*	
Volatile Organic Compounds							
Acetone	<15	<15	<10	<10	<10	<10	100000
Benzene	**23**	**21**	<0.20	<0.20	<0.20	<0.20	0.5
Bromodichloromethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	67000
Bromoform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5
Bromomethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.89
Carbon Tetrachloride	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.2
Chlorobenzene	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	140
Chloroform	<0.20	<0.20	<0.20	<0.20	0.64	0.75	2
Dibromochloromethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	65000
1,2-Dichlorobenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	150
1,3-Dichlorobenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	7600
1,4-Dichlorobenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5
Dichlorodifluoromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3500
1,1-Dichloroethane	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	11
1,2-Dichloroethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5
1,1-Dichloroethylene	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.5
cis-1,2-Dichloroethylene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6
trans-1,2-Dichloroethylene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6
1,2-Dichloropropane	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.58
1,3-Dichloropropene (Total)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5
Ethylbenzene	**66**	**73**	<0.20	<0.20	<0.20	<0.20	54
Ethylene Dibromide	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.2
Hexane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5
Methyl Ethyl Ketone	<10	<10	<10	<10	<10	<10	21000
Methyl Isobutyl Ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5200
Methyl t-Butyl Ether (MTBE)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	15
Methylene Chloride	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	26
Styrene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	43
1,1,1,2-Tetrachloroethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.1
1,1,2,2-Tetrachloroethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5
Tetrachloroethylene	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.5
Toluene	1.7	2.1	<0.20	<0.20	<0.20	<0.30	320
1,1,1-Trichloroethane	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	23
1,1,2-Trichloroethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.5
Trichloroethylene	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.5
Trichlorofluoromethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2000
Vinyl Chloride	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.5
Xylenes (Total)	7.5	9.9	<0.20	<0.20	<0.20	<0.20	72
Petroleum Hydrocarbons (PHCs)							
PHCs F1 (C_6 - C_{10})	350	350	<25	<25	<25	<25	420
PHCs F2 (>C_{10} - C_{16})	120	130	<100	<100	<100	<100	150
PHCs F3 (>C_{16} - C_{34})	<200	**540**	<200	<200	<200	<200	500
PHCs F4 (>C_{34} - C_{50})	<200	390	<200	<200	<200	<200	500
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	17
Acenaphthylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	1
Anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	1
Benzo(a)anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	1.8
Benzo(a)pyrene	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	<0.0090	0.81
Benzo(b)fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.75
Benzo(ghi)perylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.2
Benzo(k)fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.4
Chrysene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.7
Dibenzo(a,h)anthracene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.4
Fluoranthene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	44
Fluorene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	290
Indeno(1,2,3-cd)pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.2
1- & 2-Methylnaphthalene	2.1	2.0	<0.071	<0.071	<0.071	<0.071	1500
Naphthalene	2.5	2.3	<0.050	<0.050	<0.050	<0.050	7
Phenanthrene	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	380
Pyrene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	5.7
Metals							
Antimony	-	-	-	<0.50	-	-	16000
Arsenic	-	-	-	<1.0	-	-	1500
Barium	-	-	-	130	-	-	23000
Beryllium	-	-	-	<0.40	-	-	53
Boron (Total)	-	-	-	190	-	-	36000
Cadmium	-	-	-	<0.090	-	-	2.1
Chromium (Total)	-	-	-	<5.0	-	-	640
Chromium (Hexavalent)	-	-	-	<0.50	-	-	110
Cobalt	-	-	-	0.81	-	-	52
Copper	-	-	-	<0.90	-	-	69
Lead	-	-	-	<0.50	-	-	20
Mercury	-	-	-	<0.10	<0.10	-	0.1
Molybdenum	-	-	-	0.79	-	-	7300
Nickel	-	-	-	4.8	-	-	390
Selenium	-	-	-	<2.0	-	-	50
Silver	-	-	-	<0.090	-	-	1.2
Sodium	-	-	-	92000	-	-	1800000
Thallium	-	-	-	0.064	-	-	400
Uranium	-	-	-	0.99	-	-	330
Vanadium	-	-	-	<0.50	-	-	200
Zinc	-	-	-	5.3	-	-	890

Notes:

MECP Table 7 SCS	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition, for All Types of Property Use and Coarse-Textured Soils
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units In Micrograms Per Litre, Unless Otherwise Noted
mbgs	Metres Below Ground Surface

TABLE 7
GROUNDWATER ANALYTICAL RESULTS
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Sample Designation	*MW202*	*DUP-202*	*MW203*	*TRIP BLANK*	*TRIP BLANK*	*TRIP BLANK*	***MECP Table 7 SCS***
Sample Collection Date (dd/mm/yyyy)	*09/09/2020*	*09/09/2020*	*09/09/2020*	*06/08/2020*	*07/02/2020*	*09/09/2020*	
Sample Depth (mbgs)	*6.0 - 9.1*	*6.0 - 9.1*	*4.5 - 7.6*	*NA*	*NA*	*NA*	
Sample Location	*MW202*	*MW202*	*MW203*	*NA*	*NA*	*NA*	
Laboratory Certificate of Analysis No.	*C0N4811*	*C0N4811*	*C0N4811*	*C0E0707*	*C0G4922*	*C0N4811*	
Date of Analysis (dd/mm/yyyy)	*14/09/2020 - 16/09/2020*	*14/09/2020 - 16/09/2020*	*14/09/2020 - 16/09/2020*	*11/06/2020 - 12/06/2020*	*07/07/2020 - 09/07/2020*	*14/09/2020 - 16/09/2020*	
Volatile Organic Compounds							
Acetone	<10	-	<10	<10	<10	<10	100000
Benzene	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.5
Bromodichloromethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	67000
Bromoform	<1.0	-	<1.0	<1.0	<1.0	<1.0	5
Bromomethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.89
Carbon Tetrachloride	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.2
Chlorobenzene	<0.20	-	<0.20	<0.20	<0.20	<0.20	140
Chloroform	<0.20	-	0.23	<0.20	<0.20	<0.20	2
Dibromochloromethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	65000
1,2-Dichlorobenzene	<0.50	-	<0.50	<0.50	<0.50	<0.50	150
1,3-Dichlorobenzene	<0.50	-	<0.50	<0.50	<0.50	<0.50	7600
1,4-Dichlorobenzene	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.5
Dichlorodifluoromethane	<1.0	-	<1.0	<1.0	<1.0	<1.0	3500
1,1-Dichloroethane	<0.20	-	<0.20	<0.20	<0.20	<0.20	11
1,2-Dichloroethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.5
1,1-Dichloroethylene	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.5
cis-1,2-Dichloroethylene	<0.50	-	<0.50	<0.50	<0.50	<0.50	1.6
trans-1,2-Dichloroethylene	<0.50	-	<0.50	<0.50	<0.50	<0.50	1.6
1,2-Dichloropropane	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.58
1,3-Dichloropropene (Total)	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.5
Ethylbenzene	<0.20	-	<0.20	<0.20	<0.20	<0.20	54
Ethylene Dibromide	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.2
Hexane	<1.0	-	<1.0	<1.0	<1.0	<1.0	5
Methyl Ethyl Ketone	<10	-	<10	<10	<10	<10	21000
Methyl Isobutyl Ketone	<5.0	-	<5.0	<5.0	<5.0	<5.0	5200
Methyl t-Butyl Ether (MTBE)	<0.50	-	<0.50	<0.50	<0.50	<0.50	15
Methylene Chloride	<2.0	-	<2.0	<2.0	<2.0	<2.0	26
Styrene	<0.50	-	<0.50	<0.50	<0.50	<0.50	43
1,1,1,2-Tetrachloroethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	1.1
1,1,2,2-Tetrachloroethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.5
Tetrachloroethylene	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.5
Toluene	<0.20	-	<0.40	<0.20	<0.20	<0.20	320
1,1,1-Trichloroethane	<0.20	-	<0.20	<0.20	<0.20	<0.20	23
1,1,2-Trichloroethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	0.5
Trichloroethylene	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.5
Trichlorofluoromethane	<0.50	-	<0.50	<0.50	<0.50	<0.50	2000
Vinyl Chloride	<0.20	-	<0.20	<0.20	<0.20	<0.20	0.5
Xylenes (Total)	<0.20	-	0.22	<0.20	<0.20	<0.20	72
Petroleum Hydrocarbons (PHCs)							
PHCs F1 (C_6 - C_{10})	<25	-	<25	<25	<25	<25	420
PHCs F2 (>C_{10} - C_{16})	<100	-	<100	-	-	-	150
PHCs F3 (>C_{16} - C_{34})	<200	-	<200	-	-	-	500
PHCs F4 (>C_{34} - C_{50})	<200	-	<200	-	-	-	500
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.050	-	<0.050	-	-	-	17
Acenaphthylene	<0.050	-	<0.050	-	-	-	1
Anthracene	<0.050	-	<0.050	-	-	-	1
Benzo(a)anthracene	<0.050	-	<0.050	-	-	-	1.8
Benzo(a)pyrene	<0.0090	-	<0.0090	-	-	-	0.81
Benzo(b)fluoranthene	<0.050	-	<0.050	-	-	-	0.75
Benzo(ghi)perylene	<0.050	-	<0.050	-	-	-	0.2
Benzo(k)fluoranthene	<0.050	-	<0.050	-	-	-	0.4
Chrysene	<0.050	-	<0.050	-	-	-	0.7
Dibenzo(a,h)anthracene	<0.050	-	<0.050	-	-	-	0.4
Fluoranthene	<0.050	-	<0.050	-	-	-	44
Fluorene	<0.050	-	<0.050	-	-	-	290
Indeno(1,2,3-cd)pyrene	<0.050	-	<0.050	-	-	-	0.2
1- & 2-Methylnaphthalene	<0.071	-	<0.071	-	-	-	1500
Naphthalene	<0.050	-	<0.050	-	-	-	7
Phenanthrene	<0.030	-	<0.030	-	-	-	380
Pyrene	<0.050	-	<0.050	-	-	-	5.7
Metals							
Antimony	0.71	0.64	-	-	-	-	16000
Arsenic	<1.0	<1.0	-	-	-	-	1500
Barium	130	130	-	-	-	-	23000
Beryllium	<0.40	<0.40	-	-	-	-	53
Boron (Total)	690	660	-	-	-	-	36000
Cadmium	<0.090	<0.090	-	-	-	-	2.1
Chromium (Total)	<5.0	<5.0	-	-	-	-	640
Chromium (Hexavalent)	<0.50	<0.50	-	-	-	-	110
Cobalt	5.1	5.2	-	-	-	-	52
Copper	2.2	2.7	-	-	-	-	69
Lead	<0.50	<0.50	-	-	-	-	20
Mercury	<0.10	<0.10	-	-	-	-	0.1
Molybdenum	3.3	3.4	-	-	-	-	7300
Nickel	15	16	-	-	-	-	390
Selenium	<2.0	<2.0	-	-	-	-	50
Silver	<0.090	<0.090	-	-	-	-	1.2
Sodium	990000	990000	-	-	-	-	1800000
Thallium	0.21	0.21	-	-	-	-	400
Uranium	5.0	5.1	-	-	-	-	330
Vanadium	1.1	1.1	-	-	-	-	200
Zinc	<5.0	<5.0	-	-	-	-	890

Notes:

MECP Table 7 SCS	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition, for All Types of Property Use and Coarse-Textured Soils
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units In Micrograms Per Litre, Unless Otherwise Noted
mbgs	Metres Below Ground Surface

TABLE 8
MAXIMUM CONCENTRATIONS IN SOIL
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	*Maximum Concentration*	*Sample Designation*	*Sample Location*	*Sample Depth (mbgs)*
Volatile Organic Compounds				
Acetone	<0.5	All Submitted Samples		
Benzene	<0.02	All Submitted Samples		
Bromodichloromethane	<0.05	All Submitted Samples		
Bromoform	<0.05	All Submitted Samples		
Bromomethane	<0.05	All Submitted Samples		
Carbon Tetrachloride	<0.05	All Submitted Samples		
Chlorobenzene	<0.05	All Submitted Samples		
Chloroform	<0.05	All Submitted Samples		
Dibromochloromethane	<0.05	All Submitted Samples		
1,2-Dichlorobenzene	<0.05	All Submitted Samples		
1,3-Dichlorobenzene	<0.05	All Submitted Samples		
1,4-Dichlorobenzene	<0.05	All Submitted Samples		
Dichlorodifluoromethane	<0.05	All Submitted Samples		
1,1-Dichloroethane	<0.05	All Submitted Samples		
1,2-Dichloroethane	<0.05	All Submitted Samples		
1,1-Dichloroethylene	<0.05	All Submitted Samples		
cis-1,2-Dichloroethylene	<0.05	All Submitted Samples		
trans-1,2-Dichloroethylene	<0.05	All Submitted Samples		
1,2-Dichloropropane	<0.05	All Submitted Samples		
1,3-Dichloropropene (Total)	<0.1	All Submitted Samples		
Ethylbenzene	1.3	BH103 SS1	BH103	0-0.46
Ethylene Dibromide	<0.05	All Submitted Samples		
Hexane	0.15	BH113 SS2	BH113	0.61-1.22
Methyl Ethyl Ketone	<0.5	All Submitted Samples		
Methyl Isobutyl Ketone	<0.5	All Submitted Samples		
Methyl t-Butyl Ether (MTBE)	<0.05	All Submitted Samples		
Methylene Chloride	<0.05	All Submitted Samples		
Styrene	<0.05	All Submitted Samples		
1,1,1,2-Tetrachloroethane	<0.05	All Submitted Samples		
1,1,2,2-Tetrachloroethane	<0.05	All Submitted Samples		
Tetrachloroethylene	0.22	MW-5 SS-2	MW-5	0.8-1.5
Toluene	0.14	DUP-1	BH101	0-0.76
1,1,1-Trichloroethane	<0.05	All Submitted Samples		
1,1,2-Trichloroethane	<0.05	All Submitted Samples		
Trichloroethylene	<0.05	All Submitted Samples		
Trichlorofluoromethane	<0.05	All Submitted Samples		
Vinyl Chloride	<0.02	All Submitted Samples		
Xylenes (Total)	4.6	BH104 SS1	BH104	0-0.76
Petroleum Hydrocarbons (PHCs)				
PHCs F1 (C_6 - C_{10})	110	BH104 SS1	BH104	0-0.76
PHCs F2 (>C_{10} - C_{16})	220	BH113 SS2	BH113	0.61-1.22
PHCs F3 (>C_{16} - C_{34})	4500	BH113 SS2	BH113	0.61-1.22
PHCs F4 (>C_{34} - C_{50})	3400	BH-11 SS-1	BH-11	0.61-1.22
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	5.8	BH113 SS2	BH113	0.61-1.22
Acenaphthylene	13	BH113 SS2	BH113	0.61-1.22
Anthracene	22	BH113 SS2	BH113	0.61-1.22
Benzo(a)anthracene	67	BH113 SS2	BH113	0.61-1.22
Benzo(a)pyrene	57	BH113 SS2	BH113	0.61-1.22
Benzo(b)fluoranthene	65	BH113 SS2	BH113	0.61-1.22
Benzo(ghi)perylene	27	BH113 SS2	BH113	0.61-1.22
Benzo(k)fluoranthene	26	BH113 SS2	BH113	0.61-1.22
Chrysene	55	BH113 SS2	BH113	0.61-1.22
Dibenzo(a,h)anthracene	9.1	BH113 SS2	BH113	0.61-1.22
Fluoranthene	120	BH113 SS2	BH113	0.61-1.22
Fluorene	10	BH113 SS2	BH113	0.61-1.22
Indeno(1,2,3-cd)pyrene	29	BH113 SS2	BH113	0.61-1.22
Methylnaphthalene 2-(1-)	9.1	BH113 SS2	BH113	0.61-1.22
Naphthalene	2.3	BH113 SS2	BH113	0.61-1.22
Phenanthrene	75	BH113 SS2	BH113	0.61-1.22
Pyrene	120	BH113 SS2	BH113	0.61-1.22
Metals				
Antimony	43	MW-4 SS-2	MW-4	0.8-1.1
Arsenic	64	MW-4 SS-2	MW-4	0.8-1.1
Barium	460	MW-4 SS-2	MW-4	0.8-1.1
Beryllium	0.78	BH-10 SS-1	BH-10	0-0.8
Boron (Total)	20	MW-4 SS-2	MW-4	0.8-1.1
Boron (Hot Water Soluble)	3.9	BH-8 SS-1	BH-8	0-0.8
Cadmium	8.7	MW-4 SS-2	MW-4	0.8-1.1
Chromium (Total)	45	MW-4 SS-2	MW-4	0.8-1.1
Chromium (Hexavalent)	<0.2	All Submitted Samples		
Cobalt	20	MW-4 SS-2	MW-4	0.8-1.1
Copper	310	MW-4 SS-2	MW-4	0.8-1.1
Lead	15000	MW-4 SS-2	MW-4	0.8-1.1
Mercury	10	BH113 SS2	BH113	0.61-1.22
Molybdenum	7.9	BH109 SS3	BH109	1.22-1.83
Nickel	77	MW-4 SS-2	MW-4	0.8-1.1
Selenium	1.5	BH-10 SS-1	BH-10	0-0.8
Silver	1.6	MW-4 SS-2	MW-4	0.8-1.1
Thallium	0.64	MW-4 SS-2	MW-4	0.8-1.1
Uranium	1.7	MW-4 SS-2	MW-4	0.8-1.1
Vanadium	41	BH105 SS1	BH105	0-0.76
Zinc	4200	MW-4 SS-2	MW-4	0.8-1.1

Notes:

Units	All Units In Micrograms Per Gram, Unless Otherwise Noted
mbgs	Metres Below Ground Surface
mS/cm	MilliSiemens Per Centimetre

TABLE 9
MAXIMUM CONCENTRATIONS IN GROUNDWATER
1213763 Ontario Inc.
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	*Maximum Concentration*	*Sample Designation*	*Sample Location*	*Sample Depth (mbgs)*
Volatile Organic Compounds				
Acetone	75	EXMW-3	EXMW-3	4.8-7.9
Benzene	78	MW-1	MW-1	4.5-7.6
Bromodichloromethane	<0.5		All Submitted Samples	
Bromoform	<1		All Submitted Samples	
Bromomethane	<0.5		All Submitted Samples	
Carbon Tetrachloride	<0.2		All Submitted Samples	
Chlorobenzene	<0.2		All Submitted Samples	
Chloroform	0.75	DUP-201	MW201	12.1-15.2
Dibromochloromethane	<0.5		All Submitted Samples	
1,2-Dichlorobenzene	<0.5		All Submitted Samples	
1,3-Dichlorobenzene	<0.5		All Submitted Samples	
1,4-Dichlorobenzene	<0.5		All Submitted Samples	
Dichlorodifluoromethane	<1		All Submitted Samples	
1,1-Dichloroethane	<0.2		All Submitted Samples	
1,2-Dichloroethane	<0.5		All Submitted Samples	
1,1-Dichloroethylene	<0.2		All Submitted Samples	
cis-1,2-Dichloroethylene	<0.5		All Submitted Samples	
trans-1,2-Dichloroethylene	<0.5		All Submitted Samples	
1,2-Dichloropropane	<0.2		All Submitted Samples	
1,3-Dichloropropene (Total)	<0.5		All Submitted Samples	
Ethylbenzene	73	DUP-3	MW-1	4.5-7.6
Ethylene Dibromide	<0.2		All Submitted Samples	
Hexane	<1		All Submitted Samples	
Methyl Ethyl Ketone	<10		All Submitted Samples	
Methyl Isobutyl Ketone	<5		All Submitted Samples	
Methyl t-Butyl Ether (MTBE)	1.3	MW-2	MW-2	4.5-7.6
Methylene Chloride	<2		All Submitted Samples	
Styrene	<0.5		All Submitted Samples	
1,1,1,2-Tetrachloroethane	<0.5		All Submitted Samples	
1,1,2,2-Tetrachloroethane	<0.5		All Submitted Samples	
Tetrachloroethylene	<0.2		All Submitted Samples	
Toluene	16	MW-1	MW-1	4.5-7.6
1,1,1-Trichloroethane	<0.2		All Submitted Samples	
1,1,2-Trichloroethane	<0.5		All Submitted Samples	
Trichloroethylene	<0.2		All Submitted Samples	
Trichlorofluoromethane	<0.5		All Submitted Samples	
Vinyl Chloride	<0.2		All Submitted Samples	
Xylenes (Total)	89	MW-1	MW-1	4.5-7.6
Petroleum Hydrocarbons (PHCs)				
PHCs F1 (C_6 - C_{10})	460	MW-1	MW-1	4.5-7.6
PHCs F2 (>C_{10} - C_{16})	470	DUP-2	MW-1	4.5-7.6
PHCs F3 (>C_{16} - C_{34})	540	DUP-3	MW-1	4.5-7.6
PHCs F4 (>C_{34} - C_{50})	390	DUP-3	MW-1	4.5-7.6
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	0.094	DUP-2	MW-1	4.5-7.6
Acenaphthylene	<0.05		All Submitted Samples	
Anthracene	<0.05		All Submitted Samples	
Benzo(a)anthracene	<0.05		All Submitted Samples	
Benzo(a)pyrene	<0.01		All Submitted Samples	
Benzo(b)fluoranthene	<0.05		All Submitted Samples	
Benzo(ghi)perylene	<0.05		All Submitted Samples	
Benzo(k)fluoranthene	<0.05		All Submitted Samples	
Chrysene	<0.05		All Submitted Samples	
Dibenzo(a,h)anthracene	<0.05		All Submitted Samples	
Fluoranthene	<0.05		All Submitted Samples	
Fluorene	0.14	DUP-2	MW-1	4.5-7.6
Indeno(1,2,3-cd)pyrene	<0.05		All Submitted Samples	
Methylnaphthalene 2-(1-)	10	DUP-2	MW-1	4.5-7.6
Naphthalene	15	DUP-2	MW-1	4.5-7.6
Phenanthrene	0.054	DUP-2	MW-1	4.5-7.6
Pyrene	0.053	MW-1	MW-1	4.5-7.6
Metals				
Antimony	2.7	MW-4	MW-4	4.5-7.6
Arsenic	1.2	MW-1/DUP-2	MW-1	4.5-7.6
Barium	260	MW-1/DUP-2	MW-1	4.5-7.6
Beryllium	<0.5		All Submitted Samples	
Boron	1100	MW-2	MW-2	4.5-7.6
Cadmium	0.15	EXMW-5	EXMW-5	4.0-7.1
Chromium (Total)	<5		All Submitted Samples	
Chromium (Hexavalent)	<0.5		All Submitted Samples	
Cobalt	38	EXMW-2	EXMW-2	4.6-7.7
Copper	6.1	MW-4	MW-4	4.5-7.6
Lead	<0.5		All Submitted Samples	
Mercury	0.2	EXMW-1	EXMW-1	4.6-7.7
Molybdenum	4.7	MW-5	MW202	6.0-9.1
Nickel	16	DUP-202	MW202	6.0-9.1
Selenium	2.0	MW-4	MW-4	4.5-7.6
Silver	<0.1		All Submitted Samples	
Sodium	990000	MW202/DUP-202	MW202	6.0-9.1
Thallium	0.23	MW-2	MW-2	4.5-7.6
Uranium	5.1	DUP-202	MW202	6.0-9.1
Vanadium	1.1	MW202/DUP-202	MW202	6.0-9.1
Zinc	31	EXMW-1	EXMW-1	4.6-7.7

Notes:

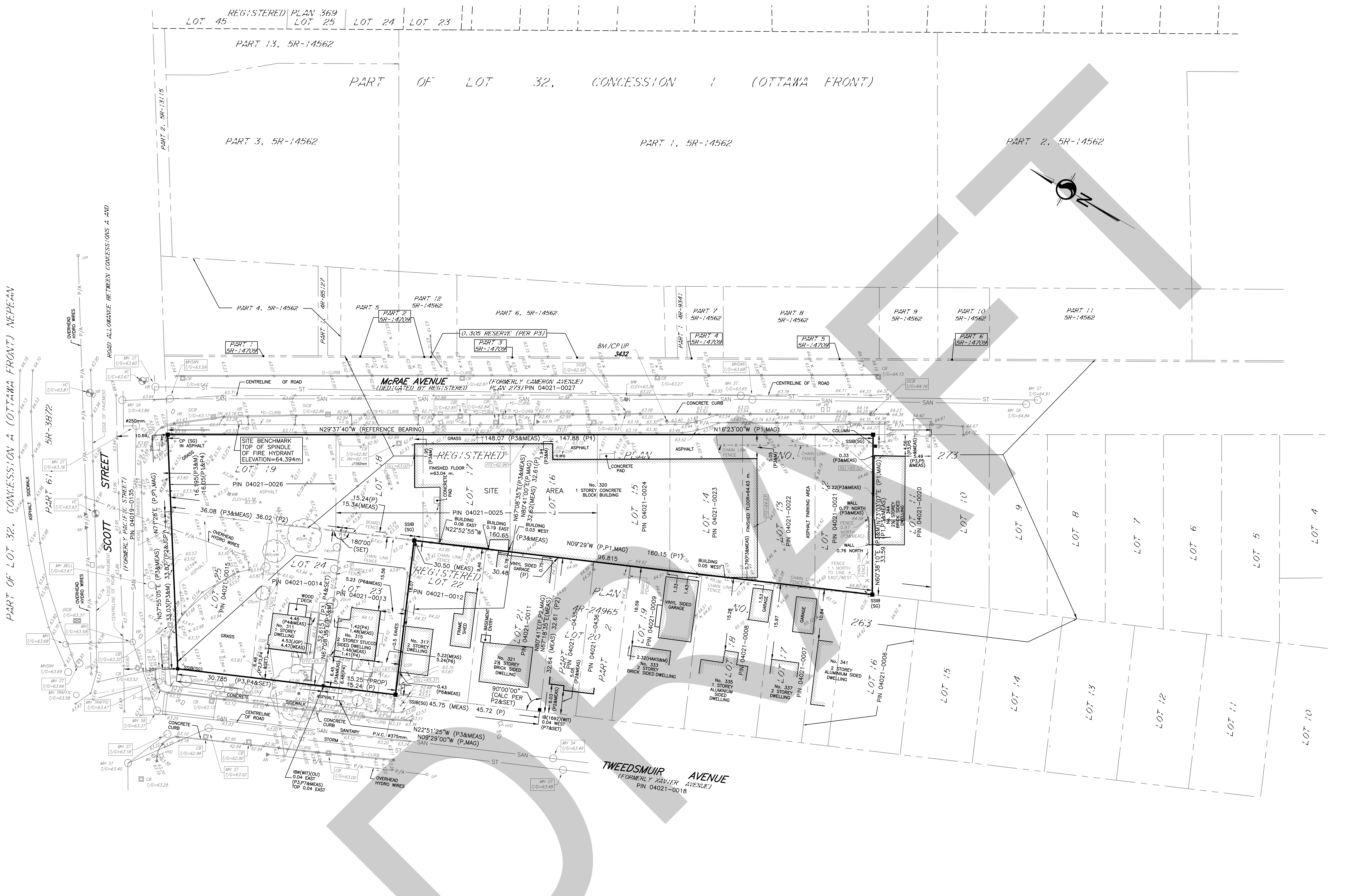
Units	All Units In Micrograms Per Litre
mbgs	Metres Below Ground Surface

10.0 APPENDICES

APPENDIX A

Legal Survey and Survey Data

13 May 2019 9:51 AM



Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC PLAN OF SURVEY

LOTS 12 TO 19
REGISTERED PLAN 273
AND
LOTS 23, 24 AND 25
REGISTERED PLAN 263
CITY OF OTTAWA

Scale 1:400

3 0 10 20 30 METRES

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99994.

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF MCRAE AVENUE AS SHOWN ON A PLAN BY SG DATED SEPT. 29/08 HAVING A BEARING OF N29°37'40"W.

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CITY OF OTTAWA VERTICAL CONTROL MONUMENT No.N-2 (INDEX No. 98) HAVING AN ELEVATION OF 68.260 m.

SITE BENCHMARK AS SHOWN ON THE FACE OF THE PLAN.

UTILITY NOTE

THIS DRAWING CAN NOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION.

ONLY VISIBLE SURFACE UTILITIES WERE LOCATED.

A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY BEFORE ANY WORK INVOLVING BREAKING GROUND, PROBING, EXCAVATING, ETC.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
⊕ BM	"	BENCHMARK
✚	"	CONCRETE MONUMENT
△ HCM	"	HORIZONTAL CONTROL MONUMENT
○ NW	"	NAIL AND WASHER
○ PKN	"	PK NAIL
▽ VCM	"	VERTICAL CONTROL MONUMENT
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS, M	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
P	"	REGISTERED PLAN 263
P1	"	REGISTERED PLAN 273
P2	"	PLAN 4R-24965
P3	"	PLAN BY SG DATED SEPT. 29/08
P4	"	PLAN BY 990 DATED MAY 27/66
P5	"	PLAN BY 1236 REFERENCE 00-1105
P6	"	PLAN BY 647 DATED MAR. 11/83
P7	"	PLAN BY 1475 DATED JUNE 23/14
MW	"	MONITORING WELL
*	"	SITE VEHICULAR ENTRANCE
D-CURB	"	DEPRESSED CURB

◻	ACU	"	AIR CONDITIONING UNIT
◀	AN	"	ANCHOR
○	AP	"	AIR PUMP
▲	ANT	"	ANTENNA
◕	BH	"	BOREHOLE
○	BIB	"	HOSE BIB
⫼	BKR	"	BIKE RACK
▬	BENCH	"	BENCH
●	BOL	"	BOLLARD
○	BOUL	"	BOULDER
▣	CB	"	CATCH BASIN
□□	DCB	"	DOUBLE CB
○	CBMH	"	CB MANHOLE
○	DCBMH	"	DOUBLE CB MANHOLE
▣	SICB	"	SIDE INLET CB
▣	CHM	"	CHIMNEY
○	CSV	"	VALVE CURB STOP
⊕	DRN	"	DRAIN
▢	EPOST	"	ELECTRICAL OUTLET
○	FP	"	FLAG POLE
△	FL	"	FLOOD LIGHT
○	FTF	"	FUEL TANK FILLER CAP
⊙	GC	"	GARBAGE CAN
⊕	GMRK	"	GAS MARKER
‖	GFL	"	PIPE FLANGE (GAS)
□	GFP	"	GAS FUEL PUMP
○	GP	"	POLE GUYWIRE
□	GSR	"	GAS SERVICE REGULATOR
⋈	GV	"	GAS VALVE
○	HIC	"	HICKENBOTTOM
▭	HDS	"	HEADSTONE
○	HLS	"	LIGHT STANDARD HYDRO
⊠	HM	"	HYDRO METER
□	HTN	"	HYDRO TRANSFORMER
○	HW	"	HAND WELL
⌖	HYD	"	FIRE HYDRANT
▢	JBX	"	JUNCTION BOX
▭	MB	"	MAILBOX
○	MP	"	MONITORING PIN
○	MH	"	MAINTENANCE HOLE UNIDENTIFIED
○	MHB	"	MAINTENANCE HOLE BELL
○	MHF	"	MAINTENANCE HOLE FIBRE OPTIC
○	MHH	"	MAINTENANCE HOLE HYDRO
○	MHI	"	MAINTENANCE HOLE INVERT
○	MHSA	"	MAINTENANCE HOLE SANITARY
○	MHST	"	MAINTENANCE HOLE STORM
○	MHT	"	MAINTENANCE HOLE TRAFFIC
◕	MW	"	MONITORING WELL
□	NPB	"	NEWS PAPER BOX
◎	OLP	"	LIGHT STANDARD ORNAMENTAL
⊗	OW	"	OBSERVATION WELL
□	PKM	"	PARKING METER
□	PLBX	"	PULL BOX
⊸	PLQ	"	PLAQUE
□	PLR	"	PILLAR
○	POST	"	POST
⊕	PZ	"	PIEZIOMETER
▢	RLC	"	RED LIGHT CAMERA
⊗	RWSL	"	RAILWAY SIGNAL LIGHT
▣	RWSS	"	RAILWAY SWITCH STAND
(	SAT	"	SATELLITE DISH
▣	SCLP	"	SCULPTURE
○	SCP	"	SUMP/CATCH PIT
ⓥ	SCV	"	SPRINKLER CONTROL VALVE
●	SHB	"	SPRINKLER HEAD
⌓	SIA	"	SIAMESE CONNECTION
⊸	SN	"	SIGN
▣	SICB	"	SIDE INLET CATCHBASIN
□	SPAN	"	SOLAR PANEL
○	SPT	"	SEPTIC TANK
⊙	TABLE	"	TABLE
□	TB BELL	"	TERMINAL BOX - BELL
□	TB CATV	"	TERMINAL BOX - CABLE
□	TCB	"	TRAFFIC CONTROL BOX
✚	TPIT	"	TEST PIT
☼	TRC	"	TREE CONIFEROUS
○	TRD	"	TREE DECIDUOUS
○	TRS	"	TREE STUMP
○	TSL	"	TRAFFIC SIGNAL LIGHT
⊕	UMB	"	MARKER BELL UNDERGROUND
⊕	UMC	"	MARKER CABLE UNDERGROUND
⊕	UMG	"	MARKER GAS UNDERGROUND
⊕	UMO	"	MARKER OIL UNDERGROUND
○	UP	"	UTILITY POLE
▭	VB	"	VALVE BOX
⋈	VC	"	VALVE CHAMBER
⊖	WV	"	WATER VALVE
⊕	WELL	"	WELL

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

THE SURVEY WAS COMPLETED ON THE 3rd. DAY OF MAY, 2019.

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

DRAWN: WS/CEC/NJ CHECKED: KJ PM: KJ FIELD: WO PROJECT No.: 161614033-111

SKETCH Illustrating Location and Elevation of Monitoring Wells at

320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 500

20 15 10 5 0 10 20 Metres

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Notes & Legend

Caution

This is NOT a Plan of Survey and shall not be used except for the purpose indicated in the title block.

BOUNDARY INFORMATION COMPILED FROM PLANS.

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
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Ontario Land Surveyors

Job No. 21050-20-C1

Location of Monitoring Wells
at 320 McRae Avenue, Ottawa

Zone 9 MTM NAD83(original)

CGVD28 Vertical Datum

	Northing	Easting	Elevation
MW-1	5028779.90	363452.20	63.37
MW-2	5028781.05	363444.02	63.45
MW-3	5028776.31	363433.17	63.49
MW-4	5028716.67	363499.91	63.10
MW-5	5028682.84	363509.56	64.11
MW-110	5028663.47	363512.21	64.52
MW-114	5028760.13	363475.32	62.92
MW-201	5028780.79	363451.67	63.39
MW-202	5028774.52	363466.39	63.09
MW-203	5028725.45	363475.23	63.00
EXMW-3	5028741.84	363470.09	63.14
EXMW-4	5028726.64	363481.30	62.93
EXMW-5	5028693.36	363500.95	64.60

October 15, 2020
Job # 21050-20

APPENDIX B-1

Previous Analytical Data

TABLE 3
pH AND GRAIN SIZE ANALYSIS FOR SOIL
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	***Units***	***MECP Site Condition Standard Selection Criteria***	***Sample Designation***						
			Sample Collection Date (dd/mm/yyyy)						
			Sample Depth (mbgs)						
			MW-1 SS-2	*MW-3 SS-1*	*BH-6 SS-2*	*BH-7 SS-1*	*BH-10 SS-1*	*BH-9 SS-4*	*MW-5 SS-2*
			01/11/2018	*01/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*
			0.8 - 1.5	*0.0 - 0.8*	*0.8 - 1.5*	*0.0 - 0.8*	*0.0 - 0.8*	*2.3 - 3.3*	*0.8 - 1.5*
			Surface	*Surface*	*Surface*	*Surface*	*Surface*	*Subsurface*	*Surface*
pH		Surface: 5 < pH < 9 Subsurface: 5 < pH < 11	7.85	7.73	7.91	7.58	7.72	7.92	NA
Sieve #200 <0.075 mm	%	50%	NA	NA	NA	NA	NA	15	53
Sieve #200 >0.075 mm	%	50%	NA	NA	NA	NA	NA	85	47
Grain Size Classification			NA	NA	NA	NA	NA	COARSE	MEDIUM/FINE

Notes:

BOLD	Environmentally Sensitive Area (Based Upon pH of Surface Soil)
BOLD	Environmentally Sensitive Area (Based Upon pH of Sub-Surface Soil)
NA	Not Analysed
mbgs	Metres Below Ground Surface

TABLE 5
PETROLEUM HYDROCARBON AND BTEX ANALYSIS FOR SOIL
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	*MECP Table 7 Standards**	***Sample Designation***											
		Sample Collection Date (dd/mm/yyyy)											
		Sample Depth (mbgs)											
		MW-1 SS-2	*MW-2 SS-2*	*MW-3 SS-1*	*MW-4 SS-2*	*MW-5 SS-2*	*BH-6 SS-2*	*BH-7 SS-1*	*BH-8 SS-1*	*BH-9 SS-4*	*BH-10 SS-1*	*BH-11 SS-1*	*DUP-1*
		01/11/2018	*01/11/2018*	*01/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*
		0.8 - 1.5	*0.8 - 1.5*	*0.0 - 0.8*	*0.8 - 1.1*	*0.8 - 1.5*	*0.8 - 1.5*	*0.0 - 0.8*	*0.0 - 0.8*	*2.3 - 3.3*	*0.0 - 0.8*	*0.0 - 0.8*	*0.0 - 0.8*
Benzene	0.21	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	2.3	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	2	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes (Total)	3.1	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons F1 (C_6 - C_{10})	55	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Petroleum Hydrocarbons F2 (>C_{10} - C_{16})	98	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Petroleum Hydrocarbons F3 (>C_{16} - C_{34})	300	<50	<50	<50	110	<50	<50	**400**	200	<50	75	**580**	**470**
Petroleum Hydrocarbons F4 (>C_{34} - C_{50})	2800	<50	<50	68	81	<50	<50	390	190	<50	290	1100	920
Petroleum Hydrocarbons F4 Gravimetric	2800	-	-	-	-	-	-	2500	830	-	2200	**3400**	**2900**

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.

BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/g
mbgs	Metres Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes

TABLE 6
VOLATILE ORGANIC COMPOUND ANALYSIS FOR SOIL
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	***MECP Table 7 Standards****	***Sample Designation***											
		Sample Collection Date (dd/mm/yyyy)											
		Sample Depth (mbgs)											
		MW-1 SS-2	*MW-2 SS-2*	*MW-3 SS-1*	*MW-4 SS-2*	*MW-5 SS-2*	*BH-6 SS-2*	*BH-7 SS-1*	*BH-8 SS-1*	*BH-9 SS-4*	*BH-10 SS-1*	*BH-11 SS-1*	*DUP-1*
		01/11/2018	*01/11/2018*	*01/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*
		0.8 - 1.5	*0.8 - 1.5*	*0.0 - 0.8*	*0.8 - 1.1*	*0.8 - 1.5*	*0.8 - 1.5*	*0.0 - 0.8*	*0.0 - 0.8*	*2.3 - 3.3*	*0.0 - 0.8*	*0.0 - 0.8*	*0.0 - 0.8*
Acetone	16	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	0.21	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Bromodichloromethane	13	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	0.27	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon Tetrachloride	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	2.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	9.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	3.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	4.8	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	0.083	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	3.5	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cis-1,2-Dichloroethylene	3.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trans-1,2-Dichloroethylene	0.084	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cis-1,3-Dichloropropylene	NV	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Trans-1,3-Dichloropropylene	NV	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	2	<0.020	<0.020	0.046	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylene Dibromide	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	16	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Isobutyl Ketone	1.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-t-Butyl Ether	0.75	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	0.7	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,1,2-Tetrachloroethane	0.058	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	2.3	<0.020	0.050	0.053	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Tetrachloroethylene	0.28	<0.050	<0.050	<0.050	<0.050	0.22	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,1-Trichloroethane	0.38	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	0.061	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vinyl Chloride	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
m-Xylene & p-Xylene	NV	<0.020	0.047	0.22	<0.020	<0.020	<0.020	<0.020	0.027	<0.020	<0.020	<0.020	<0.020
o-Xylene	NV	<0.020	<0.020	0.074	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Xylenes	3.1	<0.020	0.047	0.29	<0.020	<0.020	<0.020	<0.020	0.027	<0.020	<0.020	<0.020	<0.020
Dichlorodifluoromethane	16	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dioxane, 1,4-	1.8	-	-	-	-	-	-	-	-	-	-	-	-
Hexane(n)	2.8	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trichlorofluoromethane	4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichloropropene (cis + trans)	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/g
mbgs	Metres Below Ground Surface

TABLE 7

POLYCYCLIC AROMATIC HYDROCARBON ANALYSIS FOR SOIL

The Great-West Life Assurance Company

320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	MECP Table 7 Standards*	Sample Designation Sample Collection Date (dd/mm/yyyy) Sample Depth (mbgs)											
		MW-1 SS-2	*MW-2 SS-2*	*MW-3 SS-1*	*MW-4 SS-2*	*MW-5 SS-2*	*BH-6 SS-2*	*BH-7 SS-1*	*BH-8 SS-1*	*BH-9 SS-4*	*BH-10 SS-1*	*BH-11 SS-1*	*DUP-1*
		01/11/2018	*01/11/2018*	*01/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*
		0.8 - 1.5	*0.8 - 1.5*	*0.0 - 0.8*	*0.8 - 1.1*	*0.8 - 1.5*	*0.8 - 1.5*	*0.0 - 0.8*	*0.0 - 0.8*	*2.3 - 3.3*	*0.0 - 0.8*	*0.0 - 0.8*	*0.0 - 0.8*
Acenaphthene	7.9	<0.0050	<0.0050	<0.0050	0.026	0.010	<0.0050	0.014	0.0082	<0.0050	0.0076	0.028	0.010
Acenaphthylene	0.15	<0.0050	<0.0050	0.0062	0.022	0.018	<0.0050	0.010	0.020	<0.0050	0.0075	<0.0050	<0.0050
Anthracene	0.67	<0.0050	<0.0050	<0.0050	0.046	0.033	<0.0050	0.021	0.027	<0.0050	0.015	0.053	0.019
Benzo(a)anthracene	0.5	0.010	<0.0050	0.026	0.28	0.093	<0.0050	0.16	0.29	<0.0050	0.10	0.20	0.085
Benzo(a)pyrene	0.3	0.015	<0.0050	0.030	0.28	0.11	<0.0050	0.15	0.28	<0.0050	0.093	0.15	0.073
Benzo(b)fluoranthene	0.78	0.024	0.010	0.044	0.33	0.15	<0.0050	0.18	0.32	<0.0050	0.12	0.19	0.094
Benzo(ghi)perylene	6.6	0.018	0.0081	0.028	0.25	0.10	<0.0050	0.12	0.17	<0.0050	0.074	0.11	0.068
Benzo(k)fluoranthene	0.78	0.0076	<0.0050	0.016	0.12	0.053	<0.0050	0.070	0.12	<0.0050	0.045	0.072	0.036
Chrysene	7	0.016	0.0076	0.035	0.30	0.10	<0.0050	0.17	0.24	<0.0050	0.10	0.21	0.099
Dibenzo(a,h)anthracene	0.1	0.0057	<0.0050	0.0071	0.076	0.028	<0.0050	0.041	0.065	<0.0050	0.027	0.031	0.020
Fluoranthene	0.69	0.019	0.0065	0.055	0.52	0.19	<0.0050	0.45	0.53	<0.0050	0.22	0.58	0.25
Fluorene	62	<0.0050	<0.0050	<0.0050	0.034	0.016	<0.0050	0.030	0.029	<0.0050	0.023	0.041	0.030
Indeno(1,2,3-cd)pyrene	0.38	0.013	<0.0050	0.025	0.23	0.093	<0.0050	0.12	0.19	<0.0050	0.079	0.11	0.063
Methylnaphthalene 2-(1-)	0.99	<0.014	<0.014	<0.014	0.049	<0.014	<0.014	0.039	0.035	<0.014	0.034	0.032	0.033
Naphthalene	0.6	<0.0050	<0.0050	<0.0050	0.013	<0.0050	<0.0050	0.012	0.011	<0.0050	0.0086	0.0065	0.0078
Phenanthrene	6.2	0.015	0.0084	0.020	0.20	0.11	<0.0050	0.17	0.12	<0.0050	0.096	0.31	0.14
Pyrene	78	0.018	0.0055	0.048	0.45	0.15	<0.0050	0.33	0.47	<0.0050	0.18	0.41	0.18

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/g
mbgs	Metres Below Ground Surface

TABLE 8
METALS ANALYSIS FOR SOIL
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	***MECP Table 7 Standards****	***Sample Designation***											
		Sample Collection Date (dd/mm/yyyy)											
		Sample Depth (mbgs)											
		MW-1 SS-2	*MW-2 SS-2*	*MW-3 SS-1*	*MW-4 SS-2*	*MW-5 SS-2*	*BH-6 SS-2*	*BH-7 SS-1*	*BH-8 SS-1*	*BH-9 SS-4*	*BH-10 SS-1*	*BH-11 SS-1*	*DUP-1*
		01/11/2018	*01/11/2018*	*01/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*	*02/11/2018*
		0.8 - 1.5	*0.8 - 1.5*	*0.0 - 0.8*	*0.8 - 1.1*	*0.8 - 1.5*	*0.8 - 1.5*	*0.0 - 0.8*	*0.0 - 0.8*	*2.3 - 3.3*	*0.0 - 0.8*	*0.0 - 0.8*	*0.0 - 0.8*
Antimony	7.5	<0.20	<0.20	-	**43**	0.41	<0.20	3.1	6.4	<0.20	2.6	<0.20	<0.20
Arsenic	18	1.5	4.3	-	**64**	2.9	<1.0	4.5	11	<1.0	9.0	1.7	1.5
Barium	390	260	190	-	**460**	140	86	390	260	36	280	290	280
Beryllium	4	0.32	0.33	-	0.75	0.54	0.24	0.40	0.46	<0.20	0.78	0.36	0.36
Boron (Hot Water Soluble)	1.5	0.55	0.22	-	**1.8**	0.93	0.19	**1.7**	**3.9**	0.071	0.77	0.25	0.23
Cadmium	1.2	<0.10	<0.10	-	**8.7**	0.17	<0.10	0.71	**1.7**	<0.10	0.58	0.11	<0.10
Chromium	160	17	12	-	45	21	13	15	25	9.5	19	13	18
Chromium VI	8	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cobalt	22	4.5	8.0	-	20	8.7	4.4	6.2	8.4	4.3	8.0	6.0	7.7
Copper	140	11	16	-	**310**	16	8.4	28	60	10	37	9.4	12
Lead	120	16	15	-	**15000**	40	6.8	**190**	**870**	4.4	**180**	17	17
Mercury	0.27	<0.050	<0.050	-	**1.0**	0.088	<0.050	0.13	**0.47**	<0.050	0.097	<0.050	<0.050
Molybdenum	6.9	1.2	2.6	-	3.9	0.90	<0.50	0.83	1.9	<0.50	1.3	0.88	0.80
Nickel	100	10	14	-	77	16	7.9	16	22	7.0	14	12	16
Selenium	2.4	<0.50	<0.50	-	1.1	<0.50	<0.50	<0.50	1.1	<0.50	1.5	<0.50	<0.50
Silver	20	<0.20	<0.20	-	1.6	0.21	<0.20	<0.20	1.3	<0.20	0.34	<0.20	<0.20
Thallium	1	0.11	0.22	-	0.64	0.20	0.083	0.18	0.21	<0.050	0.18	0.21	0.23
Vanadium	86	22	16	-	37	31	24	21	27	23	28	18	20
Zinc	340	25	24	-	**4200**	51	19	140	**590**	20	250	23	24
pH (pH Units)	NV	7.85	-	7.73	-	-	7.91	7.58	-	7.92	7.72	-	-
Conductivity (ms/cm)	0.7	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio	5	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide, Free	0.051	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	NV	-	-	-	-	-	-	-	-	-	-	-	-
Boron (Total)	120	13	9.5	-	20	11	5.2	13	19	<5.0	10	8.7	9.6
Uranium	23	0.42	0.58	-	1.7	0.59	0.47	0.49	1.3	0.55	0.62	0.39	0.39

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for Residential/Parkland/Institutional Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/g
mbgs	Metres Below Ground Surface
NA	Not Applicable

TABLE 9

PETROLEUM HYDROCARBON AND BTEX ANALYSIS FOR GROUNDWATER

The Great-West Life Assurance Company

320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	MECP Table 7 Standards*	Sample Designation									
		Sample Collection Date (dd/mm/yyyy)									
		EXMW-1	MW-1	DUP-2	EXMW-2	MW-2	EXMW-3	MW-4	EXMW-4	MW-5	EXMW-5
		13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018	13/11/2018
Benzene	0.5	-	-		-	-	-	-	-	-	-
Toluene	320	-	-		-	-	-	-	-	-	-
Ethylbenzene	54	-	-		-	-	-	-	-	-	-
Xylenes (Total)	72	-	-		-	-	-	-	-	-	-
Petroleum Hydrocarbons F1 (C_6 - C_{10})	420	<25	**460**	390	<25	<25	<25	<25	<25	<25	<25
Petroleum Hydrocarbons F2 (>C_{10} - C_{16})	150	<100	**380**	**470**	<100	<100	<100	<100	<100	<100	<100
Petroleum Hydrocarbons F3 (>C_{16} - C_{34})	500	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Petroleum Hydrocarbons F4 (>C_{34} - C_{50})	500	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/L
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes

TABLE 10
VOLATILE ORGANIC COMPOUND ANALYSIS FOR GROUNDWATER
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	***MECP Table 7 Standards****	***Sample Designation***										
		Sample Collection Date (dd/mm/yyyy)										
		Trip Blank	*EXMW-1*	*MW-1*	*DUP-2*	*EXMW-2*	*MW-2*	*EXMW-3*	*MW-4*	*EXMW-4*	*MW-5*	*EXMW-5*
		13/11/2018	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*
Acetone	100000	<10	<10	<10	<10	<10	12	75	<10	40	<10	34
Benzene	0.5	<0.20	<0.20	**78**	**68**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	67000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	140	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.28	<0.20	<0.20	<0.20
Dibromochloromethane	65000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	150	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	7600	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	11	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cis-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane	0.58	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cis-1,3-Dichloropropylene	NV	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Trans-1,3-Dichloropropylene	NV	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	54	<0.20	<0.20	37	30	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Ethyl Ketone	21000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	26	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl Isobutyl Ketone	5200	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl-t-Butyl Ether	15	<0.50	<0.50	1.2	1.2	<0.50	1.3	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	43	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	320	<0.20	<0.20	16	14	<0.20	<0.20	<0.20	<0.20	0.31	<0.20	0.30
Tetrachloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	23	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m-Xylene & p-Xylene	NV	<0.20	<0.20	68	58	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	NV	<0.20	<0.20	20	18	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Total Xylenes	72	<0.20	<0.20	**89**	**75**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichlorodifluoromethane	3500	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexane(n)	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	2000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichloropropene (cis + trans)	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/L

TABLE 11
POLYCYCLIC AROMATIC HYDROCARBON ANALYSIS FOR GROUNDWATER
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	***MECP Table 7 Standards****	***Sample Designation***									
		Sample Collection Date (dd/mm/yyyy)									
		EXMW-1	*MW-1*	*DUP-2*	*EXMW-2*	*MW-2*	*EXMW-3*	*MW-4*	*EXMW-4*	*MW-5*	*EXMW-5*
		13/11/2018	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*
Acenaphthene	17	<0.050	0.076	0.094	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)anthracene	1.8	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	0.81	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	0.75	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(ghi)perylene	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	0.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	0.7	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibenzo(a,h)anthracene	0.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoranthene	44	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluorene	290	<0.050	0.11	0.14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylnaphthalene 2-(1-)	1500	<0.071	7.6	10	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071
Naphthalene	7	<0.050	**11**	**15**	<0.050	<0.050	<0.050	<0.050	0.089	<0.050	<0.050
Phenanthrene	380	<0.030	0.043	0.054	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Pyrene	5.7	<0.050	0.053	0.051	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/L

TABLE 12
METALS ANALYSIS FOR GROUNDWATER
The Great-West Life Assurance Company
320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Parameter	*MECP Table 7 Standards**	*Sample Designation*									
		Sample Collection Date (dd/mm/yyyy)									
		EXMW-1	*MW-1*	*DUP-2*	*EXMW-2*	*MW-2*	*EXMW-3*	*MW-4*	*EXMW-4*	*MW-5*	*EXMW-5*
		13/11/2018	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*	*13/11/2018*
Antimony	16000	0.82	<0.50	<0.50	<0.50	0.61	<0.50	2.7	<0.50	<0.50	0.51
Arsenic	1500	<1.0	1.2	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Barium	23000	120	260	260	130	160	200	74	230	110	160
Beryllium	53	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Boron	36000	140	280	290	260	1100	280	210	98	280	230
Cadmium	2.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15
Chromium	640	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chromium VI	110	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt	52	<0.50	3.9	4.1	38	3.3	<0.50	1.1	<0.50	1.9	5.9
Copper	69	3.7	<1.0	<1.0	5.4	1.9	<1.0	6.1	<1.0	2.4	2.3
Lead	20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Mercury	0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	7300	3.5	1.2	1.2	2.0	4.6	<0.50	3.5	0.63	4.7	1.4
Nickel	390	3.6	8.6	8.8	6.2	12	1.2	6.0	<1.0	12	8.2
Selenium	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0
Sodium	1800000	570000	720000	700000	680000	630000	230000	190000	62000	370000	170000
Silver	1.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Thallium	400	0.098	<0.050	<0.050	<0.050	0.23	<0.050	<0.050	<0.050	0.068	0.072
Uranium	330	2.2	0.78	0.81	2.5	3.5	0.51	4	<0.10	3.6	1.0
Vanadium	200	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.76	<0.50	<0.50	<0.50
Zinc	890	31	<5.0	<5.0	16	<5.0	<5.0	<5.0	<5.0	<5.0	26

Notes:

MECP Table 7 Standards	Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 7 Standards, Coarse-Textured Soils, Non-Potable Groundwater Condition, for All Types of Property Use.
BOLD	Exceeds Site Condition Standard
BOLD	Reportable Detection Limit Exceeds Site Condition Standard
Units	All Units in µg/L

Your Project #: 230236.002
Your C.O.C. #: 102884

Attention: Mike Kosiw

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2018/11/13
Report #: R5482222
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T5024
Received: 2018/11/05, 15:30

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum	12	N/A	2018/11/09	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron (1)	1	2018/11/07	2018/11/08	CAM SOP-00408	R153 Ana. Prot. 2011
Hot Water Extractable Boron (1)	10	2018/11/08	2018/11/08	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum	12	N/A	2018/11/08	OTT SOP-00002	EPA 8260C m
Hexavalent Chromium in Soil by IC (1, 2)	11	2018/11/07	2018/11/08	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (3)	12	2018/11/06	2018/11/09	OTT SOP-00001	CCME CWS
F4G (CCME Hydrocarbons Gravimetric)	5	2018/11/12	2018/11/13	OTT SOP-00001	CCME CWS
Strong Acid Leachable Metals by ICPMS (1)	11	2018/11/09	2018/11/09	CAM SOP-00447	EPA 6020B m
Moisture	12	N/A	2018/11/07	CAM SOP-00445	McKeague 2nd ed 1978
PAH Compounds in Soil by GC/MS (SIM)	6	2018/11/06	2018/11/06	OTT SOP-00011	EPA 8270D m
PAH Compounds in Soil by GC/MS (SIM)	1	2018/11/06	2018/11/07	OTT SOP-00011	EPA 8270D m
PAH Compounds in Soil by GC/MS (SIM)	5	2018/11/06	2018/11/08	OTT SOP-00011	EPA 8270D m
pH CaCl2 EXTRACT (1)	6	2018/11/08	2018/11/08	CAM SOP-00413	EPA 9045 D m
Sieve, 75um (1)	2	N/A	2018/11/09	CAM SOP-00467	Carter 2nd ed m
Volatile Organic Compounds and F1 PHCs	12	N/A	2018/11/07	OTT SOP-00002	EPA 8260C 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.

Your Project #: 230236.002
Your C.O.C. #: 102884

Attention: Mike Kosiw

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Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2018/11/13
Report #: R5482222
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T5024
Received: 2018/11/05, 15:30

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573
==
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.

O.REG 153 METALS PACKAGE (SOIL)

Maxxam ID		IFH143	IFH144		IFH146		IFH147	IFH148		
Sampling Date		2018/11/01	2018/11/01		2018/11/02		2018/11/02	2018/11/02		
COC Number		102884	102884		102884		102884	102884		
	UNITS	**MW-1 SS-2**	**MW-2 SS-2**	**RDL**	**MW-4 SS-2**	**RDL**	**MW-5 SS-2**	**BH-6 SS-2**	**RDL**	**QC Batch**
Inorganics										
Chromium (VI)	ug/g	<0.2	<0.2	0.2	<0.2	0.2	<0.2	<0.2	0.2	5825517
Metals										
Hot Water Ext. Boron (B)	ug/g	0.55	0.22	0.050	1.8	0.050	0.93	0.19	0.050	5827292
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	43	0.20	0.41	<0.20	0.20	5829447
Acid Extractable Arsenic (As)	ug/g	1.5	4.3	1.0	64	1.0	2.9	<1.0	1.0	5829447
Acid Extractable Barium (Ba)	ug/g	260	190	0.50	460	0.50	140	86	0.50	5829447
Acid Extractable Beryllium (Be)	ug/g	0.32	0.33	0.20	0.75	0.20	0.54	0.24	0.20	5829447
Acid Extractable Boron (B)	ug/g	13	9.5	5.0	20	5.0	11	5.2	5.0	5829447
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	0.10	8.7	0.10	0.17	<0.10	0.10	5829447
Acid Extractable Chromium (Cr)	ug/g	17	12	1.0	45	1.0	21	13	1.0	5829447
Acid Extractable Cobalt (Co)	ug/g	4.5	8.0	0.10	20	0.10	8.7	4.4	0.10	5829447
Acid Extractable Copper (Cu)	ug/g	11	16	0.50	310	0.50	16	8.4	0.50	5829447
Acid Extractable Lead (Pb)	ug/g	16	15	1.0	15000	5.0	40	6.8	1.0	5829447
Acid Extractable Molybdenum (Mo)	ug/g	1.2	2.6	0.50	3.9	0.50	0.90	<0.50	0.50	5829447
Acid Extractable Nickel (Ni)	ug/g	10	14	0.50	77	0.50	16	7.9	0.50	5829447
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	1.1	0.50	<0.50	<0.50	0.50	5829447
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	1.6	0.20	0.21	<0.20	0.20	5829447
Acid Extractable Thallium (Tl)	ug/g	0.11	0.22	0.050	0.64	0.050	0.20	0.083	0.050	5829447
Acid Extractable Uranium (U)	ug/g	0.42	0.58	0.050	1.7	0.050	0.59	0.47	0.050	5829447
Acid Extractable Vanadium (V)	ug/g	22	16	5.0	37	5.0	31	24	5.0	5829447
Acid Extractable Zinc (Zn)	ug/g	25	24	5.0	4200	25	51	19	5.0	5829447
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.050	1.0	0.050	0.088	<0.050	0.050	5829447

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (SOIL)

Maxxam ID		IFH149	IFH150			IFH150			IFH151		
Sampling Date		2018/11/02	2018/11/02			2018/11/02			2018/11/02		
COC Number		102884	102884			102884			102884		
	UNITS	**BH-7 SS-1**	**BH-8 SS-1**	**RDL**	**QC Batch**	**BH-8 SS-1 Lab-Dup**	**RDL**	**QC Batch**	**BH-9 SS-4**	**RDL**	**QC Batch**
Inorganics											
Chromium (VI)	ug/g	<0.2	<0.2	0.2	5825517				<0.2	0.2	5825517
Metals											
Hot Water Ext. Boron (B)	ug/g	1.7	3.9	0.050	5827292				0.071	0.050	5827292
Acid Extractable Antimony (Sb)	ug/g	3.1	6.4	0.20	5829447	7.4	0.20	5829447	<0.20	0.20	5829447
Acid Extractable Arsenic (As)	ug/g	4.5	11	1.0	5829447	10	1.0	5829447	<1.0	1.0	5829447
Acid Extractable Barium (Ba)	ug/g	390	260	0.50	5829447	270	0.50	5829447	36	0.50	5829447
Acid Extractable Beryllium (Be)	ug/g	0.40	0.46	0.20	5829447	0.46	0.20	5829447	<0.20	0.20	5829447
Acid Extractable Boron (B)	ug/g	13	19	5.0	5829447	19	5.0	5829447	<5.0	5.0	5829447
Acid Extractable Cadmium (Cd)	ug/g	0.71	1.7	0.10	5829447	1.6	0.10	5829447	<0.10	0.10	5829447
Acid Extractable Chromium (Cr)	ug/g	15	25	1.0	5829447	26	1.0	5829447	9.5	1.0	5829447
Acid Extractable Cobalt (Co)	ug/g	6.2	8.4	0.10	5829447	8.5	0.10	5829447	4.3	0.10	5829447
Acid Extractable Copper (Cu)	ug/g	28	60	0.50	5829447	65	0.50	5829447	10	0.50	5829447
Acid Extractable Lead (Pb)	ug/g	190	870	1.0	5829447	990	1.0	5829447	4.4	1.0	5829447
Acid Extractable Molybdenum (Mo)	ug/g	0.83	1.9	0.50	5829447	1.8	0.50	5829447	<0.50	0.50	5829447
Acid Extractable Nickel (Ni)	ug/g	16	22	0.50	5829447	22	0.50	5829447	7.0	0.50	5829447
Acid Extractable Selenium (Se)	ug/g	<0.50	1.1	0.50	5829447	1.1	0.50	5829447	<0.50	0.50	5829447
Acid Extractable Silver (Ag)	ug/g	<0.20	1.3	0.20	5829447	1.5	0.20	5829447	<0.20	0.20	5829447
Acid Extractable Thallium (Tl)	ug/g	0.18	0.21	0.050	5829447	0.20	0.050	5829447	<0.050	0.050	5829447
Acid Extractable Uranium (U)	ug/g	0.49	1.3	0.050	5829447	1.4	0.050	5829447	0.55	0.050	5829447
Acid Extractable Vanadium (V)	ug/g	21	27	5.0	5829447	28	5.0	5829447	23	5.0	5829447
Acid Extractable Zinc (Zn)	ug/g	140	590	5.0	5829447	580	5.0	5829447	20	5.0	5829447
Acid Extractable Mercury (Hg)	ug/g	0.13	0.47	0.050	5829447	0.48	0.050	5829447	<0.050	0.050	5829447

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

O.REG 153 METALS PACKAGE (SOIL)

Maxxam ID		IFH151			IFH152	IFH153	IFH154		
Sampling Date		2018/11/02			2018/11/02	2018/11/02	2018/11/02		
COC Number		102884			102884	102884	102884		
	UNITS	**BH-9 SS-4 Lab-Dup**	**RDL**	**QC Batch**	**BH-10 SS-1**	**BH-11 SS-1**	**DUP-1**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<0.2	0.2	5825517	<0.2	<0.2	<0.2	0.2	5825517
Metals									
Hot Water Ext. Boron (B)	ug/g				0.77	0.25	0.23	0.050	5827292
Acid Extractable Antimony (Sb)	ug/g				2.6	<0.20	<0.20	0.20	5829447
Acid Extractable Arsenic (As)	ug/g				9.0	1.7	1.5	1.0	5829447
Acid Extractable Barium (Ba)	ug/g				280	290	280	0.50	5829447
Acid Extractable Beryllium (Be)	ug/g				0.78	0.36	0.36	0.20	5829447
Acid Extractable Boron (B)	ug/g				10	8.7	9.6	5.0	5829447
Acid Extractable Cadmium (Cd)	ug/g				0.58	0.11	<0.10	0.10	5829447
Acid Extractable Chromium (Cr)	ug/g				19	13	18	1.0	5829447
Acid Extractable Cobalt (Co)	ug/g				8.0	6.0	7.7	0.10	5829447
Acid Extractable Copper (Cu)	ug/g				37	9.4	12	0.50	5829447
Acid Extractable Lead (Pb)	ug/g				180	17	17	1.0	5829447
Acid Extractable Molybdenum (Mo)	ug/g				1.3	0.88	0.80	0.50	5829447
Acid Extractable Nickel (Ni)	ug/g				14	12	16	0.50	5829447
Acid Extractable Selenium (Se)	ug/g				1.5	<0.50	<0.50	0.50	5829447
Acid Extractable Silver (Ag)	ug/g				0.34	<0.20	<0.20	0.20	5829447
Acid Extractable Thallium (Tl)	ug/g				0.18	0.21	0.23	0.050	5829447
Acid Extractable Uranium (U)	ug/g				0.62	0.39	0.39	0.050	5829447
Acid Extractable Vanadium (V)	ug/g				28	18	20	5.0	5829447
Acid Extractable Zinc (Zn)	ug/g				250	23	24	5.0	5829447
Acid Extractable Mercury (Hg)	ug/g				0.097	<0.050	<0.050	0.050	5829447

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

O.REG 153 PAHS (SOIL)

Maxxam ID		IFH143	IFH144	IFH145	IFH146	IFH147	IFH148		
Sampling Date		2018/11/01	2018/11/01	2018/11/01	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**MW-1 SS-2**	**MW-2 SS-2**	**MW-3 SS-1**	**MW-4 SS-2**	**MW-5 SS-2**	**BH-6 SS-2**	**RDL**	**QC Batch**
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	<0.014	<0.014	<0.014	0.049	<0.014	<0.014	0.014	5822328
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	<0.0050	<0.0050	<0.0050	0.026	0.010	<0.0050	0.0050	5822450
Acenaphthylene	ug/g	<0.0050	<0.0050	0.0062	0.022	0.018	<0.0050	0.0050	5822450
Anthracene	ug/g	<0.0050	<0.0050	<0.0050	0.046	0.033	<0.0050	0.0050	5822450
Benzo(a)anthracene	ug/g	0.010	<0.0050	0.026	0.28	0.093	<0.0050	0.0050	5822450
Benzo(a)pyrene	ug/g	0.015	<0.0050	0.030	0.28	0.11	<0.0050	0.0050	5822450
Benzo(b/j)fluoranthene	ug/g	0.024	0.010	0.044	0.33	0.15	<0.0050	0.0050	5822450
Benzo(g,h,i)perylene	ug/g	0.018	0.0081	0.028	0.25	0.10	<0.0050	0.0050	5822450
Benzo(k)fluoranthene	ug/g	0.0076	<0.0050	0.016	0.12	0.053	<0.0050	0.0050	5822450
Chrysene	ug/g	0.016	0.0076	0.035	0.30	0.10	<0.0050	0.0050	5822450
Dibenz(a,h)anthracene	ug/g	0.0057	<0.0050	0.0071	0.076	0.028	<0.0050	0.0050	5822450
Fluoranthene	ug/g	0.019	0.0065	0.055	0.52	0.19	<0.0050	0.0050	5822450
Fluorene	ug/g	<0.0050	<0.0050	<0.0050	0.034	0.016	<0.0050	0.0050	5822450
Indeno(1,2,3-cd)pyrene	ug/g	0.013	<0.0050	0.025	0.23	0.093	<0.0050	0.0050	5822450
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.016	<0.0050	<0.0050	0.0050	5822450
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.033	<0.0050	<0.0050	0.0050	5822450
Naphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.013	<0.0050	<0.0050	0.0050	5822450
Phenanthrene	ug/g	0.015	0.0084	0.020	0.20	0.11	<0.0050	0.0050	5822450
Pyrene	ug/g	0.018	0.0055	0.048	0.45	0.15	<0.0050	0.0050	5822450
Surrogate Recovery (%)									
D10-Anthracene	%	73	75	71	73	70	80		5822450
D14-Terphenyl (FS)	%	74	65	64	76	71	71		5822450
D8-Acenaphthylene	%	69	73	71	68	74	77		5822450

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (SOIL)

Maxxam ID		IFH149	IFH150	IFH151	IFH152	IFH153	IFH154		
Sampling Date		2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**BH-7 SS-1**	**BH-8 SS-1**	**BH-9 SS-4**	**BH-10 SS-1**	**BH-11 SS-1**	**DUP-1**	**RDL**	**QC Batch**
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	0.039	0.035	<0.014	0.034	0.032	0.033	0.014	5822328
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	0.014	0.0082	<0.0050	0.0076	0.028	0.010	0.0050	5822450
Acenaphthylene	ug/g	0.010	0.020	<0.0050	0.0075	<0.0050	<0.0050	0.0050	5822450
Anthracene	ug/g	0.021	0.027	<0.0050	0.015	0.053	0.019	0.0050	5822450
Benzo(a)anthracene	ug/g	0.16	0.29	<0.0050	0.10	0.20	0.085	0.0050	5822450
Benzo(a)pyrene	ug/g	0.15	0.28	<0.0050	0.093	0.15	0.073	0.0050	5822450
Benzo(b/j)fluoranthene	ug/g	0.18	0.32	<0.0050	0.12	0.19	0.094	0.0050	5822450
Benzo(g,h,i)perylene	ug/g	0.12	0.17	<0.0050	0.074	0.11	0.068	0.0050	5822450
Benzo(k)fluoranthene	ug/g	0.070	0.12	<0.0050	0.045	0.072	0.036	0.0050	5822450
Chrysene	ug/g	0.17	0.24	<0.0050	0.10	0.21	0.099	0.0050	5822450
Dibenz(a,h)anthracene	ug/g	0.041	0.065	<0.0050	0.027	0.031	0.020	0.0050	5822450
Fluoranthene	ug/g	0.45	0.53	<0.0050	0.22	0.58	0.25	0.0050	5822450
Fluorene	ug/g	0.030	0.029	<0.0050	0.023	0.041	0.030	0.0050	5822450
Indeno(1,2,3-cd)pyrene	ug/g	0.12	0.19	<0.0050	0.079	0.11	0.063	0.0050	5822450
1-Methylnaphthalene	ug/g	0.013	0.011	<0.0050	0.011	0.012	0.012	0.0050	5822450
2-Methylnaphthalene	ug/g	0.026	0.024	<0.0050	0.023	0.021	0.021	0.0050	5822450
Naphthalene	ug/g	0.012	0.011	<0.0050	0.0086	0.0065	0.0078	0.0050	5822450
Phenanthrene	ug/g	0.17	0.12	<0.0050	0.096	0.31	0.14	0.0050	5822450
Pyrene	ug/g	0.33	0.47	<0.0050	0.18	0.41	0.18	0.0050	5822450
Surrogate Recovery (%)									
D10-Anthracene	%	82	77	76	72	69	88		5822450
D14-Terphenyl (FS)	%	78	78	67	76	86	96		5822450
D8-Acenaphthylene	%	72	70	74	69	65	79		5822450

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (SOIL)

Maxxam ID		IFH154		
Sampling Date		2018/11/02		
COC Number		102884		
	UNITS	**DUP-1 Lab-Dup**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons				
Acenaphthene	ug/g	0.015	0.0050	5822450
Acenaphthylene	ug/g	<0.0050	0.0050	5822450
Anthracene	ug/g	0.024	0.0050	5822450
Benzo(a)anthracene	ug/g	0.091	0.0050	5822450
Benzo(a)pyrene	ug/g	0.075	0.0050	5822450
Benzo(b/j)fluoranthene	ug/g	0.096	0.0050	5822450
Benzo(g,h,i)perylene	ug/g	0.069	0.0050	5822450
Benzo(k)fluoranthene	ug/g	0.037	0.0050	5822450
Chrysene	ug/g	0.099	0.0050	5822450
Dibenz(a,h)anthracene	ug/g	0.021	0.0050	5822450
Fluoranthene	ug/g	0.26	0.0050	5822450
Fluorene	ug/g	0.027	0.0050	5822450
Indeno(1,2,3-cd)pyrene	ug/g	0.067	0.0050	5822450
1-Methylnaphthalene	ug/g	0.0080	0.0050	5822450
2-Methylnaphthalene	ug/g	0.012	0.0050	5822450
Naphthalene	ug/g	0.0062	0.0050	5822450
Phenanthrene	ug/g	0.15	0.0050	5822450
Pyrene	ug/g	0.20	0.0050	5822450
Surrogate Recovery (%)				
D10-Anthracene	%	84		5822450
D14-Terphenyl (FS)	%	97		5822450
D8-Acenaphthylene	%	77		5822450

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

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Maxxam ID		IFH143	IFH144	IFH145	IFH146	IFH147	IFH148		
Sampling Date		2018/11/01	2018/11/01	2018/11/01	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**MW-1 SS-2**	**MW-2 SS-2**	**MW-3 SS-1**	**MW-4 SS-2**	**MW-5 SS-2**	**BH-6 SS-2**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	15	3.3	13	20	16	10	0.2	5822472
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5822329
Volatile Organics									
Acetone (2-Propanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
Bromodichloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Bromoform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Bromomethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Carbon Tetrachloride	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Chlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Chloroform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Dibromochloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichloropropane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	5825431
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5825431
Ethylbenzene	ug/g	<0.020	<0.020	0.046	<0.020	<0.020	<0.020	0.020	5825431
Ethylene Dibromide	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Hexane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Styrene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Tetrachloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	0.22	<0.050	0.050	5825431

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Maxxam ID		IFH143	IFH144	IFH145	IFH146	IFH147	IFH148		
Sampling Date		2018/11/01	2018/11/01	2018/11/01	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**MW-1 SS-2**	**MW-2 SS-2**	**MW-3 SS-1**	**MW-4 SS-2**	**MW-5 SS-2**	**BH-6 SS-2**	**RDL**	**QC Batch**
Toluene	ug/g	<0.020	0.050	0.053	<0.020	<0.020	<0.020	0.020	5825431
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Trichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Vinyl Chloride	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
p+m-Xylene	ug/g	<0.020	0.047	0.22	<0.020	<0.020	<0.020	0.020	5825431
o-Xylene	ug/g	<0.020	<0.020	0.074	<0.020	<0.020	<0.020	0.020	5825431
Total Xylenes	ug/g	<0.020	0.047	0.29	<0.020	<0.020	<0.020	0.020	5825431
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	10	5825431
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	10	5825431
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	<10	10	5822443
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	110	<50	<50	50	5822443
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	68	81	<50	<50	50	5822443
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes	Yes		5822443
Surrogate Recovery (%)									
o-Terphenyl	%	100	97	102	103	94	101		5822443
4-Bromofluorobenzene	%	88	88	89	88	88	88		5825431
D10-o-Xylene	%	98	115	103	104	99	92		5825431
D4-1,2-Dichloroethane	%	108	102	107	111	104	108		5825431
D8-Toluene	%	103	104	101	102	104	103		5825431

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Maxxam ID		IFH149	IFH150	IFH151	IFH152	IFH153	IFH154		
Sampling Date		2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**BH-7 SS-1**	**BH-8 SS-1**	**BH-9 SS-4**	**BH-10 SS-1**	**BH-11 SS-1**	**DUP-1**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	25	14	6.8	12	3.3	3.3	0.2	5822472
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5822329
Volatile Organics									
Acetone (2-Propanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
Bromodichloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Bromoform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Bromomethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Carbon Tetrachloride	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Chlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Chloroform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Dibromochloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,2-Dichloropropane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	5825431
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	5825431
Ethylbenzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
Ethylene Dibromide	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Hexane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5825431
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Styrene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Tetrachloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Maxxam ID		IFH149	IFH150	IFH151	IFH152	IFH153	IFH154		
Sampling Date		2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884	102884		
	UNITS	**BH-7 SS-1**	**BH-8 SS-1**	**BH-9 SS-4**	**BH-10 SS-1**	**BH-11 SS-1**	**DUP-1**	**RDL**	**QC Batch**
Toluene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Trichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5825431
Vinyl Chloride	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
p+m-Xylene	ug/g	<0.020	0.027	<0.020	<0.020	<0.020	<0.020	0.020	5825431
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5825431
Total Xylenes	ug/g	<0.020	0.027	<0.020	<0.020	<0.020	<0.020	0.020	5825431
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	10	5825431
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	10	5825431
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	<10	10	5822443
F3 (C16-C34 Hydrocarbons)	ug/g	400	200	<50	75	580	470	50	5822443
F4 (C34-C50 Hydrocarbons)	ug/g	390	190	<50	290	1100	920	50	5822443
Reached Baseline at C50	ug/g	No	No	Yes	No	No	No		5822443
Surrogate Recovery (%)									
o-Terphenyl	%	96	102	101	99	103	98		5822443
4-Bromofluorobenzene	%	88	89	88	87	88	88		5825431
D10-o-Xylene	%	97	93	105	94	93	124		5825431
D4-1,2-Dichloroethane	%	118	108	106	116	106	114		5825431
D8-Toluene	%	100	104	104	99	102	100		5825431

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

RESULTS OF ANALYSES OF SOIL

Maxxam ID		IFH143	IFH145		IFH147			IFH148	IFH149	
Sampling Date		2018/11/01	2018/11/01		2018/11/02			2018/11/02	2018/11/02	
COC Number		102884	102884		102884			102884	102884	
	UNITS	**MW-1 SS-2**	**MW-3 SS-1**	**QC Batch**	**MW-5 SS-2**	**RDL**	**QC Batch**	**BH-6 SS-2**	**BH-7 SS-1**	**QC Batch**
Inorganics										
Available (CaCl2) pH	pH	7.85	7.73	5827206				7.91	7.58	5827206
Miscellaneous Parameters										
Grain Size	%				FINE	N/A	5827884			
Sieve - #200 (<0.075mm)	%				53	1	5827884			
Sieve - #200 (>0.075mm)	%				47	1	5827884			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		IFH151			IFH152	
Sampling Date		2018/11/02			2018/11/02	
COC Number		102884			102884	
	UNITS	**BH-9 SS-4**	**RDL**	**QC Batch**	**BH-10 SS-1**	**QC Batch**
Inorganics						
Available (CaCl2) pH	pH	7.92		5827206	7.72	5827206
Miscellaneous Parameters						
Grain Size	%	COARSE	N/A	5827884		
Sieve - #200 (<0.075mm)	%	15	1	5827884		
Sieve - #200 (>0.075mm)	%	85	1	5827884		

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IFH149	IFH150	IFH152	IFH153	IFH154		
Sampling Date		2018/11/02	2018/11/02	2018/11/02	2018/11/02	2018/11/02		
COC Number		102884	102884	102884	102884	102884		
	UNITS	**BH-7 SS-1**	**BH-8 SS-1**	**BH-10 SS-1**	**BH-11 SS-1**	**DUP-1**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons								
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	2500	830	2200	3400	2900	100	5830138

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: IFH143
Sample ID: MW-1 SS-2
Matrix: Soil

Collected: 2018/11/01
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH144
Sample ID: MW-2 SS-2
Matrix: Soil

Collected: 2018/11/01
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH145
Sample ID: MW-3 SS-1
Matrix: Soil

Collected: 2018/11/01
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH146
Sample ID: MW-4 SS-2
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai

TEST SUMMARY

Maxxam ID: IFH146
Sample ID: MW-4 SS-2
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/07	Liliana Gaburici
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH147
Sample ID: MW-5 SS-2
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
Sieve, 75um	SIEV	5827884	N/A	2018/11/09	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH148
Sample ID: BH-6 SS-2
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH149
Sample ID: BH-7 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici

TEST SUMMARY

Maxxam ID: IFH149
Sample ID: BH-7 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5830138	2018/11/12	2018/11/13	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH150
Sample ID: BH-8 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5830138	2018/11/12	2018/11/13	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH150 Dup
Sample ID: BH-8 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri

Maxxam ID: IFH151
Sample ID: BH-9 SS-4
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi

TEST SUMMARY

Maxxam ID: IFH151
Sample ID: BH-9 SS-4
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/06	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Sieve, 75um	SIEV	5827884	N/A	2018/11/09	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH151 Dup
Sample ID: BH-9 SS-4
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz

Maxxam ID: IFH152
Sample ID: BH-10 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5830138	2018/11/12	2018/11/13	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici
pH CaCl2 EXTRACT	AT	5827206	2018/11/08	2018/11/08	Gnana Thomas
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH153
Sample ID: BH-11 SS-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/08	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5830138	2018/11/12	2018/11/13	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

TEST SUMMARY

Maxxam ID: IFH154
Sample ID: DUP-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5822328	N/A	2018/11/09	Liliana Gaburici
Hot Water Extractable Boron	ICP	5827292	2018/11/07	2018/11/08	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	5822329	N/A	2018/11/08	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	5825517	2018/11/07	2018/11/08	Sally Norouz
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5822443	2018/11/06	2018/11/09	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5830138	2018/11/12	2018/11/13	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5829447	2018/11/09	2018/11/09	Viviana Canzonieri
Moisture	BAL	5822472	N/A	2018/11/07	Fatemeh Habibagahi
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5825431	N/A	2018/11/07	Liliana Gaburici

Maxxam ID: IFH154 Dup
Sample ID: DUP-1
Matrix: Soil

Collected: 2018/11/02
Shipped:
Received: 2018/11/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5822450	2018/11/06	2018/11/08	Liliana Gaburici

GENERAL COMMENTS

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

Package 1	7.7°C

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5822443	MVA	Matrix Spike	o-Terphenyl	2018/11/09		91	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/09		78	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2018/11/09		78	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2018/11/09		78	%	50 - 130
5822443	MVA	Spiked Blank	o-Terphenyl	2018/11/09		98	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/09		85	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2018/11/09		85	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2018/11/09		85	%	80 - 120
5822443	MVA	Method Blank	o-Terphenyl	2018/11/08		104	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/08	<10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2018/11/08	<50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2018/11/08	<50		ug/g	
5822443	MVA	RPD	F2 (C10-C16 Hydrocarbons)	2018/11/08	NC		%	50
			F3 (C16-C34 Hydrocarbons)	2018/11/08	NC		%	50
			F4 (C34-C50 Hydrocarbons)	2018/11/08	NC		%	50
5822450	LGA	Matrix Spike [IFH151-01]	D10-Anthracene	2018/11/06		74	%	50 - 130
			D14-Terphenyl (FS)	2018/11/06		65	%	50 - 130
			D8-Acenaphthylene	2018/11/06		69	%	50 - 130
			Acenaphthene	2018/11/06		71	%	50 - 130
			Acenaphthylene	2018/11/06		67	%	50 - 130
			Anthracene	2018/11/06		62	%	50 - 130
			Benzo(a)anthracene	2018/11/06		65	%	50 - 130
			Benzo(a)pyrene	2018/11/06		70	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/06		69	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/06		88	%	50 - 130
			Benzo(k)fluoranthene	2018/11/06		62	%	50 - 130
			Chrysene	2018/11/06		77	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/06		112	%	50 - 130
			Fluoranthene	2018/11/06		65	%	50 - 130
			Fluorene	2018/11/06		71	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/06		70	%	50 - 130
			1-Methylnaphthalene	2018/11/06		72	%	50 - 130
			2-Methylnaphthalene	2018/11/06		77	%	50 - 130
			Naphthalene	2018/11/06		63	%	50 - 130
			Phenanthrene	2018/11/06		62	%	50 - 130
			Pyrene	2018/11/06		65	%	50 - 130
5822450	LGA	Spiked Blank	D10-Anthracene	2018/11/06		79	%	50 - 130
			D14-Terphenyl (FS)	2018/11/06		75	%	50 - 130
			D8-Acenaphthylene	2018/11/06		74	%	50 - 130
			Acenaphthene	2018/11/06		82	%	50 - 130
			Acenaphthylene	2018/11/06		73	%	50 - 130
			Anthracene	2018/11/06		68	%	50 - 130
			Benzo(a)anthracene	2018/11/06		69	%	50 - 130
			Benzo(a)pyrene	2018/11/06		95	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/06		75	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/06		105	%	50 - 130
			Benzo(k)fluoranthene	2018/11/06		70	%	50 - 130
			Chrysene	2018/11/06		82	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/06		95	%	50 - 130
			Fluoranthene	2018/11/06		70	%	50 - 130
			Fluorene	2018/11/06		75	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/06		78	%	50 - 130
			1-Methylnaphthalene	2018/11/06		77	%	50 - 130
			2-Methylnaphthalene	2018/11/06		83	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Naphthalene	2018/11/06		67	%	50 - 130
			Phenanthrene	2018/11/06		66	%	50 - 130
			Pyrene	2018/11/06		75	%	50 - 130
5822450	LGA	Method Blank	D10-Anthracene	2018/11/06		95	%	50 - 130
			D14-Terphenyl (FS)	2018/11/06		84	%	50 - 130
			D8-Acenaphthylene	2018/11/06		79	%	50 - 130
			Acenaphthene	2018/11/06	<0.0050		ug/g	
			Acenaphthylene	2018/11/06	<0.0050		ug/g	
			Anthracene	2018/11/06	<0.0050		ug/g	
			Benzo(a)anthracene	2018/11/06	<0.0050		ug/g	
			Benzo(a)pyrene	2018/11/06	<0.0050		ug/g	
			Benzo(b/j)fluoranthene	2018/11/06	<0.0050		ug/g	
			Benzo(g,h,i)perylene	2018/11/06	<0.0050		ug/g	
			Benzo(k)fluoranthene	2018/11/06	<0.0050		ug/g	
			Chrysene	2018/11/06	<0.0050		ug/g	
			Dibenz(a,h)anthracene	2018/11/06	<0.0050		ug/g	
			Fluoranthene	2018/11/06	<0.0050		ug/g	
			Fluorene	2018/11/06	<0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2018/11/06	<0.0050		ug/g	
			1-Methylnaphthalene	2018/11/06	<0.0050		ug/g	
			2-Methylnaphthalene	2018/11/06	<0.0050		ug/g	
			Naphthalene	2018/11/06	<0.0050		ug/g	
			Phenanthrene	2018/11/06	<0.0050		ug/g	
			Pyrene	2018/11/06	<0.0050		ug/g	
5822450	LGA	RPD [IFH154-01]	Acenaphthene	2018/11/08	NC		%	40
			Acenaphthylene	2018/11/08	NC		%	40
			Anthracene	2018/11/08	24		%	40
			Benzo(a)anthracene	2018/11/08	7.2		%	40
			Benzo(a)pyrene	2018/11/08	2.7		%	40
			Benzo(b/j)fluoranthene	2018/11/08	2.6		%	40
			Benzo(g,h,i)perylene	2018/11/08	0.67		%	40
			Benzo(k)fluoranthene	2018/11/08	5.1		%	40
			Chrysene	2018/11/08	0.72		%	40
			Dibenz(a,h)anthracene	2018/11/08	2.6		%	40
			Fluoranthene	2018/11/08	3.8		%	40
			Fluorene	2018/11/08	12		%	40
			Indeno(1,2,3-cd)pyrene	2018/11/08	5.0		%	40
			1-Methylnaphthalene	2018/11/08	NC		%	40
			2-Methylnaphthalene	2018/11/08	NC		%	40
			Naphthalene	2018/11/08	23		%	40
			Phenanthrene	2018/11/08	1.1		%	40
			Pyrene	2018/11/08	7.6		%	40
5822472	FHB	RPD	Moisture	2018/11/07	6.3		%	50
5825431	LGA	Spiked Blank	4-Bromofluorobenzene	2018/11/07		94	%	60 - 140
			D10-o-Xylene	2018/11/07		123	%	60 - 130
			D4-1,2-Dichloroethane	2018/11/07		102	%	60 - 140
			D8-Toluene	2018/11/07		109	%	60 - 140
			Acetone (2-Propanone)	2018/11/07		82	%	60 - 140
			Benzene	2018/11/07		104	%	60 - 130
			Bromodichloromethane	2018/11/07		99	%	60 - 130
			Bromoform	2018/11/07		82	%	60 - 130
			Bromomethane	2018/11/07		89	%	60 - 140
			Carbon Tetrachloride	2018/11/07		103	%	60 - 130
			Chlorobenzene	2018/11/07		99	%	60 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chloroform	2018/11/07		94	%	60 - 130
			Dibromochloromethane	2018/11/07		96	%	60 - 130
			1,2-Dichlorobenzene	2018/11/07		101	%	60 - 130
			1,3-Dichlorobenzene	2018/11/07		107	%	60 - 130
			1,4-Dichlorobenzene	2018/11/07		107	%	60 - 130
			Dichlorodifluoromethane (FREON 12)	2018/11/07		104	%	60 - 140
			1,1-Dichloroethane	2018/11/07		100	%	60 - 130
			1,2-Dichloroethane	2018/11/07		93	%	60 - 130
			1,1-Dichloroethylene	2018/11/07		110	%	60 - 130
			cis-1,2-Dichloroethylene	2018/11/07		99	%	60 - 130
			trans-1,2-Dichloroethylene	2018/11/07		99	%	60 - 130
			1,2-Dichloropropane	2018/11/07		92	%	60 - 130
			cis-1,3-Dichloropropene	2018/11/07		85	%	60 - 130
			trans-1,3-Dichloropropene	2018/11/07		83	%	60 - 130
			Ethylbenzene	2018/11/07		108	%	60 - 130
			Ethylene Dibromide	2018/11/07		89	%	60 - 130
			Hexane	2018/11/07		110	%	60 - 130
			Methylene Chloride(Dichloromethane)	2018/11/07		91	%	60 - 130
			Methyl Ethyl Ketone (2-Butanone)	2018/11/07		83	%	60 - 140
			Methyl Isobutyl Ketone	2018/11/07		78	%	60 - 130
			Methyl t-butyl ether (MTBE)	2018/11/07		94	%	60 - 130
			Styrene	2018/11/07		106	%	60 - 130
			1,1,1,2-Tetrachloroethane	2018/11/07		100	%	60 - 130
			1,1,2,2-Tetrachloroethane	2018/11/07		99	%	60 - 130
			Tetrachloroethylene	2018/11/07		102	%	60 - 130
			Toluene	2018/11/07		108	%	60 - 130
			1,1,1-Trichloroethane	2018/11/07		102	%	60 - 130
			1,1,2-Trichloroethane	2018/11/07		100	%	60 - 130
			Trichloroethylene	2018/11/07		96	%	60 - 130
			Trichlorofluoromethane (FREON 11)	2018/11/07		111	%	60 - 130
			Vinyl Chloride	2018/11/07		105	%	60 - 130
			p+m-Xylene	2018/11/07		109	%	60 - 130
			o-Xylene	2018/11/07		108	%	60 - 130
			F1 (C6-C10)	2018/11/07		102	%	80 - 120
5825431	LGA	RPD	Acetone (2-Propanone)	2018/11/07	2.6		%	50
			Benzene	2018/11/07	3.4		%	50
			Bromodichloromethane	2018/11/07	3.0		%	50
			Bromoform	2018/11/07	2.2		%	50
			Bromomethane	2018/11/07	3.1		%	50
			Carbon Tetrachloride	2018/11/07	1.1		%	50
			Chlorobenzene	2018/11/07	2.5		%	50
			Chloroform	2018/11/07	0.14		%	50
			Dibromochloromethane	2018/11/07	5.7		%	50
			1,2-Dichlorobenzene	2018/11/07	1.3		%	50
			1,3-Dichlorobenzene	2018/11/07	2.4		%	50
			1,4-Dichlorobenzene	2018/11/07	2.8		%	50
			Dichlorodifluoromethane (FREON 12)	2018/11/07	2.6		%	50
			1,1-Dichloroethane	2018/11/07	3.9		%	50
			1,2-Dichloroethane	2018/11/07	4.2		%	50
			1,1-Dichloroethylene	2018/11/07	3.7		%	50
			cis-1,2-Dichloroethylene	2018/11/07	2.8		%	50
			trans-1,2-Dichloroethylene	2018/11/07	3.4		%	50
			1,2-Dichloropropane	2018/11/07	4.6		%	50
			cis-1,3-Dichloropropene	2018/11/07	4.3		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			trans-1,3-Dichloropropene	2018/11/07	2.7		%	50
			Ethylbenzene	2018/11/07	1.1		%	50
			Ethylene Dibromide	2018/11/07	3.9		%	50
			Hexane	2018/11/07	7.1		%	50
			Methylene Chloride(Dichloromethane)	2018/11/07	3.7		%	50
			Methyl Ethyl Ketone (2-Butanone)	2018/11/07	1.5		%	50
			Methyl Isobutyl Ketone	2018/11/07	5.0		%	50
			Methyl t-butyl ether (MTBE)	2018/11/07	3.8		%	50
			Styrene	2018/11/07	3.3		%	50
			1,1,1,2-Tetrachloroethane	2018/11/07	1.1		%	50
			1,1,2,2-Tetrachloroethane	2018/11/07	4.0		%	50
			Tetrachloroethylene	2018/11/07	1.3		%	50
			Toluene	2018/11/07	2.2		%	50
			1,1,1-Trichloroethane	2018/11/07	3.5		%	50
			1,1,2-Trichloroethane	2018/11/07	1.9		%	50
			Trichloroethylene	2018/11/07	4.2		%	50
			Trichlorofluoromethane (FREON 11)	2018/11/07	2.2		%	50
			Vinyl Chloride	2018/11/07	3.3		%	50
			p+m-Xylene	2018/11/07	1.1		%	50
			o-Xylene	2018/11/07	3.2		%	50
			F1 (C6-C10)	2018/11/07	4.7		%	30
5825431	LGA	Method Blank	4-Bromofluorobenzene	2018/11/07		87	%	60 - 140
			D10-o-Xylene	2018/11/07		117	%	60 - 130
			D4-1,2-Dichloroethane	2018/11/07		100	%	60 - 140
			D8-Toluene	2018/11/07		102	%	60 - 140
			Acetone (2-Propanone)	2018/11/07	<0.50		ug/g	
			Benzene	2018/11/07	<0.020		ug/g	
			Bromodichloromethane	2018/11/07	<0.050		ug/g	
			Bromoform	2018/11/07	<0.050		ug/g	
			Bromomethane	2018/11/07	<0.050		ug/g	
			Carbon Tetrachloride	2018/11/07	<0.050		ug/g	
			Chlorobenzene	2018/11/07	<0.050		ug/g	
			Chloroform	2018/11/07	<0.050		ug/g	
			Dibromochloromethane	2018/11/07	<0.050		ug/g	
			1,2-Dichlorobenzene	2018/11/07	<0.050		ug/g	
			1,3-Dichlorobenzene	2018/11/07	<0.050		ug/g	
			1,4-Dichlorobenzene	2018/11/07	<0.050		ug/g	
			Dichlorodifluoromethane (FREON 12)	2018/11/07	<0.050		ug/g	
			1,1-Dichloroethane	2018/11/07	<0.050		ug/g	
			1,2-Dichloroethane	2018/11/07	<0.050		ug/g	
			1,1-Dichloroethylene	2018/11/07	<0.050		ug/g	
			cis-1,2-Dichloroethylene	2018/11/07	<0.050		ug/g	
			trans-1,2-Dichloroethylene	2018/11/07	<0.050		ug/g	
			1,2-Dichloropropane	2018/11/07	<0.050		ug/g	
			cis-1,3-Dichloropropene	2018/11/07	<0.030		ug/g	
			trans-1,3-Dichloropropene	2018/11/07	<0.040		ug/g	
			Ethylbenzene	2018/11/07	<0.020		ug/g	
			Ethylene Dibromide	2018/11/07	<0.050		ug/g	
			Hexane	2018/11/07	<0.050		ug/g	
			Methylene Chloride(Dichloromethane)	2018/11/07	<0.050		ug/g	
			Methyl Ethyl Ketone (2-Butanone)	2018/11/07	<0.50		ug/g	
			Methyl Isobutyl Ketone	2018/11/07	<0.50		ug/g	
			Methyl t-butyl ether (MTBE)	2018/11/07	<0.050		ug/g	
			Styrene	2018/11/07	<0.050		ug/g	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1,1,2-Tetrachloroethane	2018/11/07	<0.050		ug/g	
			1,1,2,2-Tetrachloroethane	2018/11/07	<0.050		ug/g	
			Tetrachloroethylene	2018/11/07	<0.050		ug/g	
			Toluene	2018/11/07	<0.020		ug/g	
			1,1,1-Trichloroethane	2018/11/07	<0.050		ug/g	
			1,1,2-Trichloroethane	2018/11/07	<0.050		ug/g	
			Trichloroethylene	2018/11/07	<0.050		ug/g	
			Trichlorofluoromethane (FREON 11)	2018/11/07	<0.050		ug/g	
			Vinyl Chloride	2018/11/07	<0.020		ug/g	
			p+m-Xylene	2018/11/07	<0.020		ug/g	
			o-Xylene	2018/11/07	<0.020		ug/g	
			Total Xylenes	2018/11/07	<0.020		ug/g	
			F1 (C6-C10)	2018/11/07	<10		ug/g	
			F1 (C6-C10) - BTEX	2018/11/07	<10		ug/g	
5825517	SAC	Matrix Spike [IFH151-03]	Chromium (VI)	2018/11/08		88	%	70 - 130
5825517	SAC	Spiked Blank	Chromium (VI)	2018/11/08		98	%	80 - 120
5825517	SAC	Method Blank	Chromium (VI)	2018/11/08	<0.2		ug/g	
5825517	SAC	RPD [IFH151-03]	Chromium (VI)	2018/11/08	NC		%	35
5827206	GTO	Spiked Blank	Available (CaCl2) pH	2018/11/08		100	%	97 - 103
5827206	GTO	RPD	Available (CaCl2) pH	2018/11/08	2.7		%	N/A
5827292	SUK	Matrix Spike	Hot Water Ext. Boron (B)	2018/11/08		108	%	75 - 125
5827292	SUK	Spiked Blank	Hot Water Ext. Boron (B)	2018/11/08		106	%	75 - 125
5827292	SUK	Method Blank	Hot Water Ext. Boron (B)	2018/11/08	<0.050		ug/g	
5827292	SUK	RPD	Hot Water Ext. Boron (B)	2018/11/08	14		%	40
5827884	GYA	QC Standard	Sieve - #200 (<0.075mm)	2018/11/09		56	%	53 - 58
			Sieve - #200 (>0.075mm)	2018/11/09		44	%	42 - 47
5827884	GYA	RPD	Sieve - #200 (<0.075mm)	2018/11/09	0.091		%	20
			Sieve - #200 (>0.075mm)	2018/11/09	7.7		%	20
5829447	VIV	Matrix Spike [IFH150-03]	Acid Extractable Antimony (Sb)	2018/11/09		94	%	75 - 125
			Acid Extractable Arsenic (As)	2018/11/09		104	%	75 - 125
			Acid Extractable Barium (Ba)	2018/11/09		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2018/11/09		92	%	75 - 125
			Acid Extractable Boron (B)	2018/11/09		92	%	75 - 125
			Acid Extractable Cadmium (Cd)	2018/11/09		92	%	75 - 125
			Acid Extractable Chromium (Cr)	2018/11/09		NC	%	75 - 125
			Acid Extractable Cobalt (Co)	2018/11/09		98	%	75 - 125
			Acid Extractable Copper (Cu)	2018/11/09		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2018/11/09		NC	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2018/11/09		95	%	75 - 125
			Acid Extractable Nickel (Ni)	2018/11/09		100	%	75 - 125
			Acid Extractable Selenium (Se)	2018/11/09		92	%	75 - 125
			Acid Extractable Silver (Ag)	2018/11/09		94	%	75 - 125
			Acid Extractable Thallium (Tl)	2018/11/09		91	%	75 - 125
			Acid Extractable Uranium (U)	2018/11/09		93	%	75 - 125
			Acid Extractable Vanadium (V)	2018/11/09		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2018/11/09		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2018/11/09		86	%	75 - 125
5829447	VIV	Spiked Blank	Acid Extractable Antimony (Sb)	2018/11/09		101	%	80 - 120
			Acid Extractable Arsenic (As)	2018/11/09		103	%	80 - 120
			Acid Extractable Barium (Ba)	2018/11/09		97	%	80 - 120
			Acid Extractable Beryllium (Be)	2018/11/09		97	%	80 - 120
			Acid Extractable Boron (B)	2018/11/09		99	%	80 - 120
			Acid Extractable Cadmium (Cd)	2018/11/09		99	%	80 - 120
			Acid Extractable Chromium (Cr)	2018/11/09		96	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Cobalt (Co)	2018/11/09		98	%	80 - 120
			Acid Extractable Copper (Cu)	2018/11/09		98	%	80 - 120
			Acid Extractable Lead (Pb)	2018/11/09		98	%	80 - 120
			Acid Extractable Molybdenum (Mo)	2018/11/09		101	%	80 - 120
			Acid Extractable Nickel (Ni)	2018/11/09		98	%	80 - 120
			Acid Extractable Selenium (Se)	2018/11/09		101	%	80 - 120
			Acid Extractable Silver (Ag)	2018/11/09		97	%	80 - 120
			Acid Extractable Thallium (Tl)	2018/11/09		98	%	80 - 120
			Acid Extractable Uranium (U)	2018/11/09		97	%	80 - 120
			Acid Extractable Vanadium (V)	2018/11/09		98	%	80 - 120
			Acid Extractable Zinc (Zn)	2018/11/09		100	%	80 - 120
			Acid Extractable Mercury (Hg)	2018/11/09		105	%	80 - 120
5829447	VIV	Method Blank	Acid Extractable Antimony (Sb)	2018/11/09	<0.20		ug/g	
			Acid Extractable Arsenic (As)	2018/11/09	<1.0		ug/g	
			Acid Extractable Barium (Ba)	2018/11/09	<0.50		ug/g	
			Acid Extractable Beryllium (Be)	2018/11/09	<0.20		ug/g	
			Acid Extractable Boron (B)	2018/11/09	<5.0		ug/g	
			Acid Extractable Cadmium (Cd)	2018/11/09	<0.10		ug/g	
			Acid Extractable Chromium (Cr)	2018/11/09	<1.0		ug/g	
			Acid Extractable Cobalt (Co)	2018/11/09	<0.10		ug/g	
			Acid Extractable Copper (Cu)	2018/11/09	<0.50		ug/g	
			Acid Extractable Lead (Pb)	2018/11/09	<1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2018/11/09	<0.50		ug/g	
			Acid Extractable Nickel (Ni)	2018/11/09	<0.50		ug/g	
			Acid Extractable Selenium (Se)	2018/11/09	<0.50		ug/g	
			Acid Extractable Silver (Ag)	2018/11/09	<0.20		ug/g	
			Acid Extractable Thallium (Tl)	2018/11/09	<0.050		ug/g	
			Acid Extractable Uranium (U)	2018/11/09	<0.050		ug/g	
			Acid Extractable Vanadium (V)	2018/11/09	<5.0		ug/g	
			Acid Extractable Zinc (Zn)	2018/11/09	<5.0		ug/g	
			Acid Extractable Mercury (Hg)	2018/11/09	<0.050		ug/g	
5829447	VIV	RPD [IFH150-03]	Acid Extractable Antimony (Sb)	2018/11/09	15		%	30
			Acid Extractable Arsenic (As)	2018/11/09	3.5		%	30
			Acid Extractable Barium (Ba)	2018/11/09	3.6		%	30
			Acid Extractable Beryllium (Be)	2018/11/09	0.86		%	30
			Acid Extractable Boron (B)	2018/11/09	1.9		%	30
			Acid Extractable Cadmium (Cd)	2018/11/09	5.8		%	30
			Acid Extractable Chromium (Cr)	2018/11/09	3.8		%	30
			Acid Extractable Cobalt (Co)	2018/11/09	1.7		%	30
			Acid Extractable Copper (Cu)	2018/11/09	7.5		%	30
			Acid Extractable Lead (Pb)	2018/11/09	13		%	30
			Acid Extractable Molybdenum (Mo)	2018/11/09	4.2		%	30
			Acid Extractable Nickel (Ni)	2018/11/09	0.044		%	30
			Acid Extractable Selenium (Se)	2018/11/09	0.59		%	30
			Acid Extractable Silver (Ag)	2018/11/09	15		%	30
			Acid Extractable Thallium (Tl)	2018/11/09	4.0		%	30
			Acid Extractable Uranium (U)	2018/11/09	3.6		%	30
			Acid Extractable Vanadium (V)	2018/11/09	1.8		%	30
			Acid Extractable Zinc (Zn)	2018/11/09	0.23		%	30
			Acid Extractable Mercury (Hg)	2018/11/09	1.9		%	30
5830138	MVA	Spiked Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2018/11/13		106	%	65 - 135
5830138	MVA	RPD	F4G-sg (Grav. Heavy Hydrocarbons)	2018/11/13	0.95		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5830138	MVA	Method Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2018/11/13	<100		ug/g	

N/A = Not Applicable

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

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

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

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

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

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

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

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

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

Steve Roberts, Ottawa Lab Manager

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
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

102884 Page 1 of 1

Invoice Information

Company Name: Pinchin Ltd
Contact Name: Mike Kosiw, Matt Ryan, Scott Mather
Address: 1 Hines Rd, Kanata
Phone:
Fax:
Email:

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address: Same
Phone:
Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 230236-002
Site Location:
Site #:
Sampled By:

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:
Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☒ Ind/Comm ☒ Coarse
☒ Table 3 ☐ Agri/ Other
☒ Table 7
FOR RSC (PLEASE CIRCLE) Y [✓ N]

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / [✓ N]

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	pH	Texture (75um)						HOLD- DO NOT ANALYZE
1	MW-1 SS-2	Nov 1	Am	SOIL	2		X	X	X			X	X	X							
2	MW-2 SS-2	2018	pm	|	2		X	X	X			X	X								
3	MW-3 SS-1	|	pm	|	2		X	X	X				X	X							
4	MW-4 SS-2	Nov 2	AM	|	2		X	X	X			X	X								
5	MW-5 SS-2	2018	|	|	2		X	X	X			X	X		X						
6	BH-6 SS-2	|	|	|	2		X	X	X			X	X	X							
7	BH-7 SS-1	|	pm	|	2		X	X	X			X	X	X							
8	BH-8 SS-1	|	|	|	2		X	X	X			X	X								
9	BH-9 SS-4	|	|	|	2		X	X	X			X	X	X	X						
10	BH-10 SS-1	|	|	|	2		X	X	X			X	X	X							

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Mike Kosiw	Nov 5, 2018	10:20	Serge Leger	2018/11/05	15:30

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] / N		COOLER TEMPERATURES
Present	Intact	
X	X	7, 8, 8

COOLING MEDIA PRESENT: [✓ Y] / N

COMMENTS

05-Nov-18 15:30
Alisha Williamson
B8T5024
KIY OTT 001

RECEIVED IN OTTAWA

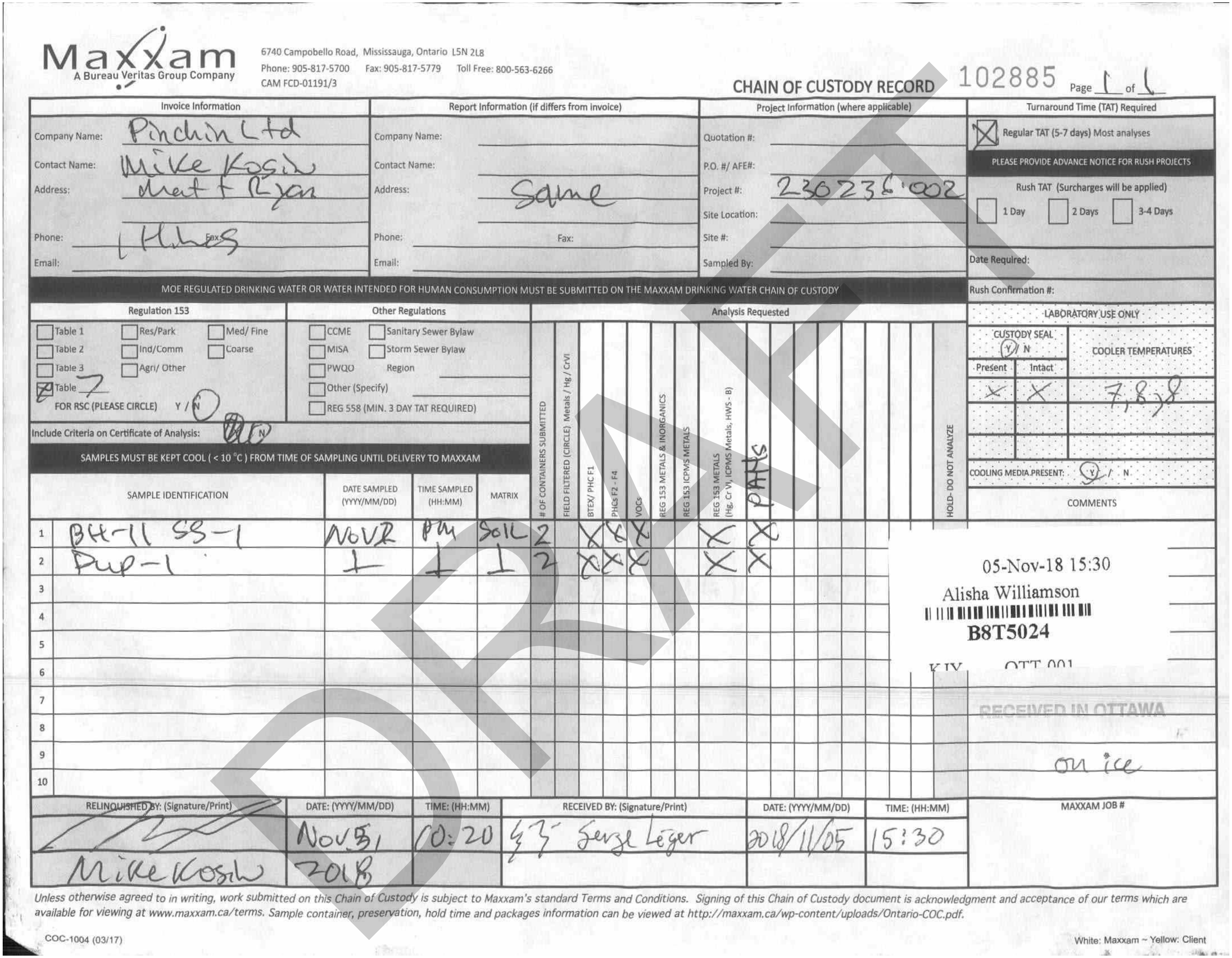
on ice

MAXXAM JOB #

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. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

COC-1004 (03/17)

White: Maxxam – Yellow: Client



Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

102885 Page 1 of 1

Invoice Information

Company Name: Pinchin Ltd
Contact Name: Mike Kosin
Address: Mat + Ryan
Phone: 1 H.les Fax:
Email:

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address: Same
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 230236.002
Site Location:
Site #:
Sampled By:

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:
Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☐ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 7
FOR RSC (PLEASE CIRCLE) Y / [✓ N]

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: [✓ Y] / N

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

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] / N

Present	Intact	COOLER TEMPERATURES
X	X	7,8,8

COOLING MEDIA PRESENT: [✓ Y] / N

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs								HOLD- DO NOT ANALYZE
1	BH-11 SS-1	NOV 2	PM	SOIL	2		X	X	X			X	X								
2	Dup-1	|	|	|	2		X	X	X			X	X								
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

COMMENTS

05-Nov-18 15:30
Alisha Williamson
B8T5024
KIY OTT-001

RECEIVED IN OTTAWA

on ice

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Kosin	Nov 5, 2018	10:20	Serge Léger	2018/11/05	15:30	

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. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

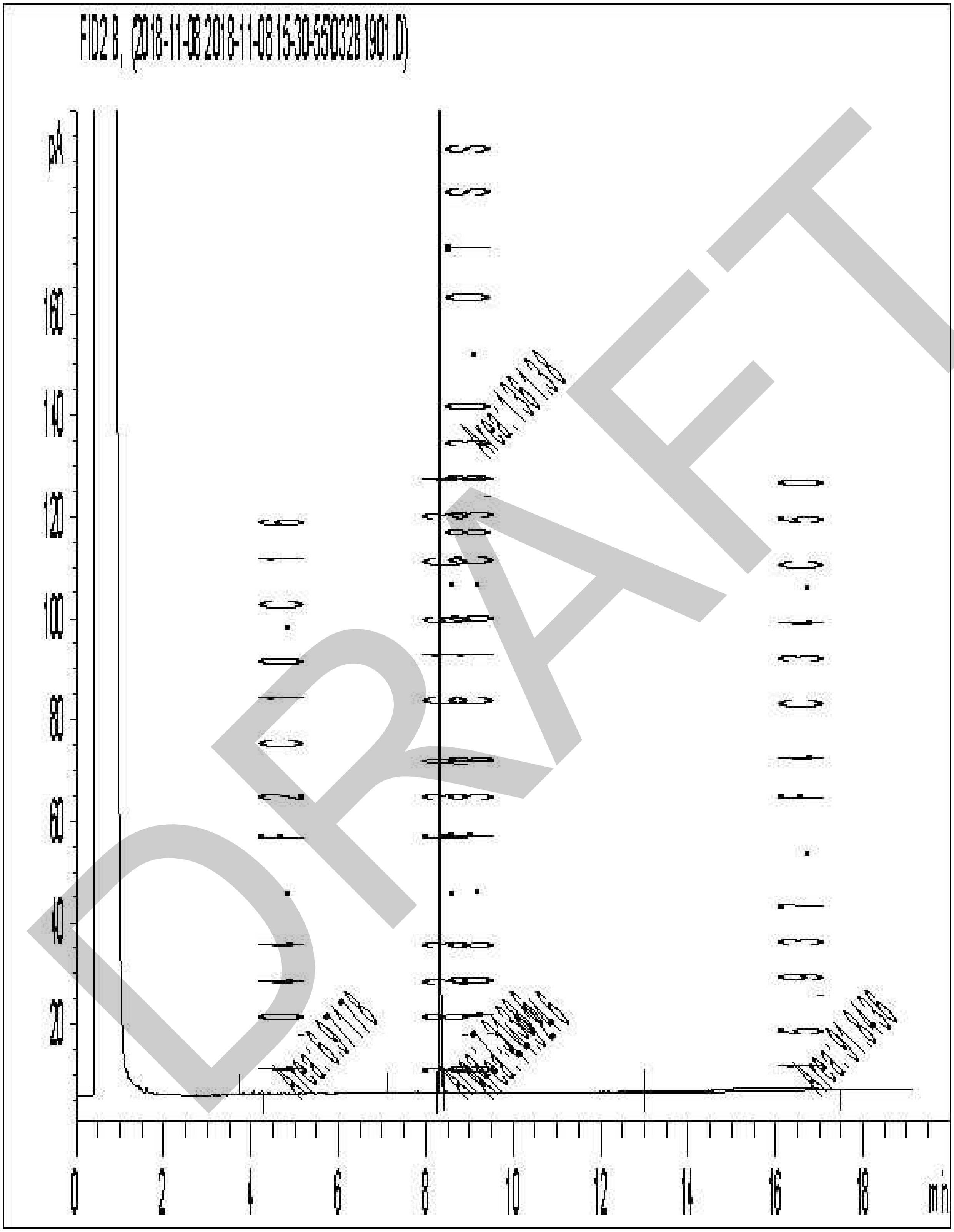
COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH143

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-1 SS-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

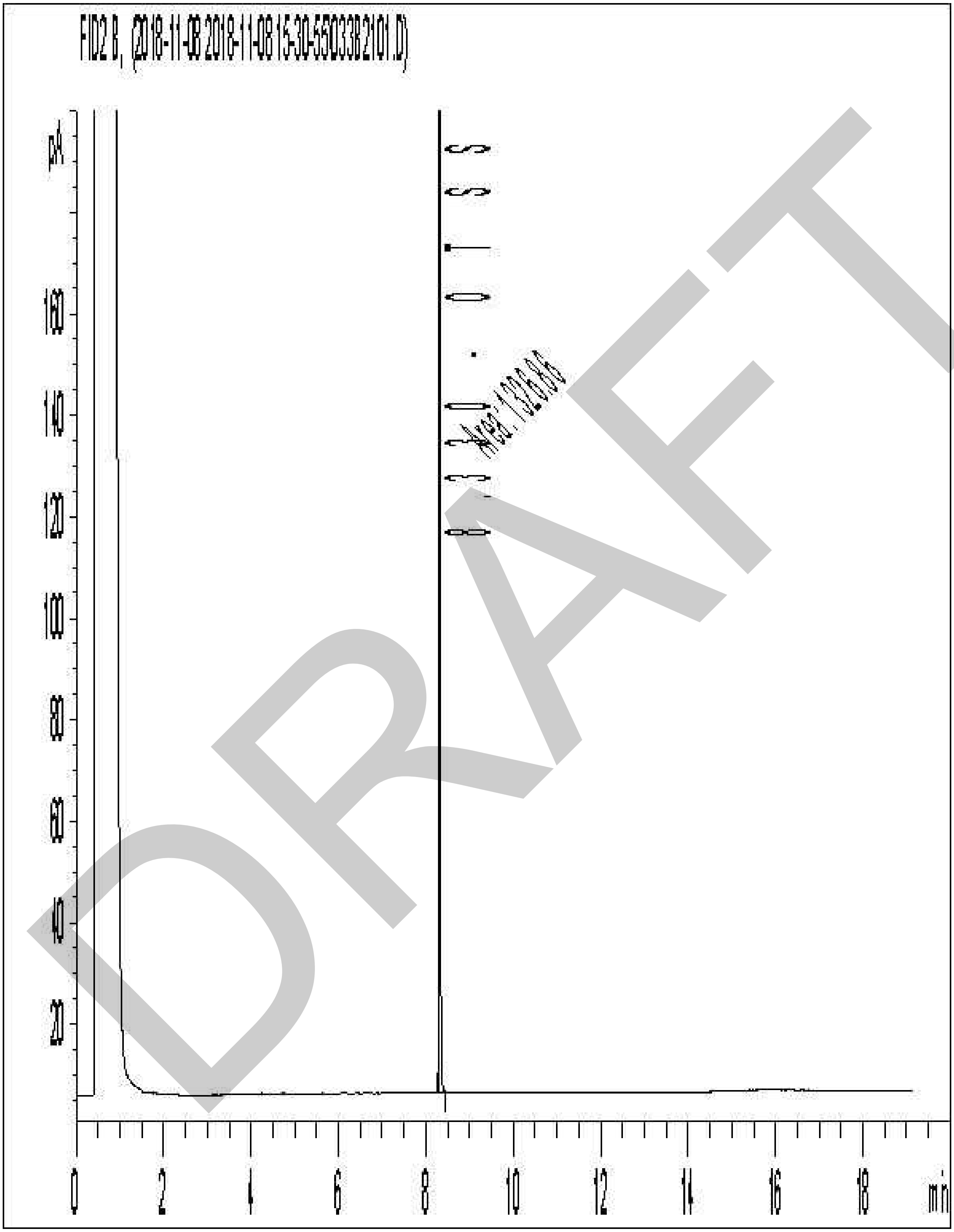


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH144

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-2 SS-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

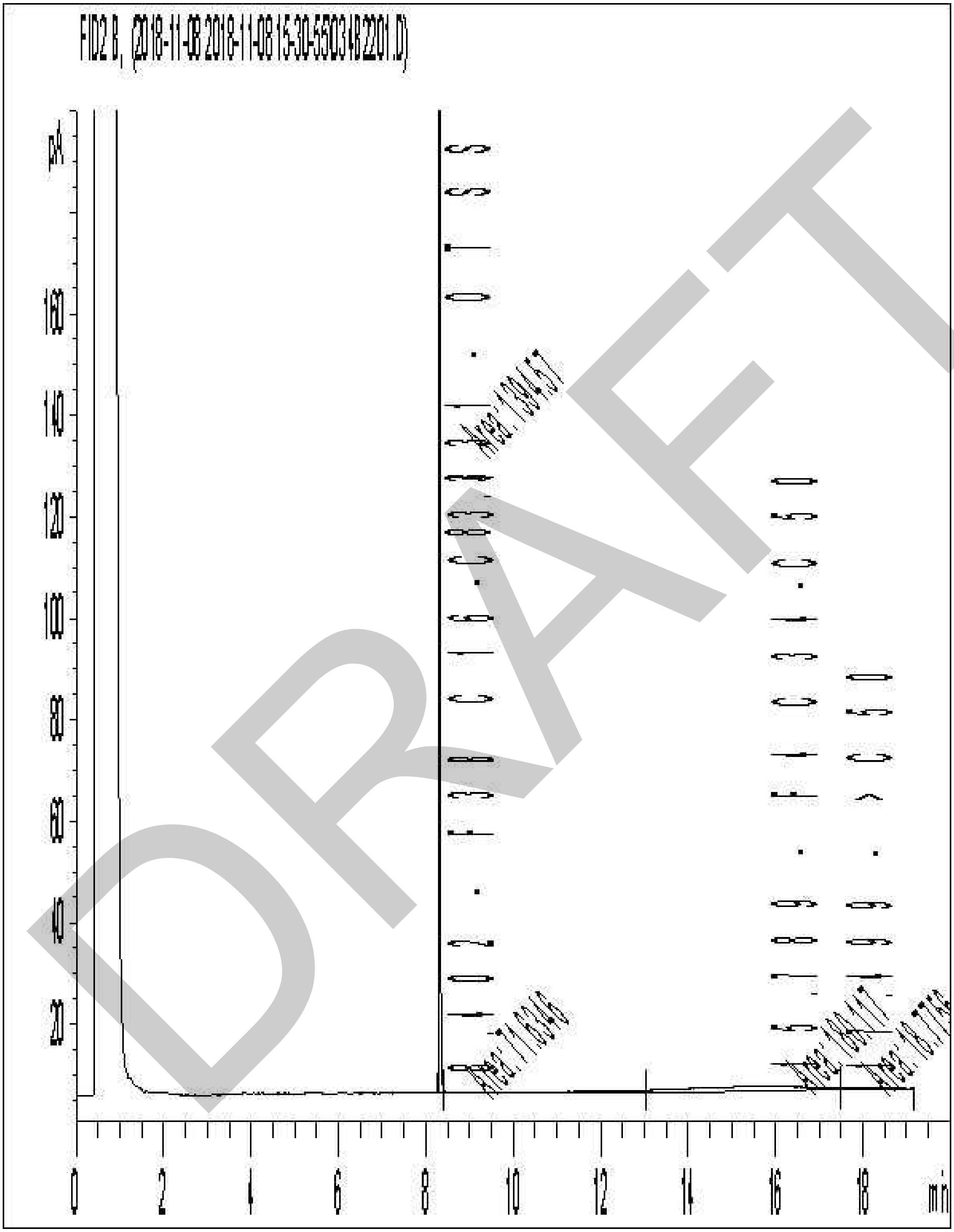


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH145

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-3 SS-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

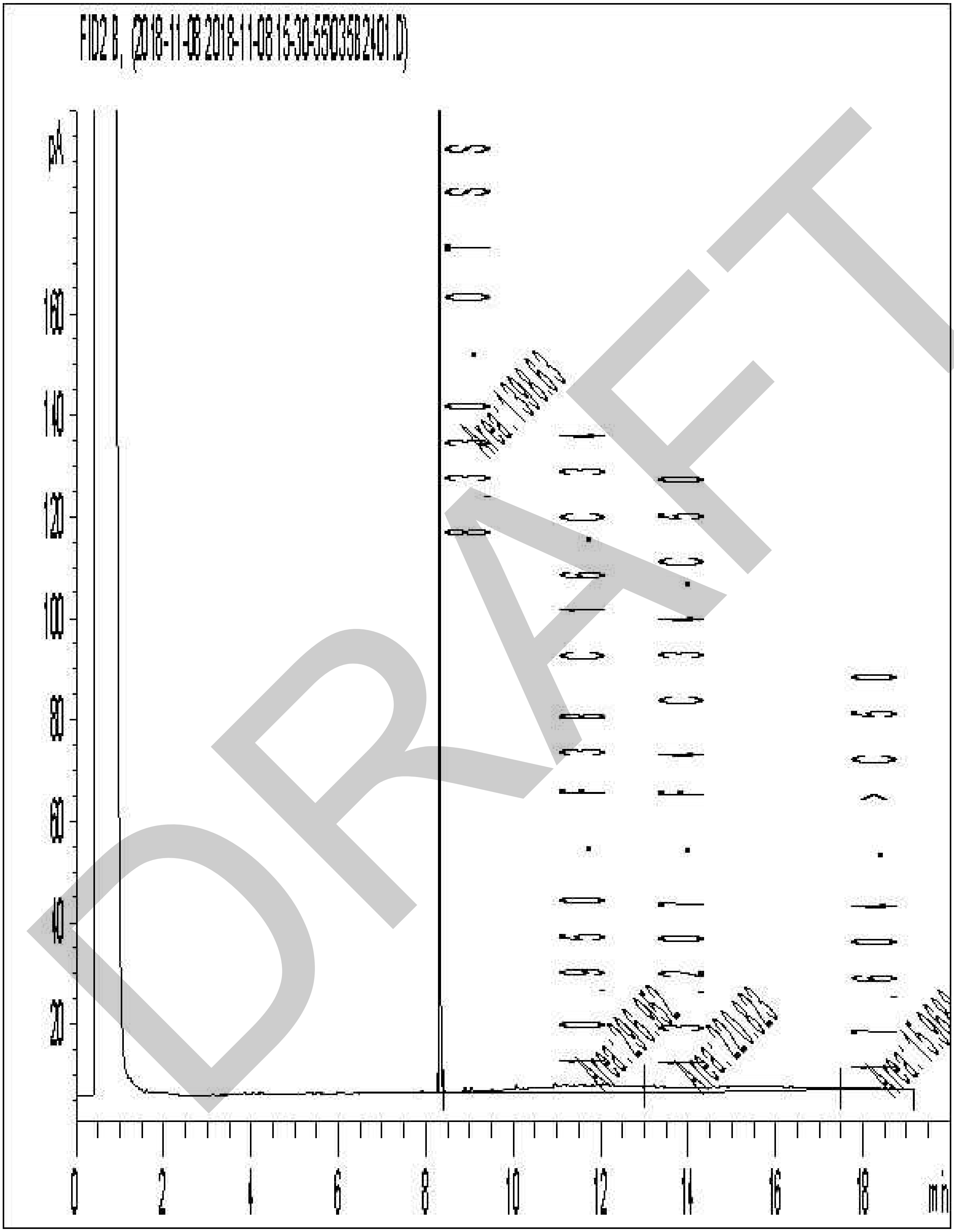


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH146

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-4 SS-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

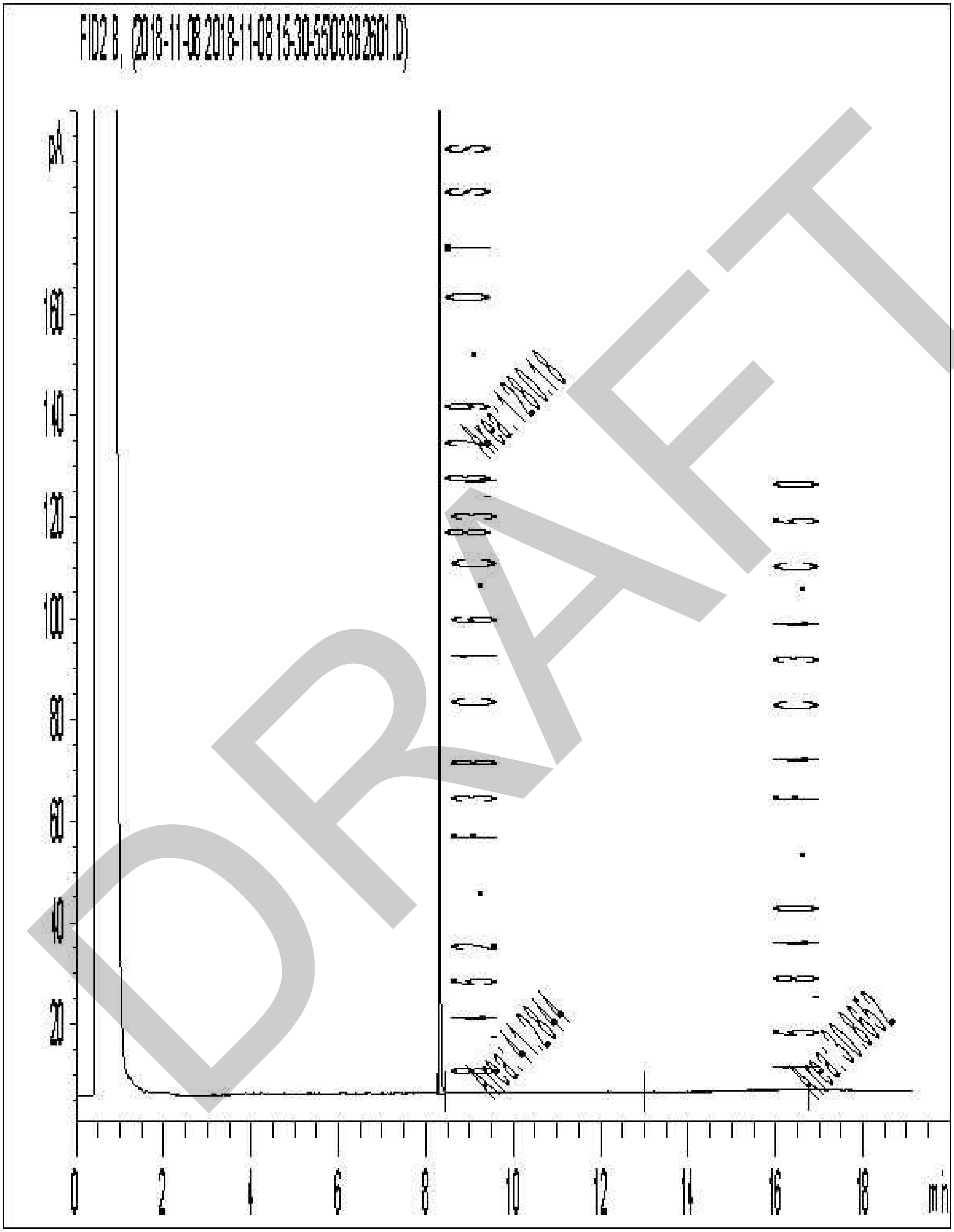


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH147

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-5 SS-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

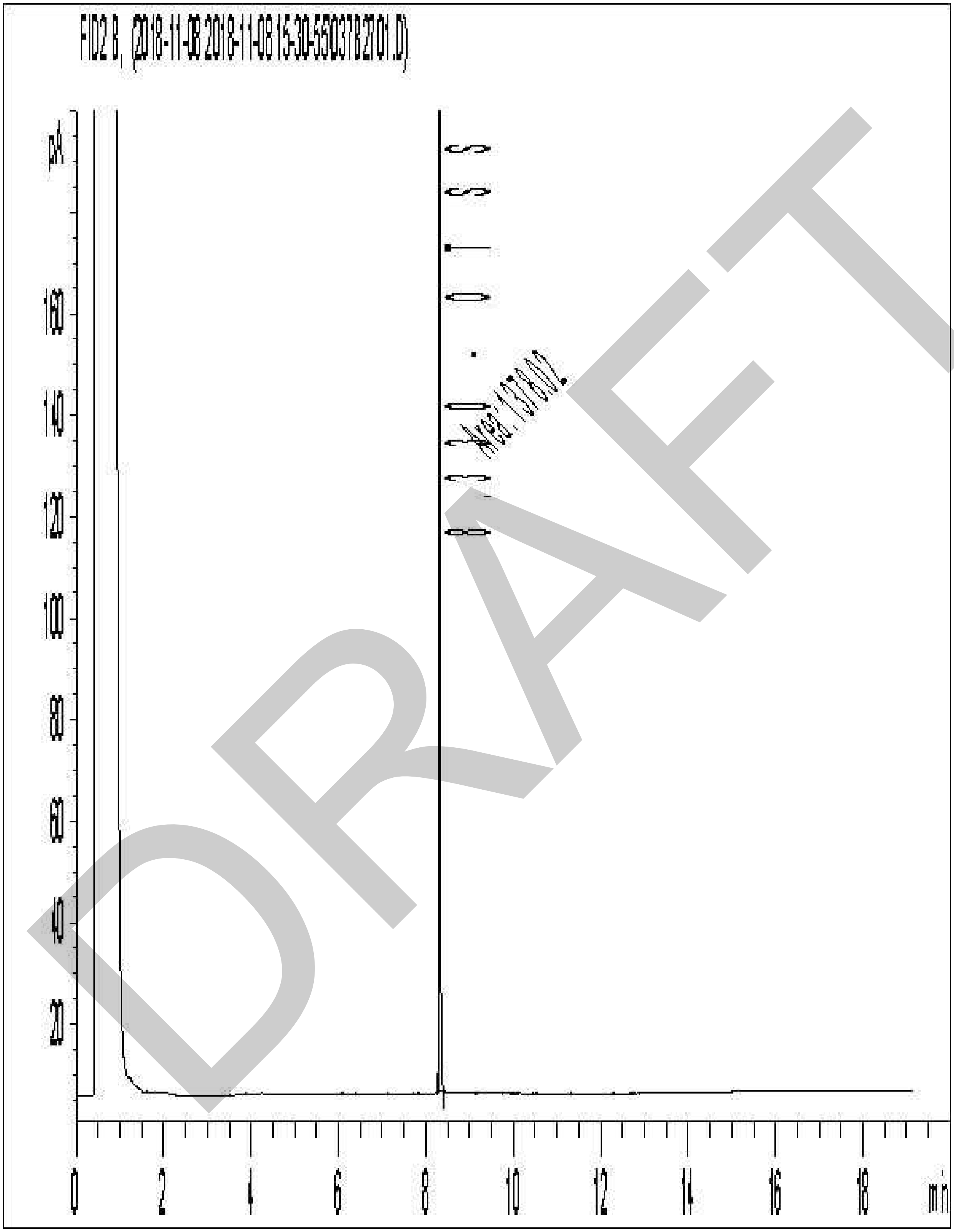


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH148

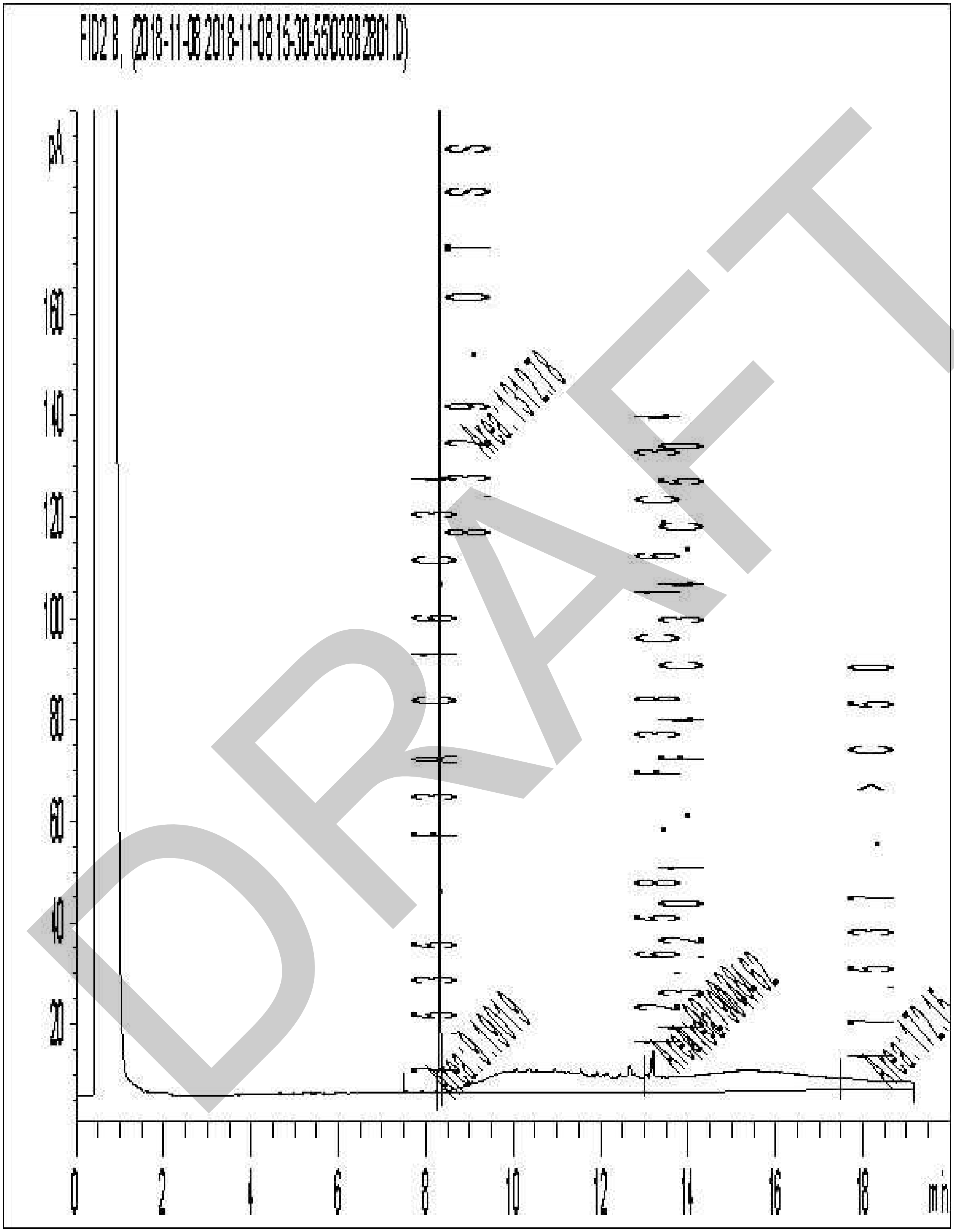
Pinchin Ltd
Client Project #: 230236.002
Client ID: BH-6 SS-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

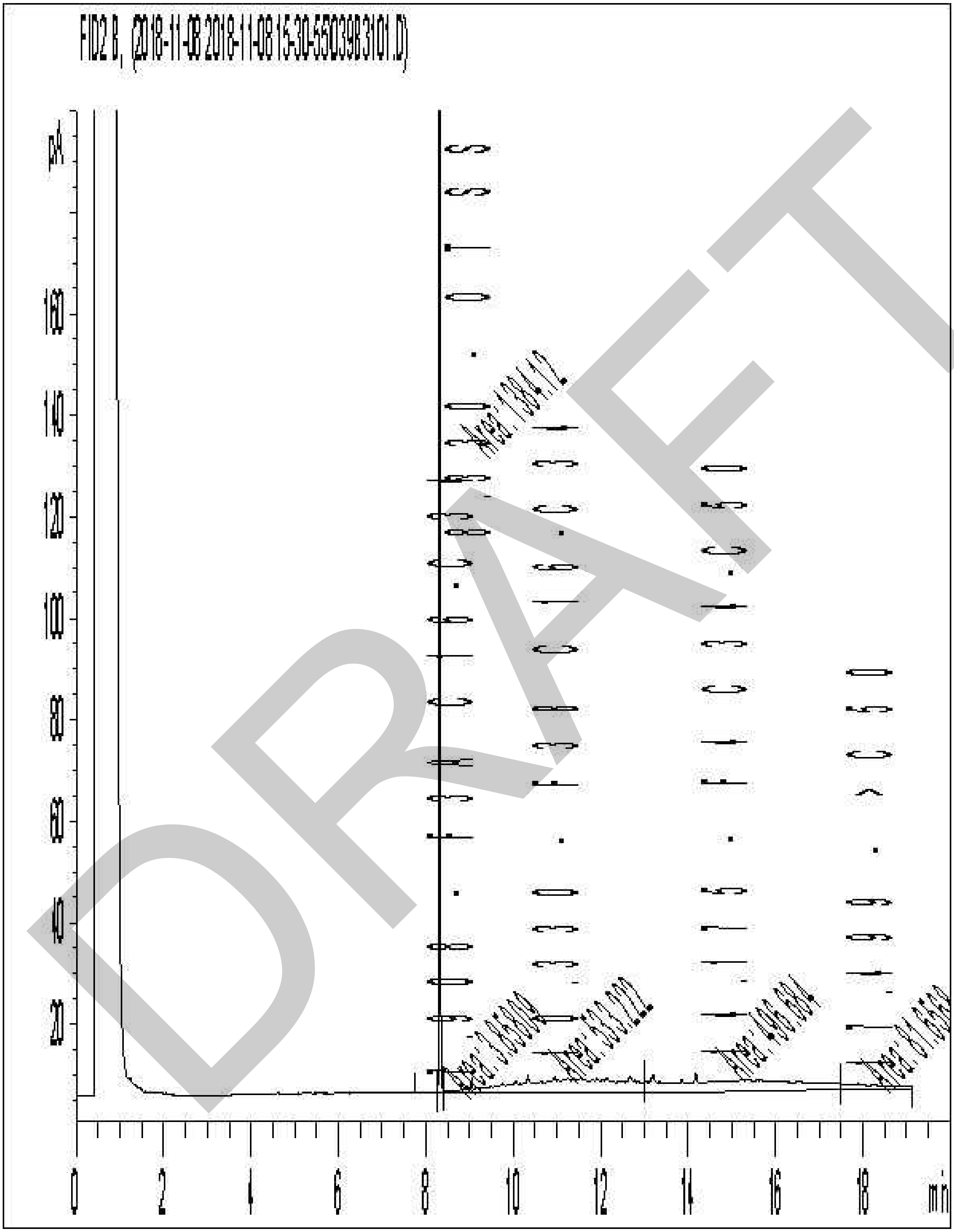


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH150

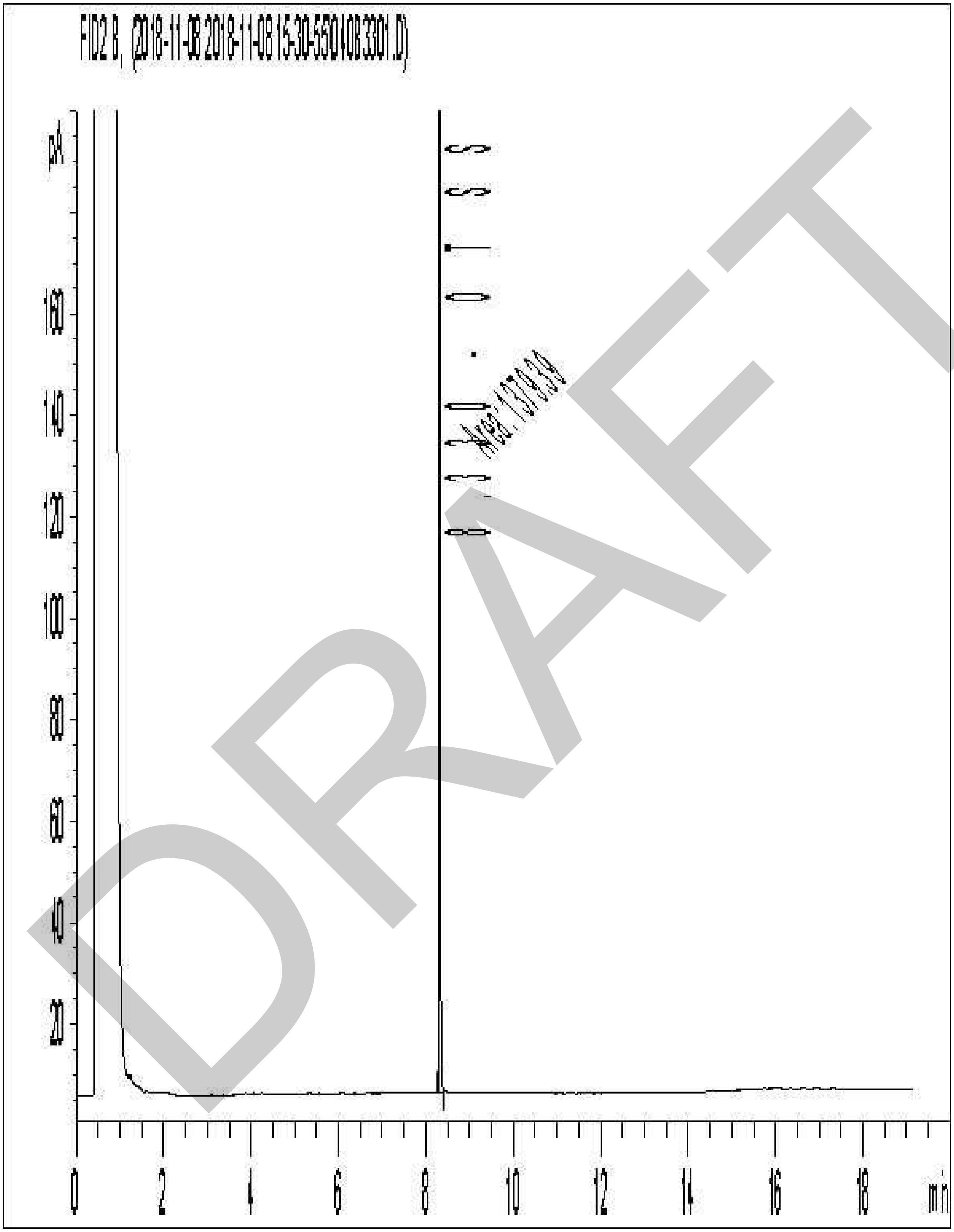
Pinchin Ltd
Client Project #: 230236.002
Client ID: BH-8 SS-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

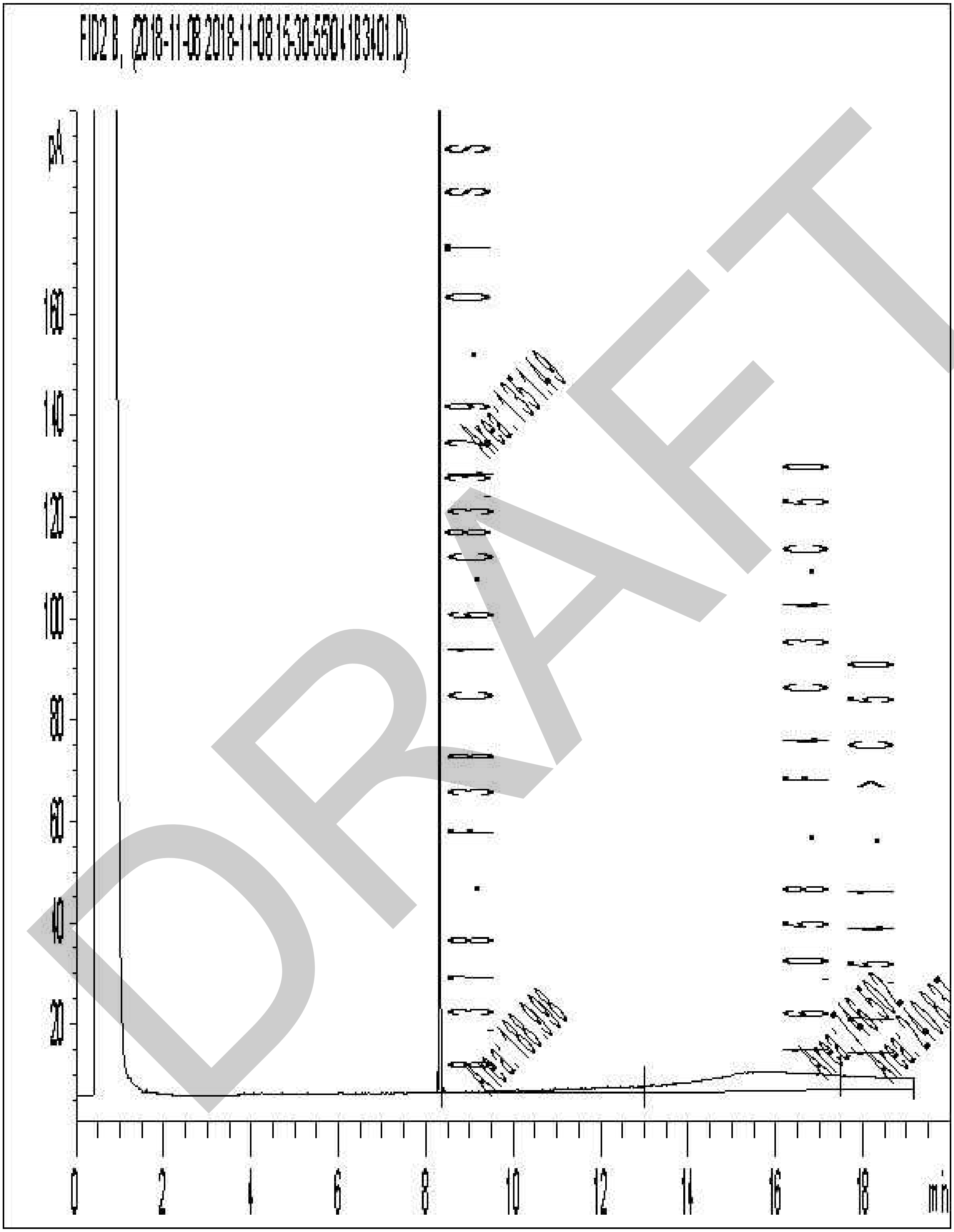


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH152

Pinchin Ltd
Client Project #: 230236.002
Client ID: BH-10 SS-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

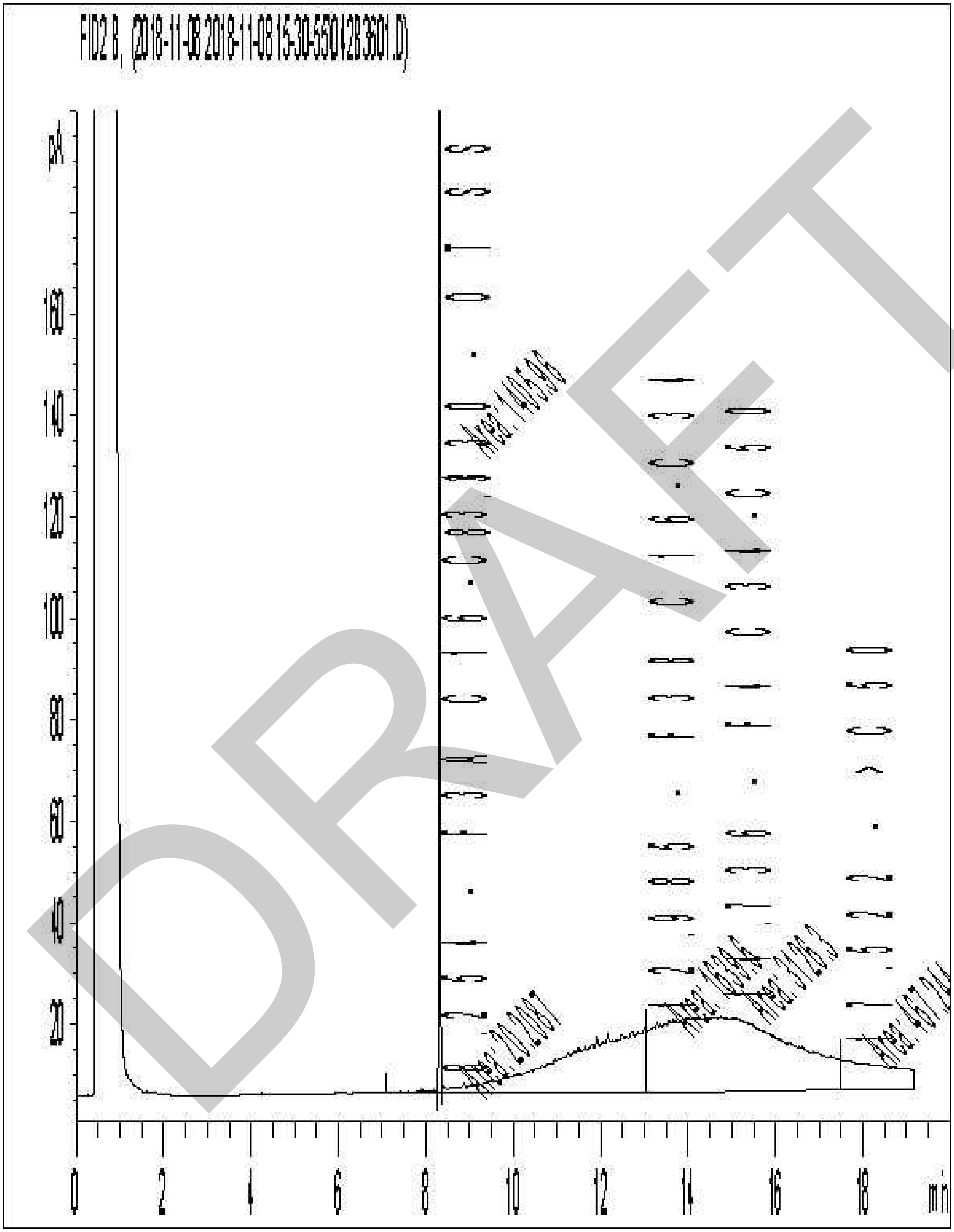


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH153

Pinchin Ltd
Client Project #: 230236.002
Client ID: BH-11 SS-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

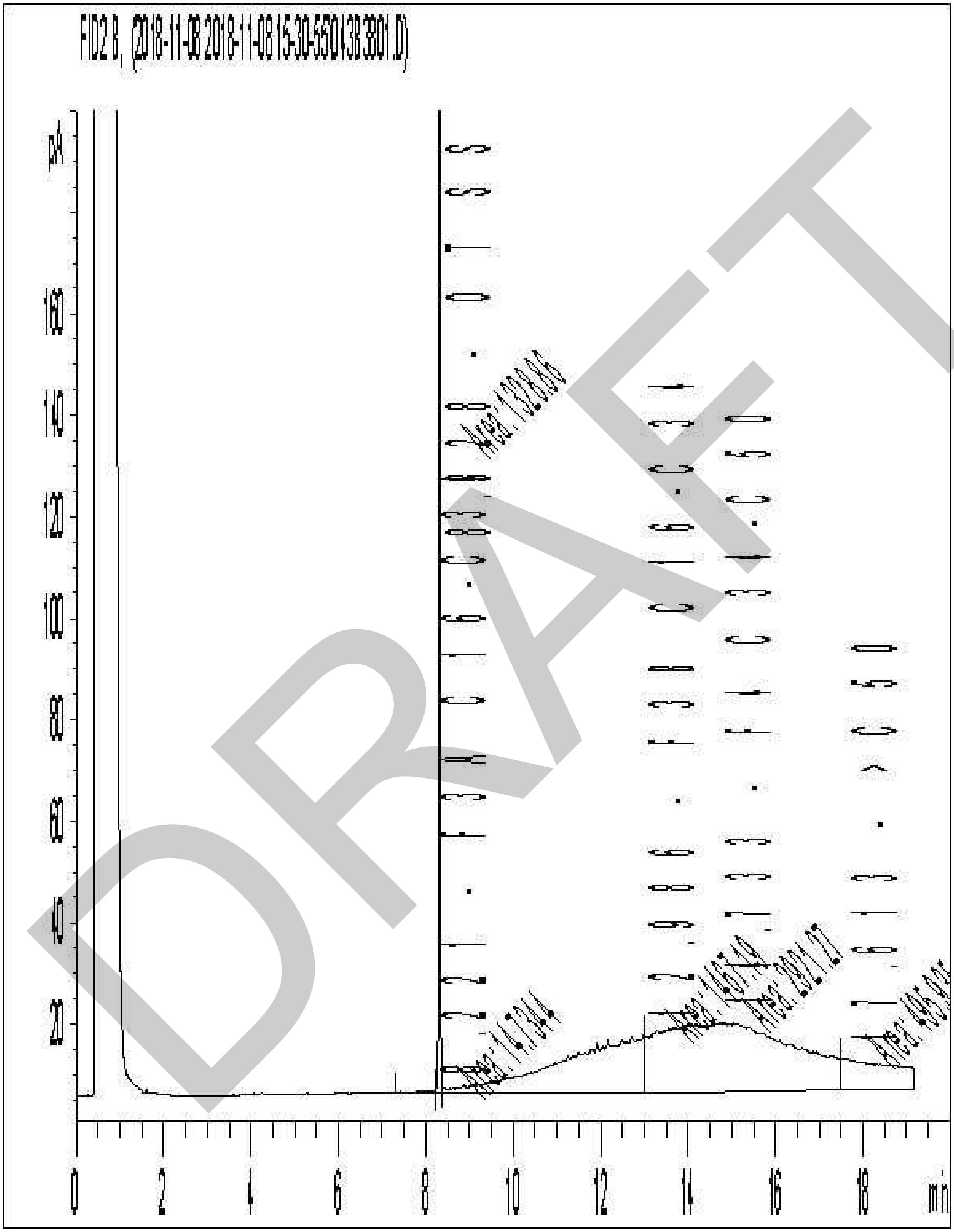


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T5024
Report Date: 2018/11/13
Maxxam Sample: IFH154

Pinchin Ltd
Client Project #: 230236.002
Client ID: DUP-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Your Project #: 230236.002
Your C.O.C. #: 102893

Attention: Matt Ryan + Mike Kosiw

Pinchin Ltd
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1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2018/11/19
Report #: R5491208
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8U4943
Received: 2018/11/14, 16:00

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum (1)	10	N/A	2018/11/19	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	11	N/A	2018/11/19		EPA 8260C m
Chromium (VI) in Water (1)	10	N/A	2018/11/19	CAM SOP-00436	EPA 7199 m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	1	2018/11/16	2018/11/18	CAM SOP-00316	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	9	2018/11/16	2018/11/19	CAM SOP-00316	CCME PHC-CWS m
Mercury (1)	10	2018/11/16	2018/11/16	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS (1)	10	N/A	2018/11/16	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM) (1)	10	2018/11/16	2018/11/17	CAM SOP-00318	EPA 8270D m
Volatile Organic Compounds and F1 PHCs (1)	9	N/A	2018/11/16	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds and F1 PHCs (1)	1	N/A	2018/11/19	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds in Water (1)	1	N/A	2018/11/16	CAM SOP-00228	EPA 8260C 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.

Your Project #: 230236.002
Your C.O.C. #: 102893

Attention: Matt Ryan + Mike Kosiw

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Suite 200
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MAXXAM JOB #: B8U4943
Received: 2018/11/14, 16:00

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573
==

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.

O.REG 153 METALS PACKAGE (WATER)

Maxxam ID		IHM233	IHM234	IHM235	IHM236		IHM237	IHM238		
Sampling Date		2018/11/13	2018/11/13	2018/11/13	2018/11/13		2018/11/13	2018/11/13		
COC Number		102893	102893	102893	102893		102893	102893		
	UNITS	**EXMW-1**	**MW-1**	**EXMW-2**	**MW-2**	**RDL**	**EXMW-3**	**MW-4**	**RDL**	**QC Batch**
Metals										
Chromium (VI)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	5832710
Mercury (Hg)	ug/L	0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	5840721
Dissolved Antimony (Sb)	ug/L	0.82	<0.50	<0.50	0.61	0.50	<0.50	2.7	0.50	5840092
Dissolved Arsenic (As)	ug/L	<1.0	1.2	<1.0	<1.0	1.0	<1.0	<1.0	1.0	5840092
Dissolved Barium (Ba)	ug/L	120	260	130	160	2.0	200	74	2.0	5840092
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	5840092
Dissolved Boron (B)	ug/L	140	280	260	1100	10	280	210	10	5840092
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	5840092
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	<5.0	<5.0	5.0	5840092
Dissolved Cobalt (Co)	ug/L	<0.50	3.9	38	3.3	0.50	<0.50	1.1	0.50	5840092
Dissolved Copper (Cu)	ug/L	3.7	<1.0	5.4	1.9	1.0	<1.0	6.1	1.0	5840092
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	5840092
Dissolved Molybdenum (Mo)	ug/L	3.5	1.2	2.0	4.6	0.50	<0.50	3.5	0.50	5840092
Dissolved Nickel (Ni)	ug/L	3.6	8.6	6.2	12	1.0	1.2	6.0	1.0	5840092
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	2.0	5840092
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	5840092
Dissolved Sodium (Na)	ug/L	570000	720000	680000	630000	500	230000	190000	100	5840092
Dissolved Thallium (Tl)	ug/L	0.098	<0.050	<0.050	0.23	0.050	<0.050	<0.050	0.050	5840092
Dissolved Uranium (U)	ug/L	2.2	0.78	2.5	3.5	0.10	0.51	4.0	0.10	5840092
Dissolved Vanadium (V)	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	0.76	0.50	5840092
Dissolved Zinc (Zn)	ug/L	31	<5.0	16	<5.0	5.0	<5.0	<5.0	5.0	5840092

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (WATER)

Maxxam ID		IHM239	IHM240			IHM240			IHM241		
Sampling Date		2018/11/13	2018/11/13			2018/11/13			2018/11/13		
COC Number		102893	102893			102893			102893		
	UNITS	**EXMW-4**	**MW-5**	**RDL**	**QC Batch**	**MW-5 Lab-Dup**	**RDL**	**QC Batch**	**EXMW-5**	**RDL**	**QC Batch**
Metals											
Chromium (VI)	ug/L	<0.50	<0.50	0.50	5832710	<0.50	0.50	5832710	<0.50	0.50	5832710
Mercury (Hg)	ug/L	<0.1	<0.1	0.1	5840721				<0.1	0.1	5840721
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	5840092				0.51	0.50	5840092
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	1.0	5840092				<1.0	1.0	5840092
Dissolved Barium (Ba)	ug/L	230	110	2.0	5840092				160	2.0	5840092
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	0.50	5840092				<0.50	0.50	5840092
Dissolved Boron (B)	ug/L	98	280	10	5840092				230	10	5840092
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	5840092				0.15	0.10	5840092
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	5840092				<5.0	5.0	5840092
Dissolved Cobalt (Co)	ug/L	<0.50	1.9	0.50	5840092				5.9	0.50	5840092
Dissolved Copper (Cu)	ug/L	<1.0	2.4	1.0	5840092				2.3	1.0	5840092
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	5840092				<0.50	0.50	5840092
Dissolved Molybdenum (Mo)	ug/L	0.63	4.7	0.50	5840092				1.4	0.50	5840092
Dissolved Nickel (Ni)	ug/L	<1.0	12	1.0	5840092				8.2	1.0	5840092
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	2.0	5840092				<2.0	2.0	5840092
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	5840092				<0.10	0.10	5840092
Dissolved Sodium (Na)	ug/L	62000	370000	100	5840092				170000	100	5840092
Dissolved Thallium (Tl)	ug/L	<0.050	0.068	0.050	5840092				0.072	0.050	5840092
Dissolved Uranium (U)	ug/L	<0.10	3.6	0.10	5840092				1.0	0.10	5840092
Dissolved Vanadium (V)	ug/L	<0.50	<0.50	0.50	5840092				<0.50	0.50	5840092
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	5840092				26	5.0	5840092

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

O.REG 153 METALS PACKAGE (WATER)

Maxxam ID		IHM242		
Sampling Date		2018/11/13		
COC Number		102893		
	UNITS	**DUP-2**	**RDL**	**QC Batch**
Metals				
Chromium (VI)	ug/L	<0.50	0.50	5832710
Mercury (Hg)	ug/L	<0.1	0.1	5840721
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	5840092
Dissolved Arsenic (As)	ug/L	1.2	1.0	5840092
Dissolved Barium (Ba)	ug/L	260	2.0	5840092
Dissolved Beryllium (Be)	ug/L	<0.50	0.50	5840092
Dissolved Boron (B)	ug/L	290	10	5840092
Dissolved Cadmium (Cd)	ug/L	<0.10	0.10	5840092
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	5840092
Dissolved Cobalt (Co)	ug/L	4.1	0.50	5840092
Dissolved Copper (Cu)	ug/L	<1.0	1.0	5840092
Dissolved Lead (Pb)	ug/L	<0.50	0.50	5840092
Dissolved Molybdenum (Mo)	ug/L	1.2	0.50	5840092
Dissolved Nickel (Ni)	ug/L	8.8	1.0	5840092
Dissolved Selenium (Se)	ug/L	<2.0	2.0	5840092
Dissolved Silver (Ag)	ug/L	<0.10	0.10	5840092
Dissolved Sodium (Na)	ug/L	700000	500	5840092
Dissolved Thallium (Tl)	ug/L	<0.050	0.050	5840092
Dissolved Uranium (U)	ug/L	0.81	0.10	5840092
Dissolved Vanadium (V)	ug/L	<0.50	0.50	5840092
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	5840092

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (WATER)

Maxxam ID		IHM233		IHM234	IHM235	IHM236	IHM237	IHM238		
Sampling Date		2018/11/13		2018/11/13	2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893		102893	102893	102893	102893	102893		
	UNITS	**EXMW-1**	**QC Batch**	**MW-1**	**EXMW-2**	**MW-2**	**EXMW-3**	**MW-4**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/L	<0.071	5838815	7.6	<0.071	<0.071	<0.071	<0.071	0.071	5838815
Polyaromatic Hydrocarbons										
Acenaphthene	ug/L	<0.050	5841578	0.076	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Acenaphthylene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Anthracene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(a)anthracene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(a)pyrene	ug/L	<0.010	5841578	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5841618
Benzo(b/j)fluoranthene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(g,h,i)perylene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(k)fluoranthene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Chrysene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Dibenz(a,h)anthracene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Fluoranthene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Fluorene	ug/L	<0.050	5841578	0.11	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	5841578	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5841618
1-Methylnaphthalene	ug/L	<0.050	5841578	7.5	<0.050	<0.050	<0.050	<0.050	0.050	5841618
2-Methylnaphthalene	ug/L	<0.050	5841578	0.12	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Naphthalene	ug/L	<0.050	5841578	11	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Phenanthrene	ug/L	<0.030	5841578	0.043	<0.030	<0.030	<0.030	<0.030	0.030	5841618
Pyrene	ug/L	<0.050	5841578	0.053	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Surrogate Recovery (%)										
D10-Anthracene	%	21 (1)	5841578	94	98	97	88	98		5841618
D14-Terphenyl (FS)	%	33 (1)	5841578	54	83	82	46 (2)	82		5841618
D8-Acenaphthylene	%	36 (1)	5841578	99	98	97	96	99		5841618

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) Surrogate recovery was below the lower control limit due to matrix interference(high amount of sediment presented in the sample bottle). This may represent a low bias in some results.

(2) Surrogate recovery may have been impacted by the amount of sediment that was present in sample.

O.REG 153 PAHS (WATER)

Maxxam ID		IHM239	IHM240	IHM241	IHM242		
Sampling Date		2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893	102893	102893	102893		
	UNITS	**EXMW-4**	**MW-5**	**EXMW-5**	**DUP-2**	**RDL**	**QC Batch**
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	<0.071	10	0.071	5838815
Polyaromatic Hydrocarbons							
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.094	0.050	5841618
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	5841618
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
Fluorene	ug/L	<0.050	<0.050	<0.050	0.14	0.050	5841618
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	5841618
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	9.9	0.050	5841618
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	0.17	0.050	5841618
Naphthalene	ug/L	0.089	<0.050	<0.050	15	0.050	5841618
Phenanthrene	ug/L	<0.030	<0.030	<0.030	0.054	0.030	5841618
Pyrene	ug/L	<0.050	<0.050	<0.050	0.051	0.050	5841618
Surrogate Recovery (%)							
D10-Anthracene	%	99	99	99	96		5841618
D14-Terphenyl (FS)	%	82	83	65	60		5841618
D8-Acenaphthylene	%	101	98	100	99		5841618

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IHM233		IHM234	IHM235	IHM236	IHM237		
Sampling Date		2018/11/13		2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893		102893	102893	102893	102893		
	UNITS	**EXMW-1**	**QC Batch**	**MW-1**	**EXMW-2**	**MW-2**	**EXMW-3**	**RDL**	**QC Batch**
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	5838816	<0.50	<0.50	<0.50	<0.50	0.50	5838816
Volatile Organics									
Acetone (2-Propanone)	ug/L	<10	5839695	<10	<10	12	75	10	5839695
Benzene	ug/L	<0.20	5839695	78	<0.20	<0.20	<0.20	0.20	5839695
Bromodichloromethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Bromoform	ug/L	<1.0	5839695	<1.0	<1.0	<1.0	<1.0	1.0	5839695
Bromomethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Carbon Tetrachloride	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Chlorobenzene	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Chloroform	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Dibromochloromethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,2-Dichlorobenzene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,3-Dichlorobenzene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,4-Dichlorobenzene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	5839695	<1.0	<1.0	<1.0	<1.0	1.0	5839695
1,1-Dichloroethane	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
1,2-Dichloroethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1-Dichloroethylene	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
cis-1,2-Dichloroethylene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
trans-1,2-Dichloroethylene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,2-Dichloropropane	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
cis-1,3-Dichloropropene	ug/L	<0.30	5839695	<0.30	<0.30	<0.30	<0.30	0.30	5839695
trans-1,3-Dichloropropene	ug/L	<0.40	5839695	<0.40	<0.40	<0.40	<0.40	0.40	5839695
Ethylbenzene	ug/L	<0.20	5839695	37	<0.20	<0.20	<0.20	0.20	5839695
Ethylene Dibromide	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Hexane	ug/L	<1.0	5839695	<1.0	<1.0	<1.0	<1.0	1.0	5839695
Methylene Chloride(Dichloromethane)	ug/L	<2.0	5839695	<2.0	<2.0	<2.0	<2.0	2.0	5839695
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	5839695	<10	<10	<10	<10	10	5839695
Methyl Isobutyl Ketone	ug/L	<5.0	5839695	<5.0	<5.0	<5.0	<5.0	5.0	5839695
Methyl t-butyl ether (MTBE)	ug/L	<0.50	5839695	1.2	<0.50	1.3	<0.50	0.50	5839695
Styrene	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1,1,2-Tetrachloroethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1,2,2-Tetrachloroethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Tetrachloroethylene	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Toluene	ug/L	<0.20	5839695	16	<0.20	<0.20	<0.20	0.20	5839695
1,1,1-Trichloroethane	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IHM233		IHM234	IHM235	IHM236	IHM237		
Sampling Date		2018/11/13		2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893		102893	102893	102893	102893		
	UNITS	**EXMW-1**	**QC Batch**	**MW-1**	**EXMW-2**	**MW-2**	**EXMW-3**	**RDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Trichloroethylene	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	5839695	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Vinyl Chloride	ug/L	<0.20	5839695	<0.20	<0.20	<0.20	<0.20	0.20	5839695
p+m-Xylene	ug/L	<0.20	5839695	68	<0.20	<0.20	<0.20	0.20	5839695
o-Xylene	ug/L	<0.20	5839695	20	<0.20	<0.20	<0.20	0.20	5839695
Total Xylenes	ug/L	<0.20	5839695	89	<0.20	<0.20	<0.20	0.20	5839695
F1 (C6-C10)	ug/L	<25	5839695	680	<25	<25	<25	25	5839695
F1 (C6-C10) - BTEX	ug/L	<25	5839695	460	<25	<25	<25	25	5839695
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	<100	5841590	380	<100	<100	<100	100	5841620
F3 (C16-C34 Hydrocarbons)	ug/L	<200	5841590	<200	<200	<200	<200	200	5841620
F4 (C34-C50 Hydrocarbons)	ug/L	<200	5841590	<200	<200	<200	<200	200	5841620
Reached Baseline at C50	ug/L	Yes	5841590	Yes	Yes	Yes	Yes		5841620
Surrogate Recovery (%)									
o-Terphenyl	%	117	5841590	94	102	103	98		5841620
4-Bromofluorobenzene	%	83	5839695	93	83	85	85		5839695
D4-1,2-Dichloroethane	%	112	5839695	101	108	108	109		5839695
D8-Toluene	%	93	5839695	97	96	94	95		5839695

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IHM238	IHM239	IHM240	IHM241	IHM242		
Sampling Date		2018/11/13	2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893	102893	102893	102893	102893		
	UNITS	**MW-4**	**EXMW-4**	**MW-5**	**EXMW-5**	**DUP-2**	**RDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5838816
Volatile Organics								
Acetone (2-Propanone)	ug/L	<10	40	<10	34	<10	10	5839695
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	68	0.20	5839695
Bromodichloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5839695
Bromomethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Carbon Tetrachloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Chlorobenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Chloroform	ug/L	0.28	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Dibromochloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5839695
1,1-Dichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
1,2-Dichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1-Dichloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
cis-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,2-Dichloropropane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	5839695
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	5839695
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	30	0.20	5839695
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Hexane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5839695
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5839695
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	<10	<10	<10	10	5839695
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	5839695
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	<0.50	<0.50	1.2	0.50	5839695
Styrene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Tetrachloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Toluene	ug/L	<0.20	0.31	<0.20	0.30	14	0.20	5839695
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		IHM238	IHM239	IHM240	IHM241	IHM242		
Sampling Date		2018/11/13	2018/11/13	2018/11/13	2018/11/13	2018/11/13		
COC Number		102893	102893	102893	102893	102893		
	UNITS	**MW-4**	**EXMW-4**	**MW-5**	**EXMW-5**	**DUP-2**	**RDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Trichloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5839695
Vinyl Chloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5839695
p+m-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	58	0.20	5839695
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	18	0.20	5839695
Total Xylenes	ug/L	<0.20	<0.20	<0.20	<0.20	75	0.20	5839695
F1 (C6-C10)	ug/L	<25	<25	<25	<25	580	25	5839695
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	390	25	5839695
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	470	100	5841620
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	200	5841620
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	200	5841620
Reached Baseline at C50	ug/L	Yes	Yes	Yes	Yes	Yes		5841620
Surrogate Recovery (%)								
o-Terphenyl	%	91	101	100	106	101		5841620
4-Bromofluorobenzene	%	83	83	85	81	94		5839695
D4-1,2-Dichloroethane	%	110	111	121	112	104		5839695
D8-Toluene	%	94	94	90	94	98		5839695

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		IHM232		
Sampling Date		2018/11/13		
COC Number		102893		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	5838816
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	5839308
Benzene	ug/L	<0.20	0.20	5839308
Bromodichloromethane	ug/L	<0.50	0.50	5839308
Bromoform	ug/L	<1.0	1.0	5839308
Bromomethane	ug/L	<0.50	0.50	5839308
Carbon Tetrachloride	ug/L	<0.20	0.20	5839308
Chlorobenzene	ug/L	<0.20	0.20	5839308
Chloroform	ug/L	<0.20	0.20	5839308
Dibromochloromethane	ug/L	<0.50	0.50	5839308
1,2-Dichlorobenzene	ug/L	<0.50	0.50	5839308
1,3-Dichlorobenzene	ug/L	<0.50	0.50	5839308
1,4-Dichlorobenzene	ug/L	<0.50	0.50	5839308
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	5839308
1,1-Dichloroethane	ug/L	<0.20	0.20	5839308
1,2-Dichloroethane	ug/L	<0.50	0.50	5839308
1,1-Dichloroethylene	ug/L	<0.20	0.20	5839308
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	5839308
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	5839308
1,2-Dichloropropane	ug/L	<0.20	0.20	5839308
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	5839308
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	5839308
Ethylbenzene	ug/L	<0.20	0.20	5839308
Ethylene Dibromide	ug/L	<0.20	0.20	5839308
Hexane	ug/L	<1.0	1.0	5839308
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	5839308
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	5839308
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	5839308
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	5839308
Styrene	ug/L	<0.50	0.50	5839308
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	5839308
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	5839308
Tetrachloroethylene	ug/L	<0.20	0.20	5839308
Toluene	ug/L	<0.20	0.20	5839308
1,1,1-Trichloroethane	ug/L	<0.20	0.20	5839308

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		IHM232		
Sampling Date		2018/11/13		
COC Number		102893		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	<0.50	0.50	5839308
Trichloroethylene	ug/L	<0.20	0.20	5839308
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	5839308
Vinyl Chloride	ug/L	<0.20	0.20	5839308
p+m-Xylene	ug/L	<0.20	0.20	5839308
o-Xylene	ug/L	<0.20	0.20	5839308
Total Xylenes	ug/L	<0.20	0.20	5839308
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	92		5839308
D4-1,2-Dichloroethane	%	102		5839308
D8-Toluene	%	96		5839308

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Maxxam ID: IHM232
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	5839308	N/A	2018/11/16	Blair Gannon

Maxxam ID: IHM233
Sample ID: EXMW-1
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841590	2018/11/16	2018/11/18	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841578	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM234
Sample ID: MW-1
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM235
Sample ID: EXMW-2
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

TEST SUMMARY

Maxxam ID: IHM236
Sample ID: MW-2
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM237
Sample ID: EXMW-3
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM238
Sample ID: MW-4
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM239
Sample ID: EXMW-4
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko

TEST SUMMARY

Maxxam ID: IHM239
Sample ID: EXMW-4
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM240
Sample ID: MW-5
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/19	Denis Reid

Maxxam ID: IHM240 Dup
Sample ID: MW-5
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le

Maxxam ID: IHM241
Sample ID: EXMW-5
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

Maxxam ID: IHM242
Sample ID: DUP-2
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5838815	N/A	2018/11/19	Automated Statchk

TEST SUMMARY

Maxxam ID: IHM242
Sample ID: DUP-2
Matrix: Water

Collected: 2018/11/13
Shipped:
Received: 2018/11/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5838816	N/A	2018/11/19	Automated Statchk
Chromium (VI) in Water	IC	5832710	N/A	2018/11/19	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5841620	2018/11/16	2018/11/19	Margaret Kulczyk-Stanko
Mercury	CV/AA	5840721	2018/11/16	2018/11/16	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5840092	N/A	2018/11/16	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5841618	2018/11/16	2018/11/17	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5839695	N/A	2018/11/16	Denis Reid

GENERAL COMMENTS

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

Package 1	8.3°C

Sample IHM233 [EXMW-1] : Mercury analysis: Sample was not field filtered and preserved. Analysis was completed with the client's consent.
Hexavalent chromium analysis: Sample was not field filtered and preserved. Analysis was completed with the client's consent.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5832710	LLE	Matrix Spike [IHM240-03]	Chromium (VI)	2018/11/19		101	%	80 - 120
5832710	LLE	Spiked Blank	Chromium (VI)	2018/11/19		102	%	80 - 120
5832710	LLE	Method Blank	Chromium (VI)	2018/11/19	<0.50		ug/L	
5832710	LLE	RPD [IHM240-03]	Chromium (VI)	2018/11/19	NC		%	20
5839308	BG1	Matrix Spike	4-Bromofluorobenzene	2018/11/16		97	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		104	%	70 - 130
			D8-Toluene	2018/11/16		100	%	70 - 130
			Acetone (2-Propanone)	2018/11/16		99	%	60 - 140
			Benzene	2018/11/16		96	%	70 - 130
			Bromodichloromethane	2018/11/16		101	%	70 - 130
			Bromoform	2018/11/16		104	%	70 - 130
			Bromomethane	2018/11/16		94	%	60 - 140
			Carbon Tetrachloride	2018/11/16		96	%	70 - 130
			Chlorobenzene	2018/11/16		96	%	70 - 130
			Chloroform	2018/11/16		99	%	70 - 130
			Dibromochloromethane	2018/11/16		103	%	70 - 130
			1,2-Dichlorobenzene	2018/11/16		97	%	70 - 130
			1,3-Dichlorobenzene	2018/11/16		95	%	70 - 130
			1,4-Dichlorobenzene	2018/11/16		96	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2018/11/16		78	%	60 - 140
			1,1-Dichloroethane	2018/11/16		97	%	70 - 130
			1,2-Dichloroethane	2018/11/16		101	%	70 - 130
			1,1-Dichloroethylene	2018/11/16		92	%	70 - 130
			cis-1,2-Dichloroethylene	2018/11/16		98	%	70 - 130
			trans-1,2-Dichloroethylene	2018/11/16		95	%	70 - 130
			1,2-Dichloropropane	2018/11/16		100	%	70 - 130
			cis-1,3-Dichloropropene	2018/11/16		101	%	70 - 130
			trans-1,3-Dichloropropene	2018/11/16		103	%	70 - 130
			Ethylbenzene	2018/11/16		95	%	70 - 130
			Ethylene Dibromide	2018/11/16		100	%	70 - 130
			Hexane	2018/11/16		92	%	70 - 130
			Methylene Chloride(Dichloromethane)	2018/11/16		102	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16		103	%	60 - 140
			Methyl Isobutyl Ketone	2018/11/16		106	%	70 - 130
			Methyl t-butyl ether (MTBE)	2018/11/16		94	%	70 - 130
			Styrene	2018/11/16		99	%	70 - 130
			1,1,1,2-Tetrachloroethane	2018/11/16		100	%	70 - 130
			1,1,2,2-Tetrachloroethane	2018/11/16		104	%	70 - 130
			Tetrachloroethylene	2018/11/16		95	%	70 - 130
			Toluene	2018/11/16		92	%	70 - 130
			1,1,1-Trichloroethane	2018/11/16		95	%	70 - 130
			1,1,2-Trichloroethane	2018/11/16		101	%	70 - 130
			Trichloroethylene	2018/11/16		98	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2018/11/16		95	%	70 - 130
			Vinyl Chloride	2018/11/16		95	%	70 - 130
			p+m-Xylene	2018/11/16		94	%	70 - 130
			o-Xylene	2018/11/16		94	%	70 - 130
5839308	BG1	Spiked Blank	4-Bromofluorobenzene	2018/11/16		98	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		101	%	70 - 130
			D8-Toluene	2018/11/16		100	%	70 - 130
			Acetone (2-Propanone)	2018/11/16		100	%	60 - 140
			Benzene	2018/11/16		98	%	70 - 130
			Bromodichloromethane	2018/11/16		102	%	70 - 130
			Bromoform	2018/11/16		104	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromomethane	2018/11/16		96	%	60 - 140
			Carbon Tetrachloride	2018/11/16		98	%	70 - 130
			Chlorobenzene	2018/11/16		98	%	70 - 130
			Chloroform	2018/11/16		101	%	70 - 130
			Dibromochloromethane	2018/11/16		104	%	70 - 130
			1,2-Dichlorobenzene	2018/11/16		97	%	70 - 130
			1,3-Dichlorobenzene	2018/11/16		97	%	70 - 130
			1,4-Dichlorobenzene	2018/11/16		97	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2018/11/16		83	%	60 - 140
			1,1-Dichloroethane	2018/11/16		100	%	70 - 130
			1,2-Dichloroethane	2018/11/16		101	%	70 - 130
			1,1-Dichloroethylene	2018/11/16		95	%	70 - 130
			cis-1,2-Dichloroethylene	2018/11/16		100	%	70 - 130
			trans-1,2-Dichloroethylene	2018/11/16		98	%	70 - 130
			1,2-Dichloropropane	2018/11/16		101	%	70 - 130
			cis-1,3-Dichloropropene	2018/11/16		100	%	70 - 130
			trans-1,3-Dichloropropene	2018/11/16		100	%	70 - 130
			Ethylbenzene	2018/11/16		98	%	70 - 130
			Ethylene Dibromide	2018/11/16		101	%	70 - 130
			Hexane	2018/11/16		95	%	70 - 130
			Methylene Chloride(Dichloromethane)	2018/11/16		103	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16		103	%	60 - 140
			Methyl Isobutyl Ketone	2018/11/16		106	%	70 - 130
			Methyl t-butyl ether (MTBE)	2018/11/16		96	%	70 - 130
			Styrene	2018/11/16		102	%	70 - 130
			1,1,1,2-Tetrachloroethane	2018/11/16		102	%	70 - 130
			1,1,2,2-Tetrachloroethane	2018/11/16		104	%	70 - 130
			Tetrachloroethylene	2018/11/16		98	%	70 - 130
			Toluene	2018/11/16		95	%	70 - 130
			1,1,1-Trichloroethane	2018/11/16		98	%	70 - 130
			1,1,2-Trichloroethane	2018/11/16		103	%	70 - 130
			Trichloroethylene	2018/11/16		100	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2018/11/16		98	%	70 - 130
			Vinyl Chloride	2018/11/16		99	%	70 - 130
			p+m-Xylene	2018/11/16		98	%	70 - 130
			o-Xylene	2018/11/16		99	%	70 - 130
5839308	BG1	Method Blank	4-Bromofluorobenzene	2018/11/16		95	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		102	%	70 - 130
			D8-Toluene	2018/11/16		96	%	70 - 130
			Acetone (2-Propanone)	2018/11/16	<10		ug/L	
			Benzene	2018/11/16	<0.20		ug/L	
			Bromodichloromethane	2018/11/16	<0.50		ug/L	
			Bromoform	2018/11/16	<1.0		ug/L	
			Bromomethane	2018/11/16	<0.50		ug/L	
			Carbon Tetrachloride	2018/11/16	<0.20		ug/L	
			Chlorobenzene	2018/11/16	<0.20		ug/L	
			Chloroform	2018/11/16	<0.20		ug/L	
			Dibromochloromethane	2018/11/16	<0.50		ug/L	
			1,2-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			1,3-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			1,4-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2018/11/16	<1.0		ug/L	
			1,1-Dichloroethane	2018/11/16	<0.20		ug/L	
			1,2-Dichloroethane	2018/11/16	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1-Dichloroethylene	2018/11/16	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2018/11/16	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2018/11/16	<0.50		ug/L	
			1,2-Dichloropropane	2018/11/16	<0.20		ug/L	
			cis-1,3-Dichloropropene	2018/11/16	<0.30		ug/L	
			trans-1,3-Dichloropropene	2018/11/16	<0.40		ug/L	
			Ethylbenzene	2018/11/16	<0.20		ug/L	
			Ethylene Dibromide	2018/11/16	<0.20		ug/L	
			Hexane	2018/11/16	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2018/11/16	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16	<10		ug/L	
			Methyl Isobutyl Ketone	2018/11/16	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2018/11/16	<0.50		ug/L	
			Styrene	2018/11/16	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2018/11/16	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2018/11/16	<0.50		ug/L	
			Tetrachloroethylene	2018/11/16	<0.20		ug/L	
			Toluene	2018/11/16	<0.20		ug/L	
			1,1,1-Trichloroethane	2018/11/16	<0.20		ug/L	
			1,1,2-Trichloroethane	2018/11/16	<0.50		ug/L	
			Trichloroethylene	2018/11/16	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2018/11/16	<0.50		ug/L	
			Vinyl Chloride	2018/11/16	<0.20		ug/L	
			p+m-Xylene	2018/11/16	<0.20		ug/L	
			o-Xylene	2018/11/16	<0.20		ug/L	
			Total Xylenes	2018/11/16	<0.20		ug/L	
5839308	BG1	RPD	Acetone (2-Propanone)	2018/11/16	NC		%	30
			Benzene	2018/11/16	1.9		%	30
			Bromodichloromethane	2018/11/16	NC		%	30
			Bromoform	2018/11/16	NC		%	30
			Bromomethane	2018/11/16	NC		%	30
			Carbon Tetrachloride	2018/11/16	NC		%	30
			Chlorobenzene	2018/11/16	NC		%	30
			Chloroform	2018/11/16	0.60		%	30
			Dibromochloromethane	2018/11/16	NC		%	30
			1,2-Dichlorobenzene	2018/11/16	NC		%	30
			1,3-Dichlorobenzene	2018/11/16	NC		%	30
			1,4-Dichlorobenzene	2018/11/16	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2018/11/16	NC		%	30
			1,1-Dichloroethane	2018/11/16	NC		%	30
			1,2-Dichloroethane	2018/11/16	NC		%	30
			1,1-Dichloroethylene	2018/11/16	NC		%	30
			cis-1,2-Dichloroethylene	2018/11/16	NC		%	30
			trans-1,2-Dichloroethylene	2018/11/16	NC		%	30
			1,2-Dichloropropane	2018/11/16	NC		%	30
			cis-1,3-Dichloropropene	2018/11/16	NC		%	30
			trans-1,3-Dichloropropene	2018/11/16	NC		%	30
			Ethylbenzene	2018/11/16	NC		%	30
			Ethylene Dibromide	2018/11/16	NC		%	30
			Hexane	2018/11/16	NC		%	30
			Methylene Chloride(Dichloromethane)	2018/11/16	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16	NC		%	30
			Methyl Isobutyl Ketone	2018/11/16	NC		%	30
			Methyl t-butyl ether (MTBE)	2018/11/16	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Styrene	2018/11/16	NC		%	30
			1,1,1,2-Tetrachloroethane	2018/11/16	NC		%	30
			1,1,2,2-Tetrachloroethane	2018/11/16	NC		%	30
			Tetrachloroethylene	2018/11/16	NC		%	30
			Toluene	2018/11/16	1.3		%	30
			1,1,1-Trichloroethane	2018/11/16	NC		%	30
			1,1,2-Trichloroethane	2018/11/16	NC		%	30
			Trichloroethylene	2018/11/16	NC		%	30
			Trichlorofluoromethane (FREON 11)	2018/11/16	NC		%	30
			Vinyl Chloride	2018/11/16	NC		%	30
			p+m-Xylene	2018/11/16	NC		%	30
			o-Xylene	2018/11/16	NC		%	30
			Total Xylenes	2018/11/16	NC		%	30
5839695	DR1	Matrix Spike	4-Bromofluorobenzene	2018/11/16		102	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		101	%	70 - 130
			D8-Toluene	2018/11/16		105	%	70 - 130
			Acetone (2-Propanone)	2018/11/16		98	%	60 - 140
			Benzene	2018/11/16		90	%	70 - 130
			Bromodichloromethane	2018/11/16		93	%	70 - 130
			Bromoform	2018/11/16		88	%	70 - 130
			Bromomethane	2018/11/16		85	%	60 - 140
			Carbon Tetrachloride	2018/11/16		90	%	70 - 130
			Chlorobenzene	2018/11/16		91	%	70 - 130
			Chloroform	2018/11/16		93	%	70 - 130
			Dibromochloromethane	2018/11/16		115	%	70 - 130
			1,2-Dichlorobenzene	2018/11/16		89	%	70 - 130
			1,3-Dichlorobenzene	2018/11/16		95	%	70 - 130
			1,4-Dichlorobenzene	2018/11/16		91	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2018/11/16		59 (1)	%	60 - 140
			1,1-Dichloroethane	2018/11/16		93	%	70 - 130
			1,2-Dichloroethane	2018/11/16		95	%	70 - 130
			1,1-Dichloroethylene	2018/11/16		91	%	70 - 130
			cis-1,2-Dichloroethylene	2018/11/16		92	%	70 - 130
			trans-1,2-Dichloroethylene	2018/11/16		87	%	70 - 130
			1,2-Dichloropropane	2018/11/16		93	%	70 - 130
			cis-1,3-Dichloropropene	2018/11/16		99	%	70 - 130
			trans-1,3-Dichloropropene	2018/11/16		108	%	70 - 130
			Ethylbenzene	2018/11/16		95	%	70 - 130
			Ethylene Dibromide	2018/11/16		91	%	70 - 130
			Hexane	2018/11/16		92	%	70 - 130
			Methylene Chloride(Dichloromethane)	2018/11/16		84	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16		100	%	60 - 140
			Methyl Isobutyl Ketone	2018/11/16		85	%	70 - 130
			Methyl t-butyl ether (MTBE)	2018/11/16		93	%	70 - 130
			Styrene	2018/11/16		96	%	70 - 130
			1,1,1,2-Tetrachloroethane	2018/11/16		90	%	70 - 130
			1,1,2,2-Tetrachloroethane	2018/11/16		91	%	70 - 130
			Tetrachloroethylene	2018/11/16		91	%	70 - 130
			Toluene	2018/11/16		93	%	70 - 130
			1,1,1-Trichloroethane	2018/11/16		92	%	70 - 130
			1,1,2-Trichloroethane	2018/11/16		93	%	70 - 130
			Trichloroethylene	2018/11/16		90	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2018/11/16		89	%	70 - 130
			Vinyl Chloride	2018/11/16		80	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			p+m-Xylene	2018/11/16		95	%	70 - 130
			o-Xylene	2018/11/16		96	%	70 - 130
			F1 (C6-C10)	2018/11/16		99	%	60 - 140
5839695	DR1	Spiked Blank	4-Bromofluorobenzene	2018/11/16		100	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		99	%	70 - 130
			D8-Toluene	2018/11/16		105	%	70 - 130
			Acetone (2-Propanone)	2018/11/16		84	%	60 - 140
			Benzene	2018/11/16		88	%	70 - 130
			Bromodichloromethane	2018/11/16		91	%	70 - 130
			Bromoform	2018/11/16		84	%	70 - 130
			Bromomethane	2018/11/16		80	%	60 - 140
			Carbon Tetrachloride	2018/11/16		89	%	70 - 130
			Chlorobenzene	2018/11/16		88	%	70 - 130
			Chloroform	2018/11/16		91	%	70 - 130
			Dibromochloromethane	2018/11/16		87	%	70 - 130
			1,2-Dichlorobenzene	2018/11/16		88	%	70 - 130
			1,3-Dichlorobenzene	2018/11/16		96	%	70 - 130
			1,4-Dichlorobenzene	2018/11/16		91	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2018/11/16		62	%	60 - 140
			1,1-Dichloroethane	2018/11/16		91	%	70 - 130
			1,2-Dichloroethane	2018/11/16		91	%	70 - 130
			1,1-Dichloroethylene	2018/11/16		90	%	70 - 130
			cis-1,2-Dichloroethylene	2018/11/16		89	%	70 - 130
			trans-1,2-Dichloroethylene	2018/11/16		85	%	70 - 130
			1,2-Dichloropropane	2018/11/16		90	%	70 - 130
			cis-1,3-Dichloropropene	2018/11/16		92	%	70 - 130
			trans-1,3-Dichloropropene	2018/11/16		96	%	70 - 130
			Ethylbenzene	2018/11/16		94	%	70 - 130
			Ethylene Dibromide	2018/11/16		86	%	70 - 130
			Hexane	2018/11/16		92	%	70 - 130
			Methylene Chloride(Dichloromethane)	2018/11/16		81	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16		88	%	60 - 140
			Methyl Isobutyl Ketone	2018/11/16		80	%	70 - 130
			Methyl t-butyl ether (MTBE)	2018/11/16		91	%	70 - 130
			Styrene	2018/11/16		95	%	70 - 130
			1,1,1,2-Tetrachloroethane	2018/11/16		87	%	70 - 130
			1,1,2,2-Tetrachloroethane	2018/11/16		85	%	70 - 130
			Tetrachloroethylene	2018/11/16		88	%	70 - 130
			Toluene	2018/11/16		90	%	70 - 130
			1,1,1-Trichloroethane	2018/11/16		91	%	70 - 130
			1,1,2-Trichloroethane	2018/11/16		89	%	70 - 130
			Trichloroethylene	2018/11/16		89	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2018/11/16		88	%	70 - 130
			Vinyl Chloride	2018/11/16		80	%	70 - 130
			p+m-Xylene	2018/11/16		95	%	70 - 130
			o-Xylene	2018/11/16		94	%	70 - 130
			F1 (C6-C10)	2018/11/16		98	%	60 - 140
5839695	DR1	Method Blank	4-Bromofluorobenzene	2018/11/16		89	%	70 - 130
			D4-1,2-Dichloroethane	2018/11/16		100	%	70 - 130
			D8-Toluene	2018/11/16		96	%	70 - 130
			Acetone (2-Propanone)	2018/11/16	<10		ug/L	
			Benzene	2018/11/16	<0.20		ug/L	
			Bromodichloromethane	2018/11/16	<0.50		ug/L	
			Bromoform	2018/11/16	<1.0		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromomethane	2018/11/16	<0.50		ug/L	
			Carbon Tetrachloride	2018/11/16	<0.20		ug/L	
			Chlorobenzene	2018/11/16	<0.20		ug/L	
			Chloroform	2018/11/16	<0.20		ug/L	
			Dibromochloromethane	2018/11/16	<0.50		ug/L	
			1,2-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			1,3-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			1,4-Dichlorobenzene	2018/11/16	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2018/11/16	<1.0		ug/L	
			1,1-Dichloroethane	2018/11/16	<0.20		ug/L	
			1,2-Dichloroethane	2018/11/16	<0.50		ug/L	
			1,1-Dichloroethylene	2018/11/16	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2018/11/16	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2018/11/16	<0.50		ug/L	
			1,2-Dichloropropane	2018/11/16	<0.20		ug/L	
			cis-1,3-Dichloropropene	2018/11/16	<0.30		ug/L	
			trans-1,3-Dichloropropene	2018/11/16	<0.40		ug/L	
			Ethylbenzene	2018/11/16	<0.20		ug/L	
			Ethylene Dibromide	2018/11/16	<0.20		ug/L	
			Hexane	2018/11/16	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2018/11/16	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16	<10		ug/L	
			Methyl Isobutyl Ketone	2018/11/16	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2018/11/16	<0.50		ug/L	
			Styrene	2018/11/16	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2018/11/16	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2018/11/16	<0.50		ug/L	
			Tetrachloroethylene	2018/11/16	<0.20		ug/L	
			Toluene	2018/11/16	<0.20		ug/L	
			1,1,1-Trichloroethane	2018/11/16	<0.20		ug/L	
			1,1,2-Trichloroethane	2018/11/16	<0.50		ug/L	
			Trichloroethylene	2018/11/16	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2018/11/16	<0.50		ug/L	
			Vinyl Chloride	2018/11/16	<0.20		ug/L	
			p+m-Xylene	2018/11/16	<0.20		ug/L	
			o-Xylene	2018/11/16	<0.20		ug/L	
			Total Xylenes	2018/11/16	<0.20		ug/L	
			F1 (C6-C10)	2018/11/16	<25		ug/L	
			F1 (C6-C10) - BTEX	2018/11/16	<25		ug/L	
5839695	DR1	RPD	Acetone (2-Propanone)	2018/11/16	NC		%	30
			Benzene	2018/11/16	NC		%	30
			Bromodichloromethane	2018/11/16	NC		%	30
			Bromoform	2018/11/16	NC		%	30
			Bromomethane	2018/11/16	NC		%	30
			Carbon Tetrachloride	2018/11/16	NC		%	30
			Chlorobenzene	2018/11/16	NC		%	30
			Chloroform	2018/11/16	NC		%	30
			Dibromochloromethane	2018/11/16	NC		%	30
			1,2-Dichlorobenzene	2018/11/16	NC		%	30
			1,3-Dichlorobenzene	2018/11/16	NC		%	30
			1,4-Dichlorobenzene	2018/11/16	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2018/11/16	NC		%	30
			1,1-Dichloroethane	2018/11/16	NC		%	30
			1,2-Dichloroethane	2018/11/16	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1-Dichloroethylene	2018/11/16	NC		%	30
			cis-1,2-Dichloroethylene	2018/11/16	NC		%	30
			trans-1,2-Dichloroethylene	2018/11/16	NC		%	30
			1,2-Dichloropropane	2018/11/16	NC		%	30
			cis-1,3-Dichloropropene	2018/11/16	NC		%	30
			trans-1,3-Dichloropropene	2018/11/16	NC		%	30
			Ethylbenzene	2018/11/16	NC		%	30
			Ethylene Dibromide	2018/11/16	NC		%	30
			Hexane	2018/11/16	NC		%	30
			Methylene Chloride(Dichloromethane)	2018/11/16	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2018/11/16	NC		%	30
			Methyl Isobutyl Ketone	2018/11/16	NC		%	30
			Methyl t-butyl ether (MTBE)	2018/11/16	NC		%	30
			Styrene	2018/11/16	NC		%	30
			1,1,1,2-Tetrachloroethane	2018/11/16	NC		%	30
			1,1,2,2-Tetrachloroethane	2018/11/16	NC		%	30
			Tetrachloroethylene	2018/11/16	NC		%	30
			Toluene	2018/11/16	NC		%	30
			1,1,1-Trichloroethane	2018/11/16	NC		%	30
			1,1,2-Trichloroethane	2018/11/16	NC		%	30
			Trichloroethylene	2018/11/16	NC		%	30
			Trichlorofluoromethane (FREON 11)	2018/11/16	NC		%	30
			Vinyl Chloride	2018/11/16	NC		%	30
			p+m-Xylene	2018/11/16	NC		%	30
			o-Xylene	2018/11/16	NC		%	30
			Total Xylenes	2018/11/16	NC		%	30
			F1 (C6-C10)	2018/11/16	NC		%	30
			F1 (C6-C10) - BTEX	2018/11/16	NC		%	30
5840092	ADA	Matrix Spike	Dissolved Antimony (Sb)	2018/11/16		110	%	80 - 120
			Dissolved Arsenic (As)	2018/11/16		103	%	80 - 120
			Dissolved Barium (Ba)	2018/11/16		104	%	80 - 120
			Dissolved Beryllium (Be)	2018/11/16		108	%	80 - 120
			Dissolved Boron (B)	2018/11/16		103	%	80 - 120
			Dissolved Cadmium (Cd)	2018/11/16		107	%	80 - 120
			Dissolved Chromium (Cr)	2018/11/16		101	%	80 - 120
			Dissolved Cobalt (Co)	2018/11/16		101	%	80 - 120
			Dissolved Copper (Cu)	2018/11/16		109	%	80 - 120
			Dissolved Lead (Pb)	2018/11/16		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2018/11/16		104	%	80 - 120
			Dissolved Nickel (Ni)	2018/11/16		103	%	80 - 120
			Dissolved Selenium (Se)	2018/11/16		108	%	80 - 120
			Dissolved Silver (Ag)	2018/11/16		104	%	80 - 120
			Dissolved Sodium (Na)	2018/11/16		100	%	80 - 120
			Dissolved Thallium (Tl)	2018/11/16		103	%	80 - 120
			Dissolved Uranium (U)	2018/11/16		101	%	80 - 120
			Dissolved Vanadium (V)	2018/11/16		102	%	80 - 120
			Dissolved Zinc (Zn)	2018/11/16		104	%	80 - 120
5840092	ADA	Spiked Blank	Dissolved Antimony (Sb)	2018/11/16		101	%	80 - 120
			Dissolved Arsenic (As)	2018/11/16		99	%	80 - 120
			Dissolved Barium (Ba)	2018/11/16		100	%	80 - 120
			Dissolved Beryllium (Be)	2018/11/16		99	%	80 - 120
			Dissolved Boron (B)	2018/11/16		99	%	80 - 120
			Dissolved Cadmium (Cd)	2018/11/16		101	%	80 - 120
			Dissolved Chromium (Cr)	2018/11/16		97	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Cobalt (Co)	2018/11/16		99	%	80 - 120
			Dissolved Copper (Cu)	2018/11/16		100	%	80 - 120
			Dissolved Lead (Pb)	2018/11/16		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2018/11/16		98	%	80 - 120
			Dissolved Nickel (Ni)	2018/11/16		100	%	80 - 120
			Dissolved Selenium (Se)	2018/11/16		103	%	80 - 120
			Dissolved Silver (Ag)	2018/11/16		99	%	80 - 120
			Dissolved Sodium (Na)	2018/11/16		99	%	80 - 120
			Dissolved Thallium (Tl)	2018/11/16		99	%	80 - 120
			Dissolved Uranium (U)	2018/11/16		97	%	80 - 120
			Dissolved Vanadium (V)	2018/11/16		98	%	80 - 120
			Dissolved Zinc (Zn)	2018/11/16		100	%	80 - 120
5840092	ADA	Method Blank	Dissolved Antimony (Sb)	2018/11/16	<0.50		ug/L	
			Dissolved Arsenic (As)	2018/11/16	<1.0		ug/L	
			Dissolved Barium (Ba)	2018/11/16	<2.0		ug/L	
			Dissolved Beryllium (Be)	2018/11/16	<0.50		ug/L	
			Dissolved Boron (B)	2018/11/16	<10		ug/L	
			Dissolved Cadmium (Cd)	2018/11/16	<0.10		ug/L	
			Dissolved Chromium (Cr)	2018/11/16	<5.0		ug/L	
			Dissolved Cobalt (Co)	2018/11/16	<0.50		ug/L	
			Dissolved Copper (Cu)	2018/11/16	<1.0		ug/L	
			Dissolved Lead (Pb)	2018/11/16	<0.50		ug/L	
			Dissolved Molybdenum (Mo)	2018/11/16	<0.50		ug/L	
			Dissolved Nickel (Ni)	2018/11/16	<1.0		ug/L	
			Dissolved Selenium (Se)	2018/11/16	<2.0		ug/L	
			Dissolved Silver (Ag)	2018/11/16	<0.10		ug/L	
			Dissolved Sodium (Na)	2018/11/16	<100		ug/L	
			Dissolved Thallium (Tl)	2018/11/16	<0.050		ug/L	
			Dissolved Uranium (U)	2018/11/16	<0.10		ug/L	
			Dissolved Vanadium (V)	2018/11/16	<0.50		ug/L	
			Dissolved Zinc (Zn)	2018/11/16	<5.0		ug/L	
5840092	ADA	RPD	Dissolved Antimony (Sb)	2018/11/16	NC		%	20
			Dissolved Arsenic (As)	2018/11/16	NC		%	20
			Dissolved Cadmium (Cd)	2018/11/16	NC		%	20
			Dissolved Cobalt (Co)	2018/11/16	NC		%	20
			Dissolved Copper (Cu)	2018/11/16	17		%	20
			Dissolved Lead (Pb)	2018/11/16	NC		%	20
			Dissolved Nickel (Ni)	2018/11/16	NC		%	20
			Dissolved Selenium (Se)	2018/11/16	NC		%	20
			Dissolved Silver (Ag)	2018/11/16	NC		%	20
			Dissolved Zinc (Zn)	2018/11/16	NC		%	20
5840721	RON	Matrix Spike	Mercury (Hg)	2018/11/16		92	%	75 - 125
5840721	RON	Spiked Blank	Mercury (Hg)	2018/11/16		99	%	80 - 120
5840721	RON	Method Blank	Mercury (Hg)	2018/11/16	<0.1		ug/L	
5840721	RON	RPD	Mercury (Hg)	2018/11/16	NC		%	20
5841578	RAJ	Matrix Spike	D10-Anthracene	2018/11/16		108	%	50 - 130
			D14-Terphenyl (FS)	2018/11/16		102	%	50 - 130
			D8-Acenaphthylene	2018/11/16		100	%	50 - 130
			Acenaphthene	2018/11/16		97	%	50 - 130
			Acenaphthylene	2018/11/16		102	%	50 - 130
			Anthracene	2018/11/16		107	%	50 - 130
			Benzo(a)anthracene	2018/11/16		114	%	50 - 130
			Benzo(a)pyrene	2018/11/16		112	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/16		112	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(g,h,i)perylene	2018/11/16		103	%	50 - 130
			Benzo(k)fluoranthene	2018/11/16		99	%	50 - 130
			Chrysene	2018/11/16		115	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/16		100	%	50 - 130
			Fluoranthene	2018/11/16		117	%	50 - 130
			Fluorene	2018/11/16		94	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/16		107	%	50 - 130
			1-Methylnaphthalene	2018/11/16		133 (2)	%	50 - 130
			2-Methylnaphthalene	2018/11/16		108	%	50 - 130
			Naphthalene	2018/11/16		100	%	50 - 130
			Phenanthrene	2018/11/16		107	%	50 - 130
			Pyrene	2018/11/16		111	%	50 - 130
5841578	RAJ	Spiked Blank	D10-Anthracene	2018/11/16		90	%	50 - 130
			D14-Terphenyl (FS)	2018/11/16		91	%	50 - 130
			D8-Acenaphthylene	2018/11/16		85	%	50 - 130
			Acenaphthene	2018/11/16		91	%	50 - 130
			Acenaphthylene	2018/11/16		84	%	50 - 130
			Anthracene	2018/11/16		87	%	50 - 130
			Benzo(a)anthracene	2018/11/16		87	%	50 - 130
			Benzo(a)pyrene	2018/11/16		103	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/16		97	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/16		97	%	50 - 130
			Benzo(k)fluoranthene	2018/11/16		98	%	50 - 130
			Chrysene	2018/11/16		99	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/16		91	%	50 - 130
			Fluoranthene	2018/11/16		88	%	50 - 130
			Fluorene	2018/11/16		87	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/16		100	%	50 - 130
			1-Methylnaphthalene	2018/11/16		113	%	50 - 130
			2-Methylnaphthalene	2018/11/16		97	%	50 - 130
			Naphthalene	2018/11/16		94	%	50 - 130
			Phenanthrene	2018/11/16		93	%	50 - 130
			Pyrene	2018/11/16		90	%	50 - 130
5841578	RAJ	Method Blank	D10-Anthracene	2018/11/16		87	%	50 - 130
			D14-Terphenyl (FS)	2018/11/16		93	%	50 - 130
			D8-Acenaphthylene	2018/11/16		83	%	50 - 130
			Acenaphthene	2018/11/16	<0.050		ug/L	
			Acenaphthylene	2018/11/16	<0.050		ug/L	
			Anthracene	2018/11/16	<0.050		ug/L	
			Benzo(a)anthracene	2018/11/16	<0.050		ug/L	
			Benzo(a)pyrene	2018/11/16	<0.010		ug/L	
			Benzo(b/j)fluoranthene	2018/11/16	<0.050		ug/L	
			Benzo(g,h,i)perylene	2018/11/16	<0.050		ug/L	
			Benzo(k)fluoranthene	2018/11/16	<0.050		ug/L	
			Chrysene	2018/11/16	<0.050		ug/L	
			Dibenz(a,h)anthracene	2018/11/16	<0.050		ug/L	
			Fluoranthene	2018/11/16	<0.050		ug/L	
			Fluorene	2018/11/16	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2018/11/16	<0.050		ug/L	
			1-Methylnaphthalene	2018/11/16	<0.050		ug/L	
			2-Methylnaphthalene	2018/11/16	<0.050		ug/L	
			Naphthalene	2018/11/16	<0.050		ug/L	
			Phenanthrene	2018/11/16	<0.030		ug/L	
			Pyrene	2018/11/16	<0.050		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5841578	RAJ	RPD	Acenaphthene	2018/11/16	2.1		%	30
			Acenaphthylene	2018/11/16	8.0		%	30
			Anthracene	2018/11/16	0.76		%	30
			Benzo(a)anthracene	2018/11/16	NC		%	30
			Benzo(a)pyrene	2018/11/16	NC		%	30
			Benzo(b/j)fluoranthene	2018/11/16	NC		%	30
			Benzo(g,h,i)perylene	2018/11/16	NC		%	30
			Benzo(k)fluoranthene	2018/11/16	NC		%	30
			Chrysene	2018/11/16	NC		%	30
			Dibenz(a,h)anthracene	2018/11/16	NC		%	30
			Fluoranthene	2018/11/16	8.1		%	30
			Fluorene	2018/11/16	2.9		%	30
			Indeno(1,2,3-cd)pyrene	2018/11/16	NC		%	30
			1-Methylnaphthalene	2018/11/16	6.1		%	30
			2-Methylnaphthalene	2018/11/16	6.1		%	30
			Naphthalene	2018/11/16	4.6		%	30
			Phenanthrene	2018/11/16	6.9		%	30
			Pyrene	2018/11/16	7.5		%	30
5841590	MKS	Matrix Spike	o-Terphenyl	2018/11/18		114	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/18		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2018/11/18		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2018/11/18		99	%	50 - 130
5841590	MKS	Spiked Blank	o-Terphenyl	2018/11/18		116	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/18		100	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2018/11/18		105	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2018/11/18		96	%	60 - 130
5841590	MKS	Method Blank	o-Terphenyl	2018/11/18		111	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/18	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2018/11/18	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2018/11/18	<200		ug/L	
5841590	MKS	RPD	F2 (C10-C16 Hydrocarbons)	2018/11/18	2.4		%	30
			F3 (C16-C34 Hydrocarbons)	2018/11/18	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2018/11/18	NC		%	30
5841618	RAJ	Matrix Spike	D10-Anthracene	2018/11/16		101	%	50 - 130
			D14-Terphenyl (FS)	2018/11/16		98	%	50 - 130
			D8-Acenaphthylene	2018/11/16		101	%	50 - 130
			Acenaphthene	2018/11/16		103	%	50 - 130
			Acenaphthylene	2018/11/16		106	%	50 - 130
			Anthracene	2018/11/16		101	%	50 - 130
			Benzo(a)anthracene	2018/11/16		105	%	50 - 130
			Benzo(a)pyrene	2018/11/16		102	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/16		105	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/16		103	%	50 - 130
			Benzo(k)fluoranthene	2018/11/16		95	%	50 - 130
			Chrysene	2018/11/16		101	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/16		99	%	50 - 130
			Fluoranthene	2018/11/16		105	%	50 - 130
			Fluorene	2018/11/16		101	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/16		102	%	50 - 130
			1-Methylnaphthalene	2018/11/16		111	%	50 - 130
			2-Methylnaphthalene	2018/11/16		103	%	50 - 130
			Naphthalene	2018/11/16		101	%	50 - 130
			Phenanthrene	2018/11/16		103	%	50 - 130
			Pyrene	2018/11/16		104	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5841618	RAJ	Spiked Blank	D10-Anthracene	2018/11/16		101	%	50 - 130
			D14-Terphenyl (FS)	2018/11/16		97	%	50 - 130
			D8-Acenaphthylene	2018/11/16		100	%	50 - 130
			Acenaphthene	2018/11/16		97	%	50 - 130
			Acenaphthylene	2018/11/16		100	%	50 - 130
			Anthracene	2018/11/16		95	%	50 - 130
			Benzo(a)anthracene	2018/11/16		98	%	50 - 130
			Benzo(a)pyrene	2018/11/16		96	%	50 - 130
			Benzo(b/j)fluoranthene	2018/11/16		98	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/16		97	%	50 - 130
			Benzo(k)fluoranthene	2018/11/16		93	%	50 - 130
			Chrysene	2018/11/16		97	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/16		94	%	50 - 130
			Fluoranthene	2018/11/16		99	%	50 - 130
			Fluorene	2018/11/16		95	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/16		97	%	50 - 130
			1-Methylnaphthalene	2018/11/16		106	%	50 - 130
			2-Methylnaphthalene	2018/11/16		97	%	50 - 130
			Naphthalene	2018/11/16		96	%	50 - 130
			Phenanthrene	2018/11/16		98	%	50 - 130
			Pyrene	2018/11/16		99	%	50 - 130
5841618	RAJ	Method Blank	D10-Anthracene	2018/11/17		101	%	50 - 130
			D14-Terphenyl (FS)	2018/11/17		97	%	50 - 130
			D8-Acenaphthylene	2018/11/17		100	%	50 - 130
			Acenaphthene	2018/11/17	<0.050		ug/L	
			Acenaphthylene	2018/11/17	<0.050		ug/L	
			Anthracene	2018/11/17	<0.050		ug/L	
			Benzo(a)anthracene	2018/11/17	<0.050		ug/L	
			Benzo(a)pyrene	2018/11/17	<0.010		ug/L	
			Benzo(b/j)fluoranthene	2018/11/17	<0.050		ug/L	
			Benzo(g,h,i)perylene	2018/11/17	<0.050		ug/L	
			Benzo(k)fluoranthene	2018/11/17	<0.050		ug/L	
			Chrysene	2018/11/17	<0.050		ug/L	
			Dibenz(a,h)anthracene	2018/11/17	<0.050		ug/L	
			Fluoranthene	2018/11/17	<0.050		ug/L	
			Fluorene	2018/11/17	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2018/11/17	<0.050		ug/L	
			1-Methylnaphthalene	2018/11/17	<0.050		ug/L	
			2-Methylnaphthalene	2018/11/17	<0.050		ug/L	
			Naphthalene	2018/11/17	<0.050		ug/L	
			Phenanthrene	2018/11/17	<0.030		ug/L	
			Pyrene	2018/11/17	<0.050		ug/L	
5841618	RAJ	RPD	Acenaphthene	2018/11/16	NC		%	30
			Acenaphthylene	2018/11/16	NC		%	30
			Anthracene	2018/11/16	NC		%	30
			Benzo(a)anthracene	2018/11/16	NC		%	30
			Benzo(a)pyrene	2018/11/16	NC		%	30
			Benzo(b/j)fluoranthene	2018/11/16	NC		%	30
			Benzo(g,h,i)perylene	2018/11/16	NC		%	30
			Benzo(k)fluoranthene	2018/11/16	NC		%	30
			Chrysene	2018/11/16	NC		%	30
			Dibenz(a,h)anthracene	2018/11/16	NC		%	30
			Fluoranthene	2018/11/16	NC		%	30
			Fluorene	2018/11/16	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Indeno(1,2,3-cd)pyrene	2018/11/16	NC		%	30
			1-Methylnaphthalene	2018/11/16	NC		%	30
			2-Methylnaphthalene	2018/11/16	NC		%	30
			Naphthalene	2018/11/16	NC		%	30
			Phenanthrene	2018/11/16	NC		%	30
			Pyrene	2018/11/16	NC		%	30
5841620	MKS	Matrix Spike	o-Terphenyl	2018/11/19		107	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/19		106	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2018/11/19		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2018/11/19		101	%	50 - 130
5841620	MKS	Spiked Blank	o-Terphenyl	2018/11/19		104	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/19		104	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2018/11/19		104	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2018/11/19		98	%	60 - 130
5841620	MKS	Method Blank	o-Terphenyl	2018/11/19		105	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2018/11/19	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2018/11/19	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2018/11/19	<200		ug/L	
5841620	MKS	RPD	F2 (C10-C16 Hydrocarbons)	2018/11/19	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2018/11/19	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2018/11/19	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).

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

(2) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

VALIDATION SIGNATURE PAGE

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

Eva

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Eva Pranjic
CHEMIST

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

14-Nov-18 16:00
Alisha Williamson
B8U4943

J_L ,ENV-871

Maxxam Analytics
CAM FCD-01013/5
Page 1 of 1

Presence of Visible Particulate/Sediment

When there is >1cm of visible particulate/sediment, the amount will be recorded in the field below

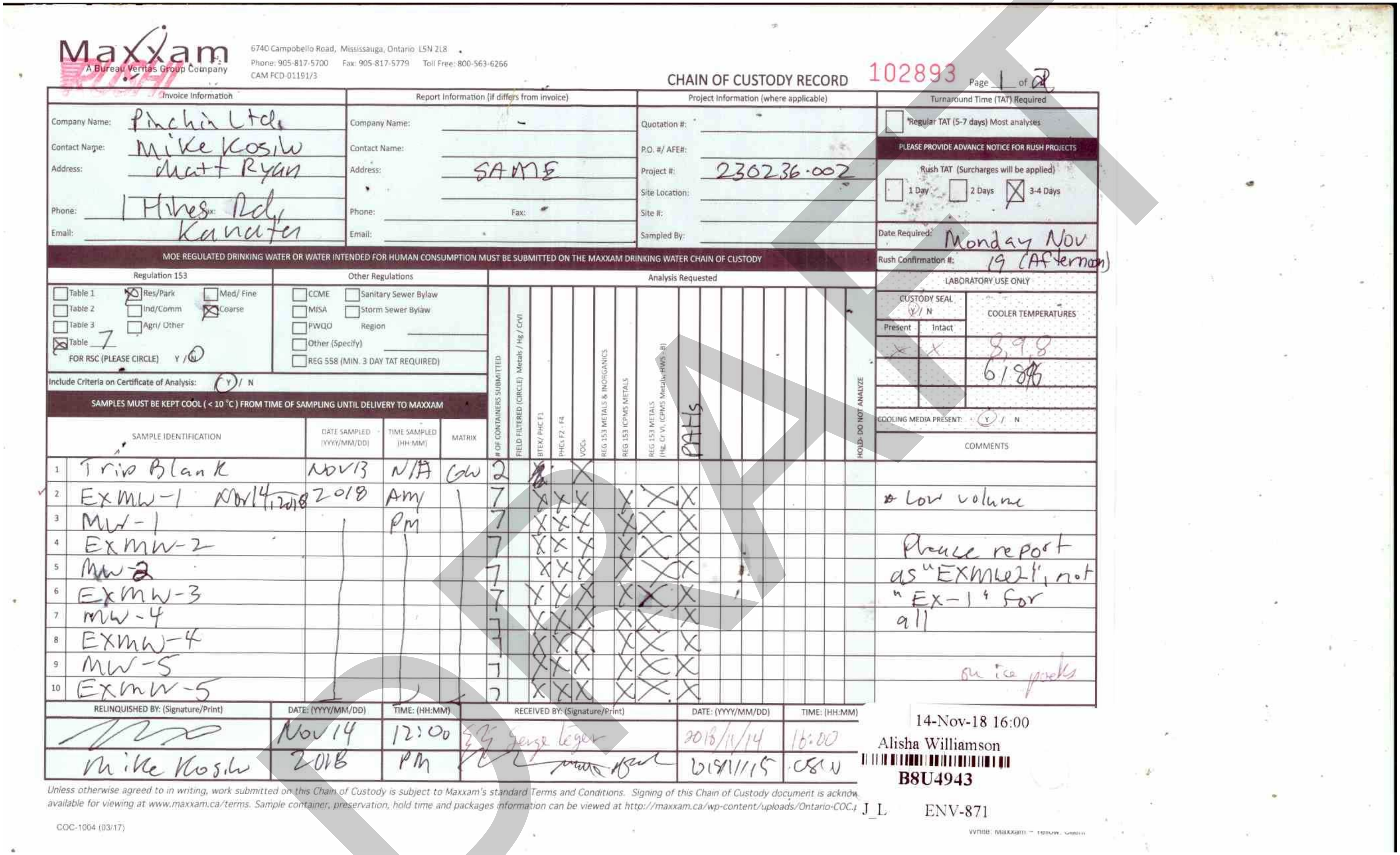
Bottle Types

			Inorganics					Organics											Hydrocarbons							Volatiles				Other
	Sample ID	All	CrVI	CN	General	Hg	Metals (Diss.)	Organic 1 of 2	Organic 2 of 2	PCB 1 of 2	PCB 2 of 2	Pest/ Herb 1 of 2	Pest/ Herb 2 of 2	SVOC/ ABN 1 of 2	SVOC/ ABN 2 of 2	PAH 1 of 2	PAH 2 of 2	Dioxin /Furan	F1 Vial 1	F1 Vial 2	F1 Vial 3	F1 Vial 4	F2-F4 1 of 2	F2-F4 2 of 2	F4G	VOC Vial 1	VOC Vial 2	VOC Vial 3	VOC Vial 4	
1	EXMW-1		TS			TS																	S	S		S	S			
2	MW-1																						TS	TS		TS	TS			
3	EXMW-2																						TS	TS		TS	TS			
4	MW-2																						TS	TS		TS	TS			
5	EXMW-3																						TS	TS		TS	TS			
6	MW-4																						TS	TS		TS	TS			
7	EXMW-4																						TS	TS		TS	TS			
8	MW-5																						TS	TS		TS	TS			
9	EXMW-5																						TS	TS		S	TS			
10	Dup-2																						TS	TS		TS	TS			

Comments:

Legend:	
P	Suspended Particulate
TS	Trace Settled Sediment (just covers bottom of container or less)
S	Sediment greater than (>) Trace, but less than (<) 1 cm

Recorded By: (signature/print)



Maxxam
A Bureau Veritas Group Company
RUSH

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

102893 Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	Pinchin Ltd.	Company Name:	-	Quotation #:	
Contact Name:	Mike Kosiw	Contact Name:		P.O. #/ AFE#:	
Address:	Matt Ryan	Address:	SAME	Project #:	230236.002
				Site Location:	
Phone:	1 Hines Rd,	Phone:	Fax:	Site #:	
Email:	Kanata	Email:		Sampled By:	

Turnaround Time (TAT) Required

☐ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)
☐ 1 Day ☐ 2 Days ☒ 3-4 Days

Date Required: Monday Nov 19 (Afternoon)

Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 7

FOR RSC (PLEASE CIRCLE) Y / [✓ N]

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: [✓ Y] / N

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

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] / N

Present	Intact	COOLER TEMPERATURES
X	X	8, 9, 8
		6, 8, 6

COOLING MEDIA PRESENT: [✓ Y] / N

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	HOLD- DO NOT ANALYZE	COMMENTS
1	Trip Blank	NOV13	N/A	GW	2		X		X						
2	EXMW-1 Nov14, 2018	2018	Am		7		X	X	X		X	X	X		* Low volume
3	MW-1		Pm		7		X	X	X		X	X	X		
4	EXMW-2				7		X	X	X		X	X	X		Please report
5	MW-2				7		X	X	X		X	X	X		as "EXMW-1", not
6	EXMW-3				7		X	X	X		X	X	X		"EX-1" for
7	MW-4				7		X	X	X		X	X	X		all
8	EXMW-4				7		X	X	X		X	X	X		
9	MW-5				7		X	X	X		X	X	X		on ice packs
10	EXMW-5				7		X	X	X		X	X	X		

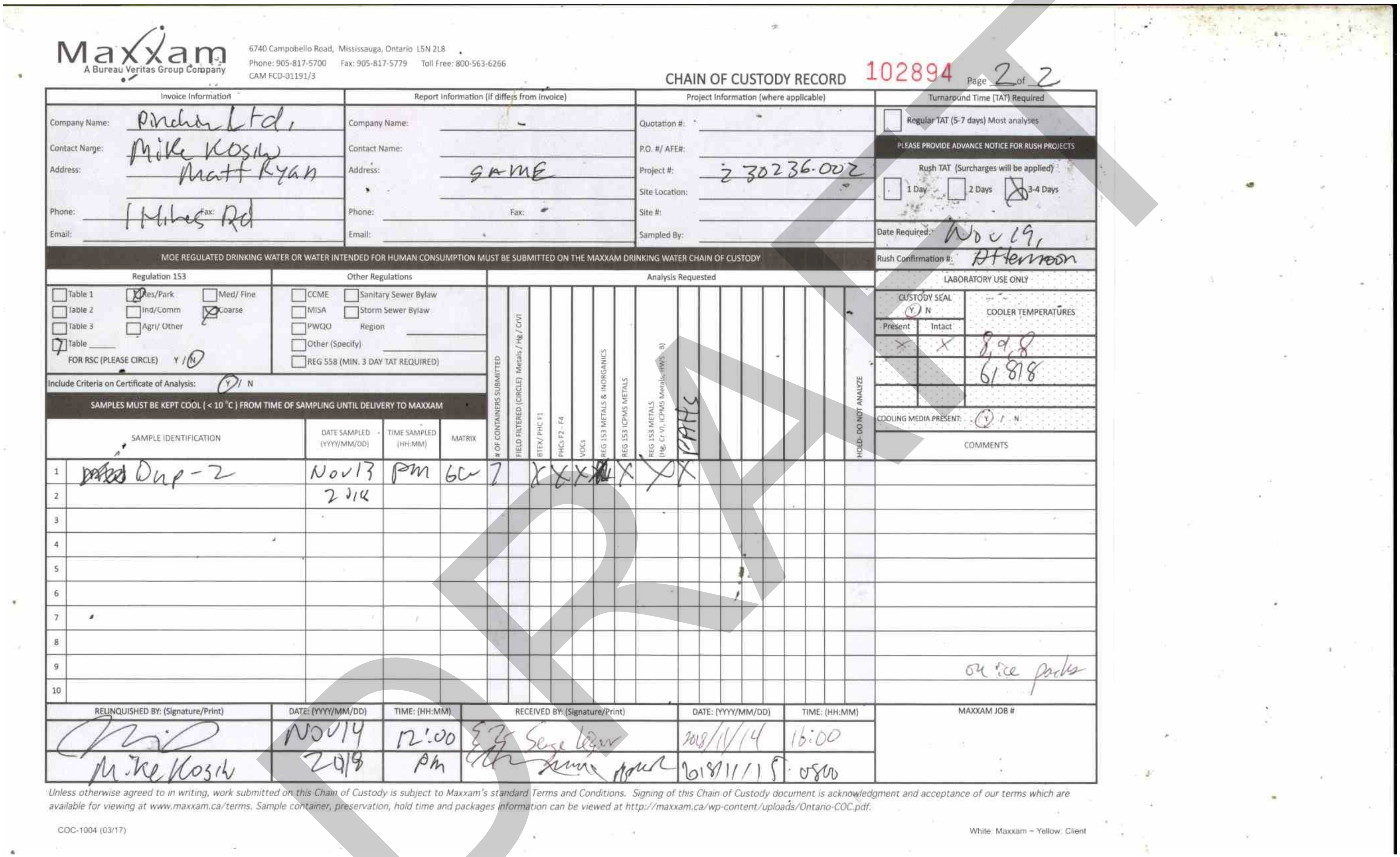
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
	Nov 14	12:00	Serge Léger	2018/11/14	16:00
Mike Kosiw	2018	PM		2018/11/15	08:[illegible]

14-Nov-18 16:00
Alisha Williamson
B8U4943
J_L ENV-871

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 acknow
available for viewing at www.maxxam.ca/terms. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.

COC-1004 (03/17)

White: Maxxam – Yellow: Client



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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

102894 Page 2 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	Pinchin Ltd,	Company Name:	-	Quotation #:	
Contact Name:	Mike Kosik Matt Ryan	Contact Name:		P.O. #/ AFE#:	
Address:		Address:	SAME	Project #:	230236.002
				Site Location:	
Phone: 1 Miles Rd Fax:		Phone: Fax:		Site #:	
Email:		Email:		Sampled By:	

Turnaround Time (TAT) Required

☐ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ 1 Day ☐ 2 Days ☒ 3-4 Days

Date Required: Nov 19,

Rush Confirmation #: Afternoon

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 7
FOR RSC (PLEASE CIRCLE) Y / [✓ N]

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: [✓ Y] / N

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs								HOLD- DO NOT ANALYZE
1	Dup-2	Nov13 2018	pm	GW	7		X	X	X	X	X	X	X								
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] N

Present	Intact	COOLER TEMPERATURES
X	X	8,9,8
		6,8,8

COOLING MEDIA PRESENT: [✓ Y] / N

COMMENTS

on ice packs

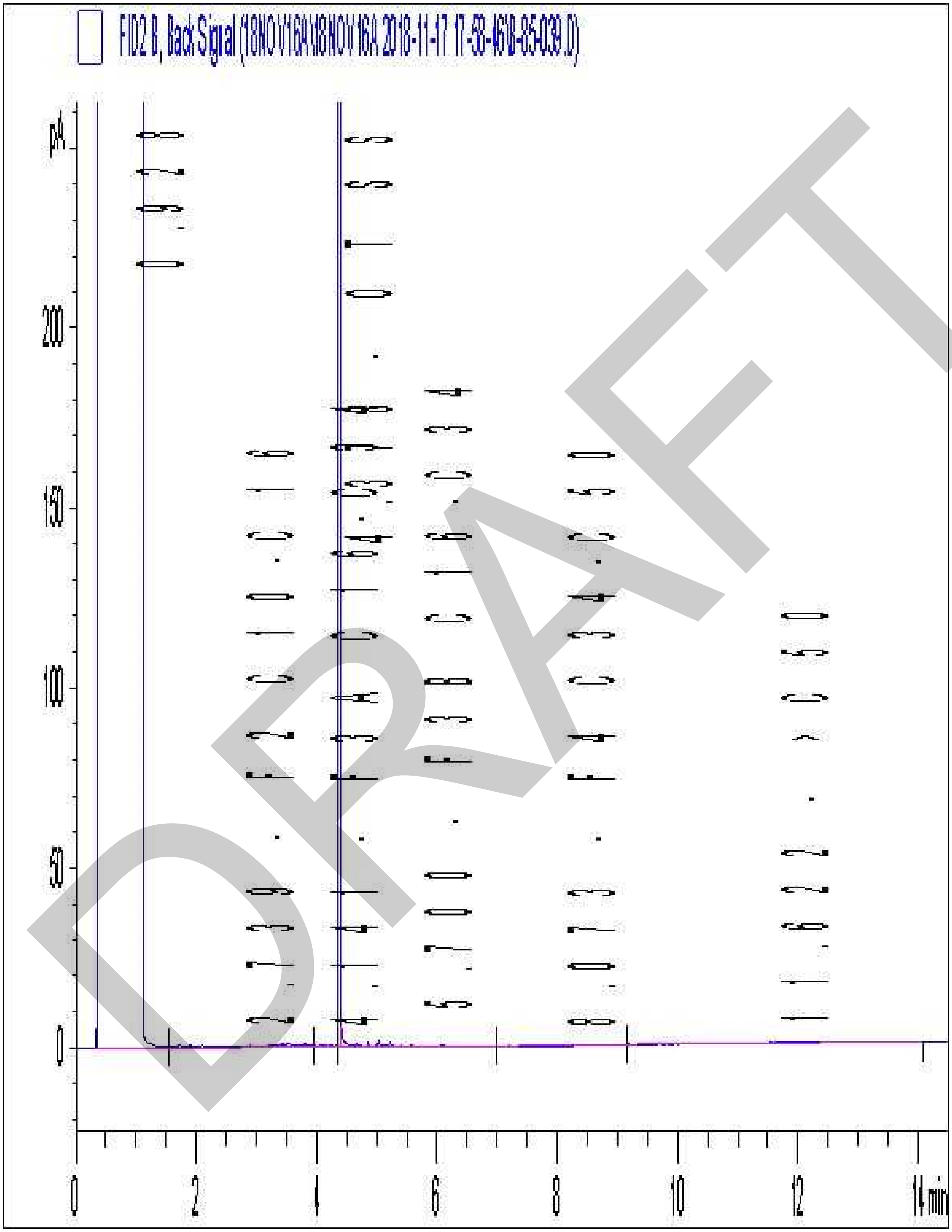
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Kosik	Nov14 2018	12:00 pm	Serge Léger	2018/11/14	16:00	
				2018/11/15	0800	

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. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

COC-1004 (03/17)

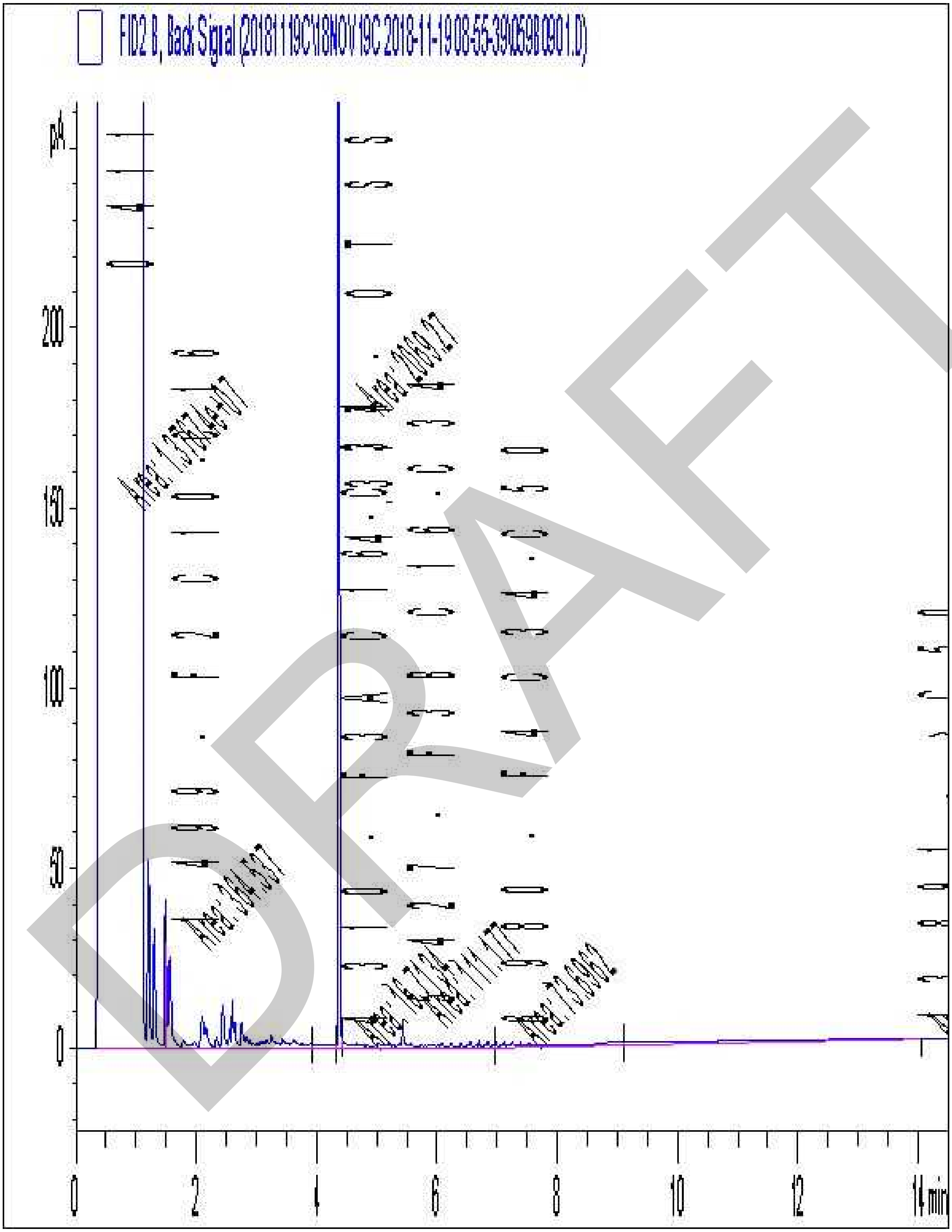
White: Maxxam ~ Yellow: Client

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

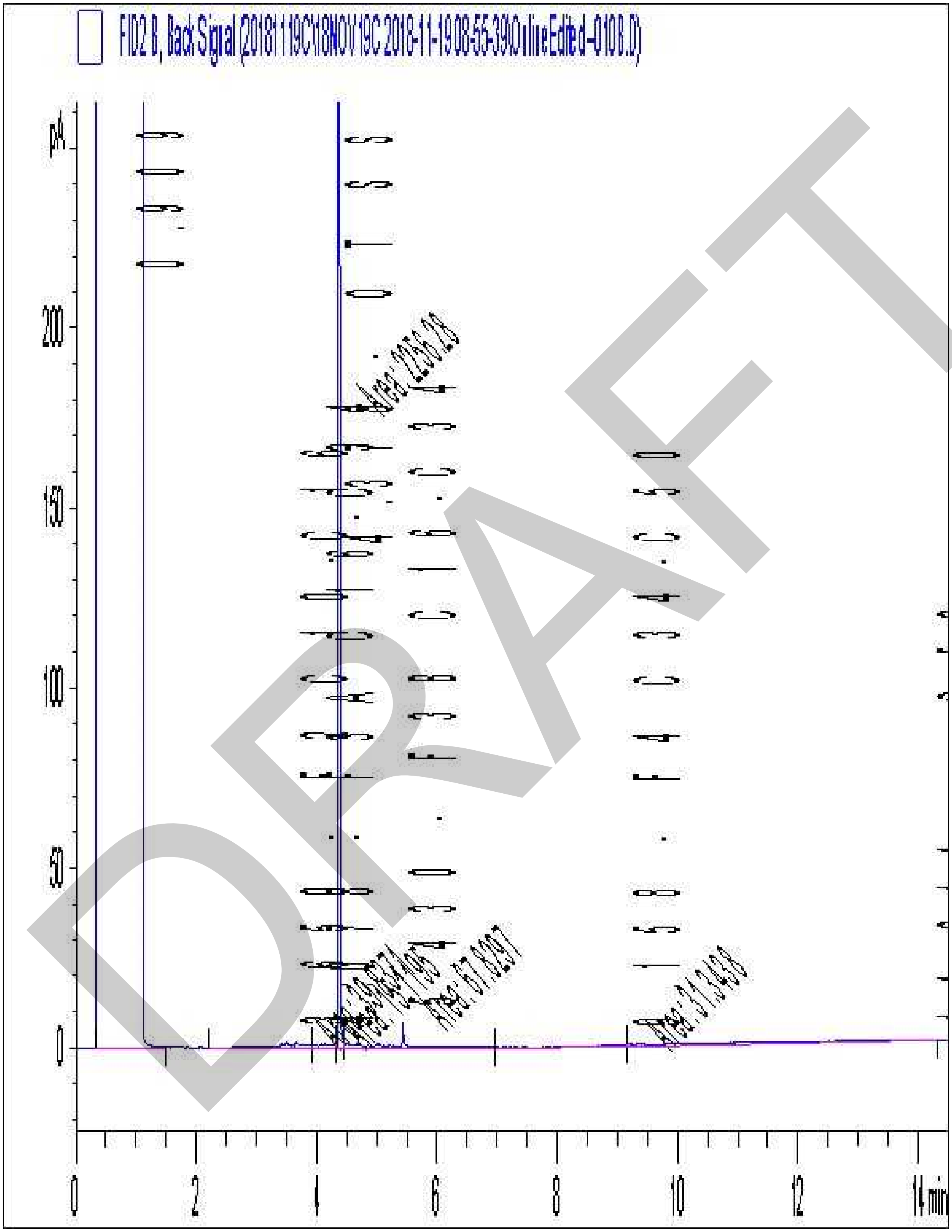


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM235

Pinchin Ltd
Client Project #: 230236.002
Client ID: EXMW-2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

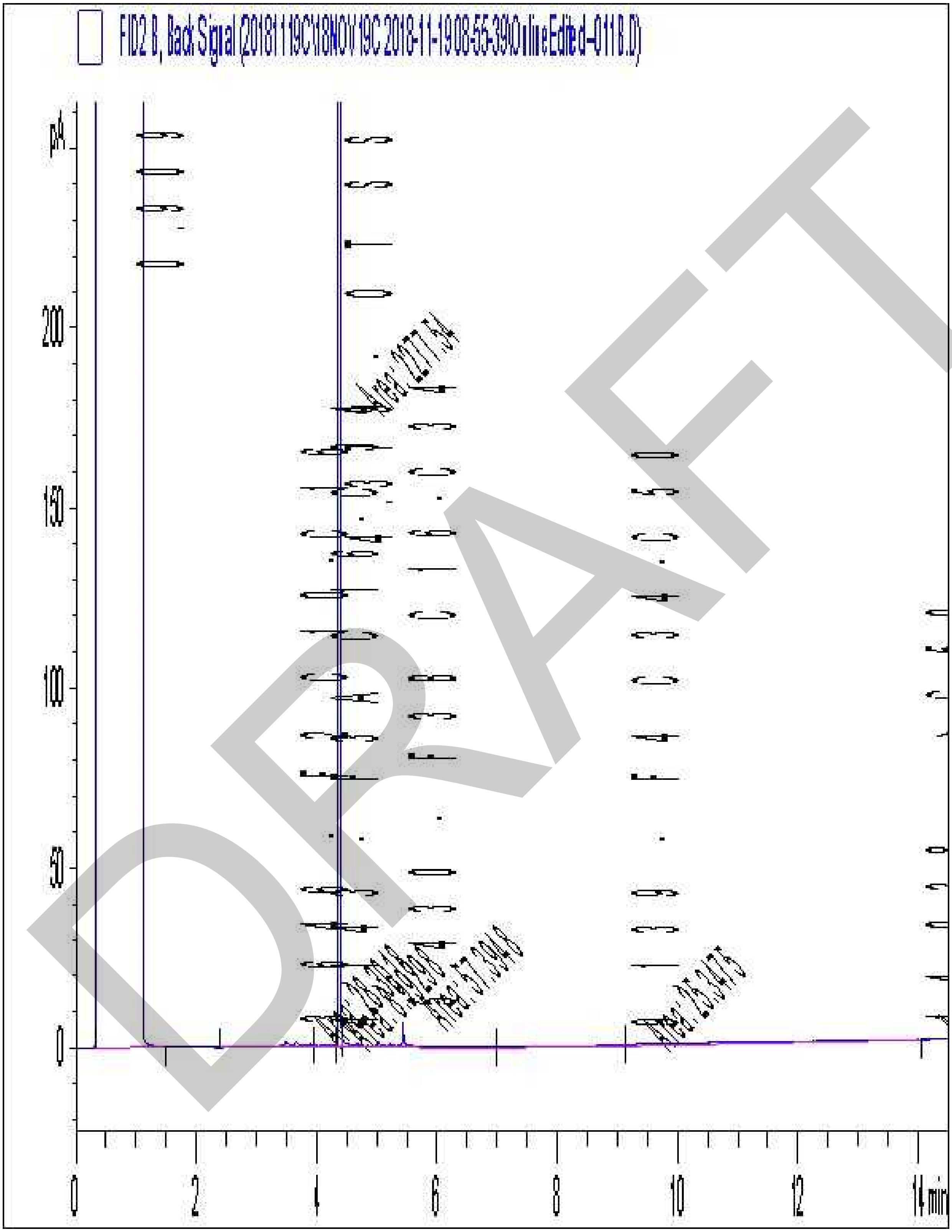


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM236

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

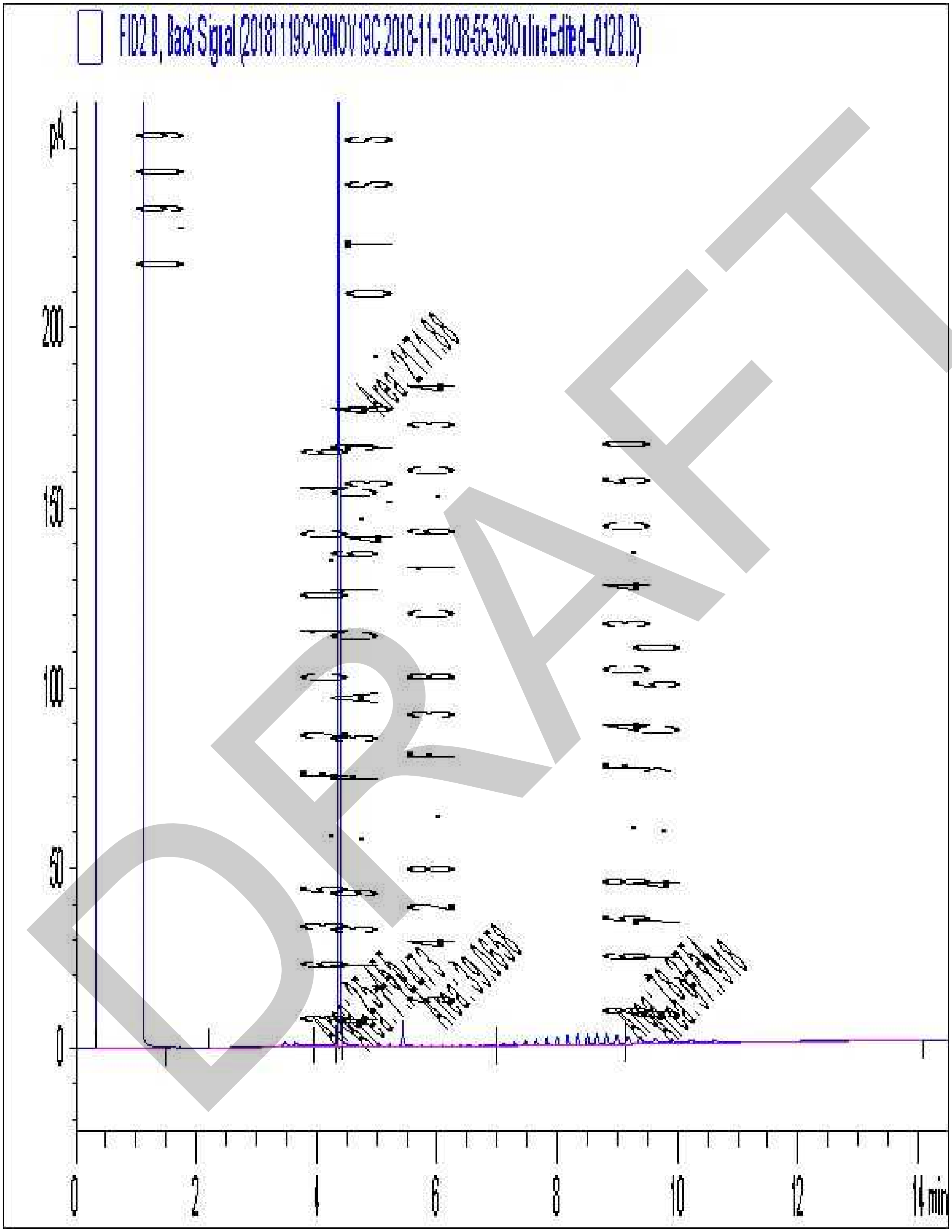


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM237

Pinchin Ltd
Client Project #: 230236.002
Client ID: EXMW-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

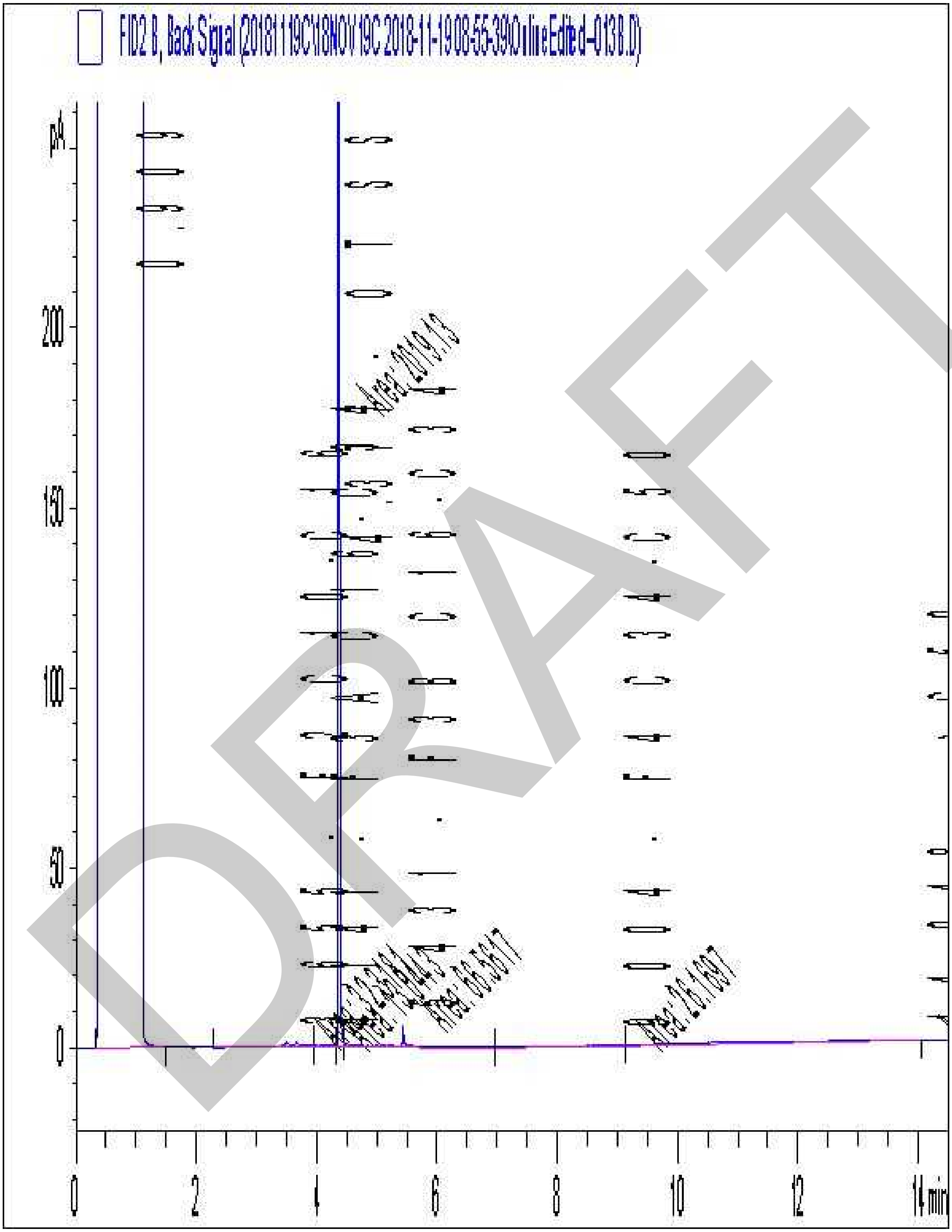


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM238

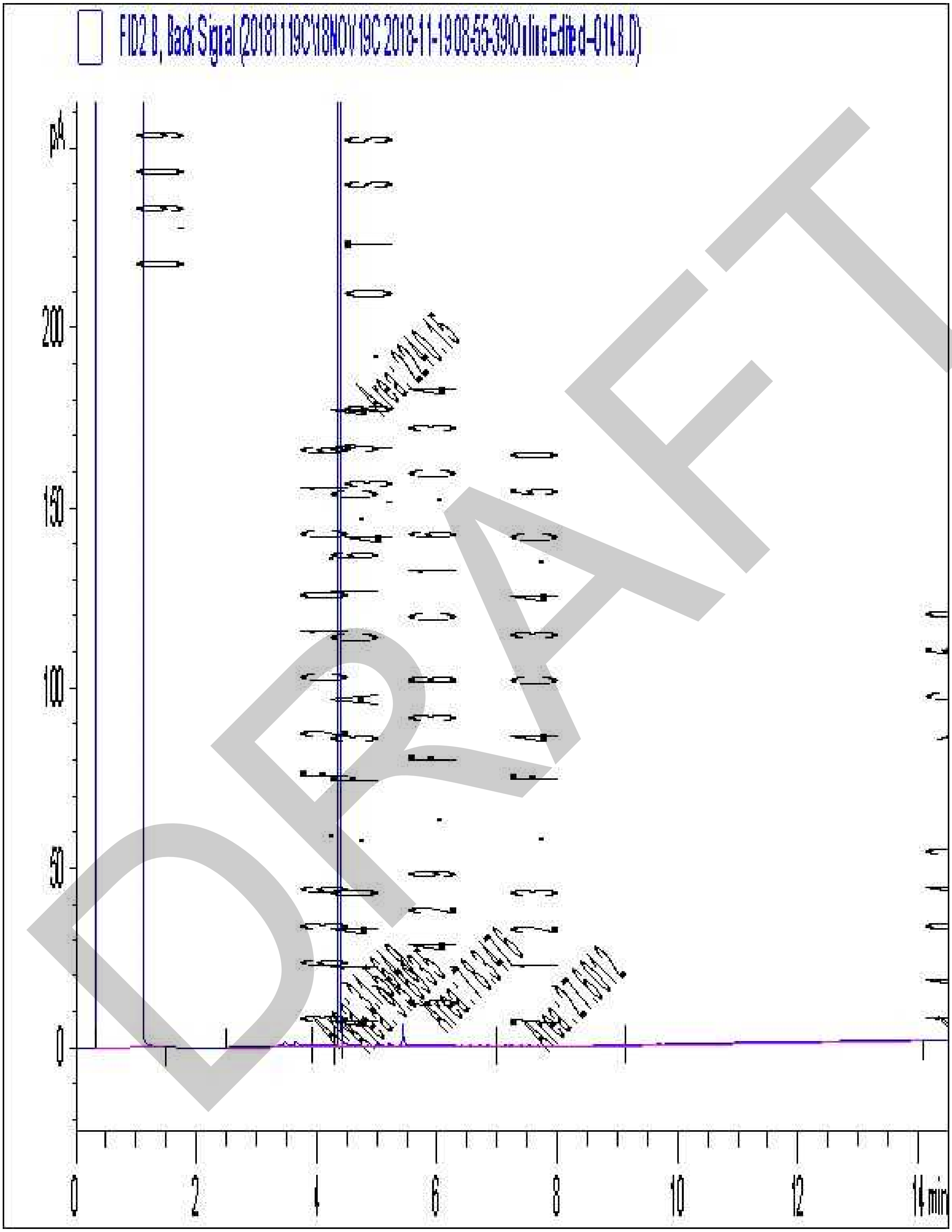
Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

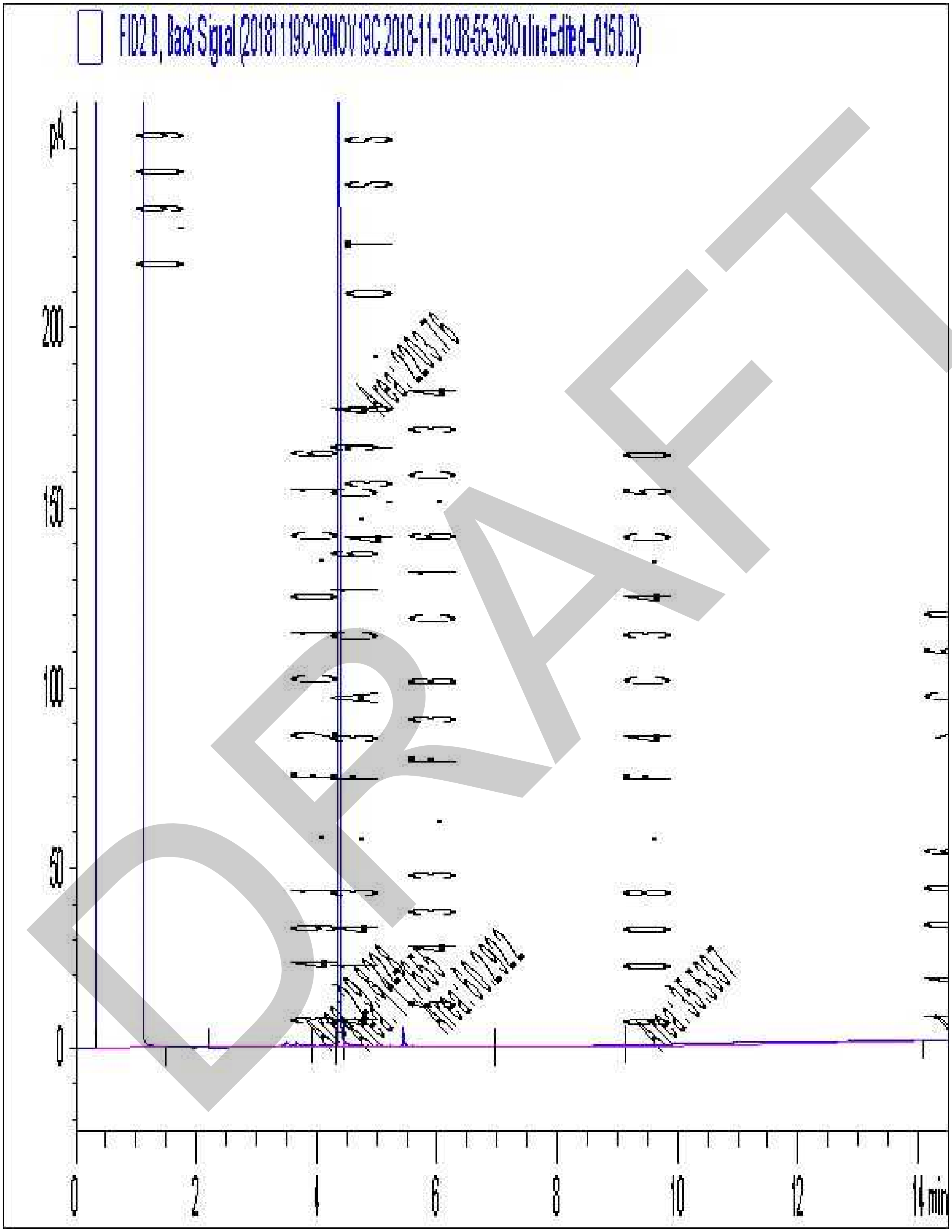


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM240

Pinchin Ltd
Client Project #: 230236.002
Client ID: MW-5

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

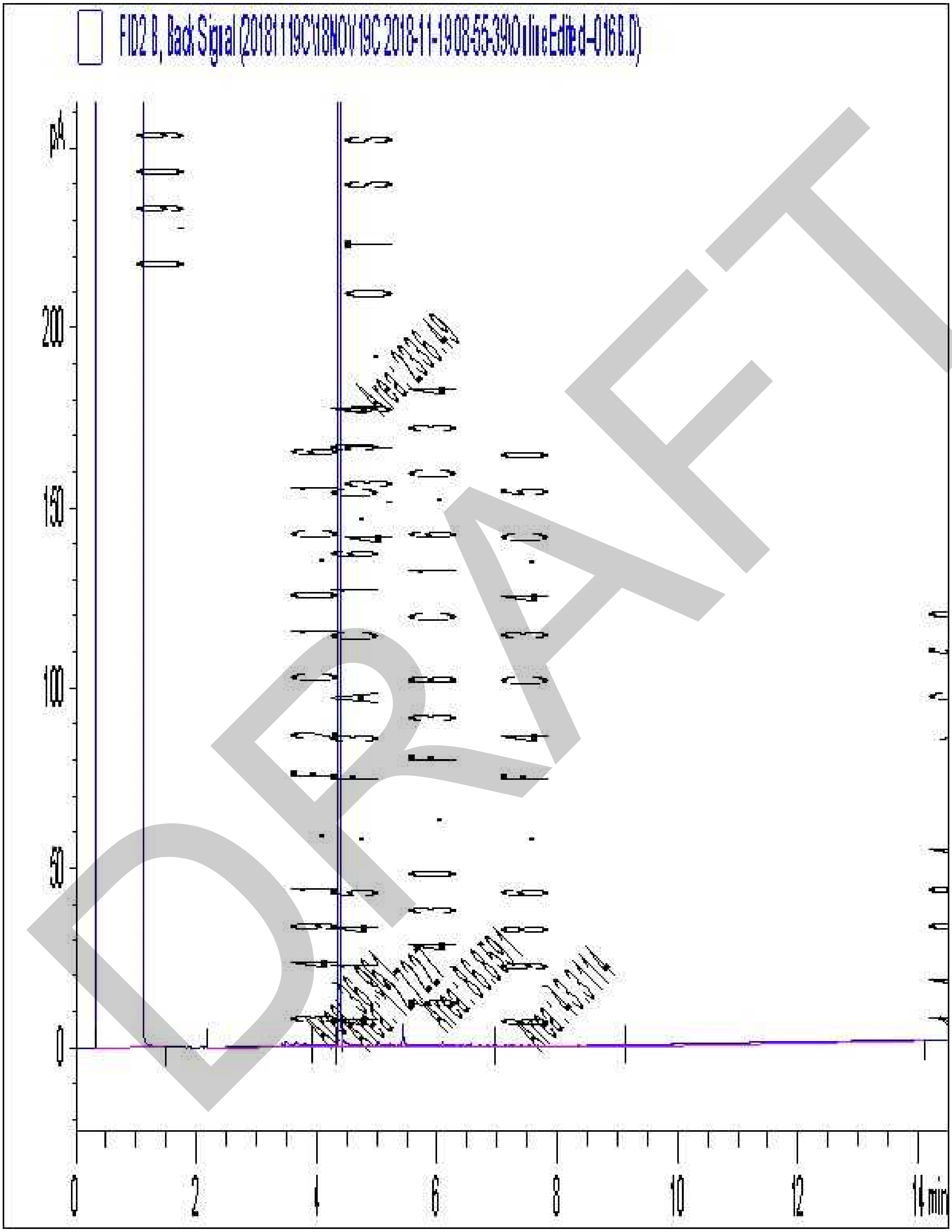


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM241

Pinchin Ltd
Client Project #: 230236.002
Client ID: EXMW-5

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

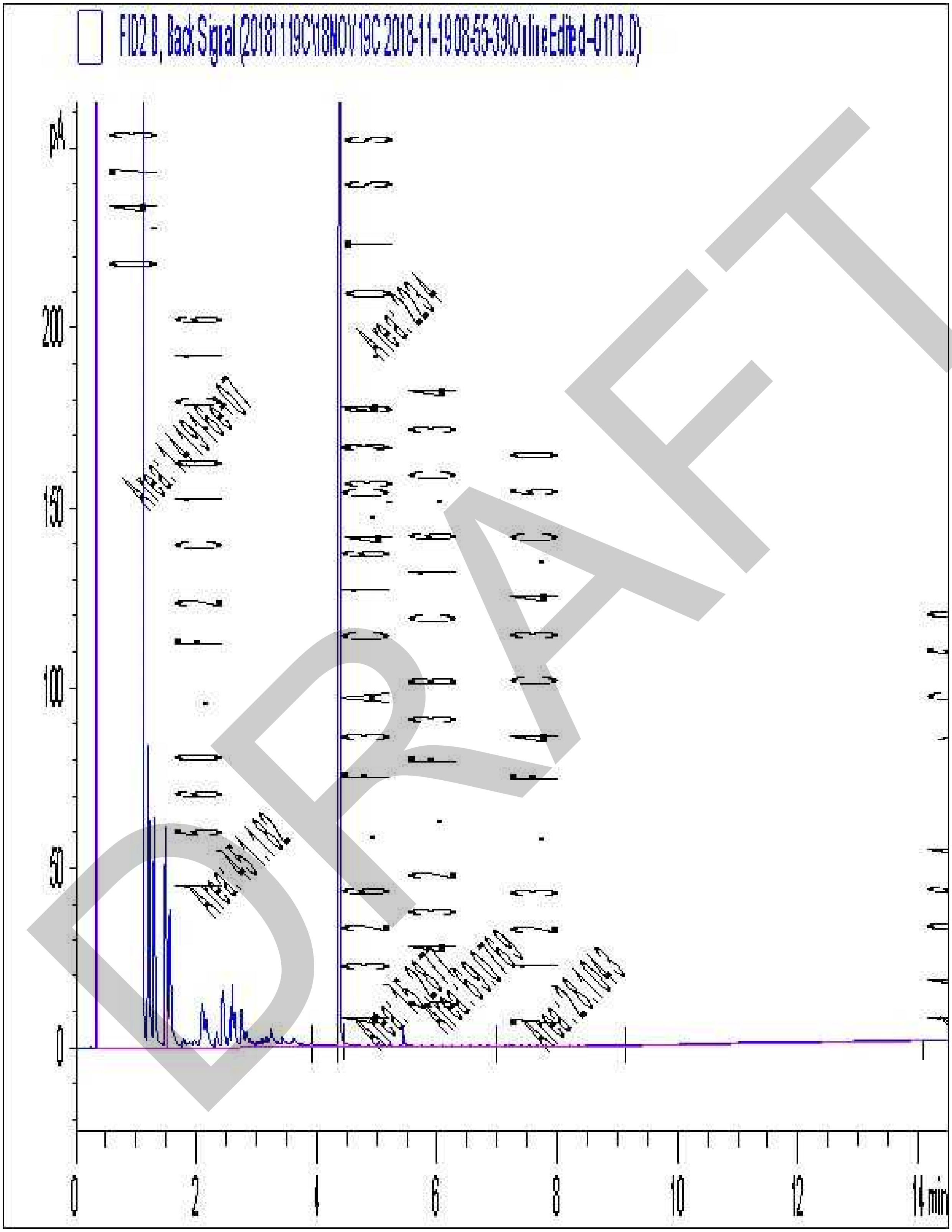


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8U4943
Report Date: 2018/11/19
Maxxam Sample: IHM242

Pinchin Ltd
Client Project #: 230236.002
Client ID: DUP-2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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

APPENDIX B-2

Sampling and Analysis Plan

Sampling and Analysis Plan for Phase Two Environmental Site Assessment

320 McRae Avenue, 1976 Scott Street,
and 311 and 315 Tweedsmuir Avenue
Ottawa, Ontario

Prepared for:

1213763 Ontario Inc.
33 Yonge Street, Suite 1000
Toronto, ON M5E 1G4

May 13, 2020

Pinchin File: 230236.006

Issued To:	**1213763 Ontario Inc.**
Issued On:	**May 13, 2020**
Pinchin File:	**230236.006**
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TABLES

1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) has prepared this Sampling and Analysis Plan (SAP) for the Phase Two Environmental Site Assessment (ESA) to be performed at the property located at 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue in Ottawa, Ontario (hereafter referred to as the Site or Phase Two Property). The Phase Two Property is presently developed with a single-storey commercial/light industrial building complete with a two-storey office portion (Site Building A), as well as two, two-storey residential dwellings (Site Buildings B and C). In addition, it should be noted that a retail fuel outlet (RFO) was formerly located on the northeast portion of the Phase Two Property. A Key Map showing the Phase Two Property location is provided on Figure 1 (all Figures are located in Appendix I).

The Phase Two ESA will be conducted at the request of 1213763 Ontario Inc. (Client) in relation to the future redevelopment of the Phase Two Property from its current mixed commercial/residential land use to residential land use. A Record of Site Condition (RSC) submittal to the Ontario Ministry of the Environment, Conservation and Parks (MECP) is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA will be conducted in accordance with the Province of Ontario's *Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act*, which was last amended by Ontario Regulation 407/19 on December 4, 2019 (O. Reg. 153/04). The Phase Two ESA will also support the filing of a Site Plan Approval application with the City of Ottawa.

This SAP provides the scope of work and procedures for completing the field investigation for the Phase Two ESA. The Phase Two ESA will be performed in accordance with the scope of work, and terms and conditions described in the proposal entitled *"Proposal for Phase Two Environmental Site Assessment and Record of Site Condition Filing, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario"*, prepared for the Client, dated March 4, 2020.

2.0 AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

The objectives of the Phase Two ESA will be to assess soil and groundwater quality at the Phase Two Property in relation to eighteen areas of potential environmental concern (APECs) and related potentially contaminating activities (PCAs) and contaminants of potential concern (COPCs) identified in a Phase One ESA completed by Pinchin in accordance with O. Reg. 153/04, the findings of which are provided in the draft report entitled "*Phase One Environmental Site Assessment Report, 320 McRae Avenue, 1976 Scott Street, 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario",* prepared for the Client.

The APECs and corresponding PCAs and COPCs are summarized in Table 1 (all Tables are located in Appendix II) and shown on Figure 2.

3.0 SCOPE OF WORK

The information obtained from the Phase One ESA, in particular the Phase One Conceptual Site Model, was used to determine the environmental media requiring investigation during the Phase Two ESA (i.e., soil and groundwater), the locations and depths for sample collection, and the parameters to be analyzed for the samples submitted from each APEC. The Phase Two ESA scope of work will include the advancement of 16 boreholes, five of which will be completed as groundwater monitoring wells, and the resampling of three existing groundwater monitoring wells. The proposed borehole and groundwater monitoring well locations, and existing groundwater monitoring wells, are provided on Figure 3.

Table 2 in Appendix II provides a detailed summary of the proposed Phase Two ESA scope of work, including:

- Boreholes and/or groundwater monitoring wells to be completed, or resampled, within each APEC and the COPCs to be analyzed for samples collected in each APEC;
- Media to be sampled at each sampling location, the sampling system (see Section 7.0), the soil sampling depth intervals, monitoring well screen intervals and the sampling frequency; and
- Number of samples per borehole or groundwater monitoring well to be collected and submitted for laboratory analysis.

Note that the soil sampling depth intervals (i.e., borehole depths), monitoring well screen intervals and sampling frequency are based on Pinchin's current knowledge of subsurface conditions, including the estimated depth to groundwater of 4.0 to 6.5 metres below ground surface (mbgs), and may be revised based on the actual subsurface conditions encountered.

Additional scope of work items include the following:

- Submission of up to four surface soil samples (0 to up to 1.5 mbgs) for pH analysis;
- Submission of up to four soil samples for grain size analysis;
- Elevation surveying by an Ontario Licensed Surveyor of the ground surface elevations of all monitoring well locations, and the top of pipe elevations for all groundwater monitoring wells;
- Depth to water measurements of all newly-installed and existing monitoring wells, including assessment for non-aqueous phase liquid. Depth to water measurements will be made during well development and groundwater sampling, and one month following groundwater sampling; and

- Completion of groundwater sampling using low-flow purging and sampling methods as per SOP-EDR023 (see Section 6.0), unless well yields are too low to permit this method to be used. For well(s) where low flow sampling cannot be employed, groundwater sampling will be conducted using the well volume method described in SOP-EDR008.

4.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) for the Phase Two ESA will be to obtain unbiased analytical data that are representative of actual soil and groundwater conditions at the Phase Two Property. This will be accomplished by implementing a quality assurance/quality control (QA/QC) program, as described in Section 5.0, and by completing the field work in accordance with Pinchin's standard operating procedures (SOPs), as described in Section 6.0. Pinchin's SOPs are based in part on the MECP's *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated December 1996 and the Association of Professional Geoscientists of Ontario document entitled *"Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)"*, dated April 2011.

The DQOs are intended to minimize uncertainty in the analytical data set such that the data are considered reliable enough to not affect the conclusions and recommendations of the Phase Two ESA and to meet the overall objective of the Phase Two ESA, which is to assess the environmental quality of the Phase Two Property in relation to the identified APECs.

5.0 QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

5.1 Non-Dedicated Sampling and Monitoring Equipment Cleaning

Based on the proposed scope of work, the following non-dedicated sampling and monitoring equipment will be used during completion of the Phase Two ESA:

- Interface probe;
- Water level tape;
- Spatula for soil sampling;
- 3.2, 3.8 or 5.2 centimetre inner diameter direct push soil samplers with dedicated single-use sample liners;
- Submersible pump; and
- Flow-through cell for groundwater sampling.

All of the above-listed equipment will be cleaned prior to initial use and between samples or sampling locations, as appropriate, following the equipment cleaning procedures described in SOP-EDR009. Any non-dedicated sampling or monitoring equipment not listed above that is used during the Phase Two ESA will also be cleaned in accordance with SOP-EDR009.

5.2 Trip Blanks

A trip blank is a set of VOC sample vials filled by the analytical laboratory with VOC-free distilled water and shipped with the groundwater sample containers. Trip blanks will be stored with the sample containers provided by the analytical laboratory during travel to the Phase Two Property, while on the Phase Two Property, and during travel from the Phase Two Property back to the analytical laboratory. The sample containers comprising a trip blank will not be opened in the field.

One trip blank will accompany each submission to the laboratory. Each trip blank will be submitted for analysis of VOCs. Based on the scope of work and anticipated field work schedule for the Phase Two ESA, it is estimated that analysis of two to three trip blanks will be required. Additional trip blanks will be submitted if there are additional laboratory submissions.

5.3 Field Duplicate Samples

Field duplicate soil and groundwater samples will be collected for laboratory analysis in accordance with SOP-EDR025 at a frequency of one sample for every ten samples submitted for laboratory analysis, with a minimum of one sample per media sampled per COPC.

5.4 Calibration Checks on Field Instruments

5.4.1 Field Screening Instruments

The photoionization detector (PID) and combustible gas indicator (CGI) used for the field screening of soil samples will be calibrated in accordance with the procedures described in SOP-EDR003. Calibration checks will also be made at the frequency specified in SOP-EDR003.

Records of the calibration and calibration checks of the PID and CGI, including any calibration sheets provided by the equipment supplier, will be retained in Pinchin's project file.

5.4.2 Water Quality Measurement Instruments

Water quality instruments used to measure field parameters during groundwater sampling will be calibrated in accordance with the procedures described in SOP-EDR016. Calibration checks will also be made at the frequency specified in SOP-EDR016.

Records of the calibration and calibration checks of the probes/instruments used for water quality parameter measurements, including any calibration sheets provided by the equipment supplier, will be retained in Pinchin's project file.

6.0 STANDARD OPERATING PROCEDURES

The proposed field investigation for the Phase Two ESA will require the following SOPs to be followed:

- Borehole drilling (SOP-EDR006);
- Soil sampling (SOP-EDR013 and SOP-EDR019);
- Field screening (SOP-EDR003);
- Monitoring well installation (SOP-EDR007);
- Monitoring well development (SOP-EDR017);
- Field measurement of water quality indicators (SOP-EDR016);
- Groundwater sampling (SOP-EDR008 and/or SOP-EDR023);
- QA/QC sampling (SOP-EDR025); and
- Non-dedicated field equipment decontamination (SOP-EDR009).

The above-referenced SOPs are provided in Appendix III. Each SOP includes a section describing the specific requirements for Phase Two ESAs completed to support the filing of an RSC in accordance with O. Reg. 153/04.

Any deviations from the SOPs will be summarized in the Phase Two ESA report.

7.0 SAMPLING SYSTEM

The borehole and monitoring well locations in all APECs will be selected following a judgemental sampling system. Boreholes and monitoring wells will be placed at locations where the potential for COPCs to be present is considered the highest (i.e., "worst case"), as per the following:

- Boreholes and monitoring wells will be completed in the vicinity of the former on-Site automotive repair garage, auto wrecking operation and autobody shop, including a chemical storage area and spray booth, in the north portion of Site Building A (APEC-3, APEC-5 and APEC-10);
- Boreholes will be completed at the former waste oil and new oil aboveground storage tank locations in the service bay of the former automotive service garage within the north portion of Site Building A (APEC-6 and APEC-8);

- Boreholes and monitoring wells will be completed in the vicinity of the current on-Site automotive repair garage in the south portion of Site Building A (APEC-4);
- Boreholes will be completed at the waste oil and new oil aboveground storage tank locations in the service bay of the current automotive service garage within the south portion of Site Building A (APEC-7 and APEC-9);
- Boreholes and monitoring wells will be completed in the vicinity of the on-Site oil/water separators within the north and south portions of Site Building A (APEC-11 and APEC-12);
- A borehole and monitoring well will be completed in the vicinity of a former suspected on-Site UST located along the southeast elevation of Site Building A (APEC-3);
- A borehole will be completed in the vicinity of a hazardous waste storage area along the southwest elevation of Site Building A (APEC-14);
- Boreholes will be completed on the northeast, east and southeast portions of the Phase Two Property to address historical fill importation at the Site (APEC-15); and
- Monitoring wells intended to assess groundwater impacts from an off-Site industrial operation, off-Site UST and off-Site automotive repair garage will be installed along the property boundary closest to the PCAs (APEC-16, APEC-17 and APEC-18).

In addition, the field screening results for soil samples collected from each borehole will be used to select "worst case" samples for laboratory analysis.

The sampling system that will be used for each APEC is summarized in Table 2.

8.0 PHYSICAL IMPEDIMENTS

Pinchin anticipates that there will be no physical impediments limiting access to the Phase Two Property during completion of the Phase Two ESA, with the following exceptions:

- Vehicle parking in the north, central and south portions of the Phase Two Property; and
- Physical distancing due to COVID-19 within the south portion of Site Building A.

9.0 TERMS AND LIMITATIONS

This Sampling and Analysis Plan (SAP) has been prepared to summarize the general scope of work and field procedures to be followed for the Phase Two ESA that will be performed for 1213763 Ontario Inc. (Client) in order to investigate potential environmental impacts at 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue in Ottawa, Ontario (Site). The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property. The Phase Two ESA will not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived from the Phase Two ESA will be specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples will be analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on a property. Performance of the Phase Two ESA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the Site, and recognizes reasonable limits on time and cost.

The Phase Two ESA will be performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This SAP was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized proposal for this project. Any use which a third party makes of this SAP, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

If additional parties require reliance on this SAP, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this SAP should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this SAP, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

APPENDIX I

Figures

PINCHIN

PROJECT NAME
SAMPLING AND ANALYSIS PLAN

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND
311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

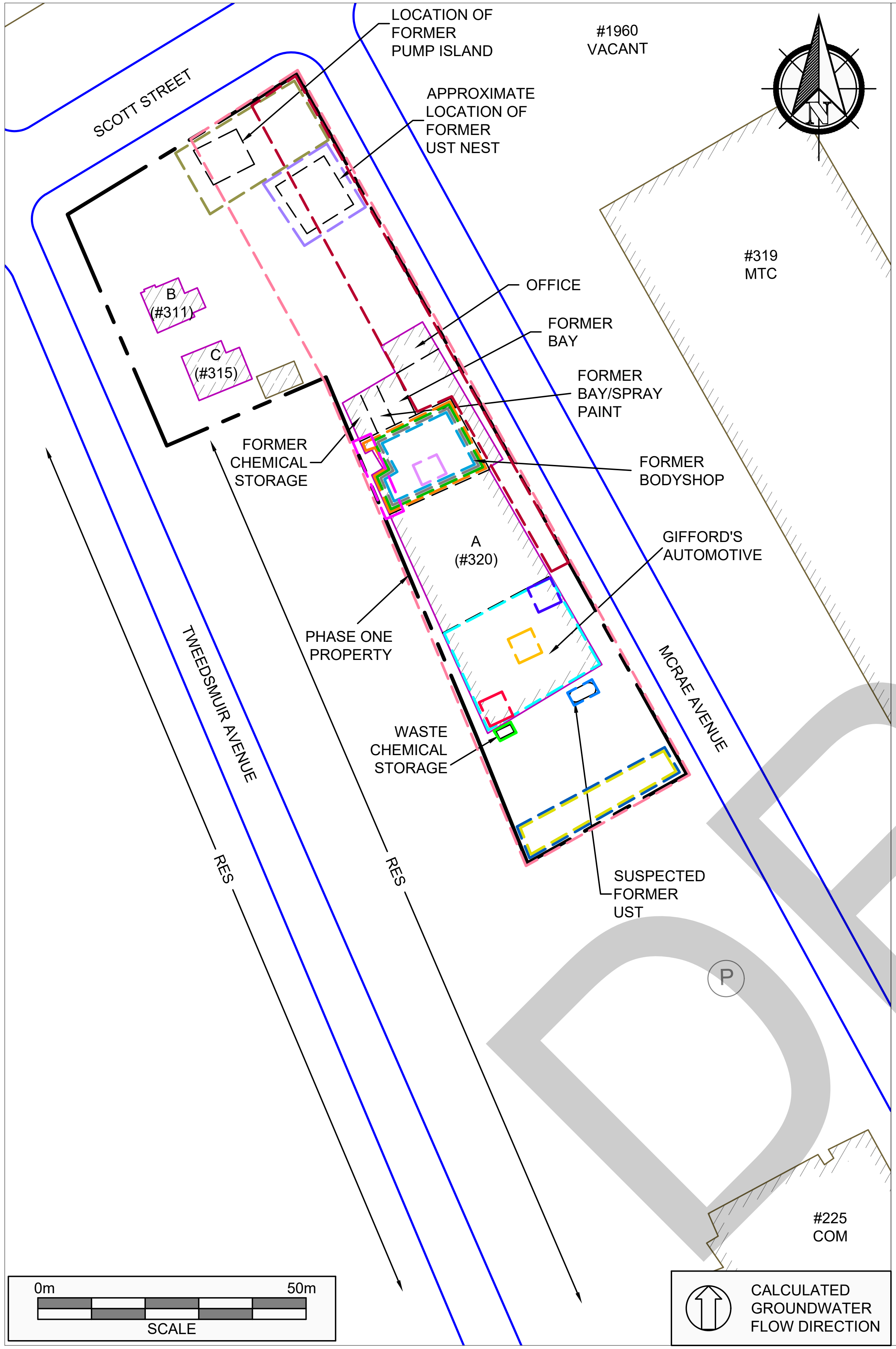
FIGURE NAME
KEY MAP

FIGURE NO.
1

SCALE
AS SHOWN

PROJECT NO.
230236.006

DATE
MAY 2020



Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1	Northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-2	Northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-3	North tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-4	South tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-5	North tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-6	Along the west wall of the north tenant space in Site Building A	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-7	Along the north wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-8	Along the south wall of the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-9	Along the south wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-10	Within the north tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-11	Within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-12	Within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-13	Adjacent to the southeast corner of the exterior of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-14	Adjacent to the southwest corner of the exterior of Site Building A.	Other – Hazardous Waste Generation	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-15	Southeast, east and northeast portions of the Phase One Property.	Item 58 - Waste Disposal and Waste Management, including Thermal Treatment, Landfilling and Transfer of Waste, Other Than Use of Biosoils as Soil Conditioners	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-16	Approximately 15 m east of the Phase One Property	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-17	Approximately 20 m south of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-18	Approximately 75 m south of the Phase One Property	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

LEGEND

— PHASE TWO PROPERTY BOUNDARY
MTC MULTI-TENANT COMMERCIAL
RES UNDERGROUND STORAGE TANK
COM UNDERGROUND STORAGE TANK
UST UNDERGROUND STORAGE TANK

APEC AREA OF ENVIRONMENTAL CONCERN

- ☐ APEC-1
- ☐ APEC-2
- ☐ APEC-3
- ☐ APEC-4
- ☐ APEC-5
- ☐ APEC-6
- ☐ APEC-7
- ☐ APEC-8
- ☐ APEC-9
- ☐ APEC-10
- ☐ APEC-11
- ☐ APEC-12
- ☐ APEC-13
- ☐ APEC-14
- ☐ APEC-15
- ☐ APEC-16
- ☐ APEC-17
- ☐ APEC-18

PINCHIN

PROJECT NAME
SAMPLING AND ANALYSIS PLAN

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

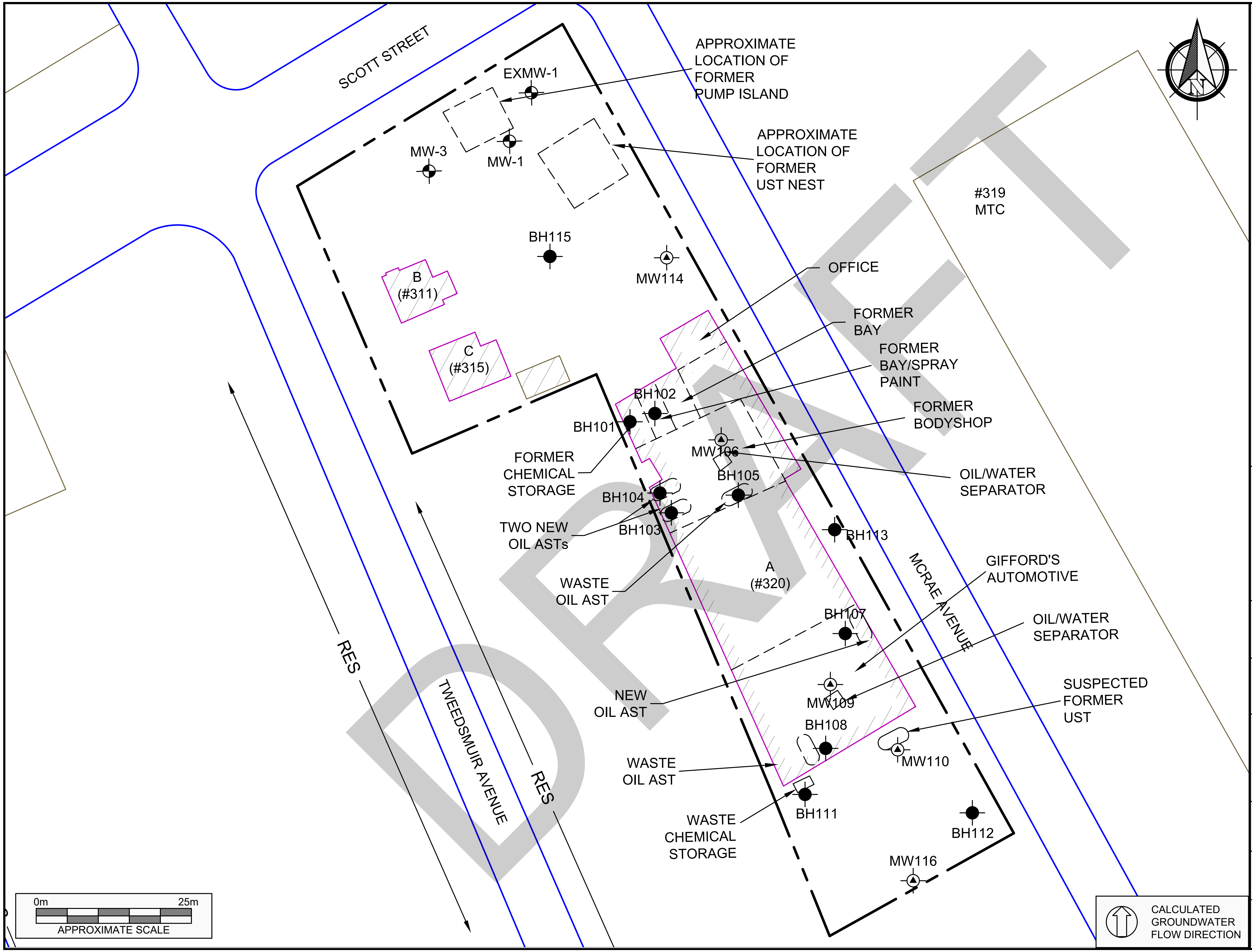
FIGURE NAME
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

SCALE
AS SHOWN

PROJECT NO.
230236.006

DATE
MAY 2020

FIGURE NO.
2



LEGEND

—	PHASE TWO PROPERTY BOUNDARY
RES	RESIDENTIAL
MTC	MULTI-TENANT COMMERCIAL
UST	UNDERGROUND STORAGE TANK
●	PROPOSED BOREHOLE
⌖	PROPOSED MONITORING WELL
▨	SITE BUILDING
⊕	EXISTING MONITORING WELL

PINCHIN

PROJECT NAME
SAMPLING AND ANALYSIS PLAN

CLIENT NAME
1213763 ONTARIO INC.

PROJECT LOCATION
320 MCRAE AVENUE, 1976 SCOTT STREET, AND 311 AND 315 TWEEDSMUIR AVENUE, OTTAWA, ONTARIO

FIGURE NAME
PROPOSED BOREHOLE AND MONITORING WELL LOCATION PLAN

SCALE	PROJECT NO.
AS SHOWN	230236.006
DATE	FIGURE NO.
MAY 2020	3

APPENDIX II

Tables

Table 1 - Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1	Northeast portion of the Phase One Property.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-2	Northeast portion of the Phase One Property.	Other – Fuel Pump Island	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-3	North tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater
APEC-4	South tenant space in Site Building A.	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-Site	PHCs BTEX PAHs VOCs	Soil and Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-5	North tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-6	Along the west wall of the north tenant space in Site Building A	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-7	Along the north wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-8	Along the south wall of the north tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-9	Along the south wall of the south tenant space in Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs	Soil
APEC-10	Within the north tenant space in Site Building A.	Item 10 - Commercial Autobody Shops	On-Site	PHCs BTEX PAHs VOCs Metals	Soil

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-11	Within the north tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-12	Within the south tenant space in Site Building A.	Other – Oil/Water Separator	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-13	Adjacent to the southeast corner of the exterior of Site Building A.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-14	Adjacent to the southwest corner of the exterior of Site Building A.	Other – Hazardous Waste Generation	On-Site	PHCs BTEX PAHs VOCs Metals	Soil
APEC-15	Southeast, east and northeast portions of the Phase One Property.	Item 58 - Waste Disposal and Waste Management, including Thermal Treatment, Landfilling and Transfer of Waste, Other Than Use of Biosoils as Soil Conditioners	On-Site	PHCs BTEX PAHs VOCs Metals	Soil and Groundwater
APEC-16	Approximately 15 m east of the Phase One Property	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Impacted or Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-17	Approximately 20 m south of the Phase One Property	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater
APEC-18	Approximately 75 m south of the Phase One Property	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	PHCs BTEX PAHs VOCs Metals	Groundwater

Notes:

1 - Areas of potential environmental concern means the area on, in or under a phase one property where one or more contaminants are potentially present, as determined through the phase one environmental site assessment, including through,

(a) identification of past or present uses on, in or under the phase one property, and

(b) identification of potentially contaminating activity.

2 - Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a phase one study area

3 - When completing this column, identify all contaminants of potential concern using the Method Groups as identified in the Protocol for in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, as specified below:

List of Method Groups:

ABNs	PCBs	Metals	Electrical Conductivity
CPs	PAHs	As, Sb, Se	Cr (VI)
1,4-Dioxane	THMs	Na	Hg
Dioxins/Furans, PCDDs/PCDFs	VOCs	B-HWS	Methyl Mercury
OCs	BTEX	Cl-	Low or high pH,
PHCs	Ca, Mg	CN-	SAR

4 - When submitting a record of site condition for filing, a copy of this table must be attached

Table 2 - Phase Two Scope of Work Summary

Sampling Location	APEC	Media Sampled	COPCs																			Number of Samples Submitted for Analysis	Soil Sampling Depth Interval (mbgs)	Screen Interval (mbgs)	Sampling Frequency	Sampling System	Rationale/Notes
			PHCs	BTEX	VOCs	PAHs	PCBs	Metals	Hydrides (As, Sb, Se)	Boron (HWS)	Chromium VI	Mercury	Methyl Mercury	ABNs	Dioxins/Furans	OCPs	Sodium	Chloride	Cyanide	EC	SAR						
EXMW-1 (Existing)	2	Groundwater										●										1	NA	2.7 - 5.8	NA	Judgemental	Former fuel pump island/Resample to confirm mercury exceedance
MW-3 (Existing)	2	Groundwater	●	●	●	●																1	NA	4.6 - 7.6	NA	Judgemental	Former fuel pump island/Not sampled during previous Phase II ESA
MW-1 (Existing)	1	Groundwater	●	●	●	●																1	NA	4.6 - 7.6	NA	Judgemental	Former UST nest/Resample to confirm BTEX/PHC exceedances
BH101	3 / 10	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Chemical storage associated with automotive repair operation and/or autobody shop
BH102	10	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Spray booth associated with autobody shop
BH103	3 / 5 / 6 / 10	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/Automotive wreckers operation/New oil ASTs/Autobody shop
BH104		Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	
BH105	3 / 5 / 8 / 10	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/Automotive wreckers operation/Waste oil AST/Autobody shop
MW106	3 / 5 / 10 / 11	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/Automotive wreckers operation/Autobody shop/Oil/water separator
		Groundwater	●	●	●	●		●	●	●	●	●										1	NA	4.6 - 7.6	NA	Judgemental	
BH107	4 / 7	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/New oil AST
BH108	4 / 9	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/Waste oil AST
MW109	4 / 12	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Automotive repair operation/Oil/water separator
		Groundwater	●	●	●	●		●	●	●	●	●										1	NA	4.6 - 7.6	NA	Judgemental	
MW110	13	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Suspected former UST
		Groundwater	●	●	●	●		●	●	●	●	●										1	NA	4.6 - 7.6	NA	Judgemental	
BH111	14	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Waste chemical storage area
BH112	15	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Fill importation
BH113		Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	
MW114	15 / 16	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Fill importation/Off-Site former industrial operations
		Groundwater	●	●	●	●		●	●	●	●	●										1	NA	4.6 - 7.6	NA	Judgemental	
BH115	15	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Fill importation
MW116	17 / 18	Soil	●	●	●	●		●	●	●	●	●										1	0 - 1.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Off-Site fuel UST/Off-Site auto repair operation
		Groundwater	●	●	●	●		●	●	●	●	●										1	NA	4.6 - 7.6	NA	Judgemental	

PHCs	Petroleum Hydrocarbons (Fraction 1 to Fraction 4)
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
VOCs	Volatile Organic Compounds
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
As, Sb, Se	Arsenic, Antimony, Selenium
Boron (HWS)	Hot Water Soluble Boron
Chromium VI	Hexavalent Chromium
ABNs	Acid/Base/Neutral Compounds
OCPs	Organochlorine Pesticides
EC	Electrical Conductivity
SAR	Sodium Adsorption Ratio

APEC	Area of Potential Environmental Concern
COPCs	Contaminants of Potential Concern
m	Metres
mbgs	Metres Below Ground Surface
NA	Not Applicable
PCA	Potentially Contaminating Activity
SOP	Standard Operating Procedure
UST	Underground Storage Tank
mbfs	Metres Below Floor Surface

APPENDIX III

Pinchin Standard Operating Procedures

SOP – EDR003 – REV004 – FIELD SCREENING OF SOIL SAMPLES

Title:	Field Screening of Soil Samples
Practice:	EDR
First Effective Date:	June 16, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

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1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	June 16, 2009	N/A	MEM
001	November 26, 2010	Update approval signature	FG
002	September 25, 2013	Revised SOP to reflect current practices/Added section on O.Reg. 153/04 compliance	RLM
003	April 29, 2016	Updated Section 4.0/Modified time between readings to 1 hour	RLM
004	April 28, 2017	Removed reference to Pinchin West/In Section 5.2, clarified that soil vapour measurements do not need to be made within one hour of sampling during winter conditions	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the quantitative and qualitative methods to be used by Pinchin field personnel for field screening soil samples for potential impacts during field investigations.

The quantitative part of field screening consists of the measurement of vapour concentrations in soil sample headspace in order to assess the potential for volatile constituents to be present in the soil. The soil vapour readings obtained from these measurements are then used to assist in selecting potential "worst case" soil samples for submission to the laboratory for analysis. There are no regulatory standards for comparison with soil headspace vapour readings and we are using the general principle that the sample with the highest soil headspace vapour concentration from a group of samples is often the most likely to be impacted by volatile constituents.

The qualitative part of field screening includes assessing the soil for visual or olfactory indicators of potential contamination and is used in conjunction with the soil headspace vapour readings to select "worst case" soil samples to be submitted for laboratory analysis.

Note that soil vapour measurements have limited value when selecting "worst case" soil samples for laboratory analysis of non-volatile parameters such as metals. Visual observations of the presence of staining and debris (e.g., brick fragments and other building materials, coal ash, etc.), along with sample depth and likely migration pathways are to be factored into selecting the samples. The sample with the highest soil headspace vapour reading is not automatically selected under these circumstances.

Soil samples collected for soil vapour measurement must not be submitted for laboratory analysis except for analysis of non-volatile parameters (i.e., metals and inorganics) or grain size analysis.

This SOP also applies to the field screening of sediment samples but for simplicity, only soil samples are referred to below.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

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This SOP will be distributed to all Pinchin staff and others as follows:

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- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

- Resealable plastic bags (e.g., Ziploc®);

  (Note that small capacity bags (e.g., 500 millilitre capacity) are preferred over larger sized bags. When conducting headspace screening of a set of soil samples, the size of bag used should be consistent throughout in order to maintain the same approximate headspace volume in each bag);
- Combustible gas indicator (CGI) capable of operating in methane-elimination and/or photo-ionization detector (PID);

  (The Project Manager will be responsible for selecting the appropriate instrument(s) for each project. CGIs (e.g., RKI Eagle or Gastechtor) are acceptable for screening of petroleum hydrocarbons (PHCs) and related compounds, whereas PIDs (e.g., MiniRAE) are acceptable for screening for volatile organic compounds (VOCs), including chlorinated solvents, but can also be used when screening for PHCs. For many projects, it will be appropriate to employ both a CGI and a PID); and
- Calibration equipment (e.g., calibration gas, regulators, tubing, calibration bags, etc. as provided by the equipment supplier).

5.2 Soil Headspace Vapour Measurement Procedure

The procedure for conducting soil headspace vapour measurements for soil sample headspace is as follows:

1. Unless pre-calibrated by the equipment supplier, calibrate the CGI/PID as per the instrument manufacturer's instructions before commencing soil vapour measurements. Record the date and time of calibration, and type and concentration of the calibration gas used in the field logbook or field forms;
2. Label the plastic bag with the sample number;
3. Create a split soil sample by splitting the sample core vertically (i.e., along the longitudinal axis) with one half used for soil headspace vapour measurement and the other half used to fill sample jars for laboratory analysis of volatile parameters (e.g., VOCs and PHCs (F1 fraction)). In other words, the depth interval of the soil subjected to soil headspace vapour measurements should be the same as the depth interval from which samples for volatile parameters are collected. This procedure doesn't apply to grab samples but is to be completed when soil cores are obtained, such as sampling with dual tube samplers, split-spoon samplers and hand augers. For grab samples, soil used for laboratory analysis and soil headspace vapour measurements should be collected from proximal locations;
4. Place the soil into the plastic bag until the bag is approximately one-quarter full as soon as possible after the sampling device is retrieved/opened;
5. Seal the bag and break apart the soil by manually kneading the soil in the sealed bag;
6. Allow the soil sample to equilibrate at ambient temperature for a minimum of 5 minutes but no longer than one hour before taking a soil headspace vapour measurement. The exception to this is that during winter conditions, the soil samples should be placed in a heated environment (e.g., building interior) to warm up for a minimum of 15 minutes before taking soil vapour measurements. In this case, the soil vapour measurements do not need to be completed within one hour of sample collection;
7. Do not store the bagged soil samples in direct sunlight prior to taking soil headspace vapour measurements;
8. When conducting soil headspace vapour measurements with a CGI, make sure it is switched to methane elimination mode;
9. When completing soil headspace vapour measurements of a soil sample using both a PID and CGI, the vapour measurement using the PID should be made first;

10. Immediately before taking a soil headspace vapour measurement, gently agitate the bag and then create a small opening in the top of the bag. Insert the tip of the CGI/PID into the headspace of the bag and quickly reseal the bag around the tip to minimize leakage. If there is any water inside the bag, ensure that the tip does not contact the water;
11. Record the maximum vapour concentration measured within the first 10 seconds after inserting the tip of the CGI/PID into the bag. Note any anomalies that occur during the taking of the measurement (e.g., if the readings displayed by the instrument progressively increase and do not reach an obvious peak);
12. Remove the tip of the CGI/PID from the bag and reseal the bag immediately in case additional soil headspace vapour measurements are needed. If the soil headspace vapour is measured for a sample using a PID and an additional measurement with a CGI is required, wait a minimum of five minutes after the bag is resealed before taking the measurement with the CGI;
13. Before completing the next soil headspace vapour measurement, allow the CGI/PID to reach "zero" or "baseline". If the CGI/PID does not return to "zero" or "baseline" it should be recalibrated before further soil headspace vapour measurements are made; and
14. At the discretion of the Project Manager, a calibration check of the CGI/PID should be completed at least once per day or at a frequency of once per 100 soil headspace vapour measurements (for projects where numerous soil headspace vapour measurements are made on a daily basis such as a large remediation project). A calibration check is made by measuring the concentration of a sample of the calibration gas with the CGI/PID without making any adjustments to the instrument beforehand and comparing the measured concentration with the known concentration. The comparison of the measured concentration versus the actual concentration of the calibration gas indicates how much the instrument's calibration may have been altered during soil headspace vapour measurements, which is known as "instrument drift". Should the calibration check show instrument drift of more than 10%, the CGI/PID needs to be recalibrated before completing further soil headspace vapour measurements. Record all pertinent information for the calibration check (e.g., date and time, initial measured concentration, calibration gas type and concentration) in the field logbook or field forms.

5.3 Visual Screening

Visual screening consists of examining the soil sample for potential indicators of contamination as per the following:

1. Visually examine the soil sample, including breaking apart a portion of the sample;

2. Note any indications of a mottled appearance, dark discolouration or staining, free-phase product or unusual colour;
3. Note any indications of non-soil constituents, such as brick, asphalt, wood or concrete fragments, coal fragments, coal ash, etc.; and
4. Record the findings of the visual screening in the field logbook or field forms. If there is no visual evidence of impacts this should be noted.

5.4 Olfactory Screening

Record in the field logbook or field forms the presence of any odours noted during sample collection and visual screening. Field staff are not expected to directly smell soil samples to assess the presence/absence of odours.

If it is possible to identify the likely type of odour (e.g., PHC-like, solvent-like, etc.) then this information should be recorded along with a comment on the severity of the odour (e.g., slight, strong, etc.). If the odour cannot be readily identified, it should be described in the field notes as "unidentified odour".

If no odours are observed, this information should also be recorded in the field logbook or field forms.

5.5 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following additional procedures must be undertaken:

- Calibration of the CGI/PID must be completed at the beginning of each field day and calibration checks must be made either at the end of each field day or after every 100 soil vapour readings (whichever occurs first); and
- Thorough records of the CGI/PID calibration and calibration checks must be kept, including any calibration sheets provided by the equipment supplier. The Quality Assurance/Quality Control section of the Phase Two ESA report requires a discussion of field screening instrument calibration, and equipment calibration records must be appended to the Phase Two ESA report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

Ontario Ministry of the Environment, *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*, December 1996.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR006 – REV003 – BOREHOLE DRILLING

Title:	Borehole Drilling
Practice:	EDR
First Effective Date:	November 25, 2010
Version:	003
Version Date:	January 3, 2018
Author:	Francesco Gagliardi and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 25, 2010	N/A	FG
001	November 22, 2013	Streamlined text to reflect most common current practices/Removed sections covered by other SOPs	RM
002	April 29, 2016	Updated Section 4.0	RM
003	April 28, 2017	Removed reference to Pinchin West	RM
003	January 3, 2018	Reviewed and confirmed current	RM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents a description of the methods employed for the completion of boreholes and the collection of subsurface soil samples.

Boreholes are typically completed to determine geologic conditions for hydrogeological evaluation, to allow the installation of monitoring wells, and to allow for the collection of subsurface soil samples for laboratory analysis.

Several methods are available for the collection of shallow subsurface soil samples using hand-held equipment (e.g., hand augers, post-hole augers). However, the use of a drill rig, equipped with direct-push tooling, solid-stem augers and/or hollow-stem augers, is the most common method used by Pinchin to advance boreholes and will be the focus of this SOP.

A detailed discussion of all the various drilling rigs and drilling methods (e.g., direct push, augering, sonic drilling, air/water/mud rotary drilling, etc.) is beyond the scope of this SOP. The Project Manager will be responsible for determining the appropriate drill rig and drilling method for the site investigation.

The majority of the site investigations completed by Pinchin involve relatively straightforward drilling within the overburden within a one aquifer system. In some situations, such as when multiple aquifers are spanned by a borehole, when drilling into bedrock or when there are known impacts in the shallow subsurface, drilling using telescoped casing methods may be appropriate. Telescoped casing and bedrock drilling methods are beyond the scope of this SOP. In these situations, the Project Manager, in consultation with the drilling contractor, will be required to confirm the drilling requirements and procedures.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

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5.0 PROCEDURE

5.1 General

The overall borehole drilling program is to be managed in accordance with SOP-EDR005. In particular, utility locates must be completed in accordance with SOP-EDR021 before any drilling activities commence.

All non-dedicated drilling and sample collection equipment must be decontaminated in accordance with SOP-EDR009.

5.2 Prior Planning and Preparation

The planning requirements for borehole drilling programs are covered in detail in SOP-EDR005.

As noted above, the type of drilling rig and drilling method will be determined by the Project Manager when scoping out the site investigation. In some cases, a switch in drilling rig and/or drilling method may be required depending on site conditions. For example, if competent bedrock is encountered in the subsurface at a depth above the water table, bedrock coring would be required to advance the borehole deep enough to install a monitoring well.

5.3 Borehole Drilling Procedures

Once the final location for a proposed boring has been selected and utility clearances are complete, one last visual check of the immediate area should be performed before drilling proceeds. This last visual check should confirm the locations of any adjacent utilities (subsurface or overhead) and verification of adequate clearance.

In some instances, in particular where there is uncertainty regarding the location of buried utilities or the borehole is being completed near a buried utility, the use of a hydro-excavating (hydro-vac) unit will be required to advance the borehole to a depth below the bottom of the utility. The hydro-vac uses a combination of high-pressure water and high-suction vacuum (in the form of a vacuum truck) to excavate soil. This is also known as "daylighting". The need to use a hydro-vac will be determined by the Project Manager.

If it is necessary to relocate any proposed borehole due to terrain, utilities, access, etc., the Project Manager must be notified and an alternate location will be selected.

5.4 Borehole Nomenclature

If a borehole is advanced strictly for the purpose of soil sampling and no monitoring well is installed, the borehole should be identified as "BHxx". If a monitoring well is installed in a borehole, the borehole should be identified as "MWxx".

To avoid confusion, for site investigations involving both boreholes and monitoring wells, the numerical identifiers are to be sequential (e.g., there should not be a BH01 and MW01 for the same project).

When completing supplemental drilling programs, the borehole number should start at either the next sequential number after the last borehole number used in the first stage, or label them as '100 series', '200 series', etc. as appropriate (e.g., BH101, MW102, etc. for the first series of additional boreholes).

It is also acceptable to add the 2 digit year either before or after the borehole or monitoring well name (e.g., 17-MW101 or MW101-17).

5.5 Borehole Advancement

Each borehole will be advanced incrementally to permit intermittent or continuous sampling as specified by the Project Manager. Typically, the sampling frequency is one sample for every 2.5 or 5 feet (0.75 or 1.5 metres) the borehole is advanced. At the discretion of the Project Manager, soil samples may be collected at a lower frequency in homogeneous soil or at a higher frequency if changes in stratigraphy or other visual observations warrant it.

5.6 Direct-Push Drilling

This method is most commonly used at Pinchin to obtain representative samples of the subsurface soil material at a site. Direct-push drilling is achieved by driving a steel sampler into the subsurface at 1.5 metre intervals until the desired depth is achieved. The samplers are advanced by the drilling rig by means of a hydraulic hammer. For each soil sample run, a dedicated PVC sample liner is placed within the steel sampler which collects the soil as the sampler is advanced. After each sample run, a new sampler is assembled and it is advanced deeper down the open borehole.

There are generally two methods of direct-push drilling which are used:

- Dual-tube sampling; and
- Macro-core sampling.

A dual-tube sampler consists of an 8.25 centimetre (cm) inner diameter steel tooling (outer tube), equipped with a steel cutting-shoe affixed to the advancing end. A smaller diameter steel tooling, consisting of a 5.75 cm inner diameter (inner tube), fits within the outer tube and contains a PVC sample liner within. These two tubes form the completed dual-tube sampler. The completed dual-tube sampler has a length of 1.5 metres.

A macro-core sampler consists of the smaller inner tube (mentioned above) used independently. The macro-core sampler measures approximately 1.5 metres in length.

The difference in drilling methods used is typically determined by soil conditions. Where soil conditions consist of tight or dense soil types (e.g., silts or clays), the macro-core sampling method may be used as this method provides less resistance to advancing the sampler. In soil types that are less resistive (e.g., loose sands), the dual-tube sampler may be used.

5.7 Auger Drilling (Split-Spoon)

The auger drilling method for borehole advancement and sampling involves using an auger drill rig to advance the borehole to the desired sampling depth and sampling with a split-spoon sampler. Borehole advancement with hollow stem augers is the preferred drilling method when sampling with split-spoon samplers as it minimizes the potential for sloughed material to reach the bottom of a borehole and possibly cross-contaminate samples when the split-spoon is driven beyond the bottom of the borehole. Solid stem augers can be used when drilling at sites with cohesive soils (e.g., silty clay), provided that the borehole remains open after the augers are removed from the ground prior to driving the split-spoon sampler.

The split-spoon sampler consists of an 18- or 24-inch (0.45- or 0.60-metre) long, 2-inch (5.1 cm) outside diameter tube, which comes apart lengthwise into two halves.

Once the borehole is advanced to the target depth, the sampler is driven continuously for either 18 or 24 inches (0.45 or 0.60 metres) by a 140-pound (63.5 kilogram) hammer. The hammer may be lifted and dropped by either the cathead and rope method, or by using an automatic or semi-automatic drop system.

The number of blows applied in each 6-inch (0.15 metre) increment is counted until one of the following occurs:

- A total of 50 blows have been applied during any one of the 6-inch (0.15 metre) increments described above;
- A total of 100 blows have been applied;

- There is no advancement of the sampler during the application of ten successive blows of the hammer (i.e., the spoon is "bouncing" on a cobble or bedrock); or
- The sampler has advanced the complete 18 or 24 inches (0.45 or 0.60 metre) without the limiting blow counts occurring as described above.

On the field form, record the number of blows required to drive each 6-inch (0.15 metre) increment of penetration. The first 6 inches is considered to be a seating drive.

The sum of the number of blows required for the second and third 6 inches (0.15 metres) of penetration is termed the "standard penetration resistance" or the "N-value". This information is typically provided on the borehole logs included in our site investigation reports.

The drill rods are then removed from the borehole and the split-spoon sampler unthreaded from the drill rods.

Caution must be used when drilling with augers below the groundwater table, particularly in sandy or silty soils. These soils tend to heave or "blow back" up the borehole due to the difference in hydraulic pressure between the inside of the borehole and the undisturbed formation soil. If blowback occurs, the drilling contractor will introduce water or drilling mud into the borehole or inside of the hollow-stem augers (if used) to equalize the hydraulic pressure and permit drilling deeper to proceed.

Heaving conditions and the use of water or drilling mud must be noted on the field logs, including the approximate volume of water or drilling mud used.

5.8 Auger Drilling (Direct Sampling)

In some jurisdictions (e.g., BC, Manitoba) it may be acceptable to collect soil samples directly from auger flights when using solid stem augers.

When sampling directly from auger flights, care must be exercised not to collect soils that were in direct contact with the auger or that were smeared along the edge of the borehole.

5.9 Borehole Advancement In Bedrock

It is sometimes possible to advance augers through weathered bedrock but borehole advancement through competent bedrock requires alternate drilling procedures. Bedrock drilling can be accomplished by advancing core barrels or tri-cone bits using air rotary or water rotary drilling methods. A description of the various bedrock drilling procedures is beyond the scope of this SOP.

The bedrock drilling method selected will depend in part on the type of bedrock, the borehole depth required, whether bedrock core logging is required, whether telescoped casing is required, etc. The Project Manager, in consultation with the drilling contractor, will determine the best method for advancing boreholes in competent bedrock.

5.10 Borehole Soil Sample Logging and Collection

The following describes the methods for logging and collection of samples from a split-spoon or direct-push sampler but can be adapted for sample collection from augers:

1. After the driller opens the split-spoon sampler or PVC liner, measure the length of the soil core retained in the sampler in inches or centimetres. Be sure to be consistent in the use of metric or imperial units, and that the units used are clearly noted in the field notes. The percentage of soil retained versus the length of the sampler is known as "sample recovery" and this information is presented on the borehole logs within our Phase II ESA reports;
2. Dedicated, disposable nitrile gloves are to be worn during soil logging and sampling;
3. When using a dual-tube or macro-core sampler with direct-push drilling, there is usually sufficient sample recovery to permit the collection of two soil samples from each sample run. In this case, if the sample recovery is greater than 2.5 feet (0.75 metres), divide the recovered soil into two depth intervals and log/collect a sample from each interval. Split-spoon samplers typically are not long enough nor provide enough sample to divide a sample run into two. However, if a recovered sample contains distinct stratigraphic units (e.g., fill material and native material, obviously impacted soil and non-impacted soil), the distinct units are to be sampled separately. It is especially important that potentially impacted soil (e.g., fill material, obviously impacted soil) is not mixed with potentially unimpacted soil (e.g., native soil, soil without obvious impacts) to form one sample;
4. Discard the top several centimetres in each core as this material is the most likely to have sloughed off the borehole wall and may not be representative of the soil from the intended depth interval;
5. To minimize the potential for cross-contamination, scrape the exterior of the soil core with a clean, stainless-steel putty knife, trowel or similar device to remove any smeared soil. Note that is not practical and can be skipped if the soil is non-cohesive (e.g., loose sand);
6. Split the soil core longitudinally along the length of the sampler and to the extent practical, collect the soil samples for laboratory analysis from the centre of the core (i.e., soil that has not contacted the sampler walls). When sampling directly from augers, soils in direct contact with the auger or soils retained on the augers that may have been in contact with the edge of the borehole should not be collected.

   Collect soil samples for potential volatile parameter analysis and soil vapour measurement (in that order) as soon as possible after the core is opened. The length of time between opening the sampler and sample collection for these parameters should not exceed 2 minutes. It is important to follow this as it minimizes the potential for volatile constituents in the soil to be lost. See SOP-EDR003 for additional details regarding the collection of soil samples for soil vapour measurement;

7. Drillers are not to open the split-spoon sampler or PVC liner until instructed to do so. If drilling and sample retrieval is occurring at a rate faster than Pinchin staff are able to sample and log the soil cores, the drillers are to be instructed to slow down or stop until further notice. This will prevent a back log of soil cores from accumulating and minimize the exposure of the soil cores to ambient conditions. This is particularly important when sampling for VOCs;
8. Collect soil samples for the remaining parameters to be analyzed;
9. Soil samples are to be labelled and handled in accordance with SOP-EDR013;
10. Record the parameters sampled for, the type(s) and number of sample containers, and the time and date of sample collection in the field notes;
11. Determine the soil texture in accordance with SOP-EDR019 and record this information in the field notes;
12. Soil samples collected for soil headspace vapour measurement must not be submitted for laboratory analysis except for analysis of non-volatile parameters (i.e., metals and inorganics) or grain size analysis;
13. Immediately following collection, place each sample container in a cooler containing ice bags or ice packs; and
14. After the maximum borehole drilling depth is reached, measure the borehole depth with a weighted measuring tape and record the total depth in the field notes if the borehole diameter is large enough to permit measurement.

5.11 Borehole Backfilling.

Following completion of each borehole in which a well is not installed, it must be properly backfilled with bentonite and/or bentonite grout by the drilling contractor. The drilling contractor is to be consulted to confirm the proper borehole abandonment procedures required by the local regulations (e.g., Ontario Regulation 903 for Ontario sites).

Drill cuttings are not be used to backfill boreholes.

Record the borehole backfilling method and materials used in the field notes.

5.12 Borehole Location Documentation

For each borehole, complete the following to document its location:

1. Photograph the completed borehole location. Close up photographs of the borehole are to be taken as well as more distant photographs that show the location of site landmarks relative to the borehole so that the photograph can be used to locate the borehole in the future; and
2. Using a measuring tape or measuring wheel, measure the distance between the borehole and a nearby landmark (e.g., corner of the nearest building) and provide a borehole location sketch in the field notes. Measurements are to be made at right angles relative to the orientation of the landmark or to a fixed axis (e.g., relative to true north). If required by the Project Manager, measure the UTM coordinates of the borehole with a hand-held GPS device.

5.13 Field Notes

The field notes must document all drilling equipment used, sample depths and measurements collected during the borehole drilling activities. The field notes must be legible and concise such that the entire borehole drilling and soil sampling event can be reconstructed later for future reference. The field notes are to be recorded on the field forms or in a field book.

5.14 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

None. Following this SOP will be sufficient to comply with the Ontario Regulation 153/04 requirements for Phase Two Environmental Site Assessments.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of Health & Safety Training by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Canadian Standards Association, *Phase II Environmental Site Assessment, CSA Standard Z769-00 (R2008)*, dated 2000 and reaffirmed in 2008.

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)*, April 2011.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR006 - REV003 - Borehole Drilling.docx

Template: Master SOP Template – February 2014

SOP – EDR007 – REV004 – MONITORING WELL DESIGN AND CONSTRUCTION

Title:	Monitoring Well Design and Construction
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

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1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 03, 2009	N/A	MEM
001	November 26, 2010	Update approval signatures	FG
002	November 15, 2013	Streamlined to cross reference AAPGO guidance document/Added section on O. Reg. 153/04 compliance	RLM
003	April 29, 2016	Updated Section 4.0/Added procedure for outer casing installation in Ontario	RLM
004	April 28, 2017	Remove reference to Pinchin West/Added note to Section 5.2 about placing a reference mark at the top of the well pipe/Added note to Section 5.3 that O.Reg.153/04 requires well screens to intersect the water table when assessing groundwater for petroleum hydrocarbon impacts during a Phase Two ESA	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

Monitoring wells are installed in overburden and bedrock to enable the collection of groundwater samples from water bearing formations at project sites. For some projects, monitoring wells are also used to monitor for combustible gases in the subsurface.

A monitoring well consists of two parts: the well screen and the well casing (also known as the well riser). The well screen allows groundwater to enter the well from the formation adjacent to the well so that it can be sampled. The well casing allows access to the well from the ground surface.

In Ontario, the regulatory requirements for monitoring well installation are provided in Ontario Regulation 903. All drilling contractors who install groundwater monitoring wells in Ontario must be licensed with the Ontario Ministry of the Environment and Climate Change (MOECC). In addition, for any well installed at a depth of greater than 3.0 metres below ground surface, a Water Well Record must be prepared by the drilling contractor and submitted to the MOECC and the well owner (typically our client).

The design and construction of soil vapour monitoring wells is beyond the scope of this SOP and is described in SOP-EDR018.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 General Considerations

5.1.1 Borehole and Well Diameters

The borehole diameter must be sufficient in size to accommodate the well casing, sand pack and seal materials. In Ontario, the borehole diameter and annular space surrounding the monitoring well must meet the requirements of Ontario Regulation 903. Other provinces have similar requirements that must be considered. It is the Project Manager's responsibility to be aware of specific provincial requirements. Wherever possible, 2-inch (5.1. centimetre) interior diameter monitoring wells should be installed as they permit the use of most sampling and monitoring devices, and will generally provide greater water volume for sampling, especially in low permeability soils. Monitoring wells with interior diameters between 1-inch (2.5 centimetres) and 1.5-inches (3.8 centimetres) are also considered acceptable in some jurisdictions but the use of monitoring wells smaller than 1-inch (2.5 centimetres) is not permitted unless approved by the Project Manager.

5.1.2 Screen Length and Placement

Well screens typically range in length from 1.5 to 3.0 metres. Saturated well screen lengths beyond 1.8 metres, including sand pack, should be avoided in British Columbia, as per British Columbia Ministry of Environment Technical Guidance 8.

Wells screens must not straddle more than one hydrostratigraphic unit and should not be placed such that a preferential pathway for contaminant migration is created between two hydrostratigraphic units. In particular, a well screen must not straddle the overburden/bedrock interface, and the well screen, sand pack and seal must be situated entirely within either the overburden or the bedrock. An exception to this if the well is installed for assessing dense non-aqueous phase liquid (DNAPL), the penetration into the bedrock is minimal, and bedrock fractures are isolated from the sand pack. This type of well installation must only be completed under the guidance of staff with the appropriate geological expertise to ensure it is done correctly.

When determining the well screen length and depth of screen placement for a project, the following should be considered by the Project Manager:

- When assessing for the presence of light non-aqueous phase liquid (LNAPL) at the water table, longer well screens are preferred due to seasonal fluctuations in the water table and the well screen should intersect the water table whenever possible;
- When assessing for the presence of DNAPL, the well screen should be positioned at the bottom of the aquifer immediately above the aquitard;
- When assessing geochemical parameters, shorter well screens may be preferable to reduce the potential for mixing of water from distinct vertical geochemical zones;
- The use of long well screens within the saturated zone may result in the mixing of impacted and unimpacted groundwater from different depths within the aquifer, with the resulting dilution effect biasing the groundwater concentrations low; and
- Nested wells can be used to determine contaminant stratification within an aquifer or assess multiple aquifers, as long as the wells and individual aquifers are properly sealed off from each other within the borehole.

5.1.3 Well Screen/Casing Materials

Polyvinyl chloride (PVC) is the standard material used to construct groundwater monitoring wells. However, some organic compounds if present at excessive concentrations can degrade PVC, and stainless-steel or Teflon well materials may be considered for use by the Project Manager at such project sites.

A filter sock must not be placed over a well screen.

5.1.4 Well Screen Slot Size and Sand Pack

The slot size of the well screen will be determined by the size of the filter pack used. Pinchin typically uses No. 10 slot screen and #1 silica sand to form the sand pack around the well screen. When investigating a site with fine-grained soil, it may be appropriate to use a finer sand pack and smaller slot size to act as a “filter” to prevent as much fine-grained soil from entering the well as possible. The Project Manager should consult with the drilling contractor to determine the most appropriate screen slot size and sand pack size.

5.1.5 Bentonite Seal

The annular space above the sand pack in all wells is to be filled with bentonite. The purpose of placing the bentonite is create a seal above the sand pack that prevents a connection between other water bearing zones within the subsurface and/or water infiltration from the surface.

5.1.6 Surface Completions

A protective steel casing and lockable cap are to be installed at each well to protect the well and prevent tampering. Protective casings come in two varieties: aboveground casings (commonly known as monument casings) and flush-mount casings.

Aboveground casings have the advantage of having better visibility and can be located more easily, especially during winter, are less likely to need repair, and have fewer problems related to water intrusion and frost heave of the casing.

Flush-mount casings are usually the only available option for wells installed in areas of high vehicular or pedestrian traffic. Also, some clients prefer flush-mount casings for aesthetic reasons as they are less obtrusive.

When installing a well in a high vehicular traffic area such as a roadway, the flush-mount casing must have sufficient strength to avoid damage when run over by vehicles. Flush-mount casings with brass lids should not be installed in high vehicular traffic areas as they are easily damaged to the point where they can no longer be opened.

5.2 Well Installation Procedures

Note that Pinchin field staff are not trained, nor have the necessary licensing, to install monitoring wells. This task is to be performed by the drilling contractor in accordance with the applicable regulatory requirements (e.g., Ontario Regulation 903 in Ontario). Pinchin field staff will assist the drilling contractor by specifying the general design of the monitoring well but will not perform the actual installation. The primary role of Pinchin field staff during well installation is to document the installation (e.g., measuring and/or recording the well length, screen length, depth to top of sand pack, etc.) as outlined below.

The following presents the general procedure for the completion of overburden and bedrock monitoring well installations after the borehole has been advanced to the appropriate depth:

1. Assemble the well by threading sufficient lengths of screen and riser materials together, and placing a threaded cap or slip-on cap at the bottom of the well. Well materials are to be kept in their plastic sleeves until immediately prior to well installation, and are not to be placed on the ground unless the ground surface is covered by clean plastic sheeting. Well materials should not be stored near potentially contaminated materials (e.g., soil cuttings);
2. Dedicated, disposable nitrile gloves are to be worn by all personnel handling the well materials and are to be replaced if they become contaminated during well installation. Confirm the length of the well screen, well riser and total length of well. This is especially important if the screen and/or riser are trimmed to fit the borehole depth or desired

screen interval. Record the length of the well screen, the length of the well casing, the total length of the well (including the bottom cap), the type of bottom cap used, and the interior diameter of the well screen/well casing in the field notes;

3. Prior to placing the assembled well into the borehole, measure the depth from ground surface to the bottom of the borehole and record this depth in the field notes;
4. When possible, place a minimum of 0.15 metres of filter pack into the bottom of the borehole to provide a firm base for the well. Note that the placement of such a filter pack base may not be appropriate when investigating a site where DNAPLs are suspected as the filter pack base may act as a DNAPL "sump" beneath the well and the DNAPL may go undetected when monitoring the well;
5. Place the assembled well into the open borehole or within the interior of the hollow stem augers. If trimming of the well casing is required, measure the length of the trimmed piece and record this information in the field notes. Before installing the sand pack, place a J-plug or slip cap on the top of the well to prevent sand and seal materials from entering the well when backfilling the annular space between the well and the borehole walls;
6. Install the sand pack around the exterior of the well screen and extend it to between 0.3 and 0.6 metres above the top of the well screen. The sand pack should be installed slowly, and with a tremie pipe if possible, to minimize the potential for bridging of the sand pack. When installing a sand pack in a borehole that has been drilled with hollow stem augers, the sand pack should be installed in lifts of approximately 0.5 metres. After placement of each lift, the augers are withdrawn from the ground by approximately 0.5 metres and the process repeated until the sand pack is placed to the required depth. Measure the depth to the top of the sand pack and record this depth in the field notes;
7. Install a bentonite seal comprised of granular and/or powdered bentonite above the sand pack to within approximately 0.6 metres of the ground surface. The bentonite should be installed slowly, and with a tremie pipe if possible, to minimize the potential for bridging of the seal. For the portion of the seal located above the water table, distilled water is to be poured into the borehole for each lift placed above the water table (approximately 0.3 to 0.6 metres per lift) to hydrate the seal. Approximately 1 to 2 litres of distilled water per lift is considered sufficient to hydrate the seal. Measure the depth to the top of the bentonite seal and record this depth in the field notes;
8. Record whether the seal was hydrated during installation and over which depth interval. Note that in some jurisdictions very long bentonite seals can be broken up with sand intervals. This reduces the potential for ground heaving due to bentonite shrinking and swelling but the sand intervals must not connect hydraulically separated aquifers;

9. (Ontario only) If the well is to be installed with a flush-mount protective casing, an outer casing comprised of a short length (10 to 15 cm) of PVC riser, or PVC coupling, that is slightly larger in diameter than the well casing needs to be installed around the well casing into the top of the bentonite seal, with the gap between the two casings sealed with bentonite. The top of the outer casing needs to be flush with or slightly below the top of the well casing. For example, if a 2-inch diameter well is installed, then a 10 to 15 cm length of 3-inch or 4-inch diameter riser or coupling placed around the 2-inch diameter well casing will suffice provided that bentonite is placed between the two casings. The flush-mount protective casing is then installed around the two casings. The outer casing does not need to be capped, and we only need to cap the well casing with a J-plug or slip cap;
10. (Ontario only) If the well is to be installed with a stick up protected by a monument casing, the procedure for installing the outer casing is essentially the same, except that the outer casing will extend from 10 to 15 cm below ground to above the ground surface, preferably flush with or slightly below the top of the well casing if the design of the monument casing permits it;
11. Place a protective well casing (monument or flush-mount) around the well casing and cement it in place;
12. Using a permanent marker, mark a point on the top of the well casing that will serve as a reference point for all future depth to water and elevation survey measurements. Measure the depth to groundwater in the well at the time of completion. Note the depth to water and time of measurement in the field notes;
13. Place a lockable J-plug on the well casing and ensure that the J-plug is tightened sufficiently to prevent surface water from infiltrating into the well if the well has a flush-mount completion. Place a lock on the J-plug for a flush-mount completion or on the lockable cap for an aboveground completion if required by the Project Manager. A PVC slip cap can also be used, especially for an aboveground completion;
14. Photograph the completed well installation. Close up photographs of the well are to be taken as well as more distant photographs that show the location of site landmarks relative to the well so that the photograph can be used to locate the well in the future; and
15. Using a measuring tape or measuring wheel, measure the distance between the well and a nearby landmark (e.g., corner of the nearest building) and provide a well location sketch in the field notes. Measurements are to be made at right angles relative to the orientation of the landmark or to a fixed axis (e.g., relative to true north). If required by the Project Manager, measure the UTM coordinates of the well with a hand-held GPS device.

5.3 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

Ontario Regulation 153/04 mandates that well screens must not exceed 3.1 metres in length. In addition, whenever the Phase Two ESA includes the assessment of petroleum hydrocarbon impacts in groundwater, the well screen in each well must intersect the water table.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

British Columbia Ministry of the Environment, *Technical Guidance 8: Groundwater Investigation and Characterization*, July 2010.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR008 – REV005 – MONITORING WELL SAMPLING

Title:	Monitoring Well Sampling
Practice:	EDR
First Effective Date:	November 8, 2013
Version:	005
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

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1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 08, 2013	N/A	RM
001	September 25, 2015	Incorporated procedures specific to Pinchin West into SOP	RM
002	February 9, 2016	Revised overall procedure to be consistent with well development SOP/Added reference to revised well development field forms	RM
003	April 29, 2016	Updated Section 4.0	RM
004	April 28, 2017	Removed reference to Pinchin West	RM
005	January 3, 2018	Changed “submersible” to “centrifugal” throughout	RM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for groundwater monitoring well purging and sampling, and provides a description of the equipment required and field methods.

Note that this SOP pertains to monitoring well sampling using the “well volume” purging procedure. Groundwater monitoring well purging and sampling using low flow procedures is described in SOP-EDR023.

3.0 OVERVIEW

Groundwater sampling involves two main steps: well purging followed by sample collection. All groundwater monitoring wells must be purged prior to groundwater sampling to remove groundwater that may have been chemically altered while residing in the well so that groundwater samples representative of actual groundwater quality within the formation intersected by the well screen can be obtained.

Monitoring well sampling should not be completed until at least 24 hours have elapsed following monitoring well development to allow subsurface conditions to equilibrate. Any deviation from this procedure must be discussed with the Project Manager before proceeding.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

5.1.1 Documents and Information Gathering

- A copy of the proposal or work plan;
- Monitoring well construction details (borehole logs, well construction summary table from a previous report or well installation field notes);
- A copy of this SOP;
- A site-specific Health and Safety Plan (as per the project requirements); and
- Client or site representative's contact details.

5.1.2 Well Purging and Sampling Equipment

- Inertial pump (e.g., Waterra tubing and foot valve) (Optional depending on jurisdiction);
- Peristaltic pump (Optional depending on the parameters being sampled);
- Centrifugal or bladder pump (Optional depending on jurisdiction and well depth);
- Disposable bailer (Optional);
- Graduated pail (to contain purge water and permit the volume of groundwater purged to be tracked);
- Pails or drums for purge water storage prior to disposal;
- Well keys (if wells are locked);
- Tools to open monitoring well (T-bar, socket set, Allen keys, etc.);
- Interface probe;
- Equipment cleaning supplies (see SOP-EDR009);
- Disposable latex or nitrile gloves; and
- Field forms.

5.2 Purging Procedures

The well purging procedure employed will be determined by the hydraulic conductivity of the formation in which the groundwater monitoring well is installed. For this SOP, a high yield well is defined as a well that cannot be purged to dryness when pumping continuously at a rate of up to 2 litres per minute (L/min) and a low yield well is defined as a well that can be purged to dryness when pumping continuously at a rate of 2 L/min or less. This threshold represents a “normal” pumping rate when hand pumping with an inertial pump.

5.2.1 Purging of High Yield Wells

The procedure for purging a high yield monitoring well is as follows:

1. Decontaminate all non-dedicated monitoring and sampling equipment that will be used, including the interface probe and centrifugal or bladder pump (if used), in accordance with the procedures described in SOP-EDR009;
2. Review the well construction details provided in the borehole logs, previous field notes or well construction summary table from a previous report. Determine the well depth, well stick up, screen length, depth to top of sand pack and diameter of the borehole annulus. If the well depth is unavailable, measure it with the interface probe;
3. Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well pipe) with an interface probe. If measurable free-phase product is present on the water table, record the depth to the top of the free-phase product and the depth to the free-phase product/water boundary (i.e., water level), and discuss this with the Project Manager before proceeding further;
4. Calculate the well volume. **Note that for the purpose of this SOP, there are two definitions of well volume depending on the province in which the project is being conducted.** For Ontario and Manitoba, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) plus the volume of water within the wetted length of the sand pack (sand pack volume). For British Columbia, Alberta and Saskatchewan, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) only.

   The volume of water in the well pipe is calculated as follows:

   Well Pipe Volume (litres) = $h_w \times \pi r_w^2 \times 1{,}000$ litres per cubic metre (L/m^3)

   Where $\pi = 3.14$

   h_w = the height of the water column in the monitoring well in metres (wetted length)

   r_w = the radius of the monitoring well in metres (i.e., half the interior diameter of the well)

The volume of the sand pack in the monitoring well is calculated as follows:

Sand Pack Volume (litres) = h_w x [(0.3 π r_b^2 x 1,000 L/m^3) – (0.3 π r_w^2 x 1,000 L/m^3)]

Where 0.3 = the assumed porosity of the sand pack

h_w = the height of the water column in the monitoring well in metres (wetted length)

π = 3.14

r_b = the radius of the borehole annulus in metres

r_w = the radius of the monitoring well in metres

For Ontario and Manitoba projects, the following table provides well volumes in litres/metre for typical well installations:

Borehole Annulus Diameter (Inches/Metres)	Well Interior Diameter (Inches)	Well Pipe Volume (Litres/Metre)*	Well Volume (Litres/Metre)*
4/0.1	1.25	0.8	2.9
	1.5	1.1	3.2
	2	2.0	3.8
6/0.15	1.25	0.8	5.9
	1.5	1.1	6.1
	2	2.0	6.7
8.25/0.21	1.5	1.1	11.2
	2	2.0	11.8
10.25/0.26	1.5	1.1	16.7
	2	2.0	17.3

* Litres to be removed per metre of standing water in the well (wetted length).

If the borehole annulus and well interior diameters match one of those listed above, to determine the volume of one well volume simply multiply the number in the last column of the table by the wetted length in the well. For example, if a 2-inch diameter well installed in a 8.25-inch diameter borehole has 2.2 metres of standing water, one well volume equals 26.0 litres (2.2 metres x 11.8 litres/metre).

Note that the above well volume calculations apply only to wells where the water level in the well is below the top of the sand pack. If the water level is above the top of the sand pack, then the well volume is the volume of water in the sand pack and well pipe within the sand pack interval, plus the volume of water in the well pipe (i.e., well pipe volume) above the top of the sand pack. For example, assume a 2-inch diameter well has been installed in a 8.25-inch diameter borehole to a depth of 6.0 metres below ground surface (mbgs), with a 3.05 metre long screen. The sand pack extends from 6.0 mbgs to 2.5 mbgs and the water level is at 1.85 mbgs. One well volume equals ([6.0 metres – 2.5 metres] x 11.8 litres/metre) + ([2.5 metres – 1.85 metres] x 2.0 litres/metre) or 42.6 litres.

For British Columbia, Alberta and Saskatchewan projects, the well volume is calculated using the conversion factor listed in the third column of the above table. For example, if there are 2.5 metres of standing water in a 1.5-inch diameter well, one well volume equals 2.75 litres (2.5 metres x 1.1 litres/metre);

5. Lower the pump intake into the well until it is approximately 0.3 metres above the bottom of the well. Remove half a well volume while pumping at a rate of approximately 1 to 2 L/min. Record the approximate purge volume, pump intake depth and pertinent visual/olfactory observations (e.g., sheen, odour, free-phase product, sediment content, clarity, colour, etc.);
6. Move the pump intake upward to the middle of the water column (or middle of the screened interval if the water level in the well is above the top of the screen). Remove half a well volume (for a cumulative total of 1 well volume) while pumping at a rate of approximately 1 to 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
7. Move the pump intake upward to near the top of the screened interval (or near the top of the water column if the water level is currently below the top of the screen). Remove half a well volume (for a cumulative total of 1.5 well volumes) while pumping at a rate of approximately 1 to 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations.

   Note that if the wetted length is short within a well (e.g., 1.5 metres or less), there will not be enough separation between pump intake depths to warrant pumping from three depths (i.e., near the bottom, middle and top of the water column). In this case, pumping from two depths (i.e., near the bottom and top of the water column) is sufficient;
8. Repeat steps 5 through 7 until a minimum of 3 well volumes in total have been removed. If the purge water contains high sediment content after the removal of 3 well volumes, well purging should continue by removing additional well volumes until the sediment content visibly decreases. If the purge water continues to have high sediment content after the removal of 2 additional well volumes (i.e., 5 well volumes in total), contact the Project Manager to discuss whether well purging should continue; and

9. Proceed with groundwater sample collection (see below).

Note that the use of a bailer to purge a high yield well with a wetted interval greater than 2 metres is not recommended given that the depth from which groundwater is removed is difficult to control.

5.2.2 Purging of Low Yield Wells

The procedure for purging a low yield monitoring well is as follows:

1. Decontaminate all non-dedicated monitoring and sampling equipment that will be used, including the interface probe and centrifugal or bladder pump (if used), in accordance with the procedures described in SOP-EDR009;
2. Review the well construction details provided in the borehole logs, previous field notes or well construction summary table from a previous report. Determine the well depth, well stick up, screen length, depth to top of sand pack and diameter of the borehole annulus. If the well depth is unavailable, measure it with the interface probe;
3. Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well pipe) with an interface probe. If measurable free-phase product is present on the water table, record the depth to the top of the free-phase product and the depth to the free-phase product/water boundary (i.e., water level), and discuss this with the Project Manager before proceeding further;
4. Position the pump intake at the bottom of the well. Purge the well to dryness at a rate of between approximately 1 and 2 litres L/min. At the conclusion of purging, drain the pump tubing if possible. Record the approximate purge volume;
5. After allowing sufficient time for the well to recover, proceed with sample collection (see below). Note that wherever possible, the well should be allowed to recover to at least 90% recovery before proceeding with sample collection. However, if recovery to this level requires more than one hour to complete, it is better to sample the well as soon as it recovers sufficiently to permit sampling, especially if samples are being collected for volatile parameters such as volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs) (F1); and
6. Record the water levels, time of water level measurements and well status (e.g., well recovery incomplete, 90% recovery target met) on the field form to document the well recovery. Purging of wells at the end of a day and returning to the site the following day to collect samples is not permitted unless the well recovery is so poor that this amount of time is needed for there to be sufficient recovery to permit sample collection.

Note that bailers can be used in lieu of a pump to purge a low yield well provided that the well yield is low enough to permit the draining of all of the groundwater in the well with the bailer.

5.3 Well Purging Record

Well purging prior to sampling is to be documented through the completion in full of the following field forms located in the Pinchin Orchard:

- EDR-GW-Well Sampling-Low Yield Well; or
- EDR-GW-Well Sampling-High Yield Well.

Any deviations from this SOP along with the rationale for these deviations must be recorded on the forms.

5.4 Sample Collection

5.4.1 General Considerations

Inertial pumps are generally suitable for all sample collection for due diligence projects. However, the motion of the inertial pump in the water column of a well, even when pumping at a low rate, can create turbulence in the well that can suspend sediment already in the well or draw it in from the formation. Sediment captured in a sample can often result in positive bias to the analytical results, especially for the parameters PHCs (F3 and F4) and polycyclic aromatic hydrocarbons (PAHs), resulting in “false positives” that are not representative of actual groundwater quality. Sampling for these parameters following low flow purging and sampling procedures (SOP-EDR023) is an acceptable option to minimize potential sediment bias but because it is more expensive and time consuming than “conventional” sampling, it is typically not completed for due diligence projects. In lieu of low flow purging and sampling, a peristaltic pump, centrifugal pump or bladder pump is to be used as a “grab sampler” when sampling for PHCs (F2-F4) and PAHs.

In Ontario and Manitoba, or where otherwise prohibited by provincial guidance documents, peristaltic pumps must not be used to collect samples for analysis of volatile parameters, namely VOCs and PHCs (F1). As such, if the suite of parameters to be sampled at a given well includes VOCs and/or PHCs (F1), a “hybrid” sampling procedure is to be followed, in which samples for VOCs, PHCs (F1), PCBs and/or metals analysis are to be collected using an inertial pump and samples for PHCs (F2-F4) and PAHs analysis are to be collected using a peristaltic pump. Alternatively, the entire suite of parameters can be collected using a centrifugal or bladder pump.

The following table summarizes the pump types, parameters that can be sampled using each pump and how the well volume is determined for each province:

Jurisdiction	**Pump Type**	**Parameters**	**Well Volume**
BC	Inertial Pump	All Parameters	Well Pipe Volume
	Peristaltic Pump	All Parameters	Well Pipe Volume

Jurisdiction	**Pump Type**	**Parameters**	**Well Volume**
Alberta/Saskatchewan	Inertial Pump	All Parameters Except PHCs (F2) and PAHs	Well Pipe Volume
	Peristaltic Pump	PHCs (F2) and PAHs	Well Pipe Volume
Manitoba/Ontario	Inertial Pump	All Parameters Except PHCs (F2-F4) and PAHs	Well Pipe Volume + Casing Volume
	Peristaltic Pump	PHCs (F2-F4) and PAHs	
All Provinces	Centrifugal Pump	All Parameters	As Per Above
All Provinces	Bladder Pump	All Parameters	As Per Above

Bailers should not be used for sample collection unless there is no other option (e.g., when there is minimal groundwater in a well). They can be used as a substitute for an inertial pump but may bias concentrations of volatile parameters low and concentrations of PHCs (F2-F4) and PAHs high. The use of a bailer for groundwater sample collection must be approved by the Project Manager.

There is a common misconception that using a peristaltic pump, centrifugal pump or bladder pump and sampling at a low pumping rate is “low flow sampling”. Sampling in this manner is essentially “grab sampling” using a device other than an inertial pump and is not “low flow sampling”. Only if groundwater sampling was completed in accordance with SOP-EDR023 can the sampling be referred to as “low flow sampling”.

5.4.2 Sampling of High and Low Yield Wells

The procedure for collecting groundwater samples from a high or low yield monitoring well is as follows:

1. Label the sample containers with the sample identifier, project number and date and time of sample collection. The sample containers for each well are be filled in the following order:
    - Volatiles parameters (e.g., VOCs, PHCs (F1));
    - Semi-volatile parameters (e.g., PHCs (F2-F4), PAHs); and
    - Non-volatile parameters (e.g., inorganic parameters, metals).

    There is an exception to the above sample collection order when using the “hybrid” sampling method. In this case, the semi-volatile parameters (PHCs (F2-F4) and/or PAHs) are to be sampled first using the peristaltic pump, centrifugal pump or bladder pump, followed by sampling volatile parameters and then non-volatile parameters using the inertial pump;

2. Position the pump intake at the approximate middle of the screened interval (or middle of the water column if the water level is below the top of the screen). At the discretion of the Project Manager, the pump intake may be positioned near the top of the water column if light non-aqueous phase liquids (LNAPLs) are being investigated (e.g., gasoline, fuel oil) and at the bottom of the well when dense non-aqueous phase liquids (DNAPLs) (e.g., chlorinated solvents) are being investigated. For a low yield well when the tubing was (or could) not be drained at the conclusion of purging, or when a high yield well is not sampled immediately after purging, pump sufficient water from the tubing before initiating sample collection at a rate of approximately 0.5 L/min to remove any water that was left over in the tubing following purging;
3. When sampling for volatile parameters (i.e., VOCs and PHCs (F1)), pump at a rate of approximately 0.5 L/min. When using an inertial pump, hold the pump vertical while pumping to minimize agitation and possible contaminant volatilization. During volatile parameter sampling, the tubing of the inertial pump must not contain air bubbles. If air bubbles are present, continue pumping until there are no air bubbles in the tubing. Once the tubing is full and free of air bubbles, carefully pour the groundwater from the tubing into the sample vials until they are filled to be headspace-free. When using a peristaltic pump (BC only), centrifugal pump or bladder pump for volatile parameter sampling, the samples can be collected by pumping directly into the sample containers until they are headspace-free. Once filled and capped, check each vial for air bubbles by turning it upside down. If bubbles are present in a vial, reopen it and add additional groundwater until there are no remaining bubbles;
4. When sampling for semi-volatile parameters, pump at a rate of between 0.5 and 1 L/min. The samples can be collected by pumping directly into the sample containers;
5. When sampling for non-volatile parameters, pump at a rate of between 0.5 and 1 L/min. The samples can be collected by pumping directly into the sample containers;
6. Samples collected for dissolved metals analysis are to be filtered in the field using dedicated, disposable 0.45 micron in-line filters or marked to be filtered by the laboratory, except for samples collected in Ontario for methyl mercury analysis which are not to be filtered. Field filtering must occur before samples for metals analysis are preserved. Prior to filling the first sample container using a new filter, the filter is to be “primed” by flushing a volume of water equal to twice the capacity of the filter through the filter. Samples for other parameters are not to be filtered in the field. In situations where field filtering cannot be completed, such as when sampling with a bailer, samples for metals analysis

are to be collected in sample containers without preservatives and the analytical laboratory is to be instructed on the Chain-of-Custody to filter and preserve the samples upon receipt;

7. When collecting samples in containers that are pre-charged with preservatives, care must be taken not to overfill the containers as some of the preservative may be lost which will result in the sample not being properly preserved. Also, sample containers for metals analysis typically have a fill line marked on the container and the container must not be filled to above this line as this will cause dilution of the preservative and the sample may not be properly preserved;
8. Record the parameters sampled for, the purging and sampling equipment used, whether samples for metals analysis were field filtered, and the time and date of sample collection in the field forms; and
9. Immediately following collection, place each sample container in a cooler containing ice bags or ice packs.

5.5 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

Groundwater sampling conducted for a Phase Two ESA completed in accordance Ontario Regulation 153/04 must be completed when well yields permit using the low flow purging and sampling methods provided in SOP-EDR023 unless authorized by the Qualified Person responsible for the Phase Two ESA.

6.0 TRAINING

The Practice Leader is responsible for identifying the initial training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, "*Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)",* April 2011.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR009 – REV004 – FIELD DECONTAMINATION OF NON-DEDICATED MONITORING AND SAMPLING EQUIPMENT

Title:	Field Decontamination of Non-Dedicated Monitoring and Sampling Equipment
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 02, 2009	N/A	MEM
001	November 26, 2010	Updated Approval Signature/Added reference to Ontario Regulation 511/09	FG
002	September 20, 2013	Revised majority of text to reflect current practices/Focused on equipment cleaning and removed reference to personnel decontamination/Added section on O. Reg. 153/04 requirements/Revised reference list	RLM
003	April 29, 2016	Updated Section 4.0/Removed methanol as optional cleaning reagent	RLM
004	April 28, 2017	Removed reference to Pinchin West/In Section 5.2.2, modified requirements for cleaning water level tapes and interface probes/In Section 5.2.3, modified requirements for cleaning electrical or retrieval cables for pumps	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the general requirements for field decontamination of non-dedicated equipment used for monitoring of environmental media and the collection of environmental samples (i.e., equipment that is re-used between monitoring and sampling locations). Note that the procedures described in this SOP also apply to pumps used for well development.

3.0 OVERVIEW

The main purpose of non-dedicated monitoring and sampling equipment decontamination is to minimize the potential for cross-contamination during monitoring/sampling activities completed for site investigations. Cross-contamination can occur when equipment used to monitor/sample contaminated soil, groundwater or sediment is reused at another monitoring/sampling location without cleaning. This can result in the transfer of contaminants from a “dirty” monitoring/sampling location to a “clean” monitoring/sampling location, causing possible positive bias of subsequent samples. Positive sample bias can result in reported analytical results that are not representative of actual site conditions and, if significant cross-contamination occurs, can result in reported exceedances of the applicable regulatory standards for samples that would have met the standards had cross-contamination not occurred.

Site investigations completed by Pinchin typically use the following non-dedicated monitoring/sampling equipment:

- Manually operated equipment (e.g., water level tapes/interface probes using during groundwater monitoring and sampling, knifes/spatulas used for soil sampling, hand augers);
- Pumps for groundwater monitoring well development, purging and/or sampling (e.g., bladder pumps, submersible pumps); and
- Downhole drilling/sampling equipment (e.g., split-spoon samplers, augers).

The above list is not all inclusive and other non-dedicated monitoring/sampling equipment may be employed during a site investigation that requires decontamination. For example, it may be appropriate to decontaminate the bucket of a backhoe used for test pitting between test pit locations. The Project Manager will be responsible for identifying the additional monitoring/sampling equipment that requires decontamination and instructing field staff regarding the procedure to be followed for cleaning this equipment.

When conducting field monitoring and sampling work in the field, it is not always possible to judge whether a monitoring/sampling location is uncontaminated. Because of this, it is important that all non-dedicated monitoring/sampling equipment be properly cleaned before initial use and between uses to minimize the potential for cross-contamination to occur.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

The following is a list of equipment needed to perform the decontamination of non-dedicated monitoring and sampling equipment in accordance with this SOP:

- Personal Protective Equipment (PPE);
- Potable tap water;
- Distilled water (store bought);

- Volatile organic compound (VOC)-free deionized distilled water (supplied by the analytical laboratory);
- Laboratory grade, phosphate-free soap;
- Wash buckets (minimum of three);
- Scrub brushes;
- Paper towels; and
- Buckets or drums with resealable lids for containing liquids generated by equipment cleaning.

Other equipment required to clean drilling equipment (e.g., steam cleaner, power washer, tub for containing wash water, etc.) is typically provided by the drilling subcontractor. The Project Manager is responsible for ensuring that the drilling subcontractor brings the required cleaning equipment to the project site. Prior to mobilization, the Project Manager should also assess the availability of a potable water supply for drilling equipment cleaning at the project site. When no accessible potable water supply is available at a project site, the drilling subcontractor will need to bring a potable water supply to the site in the drill rig water supply tank or separate support vehicle, or arrange to have a third-party supplier deliver potable water to the site.

5.2 Procedure

5.2.1 *General Procedures and Considerations*

The following general procedures and considerations apply to all decontamination of non-dedicated monitoring/sampling equipment activities:

- Personnel will dress in suitable PPE to reduce personal exposure during equipment decontamination activities;
- In addition to cleaning between monitoring/sampling locations, all non-dedicated monitoring/sampling equipment must be cleaned before initial use. Field staff should not assume that the equipment was properly cleaned by the last person to use it;
- Prior to starting a drilling program, the downhole drilling equipment (e.g., augers) must be inspected and any “dirty” equipment must not be used in the drilling program or it must be cleaned prior to use; and
- All liquids and solids generated by the cleaning of non-dedicated monitoring/sampling equipment are to be containerized and managed in accordance with the procedures outlined in SOP-EDR020 – Investigation Derived Wastes.

5.2.2 Decontamination of Manually Operated Monitoring/Sampling Equipment

The procedure for decontaminating manually operated monitoring/sampling equipment is as follows:

- Wash the equipment in a bucket filled with a mixture of phosphate-free soap/potable water, while using a brush to remove any obvious contamination and/or adhered soil;
- Rinse the equipment thoroughly in a bucket filled with potable water;
- Rinse the equipment thoroughly using a spray bottle filled with distilled water, capturing the rinsate in a bucket; and
- Allow the equipment to air dry. If there is insufficient time to allow the equipment to air dry before reusing, or the equipment cleaning is occurring during winter conditions, the equipment should be dried after the final rinse with a clean paper towel.

At the discretion of the Project Manager, it may be acceptable to use spray bottles, rather than buckets, for lightly contaminated equipment or if no obvious contaminants are present.

Should soil or obvious contaminants remain on the equipment after cleaning, the above procedure must be repeated until the soil or contaminants have been removed. The equipment should not be reused if repeated cleanings do not remove the soil or contaminants.

The above equipment cleaning procedure applies to, but is not limited to, the following non-dedicated monitoring/sampling equipment:

- Knives/spatulas used for soil sampling;
- Hand augers;
- Water level tapes and interface probes (both the end probe and portion of the tape that entered the well);
- The exterior of submersible pumps and interior/exterior of bladder pumps (including the portion of the electrical or retrieval cables that contact groundwater in a well); and
- Various pieces of drilling equipment, including split-spoon samplers, hollow stem auger centre plugs, continuous sampling tubes, and the reusable portions of dual-tube samplers.

At the discretion of the Project Manager, the distilled water used for the final equipment rinse will be VOC-free deionized distilled water supplied by the analytical laboratory. For example, the use of VOC-free distilled water would be appropriate for a project where trace VOCs are being investigated and it is important to minimize the potential for cross-contamination and positive bias of VOC sample results.

For tapes associated with water level tapes and interface probes, if they were submerged in a monitoring well water free of non-aqueous phase liquids or obvious contamination, the tape can be cleaned at the discretion of the Project Manager by pulling the tape through a towel dampened with phosphate-free soap/potable water as the tape is retrieved. The end probe should then be cleaned as described above.

5.2.3 Decontamination of Groundwater Sampling Pumps

The exterior of each bladder or submersible pump that is used for well development, well purging and/or groundwater sampling, and the portion of any electrical or retrieval cables that entered the well, are to be cleaned following the procedure described above for decontaminating manually operated monitoring/sampling equipment.

Submersible pumps are not designed to be disassembled in the field and cleaning of the interior of this type of pump requires flushing of cleaning solutions through the pump. After cleaning the exterior of the pump, the minimum decontamination requirement for a submersible pump is the flushing of a phosphate-free soap/potable water mixture contained in a bucket through the pump (i.e., pumping the mixture through the pump and capturing the pump outflow in the same bucket or a separate bucket), followed by flushing distilled water contained in a separate bucket through the pump and capturing the pump outflow in the same bucket or separate bucket. Note that store bought distilled water is acceptable for this purpose.

At the discretion of the Project Manager and depending on the requirements of the project, the final step in the process is a final flush with laboratory-supplied VOC-free distilled water.

The following summarizes the flushing sequence for decontaminating the interior of a submersible pump:

- Soap/water mixture*;
- Distilled water (store bought)*; and
- Distilled water (laboratory supplied VOC-free distilled water - to be confirmed by the Project Manager).

* Minimum requirement.

Bladder pumps are designed for disassembly in the field to facilitate the replacement of the bladders. The internal parts of a bladder pump are to be cleaned in accordance with the procedure described above for decontaminating manually operated monitoring/sampling equipment. Whenever possible, bladders are to be disposed of between well locations. However, if it is necessary to reuse a bladder, it must be cleaned in accordance with the procedure for cleaning manually operated monitoring/sampling equipment. It should be noted that bladders are difficult to clean and the decontamination procedure needs to be thorough.

Flushing of a bladder pump with distilled water after cleaning and reassembly is not required unless specified by the Project Manager.

5.2.4 Decontamination of Downhole Drilling Equipment

Hollow stem and solid stem augers used for borehole advancement are to be decontaminated by the drilling contractor using the following procedure:

- Wherever possible, all augers used for borehole drilling should be cleaned before initial use and between borehole locations by steam cleaning or power washing with potable water. However, the minimum requirements for auger cleaning are as follows:
  - Use a brush or shovel to remove excess soil from <u>all</u> used augers; and
  - Any augers that <u>may come into contact with groundwater</u> are to be decontaminated by steam cleaning or power washing with potable water. An auger must not be used for the balance of the drilling program if obvious contaminants or residual soil remain on the auger following decontamination, unless subsequent cleaning efforts remove these materials.

As noted previously, downhole drilling equipment used for soil sample retrieval (e.g., split-spoon samplers, continuous sampling tubes and the reusable portions of dual-tube samplers used with direct push rigs) and the hollow stem auger centre plug are to be decontaminated following the procedure outlined above for cleaning manually operated monitoring/sampling equipment.

5.3 Decontamination Records

Field personnel will be responsible for documenting the decontamination of non-dedicated monitoring/sampling equipment and drilling equipment in their field log book or field forms. The documentation should include the type of equipment cleaned and the frequency of cleaning, the methods and reagents used for equipment cleaning, and how fluids generated by the equipment cleaning were stored.

5.4 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following additional procedures must be undertaken:

- All augers must have excess soil removed by a brush or shovel and be steam cleaned or power washed before initial use and between borehole locations regardless of whether they contact the groundwater or not (i.e., the minimum requirements listed above for auger cleaning are not sufficient); and

- Thorough records of the frequency and cleaning materials used for the decontamination of non-dedicated monitoring/sampling equipment and downhole drilling equipment must be kept. The Quality Assurance/Quality Control section of the Phase Two ESA report requires a summary of what steps were taken to minimize the potential for cross-contamination during the Phase Two ESA. The handling and disposal of fluids generated by equipment decontamination must also be well documented in the field for inclusion in the Phase Two ESA report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR013 – REV004 – SAMPLE HANDLING DOCUMENTATION

Title:	Sample Handling Documentation
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Mark McCormack and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 03, 2009	N/A	MEM
001	November 26, 2010	Updated Approval Signature/Added reference to Ontario Regulation 511/09	FG
002	September 12, 2013	Updated text/Added tables from MOE lab protocol/Streamlined reference section/Added O. Reg. 153/04 compliance section	RLM
003	April 29, 2016	Updated Section 4.0/Aligned document retention with PEP	RLM
004	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the general requirements for sample handling and documentation practices.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

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- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment Required

- Laboratory-supplied sample containers;
- Field log book or field forms; and
- Laboratory-supplied Chain-of-Custody forms.

5.2 Procedures

5.2.1 *Sample Labelling*

Sample labels are to be filled out in the field at the time of sampling as completely as possible by field personnel. All sample labels shall be filled out using waterproof ink. At a minimum, each label shall contain the following information:

- Sample identifier, consisting of sample location (borehole number, monitoring well number, surface sample location, etc.) and sample number (if appropriate). For example, the second soil sample collected during borehole advancement at borehole BH3 would be labelled “BH3-2”;
- Pinchin project number;
- Date and time of sample collection;
- Company name (i.e., Pinchin); and
- Type of analysis.

5.2.2 *Sample Containers, Preservation and Holding Times*

The sample containers, sample preservation and holding times for projects in Ontario are to be those specified in Table A (for soil and sediment) and Table B (groundwater) from the Ontario Ministry of the Environment Climate Change (MOECC, formerly the Ontario Ministry of the Environment) document entitled *“Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act”,* dated March 9, 2004, amended as of July 1, 2011. These tables are attached and form part of this SOP.

With reference to the attached Tables A and B, field personnel must use the sample containers appropriate for the parameters being sampled for, undertake any required field preservation or filtration and observe the sample holding times.

Each province has its own preservation and holding time regulations or guidance, which are generally similar. It is the Project Manager’s responsibility to ensure that field staff are aware of, and can meet, the requirements in the province they are working in.

5.2.3 *Sample Documentation*

The following sections describe documentation required in the field notes and on the Chain-of-Custody forms.

Field Notes

Documentation of observations and data from the field will provide information on sample collection and also provide a permanent record of field activities. The observations and data will be recorded using a pen with permanent ink in the field log book or on field forms.

The information in the field book or field forms will, at a minimum, include the following:

- Site name;
- Name of field personnel;
- Sample location (borehole number, monitoring well number, surface sample location, etc.);
- Sample number;
- Date and time of sample collection;
- Description of sample;
- Matrix sampled;
- Sample depth (if applicable);
- Method of field preservation (if applicable);
- Whether filtration was completed for water samples;
- Analysis requested;
- Field observations;
- Results of any field measurements (e.g., field screening measurements, depth to water, etc.); and
- Volumes purged (if applicable).

In addition to the above, other pertinent information is to be recorded in the field log book or field forms depending on the type of sampling being completed (e.g., field parameter measurements and pumping rates for low flow sampling) as required by the SOP for the particular sampling activity.

Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the sampler's memory.

All field notes are to be scanned and saved to the project folder on the server immediately upon returning from the field.

Sample Chain-of-Custody

Sample Chain-of-Custody maintains the traceability of the samples from the time they are collected until the analytical data are issued by the laboratory. Initial information concerning collection of the samples will be recorded in the field log book or field forms as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody for each sample submission.

All signed Chain-of-Custody forms will be photocopied or duplicate copies retained prior to sample shipment. A Chain-of-Custody should be laboratory-specific and will typically be supplied by the laboratory with the sample containers requested for the project. The sampler will be responsible for fully filling out the Chain-of-Custody for each sample submission.

The Chain-of-Custody will be signed by the sampler when the sampler relinquishes the samples to anyone else (i.e., courier or laboratory). Until samples are picked up by the courier or delivered to the laboratory, they must be stored in a secure area. The following information needs to be provided on the Chain-of-Custody at a minimum:

- Company name;
- Name, address, phone number, fax number and e-mail address of the main contact for the submission (typically the Project Manager);
- Project information (project number, site address, quotation number, rush turnaround number, etc.);
- Regulatory standards or criteria applicable to the samples (including whether the samples are for regulated drinking water or whether the samples are for a Record of Site Condition);
- Sample identifiers;
- Date and time of sample collection;
- Matrix (e.g., soil, groundwater, sediment, etc.);
- Field preservation information (e.g., whether groundwater samples for metals analysis were field filtered);
- Analyses required;
- Number of sample containers per sample;
- Analytical turnaround required (i.e., standard or rush turnaround);
- Sampler’s name and signature;
- Date and time that custody of the samples was transferred;

- Name and signature of person accepting custody of the samples from Pinchin, and date and time of custody transfer; and
- Method of shipment (if applicable).

The person responsible for delivery of the samples to the laboratory or transfer to a courier will sign the Chain-of-Custody, retain a duplicate copy or photocopy of the Chain-of-Custody so it can be scanned and saved to the project file, document the method of shipment, and send the original copy of the Chain-of Custody with the samples.

5.3 Additional Considerations for Ontario Regulation. 153/04 Phase Two ESA Compliance

Custody seals must be placed on all coolers containing samples prior to transfer to a courier or delivery to the laboratory. The laboratory will comment on the presence/absence of custody seals in the Certificate-of-Analysis for each submission and this information must be discussed in the Quality Assurance/Quality Control section of the Phase Two Environmental Site Assessment report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Ontario Ministry of the Environment and Climate Change, *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 9, 2004, as amended as of July 1, 2011.

9.0 APPENDICES

Appendix I Tables A and B From Ontario MOECC Laboratory Protocol

I:\2018 SOP Updates\SOP - EDR013 - REV004 - Sample Handling Documentation.docx

Template: Master SOP Template – February 2014

APPENDIX I

Tables A and B From Ontario MOECC Laboratory Protocol

TABLE A: SOIL AND SEDIMENT Sample Handling and Storage Requirements

SOIL Inorganic Parameters	**Container**[1]	**Field Preservation**	**Storage Temp.**[2]	**Preserved Holding Time**[3]	**Unpreserved Holding Time**[3]
Chloride, electrical conductivity	glass, HDPE or PET	none	5 ± 3 °C		30 days as received (without lab drying); indefinite when dried at the lab
Cyanide (CN^-)	glass wide-mouth jar, Teflon™ lined lid	protect from light	5 ± 3 °C		14 days
Fraction organic carbon (FOC)	glass jar, Teflon™ lined lid	none	5 ± 3 °C		28 days as received(without lab drying); indefinite storage time when dried
Hexavalent chromium	glass, HDPE	none	5 ± 3 °C		30 days as received
Metals (includes hydride-forming metals, SAR, HWS boron, calcium, magnesium, sodium)	glass, HDPE	none	5 ± 3 °C		180 days as received (without lab drying); indefinite when dried at the lab
Mercury, methyl mercury	glass, HDPE or PET	none	5 ± 3 °C		28 days
pH	glass, HDPE or PET	none	5 ± 3 °C		30 days as received
SOIL Organic Parameters	**Container** [1,5,6,7,20]	**Field Preservation**	**Storage Temp.**[2]	**Preserved Holding Time**[3]	**Unpreserved Holding Time**[3]
BTEX [8], PHCs (F1)[8], THMs, VOCs[7] **NB: SEE FOOTNOTE #20**	40–60 mL glass vial (charged with methanol preservative, pre-weighed)[6]AND glass jar (for moisture content) [hermetic samplers are an acceptable alternative [5, 18]]	methanol (aqueous $NaHSO_4$ is an acceptable alternative for bromomethane)[6, 7, 18,20]	5 ± 3 °C	14 days	hermetic samples: stabilize with methanol preservative within 48 hours of sampling[18]
1,4-Dioxane[9, 15]	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[9,15,18]		5 ± 3 °C	14 days	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[18]
PHCs (F2–F4)	glass wide-mouth jar, Teflon™ lined lid	none	5 ± 3 °C		14 days
ABNs, CPs, OCs, PAHs	glass wide-mouth jar, Teflon™ lined lid	none	5 ± 3 °C		60 days
Dioxins and furans, PCBs	glass wide-mouth jar Teflon™ lined lid	none	5 ± 3 °C		indefinite storage time

HDPE = high density polyethylene; PET = polyethylene terephthalate; HWS = hot water soluble boron; THM = trihalomethanes; VOC = volatile organic compounds; BTEX = benzene, toluene, ethylbenzene, xylenes; PHCs = petroleum hydrocarbons; CPs = chlorophenols; PCBs = polychlorinated biphenyls; OCs = organochlorine pesticides

[1–20] footnotes immediately follow Table B

TABLE B: GROUND WATER Sample Handling and Storage Requirement

GROUND WATER Inorganic Parameters	**Container[10]**	**Field Preservation**	**Storage Temperature[2]**	**Preserved Holding Time[3]**	**Unpreserved Holding Time[3]**
Chloride, electrical conductivity, pH	HDPE or glass	none	5 ± 3 °C		28 days
Cyanide (CN^-)	HDPE or glass	NaOH to a pH > 12	5 ± 3 °C	14 days	must be field preserved
Hexavalent chromium	HDPE or glass	field filter followed by buffer solution to a pH 9.3–9.7 [17]	5 ± 3 °C	28 days[17]	24 hours[17]
Metals (includes hydride-forming metals, calcium, magnesium, sodium)	HDPE or Teflon™ [10]	field filter followed by HNO_3 to pH < 2[11]	room temperature when preserved	60 days	must be field preserved
Mercury	glass or Teflon™ [10]	field filter followed by HCl to pH < 2[11]	room temperature when preserved	28 days	must be field preserved
Methyl mercury	glass or Teflon™	DO NOT FILTER HCl or H_2SO_4 to pH <2[12]	5 ± 3 °C	28 days	DO NOT FILTER must be field preserved[12]
GROUND WATER Organic Parameters[10, 13, 14]	**Container[10, 13, 14]**	**Field Preservation**	**Storage Temperature[2]**	**Preserved Holding Time[3]**	**Unpreserved Holding Time[3]**
BTEX, PHCs (F1),THMs, VOCs;	40–60 mL glass vials (minimum of 2)[14] (no headspace)	$NaHSO_4$ or HCl to a pH < 2[16]	5 ± 3 °C	14 days	7 days
1,4-Dioxane[9, 15]	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[9, 15]		5 ± 3 °C	14 days	14 days
PHCs (F2–F4)	1L amber glass bottle, Teflon™ lined lid	$NaHSO_4$ or HCl to a pH < 2[16]	5 ± 3 °C	40 days	7 days
ABNs, CP, OCs, PAHs[19], PCBs	1L amber glass bottle, Teflon™ lined lid	none	5 ± 3 °C		14 days
Dioxins and furans	1L amber glass bottle, Teflon™ lined lid	None	5 ± 3 °C		indefinite storage time

HDPE = high density polyethylene;THM = trihalomethanes; VOC = volatile organic compounds; BTEX = benzene, toluene, ethylbenzene, xylenes; PHCs = petroleum hydrocarbons; CPs = chlorophenols; PCBs = polychlorinated biphenyls; OCs = organochlorine pesticides

[1] One soil container is generally sufficient for inorganic analysis and another for extractable organics. A separate container is required for BTEX, THM, VOC and PHC (F1) moisture analysis.

[2] Storage temperature refers to storage at the laboratory. Samples should be cooled and transported as soon as possible after collection.

[3] Holding time refers to the time delay between time of sample collection and time stabilization/analysis is initiated. For samples stabilized with methanol, the hold time for the recovered methanol extract is up to 40 days.

[4] PET can not be used for samples requiring antimony analysis.

[5] As an alternative, the USEPA has investigated hermetic sample devices that take and seal a single core sample. The sample is submitted as is to the laboratory where it is extruded into an extracting solvent. Samples must be received at the laboratory within 48 hours of sampling. (Note that replicate samples are necessary for bisulphate and methanol extraction for all samples plus laboratory duplicates and spikes.) Consult the laboratory for the number of samples required.

[6] The USEPA has approved field preservation. Pre-weighed vials containing known weights of methanol preservative (or aqueous sodium bisulphate if used for bromomethane) are sent to the field. Sample cores (approximately 5 g) are extruded directly into the vial. The vials are sealed, and submitted directly to the laboratory. In practice, this technique requires great care to prevent losses of methanol due to leaking vials or through splashing. Consult the laboratory for the number of containers required.

[7] Methanol-preserved samples may elevate the detection limit for bromomethane (VOC); a separate bisulphate-preserved sample or hermetically sealed sample may be submitted at the time of sampling if bromomethane is a chemical of concern – contact the laboratory to determine if a separate sample should be collected.

[8] For BTEX and PHC (F1) pre-charging the soil sampling container with methanol preservative is an accepted deviation from the CCME method.

[9] 1,4-Dioxane may be analyzed with the ABNs or VOCs; sample container requirements used for ABNs or VOCs are both acceptable. If 1,4-dioxane is to be analyzed with ABNs, follow the ABN sample container requirements; similarly if it is to be analyzed with VOCs, follow VOC sample container requirements. Consult the laboratory for the container type and the total number required (see also footnote #15).

[10] Samples containing visual sediment at the time of analysis should be documented and noted on the Certificate of Analysis or written report as results may be biased high due to the inclusion of sediment in the extraction.

[11] Field filter with 0.45µm immediately prior to adding preservative or filling pre-charged container.

[12] Sample directly into a HCl or H_2SO_4 preserved container, or add acid to an unfiltered sample immediately after sample collection in the field.

[13] Aqueous organic samples should be protected from light. If amber bottles are not available, glass should be wrapped in foil.

[14] Separate containers are required for each organic water analysis. Consult the laboratory for required volumes. Chloride and electrical conductivity can be taken from the same container.

[15] For 1,4-dioxane in soil and sediment, no preservative is required if processed as an ABN, however. Methanol is an acceptable alternative if processed as a VOC. For 1,4-dioxane in groundwater, no preservative is required, however, $NaHSO_4$ or HCl are acceptable alternatives.

[16] Preserved to reduce biodegradation, however effervescence/degassing may occur in some ground water samples. In this case, rinse preservative out three times with sample and submit to the laboratory as unpreserved.

[17] To achieve the 28-day holding time, use the ammonium sulfate buffer solution [i.e., $(NH_4)_2SO_4/NH_4OH$] or $(NH_4)_2SO_4/NH_4OH/NaOH + NaOH$] as specified in EPA Method 218.6 (revision 3.3, 1994) or Standard Methods 3500-Cr Chromium (2009).Using only NaOH without the ammonium sulfate buffer to adjust the pH would require analysis within 24 hours of sampling.

[18] Alternatively, to achieve a longer hold time, hermetic samples may be frozen within 48 hours of sampling as per ASTM method D6418 – 09; however, storage stability must be validated by the laboratory with no more than 10% losses.

[19] For benzo(a)pyrene in ground water samples filtration prior to analysis on a duplicate sample is permitted.

[20] For VOC, BTEX, F1 PHCs, 1,4 dioxane soil samples collected before July 1, 2011, the following sampling and handling requirements are also permitted.

SOIL Organic Parameters	**Container**	**Preservative**	**Storage Temperature**	**Preserved Holding Time**	**Unpreserved Holding Time**
VOC, BTEX, F1 PHCs, 1,4-dioxane*	glass jar, Teflon lined lid, no headspace, separate container required Hermetic samplers are an acceptable alternative	none field preservation with aqueous sodium bisulphate and methanol is an acceptable alternative	5 ± 3C	See notations 1-3 below	Stabilize by extraction or freezing within 48 hrs of receipt at the laboratory (7days from sampling). Frozen or field preserved samples must be extracted within 14 days of sampling.

*Special care must be used when sampling for VOC, BTEX and F1 in soil and sediment. Studies have shown that substantial losses can occur through volatilization and bacterial degradation. There are several allowable options for field collection of samples. Each is discussed below. Consult SW846, Method 5035A for additional detail. The laboratory is required to stabilize the sample on the day of receipt, either by extraction or freezing.

1. Collection in soil containers: To minimize volatilization losses, minimize sample handling and mixing during the process of filling the sample container. The bottle should be filled with headspace and voids minimized. Care is required to ensure that no soil remains on the threads of the jar, preventing a tight seal and allowing volatilization losses. To minimize losses through bacterial degradation, commence cooling of the samples immediately and transport the samples to the lab as soon as possible, ideally on the day of sampling. Samples must be received at the laboratory within 48 hours of sampling. Freezing can be used to extend the hold time to 14 days, however the practice is difficult to implement in the field and can cause sample breakage.
2. As an alternative, the USEPA has investigated hermetic sample devices that take and seal a single core sample. The sampler is submitted as is to the laboratory where it is extruded into the extracting solvent. Samples must be received at the laboratory within 48 hours of sampling. This technique minimizes volatilization losses and is worth consideration for critical sites. (Note that replicate samplers are necessary for bisulphate and methanol extraction for all samples plus lab duplicates and spikes). Consult the laboratory for the number of samplers required.

3 The USEPA has also approved field preservation. Pre-weighed vials containing known weights of methanol and aqueous sodium bisulphate preservative are sent to the field. Sample cores (≈5 g) are extruded directly into the vial. The vials are sealed, and submitted directly to the laboratory. In practice, this technique requires great care to implement successfully. Losses due to leaking vials, through splashing and effervescence (aqueous bisulphate) can easily occur and make the sample unusable. Consult the laboratory for the number of containers required.

SOP – EDR016 – REV003 – FIELD MEASUREMENT OF WATER QUALITY PARAMETERS

Title:	Field Measurement of Water Quality Parameters
Practice:	EDR
First Effective Date:	November 24, 2010
Version:	003
Version Date:	January 3, 2018
Author:	Paresh Patel
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 24, 2010	N/A	PDP
001	October 31, 2013	Cross-referenced low flow sampling SOP/Added section on O. Reg. 153/04 compliance	RLM
002	April 29, 2016	Updated Section 4.0	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
003	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for measuring water quality parameters during water sampling, and covers the calibration and use of multi-parameter and single-parameter probes for monitoring in situ water quality parameters in streams, down hole in monitoring wells and in flow-through cells. Water quality parameters may include temperature, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), conductivity and turbidity.

Measurements of water quality parameters are typically made for two main purposes: to provide information on water geochemistry to assist in designing in situ remediation programs and to assess whether representative formation groundwater is being sampled during low flow purging and sampling. They can also be used to assess whether well development is complete in certain situations (see SOP-EDR018).

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Reagents Required

- Single or multi-parameter probes for monitoring water quality parameters;
- Calibration solutions for calibrating the probes to the standard values;
- Field book or field forms;
- Distilled water;
- Beaker or bucket;
- Stirrer for DO measurement (optional); and
- Flow-through cell (optional).

5.2 Probe Measurement Accuracy

The probes utilized for measuring water quality parameters shall be capable of producing measurement accuracy greater or equal to the following specifications:

Temperature:	± 0.5 degrees Celsius (°C)
Conductivity:	± 1 microSiemens per centimetre (µS/cm)
pH:	±0.1 pH unit
Dissolved Oxygen:	±0.2 milligrams per litre (mg/L) up to20 mg/L
	± 0.6 mg/L greater than 20 mg/L
Turbidity:	±1% up to 100 Nephelometric Turbidity Units (NTU)
	±3% up to 100-400 NTU
	±5% up to 400-3,000 NTU
ORP:	± 20 millivolts (mV)

5.3 Probe Calibration

Calibrate the water quality probes used for field parameter measurement in accordance with the manufacturer's specifications. Wherever possible, arrange for the equipment rental company to calibrate the water quality probes and provide a calibration sheet that contains information such as calibration date and calibration measurements for each parameter. If the water quality probes are used for more than one day, a calibration check must be performed using standard calibration solutions at the start of each day at a minimum. If the calibration check shows deviations from the standard values that exceed the ranges provided below, the probe(s) that exceed the ranges must be calibrated prior to further use:

pH	±0.1 pH units
Specific Conductance	±3%
Temperature	±3%

DO	±10%
ORP	±10 mV
Turbidity	±10%

A calibration check should also be performed if the parameter measurements suggest that calibration drift has occurred. Document all calibration activities in the field notes, including date and time of calibration/calibration check, calibration solutions used, probe readings, and make, model and serial number of the instrument(s). Note that if the water quality probe manufacturer recommends more frequent calibration/calibration checks than specified above, the manufacturer's recommendations are to be followed.

Extra care must be taken to calibrate a multi-parameter probe to prevent cross-contamination. Specifically, following immersion of the probes into each calibration standard, all probes should be thoroughly rinsed in distilled water and the excess water shaken off or blotted dry with a lint-free wipe. Conductivity standards are much more sensitive to cross contamination/dilution than other standards, and prior to immersion in a conductivity standard, all probes should be thoroughly rinsed and completely dried with lint-free wipes. Besides being easily diluted, conductivity also affects other parameters (specifically DO), and the conductivity probe should always be the first probe calibrated. The following order for calibration of a multi-parameter probe is to be followed:

1. Specific Conductance;
2. pH;
3. DO; and
4. Turbidity.

There is no recommended order for calibration of other parameters.

5.4 Single-Parameter Probes

Prior to conducting field measurements, probe sensors must be allowed to equilibrate to the temperature of the water being monitored. Probe sensors have equilibrated adequately when the temperature reading has stabilized. Deployment of single-parameter probes will follow the following procedures:

5.4.1 Temperature

Whenever possible the temperature shall be measured in situ (i.e., within a stream, direct deployment in a monitoring well). When temperature cannot be measured in situ, it can be measured in a beaker or bucket. The following conditions must be met when measuring temperature within a beaker or bucket:

- The beaker or bucket shall be large enough to allow full immersion of the temperature probe. The beaker or bucket is to be rinsed with water from the well or stream being measured prior to obtaining the measurement;

- The probe must be placed in the beaker or bucket immediately before the temperature changes due to ambient conditions;
- The beaker or bucket must be shaded from direct sunlight and strong breezes before and during temperature measurement; and
- The probe must be allowed to equilibrate for at least 1 minute before temperature is recorded.

5.4.2 pH

Preferably, pH is measured in situ at the centroid of flow and at the mid-depth of a stream, or the mid-point of the well screen in a well. The pH probe must be allowed to equilibrate according to the manufacturer's recommendations before the pH value is recorded without removing the probe from the water.

If the pH cannot be measured in situ, it should be measured in a bucket or beaker using the procedures outlined above for measuring temperature.

5.4.3 Dissolved Oxygen

As for pH, it is preferable to measure DO in situ at the centroid of flow and at the mid-depth of a stream, or the mid-point of the well screen in a well. The DO probe must be allowed to equilibrate according to manufacturer's recommendations before the DO value is recorded without removing the probe from the water.

If DO cannot be measured in situ, it should be measured in a bucket or beaker using the procedures outlined above for measuring temperature.

Some types of DO probes require a sufficient flow of fresh water across the membrane to maintain the accuracy and precision of the DO measurement. When taking DO measurements in a bucket or beaker, either employ a stirrer, or physically move the probe in a gentle motion. Moving the probe in a gentle motion should also be completed when measuring DO in situ down hole in a monitoring well.

5.4.4 ORP

ORP shall be measured using the procedures outlined above for measuring pH. Note that changes in temperature directly affect ORP values and ORP should be measured as soon as possible after the probe has stabilized.

5.4.5 Turbidity

In situ turbidity shall be measured using the procedures outlined above for measuring pH.

If turbidity cannot be measured in situ, it can be measured with a probe in a bucket or beaker using the procedures outlined above for measuring temperature. Note that some turbidity measuring instruments do not use a probe, and a sample of the water is collected in a small vial that is inserted into the instrument which then measures the turbidity of the water.

5.4.6 Multi-Parameter Probe Use With A Flow-Through Cell

A multi-parameter probe and a flow-through cell are typically employed when undertaking low flow purging and sampling of groundwater. SOP-EDR023 describes the procedures to be followed when using a multi-parameter probe and a flow-through cell.

5.5 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following additional procedures must be undertaken:

- Thorough records of the calibration and calibration checks of the probes/instruments used for water quality parameter measurement must be kept, including any calibration sheets provided by the equipment supplier. The Quality Assurance/Quality Control section of the Phase Two ESA report requires a discussion of field equipment calibration, and equipment calibration records must be appended to the Phase Two ESA report; and
- If groundwater samples collected for a Phase Two ESA are not collected using low flow purging and sampling, which mandates the measurement of water quality parameters, water quality parameters must be measured (pH, temperature and specific conductance at a minimum) and the measurements included in the Phase Two ESA report. Ontario Regulation 153/04 does not provide specifics as to when or how these water quality parameter measurements are to be made but one set of measurements made at the conclusion of purging prior to sampling is the minimum requirement. These measurements can be made by filling a clean bucket or beaker with purge water and immersing the probes in the purge water.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

New Jersey Department of Environmental Protection, *Field Sampling Procedures Manual,* August 2005.

Commonwealth of Kentucky – Department of Environmental Protection, *Standard Operating Procedure – In Situ Water Quality Measurements and Meter Calibration,* January 1, 2009.

U.S Environmental Protection Agency – Science and Ecosystem Support Division, Athens, Georgia, *In Situ Water Quality Monitoring,* December 7, 2009.

U.S. Geological Survey, *National Field Manual for the Collection of Water-Quality Data: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 9, Chapters A1-A9,* Various dates.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR017 – REV006 – MONITORING WELL DEVELOPMENT

Title:	Monitoring Well Development
Practice:	EDR
First Effective Date:	November 23, 2010
Version:	006
Version Date:	January 3, 2018
Author:	Paresh Patel and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 23, 2010	N/A	PDP
001	June 15, 2013	Streamlined background section/Focused procedure on tasks that can be completed by Pinchin personnel/Provided step-by-step summary of field procedure	RLM
002	January 22, 2015	Incorporated procedures specific to Pinchin West into SOP	RLM
003	February 9, 2016	Revised overall procedure to include initial determination of well yield/Added reference to revised well development field forms/Provided guidance on assessing field parameter stabilization when developing wells where water or air were used during drilling	RLM
004	April 29, 2016	Updated Section 4.0	RLM
005	April 28, 2017	Removed references to Pinchin West	RLM
006	January 3, 2018	Modified Section 3.0 to allow well development to occur immediately after well installation under certain circumstances.	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for groundwater monitoring well development and provides a description of the equipment required and field methods.

All groundwater monitoring wells are to be developed following installation prior to groundwater sampling or the completion of hydraulic conductivity testing. In addition, previously installed groundwater monitoring wells that have not been purged in over one year should be redeveloped prior to additional sampling or hydraulic conductivity testing if there is evidence of sediment impacting the monitoring well (e.g., the depth to bottom of well measurement indicates sediment accumulation) or at the discretion of the Project Manager.

This SOP pertains to monitoring well development that can be undertaken by Pinchin personnel. Monitoring well development completed by drilling rigs is beyond the scope of this SOP.

3.0 OVERVIEW

The main objective of groundwater monitoring well development is to ensure that groundwater sampled from a well is representative of the groundwater in the formation adjacent to the well and that hydraulic conductivity testing provides data representative of the hydraulic characteristics of the adjacent formation.

The specific goals of well development include the following:

- Rectifying the clogging or smearing of formation materials that may have occurred during drilling of the borehole;
- Retrieving lost drilling fluids;
- Improving well efficiency (i.e., the hydraulic connection between the sand pack and the formation);
- Restoring groundwater properties that may have been altered during the drilling process (e.g., volatilization of volatile parameters due to frictional heating during auger advancement or use of air rotary drilling methods); and
- Grading the filter pack to effectively trap fine particles that may otherwise interfere with water quality analysis.

Monitoring well development should not be completed until at least 24 hours have elapsed following monitoring well installation to permit enough time for the well seal to set up, unless both of the following conditions are met:

- The well seal is entirely above the water table; and
- Surface runoff (e.g., from heavy rainfall or snow melt) is not occurring at the well location at the time of development.

Any deviation from this procedure must be approved by the Project Manager before proceeding.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

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- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

- Inertial pump (e.g., Waterra tubing and foot valve);
- Surge block for use with an inertial pump (Optional);
- Submersible pump (including pump controller and power supply) (Optional);
- Disposable bailer (Optional);
- Graduated pail (to contain purge water and permit the volume of groundwater purged to be tracked);
- Pails or drums for purge water storage prior to disposal;
- Well keys (if wells are locked);
- Tools to open monitoring well (T-bar, socket set, Allen keys, etc.);
- Interface probe;
- Equipment cleaning supplies (see SOP-EDR009);
- Field parameter measurement equipment (see SOP-EDR016) (Optional);
- Disposable nitrile gloves; and
- Field forms.

Pinchin typically employs inertial pumps or bailers for well development because they can be dedicated to each well. However, the use of submersible pumps is a viable alternative for developing deep wells with high well volumes at the discretion of the Project Manager.

5.2 Procedures

The well development procedures employed will be determined by the hydraulic conductivity of the formation in which the groundwater monitoring well is installed. For this SOP, a high yield well is defined as a well that cannot be purged to dryness when pumping continuously at a rate of up to 2 litres per minute (L/min) and a low yield well is defined as a well that can be purged to dryness when pumping continuously at a rate of up to 2 L/min or less. This threshold represents a “normal” pumping rate when hand pumping with an inertial pump.

The initial stage of well development (Stage 1) will apply to all wells and will involve the removal of up to one well volume, followed by an evaluation of the well yield. The procedures followed for Stage 2 of well development will be contingent on whether the well is determined to be a low yield or high yield well.

5.2.1 Well Development for Low and High Yield Wells - Stage 1

The initial procedure for developing a low yield or high yield monitoring well is as follows:

1. Decontaminate all non-dedicated monitoring and pumping equipment that will be used, including the interface probe and submersible pump (if used), in accordance with the procedures described in SOP-EDR009;
2. Review the well construction details provided in the borehole log, previous field notes or well construction summary table from a previous report. Determine the well depth, well stick up, screen length, depth to the top of the sand pack and diameter of the borehole annulus. If the well depth is unavailable, measure it with the interface probe;
3. Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well pipe) with an interface probe. If measurable free-phase product is present on the water table, record the depth to the top of the free-phase product and the depth to the free-phase product/water boundary (i.e., water level), and discuss this with the Project Manager before proceeding further;
4. Calculate the well volume. **Note that for the purpose of this SOP, there are two definitions of well volume depending on the province in which the project is being conducted.** For Ontario and Manitoba, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) plus the volume of water within the wetted length of the sand pack (sand pack volume). For British Columbia, Alberta and Saskatchewan, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) only.

   The volume of water in the well pipe is calculated as follows:

   Well Pipe Volume (litres) = h_w x π r_w^2 x 1,000 litres per cubic metre (L/m^3)

   Where $\pi = 3.14$

   h_w = the height of the water column in the monitoring well in metres (wetted length)

   r_w = the radius of the monitoring well in metres (i.e., half the interior diameter of the well)

   The volume of the sand pack in the monitoring well is calculated as follows:

   Sand Pack Volume (litres) = h_w x [(0.3 π r_b^2 x 1,000 L/m^3) – (0.3 π r_w^2 x 1,000 L/m^3)]

   Where 0.3 = the assumed porosity of the sand pack

h_w = the height of the water column in the monitoring well in metres (wetted length)

$\pi = 3.14$

r_b = the radius of the borehole annulus in metres

r_w = the radius of the monitoring well in metres

For Ontario and Manitoba projects, the following table provides well volumes in litres/metre for typical well installations:

Borehole Annulus Diameter (Inches/Metres)	Well Interior Diameter (Inches)	Well Pipe Volume (Litres/Metre)*	Well Volume (Litres/Metre)*
4/0.1	1.25	0.8	2.9
	1.5	1.1	3.2
	2	2.0	3.8
6/0.15	1.25	0.8	5.9
	1.5	1.1	6.1
	2	2.0	6.7
8.25/0.21	1.5	1.1	11.2
	2	2.0	11.8
10.25/0.26	1.5	1.1	16.7
	2	2.0	17.3

* Litres to be removed per metre of standing water in the well (wetted length).

If the borehole annulus and well interior diameters match one of those listed above, to determine the volume of one well volume simply multiply the number in the last column of the table by the wetted length in the well. For example, if a 2-inch diameter well installed in a 8.25-inch diameter borehole has 2.2 metres of standing water, one well volume equals 26.0 litres (2.2 metres x 11.8 litres/metre).

Note that the above well volume calculations apply only to wells where the water level in the well is below the top of the sand pack. If the water level is above the top of the sand pack, then the well volume is the volume of water in the sand pack and well pipe within the sand pack interval, plus the volume of water in the well pipe (i.e., well pipe volume) above the top of the sand pack.

For example, assume a 2-inch diameter well has been installed in a 8.25-inch diameter borehole to a depth of 6.0 metres below ground surface (mbgs), with a 3.05 metre long screen. The sand pack extends from 6.0 mbgs to 2.5 mbgs and the water level is at 1.85 mbgs. One well volume equals ([6.0 metres – 2.5 metres] x 11.8 litres/metre) + ([2.5 metres – 1.85 metres] x 2.0 litres/metre) or 42.6 litres.

For British Columbia, Alberta and Saskatchewan projects, the well volume is calculated using the conversion factor listed in the third column of the above table. For example, if there are 2.5 metres of standing water in a 1.5-inch diameter well, one well volume equals 2.75 litres (2.5 metres x 1.1 litres/metre);

5. Lower the pump into the well until the pump intake is approximately 0.3 metres above the bottom of the well. Remove half a well volume while pumping at a rate of approximately 1 to 2 L/min. Measure the depth to water after the half a well volume is removed. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations (e.g., sheen, odour, free-phase product, sediment content, clarity, colour, etc.); and
6. Move the pump intake upward to the middle of the water column (or middle of the screened interval if the static water level in the well is above the top of the screen). Remove half a well volume (for a cumulative total of 1 well volume) or purge until dry while pumping at a rate of approximately 1 to 2 L/min, whichever occurs first. Measure the depth to water after the half a well volume is removed unless dry. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations. Note that if suction is broken (indicating that drawdown to the pump intake depth has occurred), move the pump intake to the bottom of the well and continue purging.

After completing Step 6, review the water level data to assess whether the well is a low yield or high yield well. If the well is purged dry or close to dryness, or significant drawdown has occurred, then the well is a low yield well. If little or no drawdown has occurred then the well is a high yield well. Some judgement will be required by field personnel when classifying the well yield if moderate drawdown has occurred during removal of the first well volume.

5.2.2 Well Development for High Yield Wells - Stage 2

The procedure for the second stage of developing a high yield monitoring well is as follows:

1. Move the pump intake upward to near the top of the screened interval (or near the top of the water column if the water level is currently below the top of the screen). Remove half a well volume (for a cumulative total of 1.5 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump

intake depth and any pertinent visual/olfactory observations (e.g., sheen, odour, free-phase product, sediment content, clarity, colour, etc.);

2. Note that if the wetted length is short within a well (e.g., 1.5 metres or less), there will not be enough separation between pump intake depths to warrant pumping from three depths (i.e., near the bottom, middle and top of the water column). In this case, pumping from two depths (i.e., near the bottom and top of the water column) is sufficient;
3. Lower the pump intake until it is approximately 0.3 metres above the bottom of the well. Remove half a well volume (for a cumulative total of 2 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
4. Move the pump intake upward to the middle of the water column (or middle of the screened interval if the water level in the well is above the top of the screen). Remove half a well volume (for a cumulative total of 2.5 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
5. Move the pump intake upward to near the top of the screened interval (or near the top of the water column if the water level is currently below the top of the screen). Remove half a well volume (for a cumulative total of 3 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
6. If the purge water contains high sediment content after the removal of 3 well volumes, well development should continue by removing additional well volumes following the same procedure as above until the sediment content visibly decreases. If the purge water continues to have high sediment content after the removal of 2 additional well volumes (i.e., 5 well volumes in total), contact the Project Manager to discuss whether well development should continue. A cap of 10 well volumes removed is considered sufficient for high yield well development regardless of sediment content; and
7. Record the water level at the conclusion of well development.

Note that at the discretion of the Project Manager, when developing a monitoring well using an inertial pump, a surge block can be attached to the foot valve before completing Step 1 (i.e., the first time groundwater is pumped from near the top of the screened interval or water column) and then leaving it on the foot valve for the remainder of well development. A surge block is used to increase the turbulence created by pumping and enhance the removal of fine-grained material from the sand pack.

Note that the use of a bailer to develop a high yield well with a wetted interval greater than 2 metres is not recommended given that the depth from which groundwater is removed is difficult to control. However, a bailer can be used as a substitute for a surge block by raising and lowering it through the screened interval for approximately 5 to 10 minutes before the start of Step 1.

5.2.3 Well Development for Low Yield Wells - Stage 2

The procedure for the second stage of developing a low yield monitoring well is as follows:

1. Position the pump intake at the bottom of the well and purge the well to dryness if it was not purged to dryness during completion of Stage 1 at the maximum practical rate that is greater than 2 L/min. Allow sufficient time for the well to recover to at least 90% of the initial static water level or allow the well to recover for a period of time designated by the Project Manager; and
2. Repeat Step 1 until the well has been purged to dryness a minimum of 3 times. An exception to this is that if recovery is slow, and especially if sediment content is low, repeat purging (i.e., purging the well to dryness more than once) may not be necessary and the need for additional purging is to be discussed with the Project Manager. If the purge water contains high sediment content after purging to dryness 3 times, well development should continue by purging the well to dryness until the sediment content visibly decreases. If the purge water continues to have high sediment content after purging the well to dryness 2 additional times (i.e., purging the well to dryness 5 times in total), contact the Project Manager to discuss whether well development should continue. A cap of purging a well to dryness 10 times is considered sufficient for low yield well development regardless of sediment content.

As per the procedure for high yield well development, a surge block can be attached to the foot valve to increase the effectiveness of the pumping action. If a surge block is used, pumping should commence at the top of the water column in the well (instead of near the bottom of the well as described above) with the pump intake progressively lowered as the water level in the well decreases.

Note that bailers can be used in lieu of an inertial pump for the development of a low yield well. The turbulence created in a well by the act of dropping a bailer into it and then removing it full of groundwater can be effective in removing fine-grained material from the sand pack. If a bailer is left in a well, it should be “hung” above the water table to facilitate future water level monitoring.

5.2.4 Removal of Water Lost During Well Installation

When water has been used during well installation (e.g., for bedrock coring, to control heaving sands), the total volume of water required to be purged from a well during development will be equal to 3 times the estimated volume of water lost during drilling plus the volume of water that would normally be removed during well development.

For example, for a high yield well where 25 litres of water were lost during drilling and the well volume is 10 litres, the minimum amount of water to be purged during development is 105 litres (i.e., 3 times the volume of water lost during drilling [75 litres] plus a minimum of 3 well volumes [30 litres]).

For a low yield well, the well will need to be purged to dryness enough times to remove a volume equivalent to 3 times the volume of water lost during drilling plus the volume of water that would normally be removed during well development.

As an alternative to removing 3 times the volume of water lost during drilling, field parameter stabilization during well development can be used to assess whether sufficient water has been removed. For example, the conductivity of drill water (which is usually tap water) is typically much lower than groundwater, and conductivity measurements can act as a guide during development as to whether the water being removed is formation groundwater or drill water.

For assessing field parameter stability when developing a high yield well, field parameter measurements of pH, conductivity, temperature and oxidation-reduction potential are to be made after every half well volume is removed and stability is considered achieved if the field parameters are all within ±10% over 3 consecutive readings. Note that a minimum of 3 well volumes must be removed even if field parameter stabilization is achieved prior to the removal of 3 well volumes to comply with the minimum well purging requirements of this SOP (i.e., removal of a minimum of 3 well volumes from a high yield well).

For assessing field parameter stability when developing a low yield well, field parameter measurements of pH, conductivity, temperature and oxidation-reduction potential are to be made once each time a well is purged to dryness, approximately halfway through purging. For example, if based on the current water level it is estimated that 10 litres will be removed before a well is purged to dryness, the field parameters are to be measured after 5 litres have been removed. Stability is considered achieved if the field parameters are all within ±10% over 3 consecutive readings. After stabilization is achieved, continue to purge the well to dryness a final time at which point development is complete.

A second alternative would be to allow sufficient time for the drill water to dissipate into the formation. The appropriate amount of time will depend on the amount of water lost to the formation and the formation characteristics, but will be a minimum of one week. A Senior Project

Manager or Senior Technical Reviewer will be responsible for determining the suitability of this approach and the required length of time. At the discretion of the Senior Project Manager or Senior Technical Reviewer, field parameter measurements may be made during pre-sampling purging to assess whether the drill water has dissipated by the time of sampling.

Note that it can be difficult to estimate the amount of water lost during drilling. If the driller's water tank is accessible, measure the water levels in the water tank before and after drilling the well and then estimate the volume of water used during drilling using the water tank dimensions and subtract this volume from the volume of water recovered at the end of drilling from this volume to estimate the volume of water lost. If this is not possible, ask the driller to estimate the approximate volume of water lost during drilling.

For some well installations, determining even an approximate volume of water lost during drilling is not possible. In this situation, field parameter stabilization should be used as a guide in deciding how much water to remove during well development.

5.2.5 Development of Monitoring Wells Installed Using Air Rotary Drilling Methods

When developing a monitoring well installed using an air rotary drilling procedure, field parameter stabilization must be used to assess whether sufficient water has been removed and the field parameters measured must include dissolved oxygen. This is particularly important when the contaminants of concern at a site include volatile organic compounds (VOCs) as the use of compressed air during the drilling process can result in sparging of VOCs from the groundwater, resulting in groundwater samples that are biased low with respect to VOC concentrations.

The well development procedure is the same as described in Section 5.2.4, except that the field parameters measured are to include pH, conductivity, temperature, oxidation-reduction potential and dissolved oxygen. The criterion for determining field parameter stabilization for dissolved oxygen is ±10% over 3 consecutive readings or 3 consecutive readings with concentrations less than 0.5 milligrams per litre.

5.2.6 Assessing Field Parameter Stabilization

When determining whether field parameter stabilization has occurred over 3 consecutive readings (except for dissolved oxygen when using the less than 0.5 milligrams per litre over 3 consecutive readings criterion), the following procedure is to be followed:

1. For each parameter, use the first of the 3 readings and calculate 10% of this reading; and
2. The range that the next 2 readings must be within is ± 10% of the first reading.

For example, if the temperature of the first of 3 consecutive readings is 10º C, the next 2 readings must fall between 9 and 11 º C for temperature to be considered stable.

5.3 Well Development Record

Well development is to be documented through the completion in full of the following field forms located in the Pinchin Orchard:

- EDR-GW-Well Development-S1-Low/High Yield Well (completed for Stage 1 for both low and high yield wells);
- EDR-GW-Well Development-S2-Low Yield Well (completed for Stage 2 for low yield wells); and/or
- EDR-GW-Well Development-S2-High Yield Well (completed for Stage 2 for high yield wells).

Any deviations from this SOP along with the rationale for these deviations must be recorded on the EDR-GW-Well Development-S1-Low/High Yield Well form.

5.4 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

When developing a low yield well, the well must be purged to dryness a minimum of 3 times regardless of the recovery time unless reduced purging is authorized by the Qualified Person responsible for the Phase Two ESA.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, "*Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)",* April 2011.

9.0 APPENDICES

None.

SOP – EDR019 – REV004 – SOIL SAMPLE LOGGING

Title:	Soil Sample Logging
Practice:	EDR
First Effective Date:	August 03, 2013
Version:	004
Version Date:	January 3, 2018
Author:	Francesco Gagliardi and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 26, 2010	N/A	FG
001	October 31, 2013	Streamlined SOP to focus only on soil sample logging/Added O. Reg. 153/04 compliance section	RLM
002	April 29, 2016	Updated Section 4.0	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	Modified percentages of minor constituents in Section 5.1.3/Clarified when geotechnical terms can be used for soil logging in Section 5.2	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the methods used to describe the physical characteristics of soil samples collected during site investigations.

The methods and equipment used for retrieving soil samples are provided in other SOPs (e.g., SOP-EDR007 – Borehole Drilling) and will not be repeated herein.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 General Procedures

For each soil sample collected during a site investigation, the following information is to be recorded in the field log book or field forms in the order presented below:

- Depth;
- Primary soil texture;
- Colour;
- Minor constituents*;
- Noticeable odours;
- Noticeable staining;
- Noticeable free-phase product/sheen*; and
- Moisture content.

*These constituents only need to be noted if they are actually present in the sample.

5.1.1 Primary Soil Texture

The primary soil texture should be determined using the attached flow chart as a guide to help classify the soil.

5.1.2 Colour

Describe the primary colour of the soil sample (e.g., brown, grey, black, green, white, yellow, red). The relative lightness or darkness of the primary colour can be described using the adjectives "light" or "dark" as appropriate. Soil that exhibits different shades or tints is to be described by using two colours (e.g., brown-grey). If the soil sample contains spots of a different colour, this is to be described as "mottling" (e.g., grey with green mottling).

5.1.3 Minor Constituents

Note the presence of minor constituents in the soil that are "natural" materials (e.g., gravel, cobbles, sand, oxidation, etc.) or "man-made" materials (e.g., asphalt, brick, concrete, coal or glass fragments, coal ash, etc.). Gravel comprises particles between 5 millimetres (mm) and 75 mm in diameter. Cobbles comprise particles greater than 75 mm in diameter (approximately the size of a man's fist) and boulders are particles greater than 150 mm in diameter (approximately the size of man's head).

When the percentage of the minor constituents in the soil is between approximately 1 and 10%, the adjective used to describe the relative amount of the minor constituent is "trace" (e.g., silty sand with trace brick fragments).

When the percentage of minor constituents of soil is between approximately 10 and 20%, the adjective used to describe the relative amount of the minor constituent is “some” (e.g., silty sand with some concrete fragments).

When the percentage of the “natural” minor soil constituents is between approximately 20 and 35%, the minor soil type is described by adding a ‘y’ or ‘ey’ to the soil type (e.g., silty, sandy, clayey).

When the percentage of the “natural” minor soil constituents is also greater than 35%, the minor soil type is described by using “and” the soil type (e.g., sand and gravel, sand and silt).

When the percentage of the “man-made” minor soil constituents is between approximately 30 and 50%, describe the soil as per the normal procedure and add “with” the minor constituent type(s) (e.g., silty sand with coal ash and brick fragments).

5.1.4 Noticeable Odours

Field staff are not expected to directly smell soil samples to assess the presence/absence of odours.

If it is possible to identify the likely type of odour then this information should be recorded along with a comment on the severity of the odour (e.g., slight, strong, etc.). Identification of specific chemical compounds, such as petroleum hydrocarbons (PHCs) or solvents is acceptable; however, this identification should be referenced as “xxxx-like” (e.g., PHC-like, solvent-like, etc.). This principle also applies when describing staining and free-phase product.

If the odour cannot be readily identified, it should be described in the field notes as “unidentified odour”. If no noticeable odours are observed, this needs to be recorded in the field notes as “no odour”.

5.1.5 Noticeable Staining

Describe the colour and possible source of the staining (e.g., black PHC-like staining).

If no noticeable staining is observed, this needs to be recorded in the field notes as “no staining”.

5.1.6 Noticeable Free-Phase Product/Sheen

Describe the colour, odour, possible composition and relative viscosity (if sufficient product is present to assess) of the product (e.g., dark brown, viscous, motor oil-like product). Identification of the composition of the product is acceptable but needs to be described as PHC-like, motor oil-like. Alternatively, the product can be described as “resembling” a substance (e.g., “resembling motor oil”).

The presence of any observed iridescent sheen is to be recorded in the field notes. Note that the presence of an iridescent sheen by itself in the soil does not constitute the presence of free-phase product but may be an indicator that free-phase product is present within the vicinity of the borehole.

5.1.7 Moisture Content

Describe the moisture content of the soil sample using one of the following three terms:

- Dry – no visible evidence of water and the soil is dry to the touch;
- Moist – visible evidence of water but the soil is relatively dry to the touch. Do not use the term “damp” to describe this type of soil; and
- Wet – visible evidence of water and the soil is wet to the touch. Free water is evident when sandy soil is squeezed. Do not use the term “saturated” to describe this type of soil.

5.1.8 Recording Soil Sample Descriptions in Field Notes

Recording the information in the field notes consistently in the above order will make it easier to prepare the borehole logs for the site investigation report.

Example soil sample descriptions are as follows:

- Sand, grey, trace gravel, PHC-like odours, free-phase PHC-like product, wet;
- Silty sand, brownish-grey, some gravel, trace asphalt and brick fragments, no odours or staining, moist; and
- Silty clay, brown, trace gravel, no odours or staining, moist to wet at 2.4 mbgs.

5.2 General Considerations

Where any physical properties change within a soil sample, the depth at which this transition takes place needs to be recorded. For example, for a soil sample collected from 1.8 to 2.4 metres below ground surface (mbgs), if the upper 0.3 metres has no odours but PHC-like odours are present below this depth then the field notes need to state “no odours from 1.8 to 2.1 mbgs, PHC-like odours from 2.1 to 2.4 mbgs”.

Some soil samples will contain a thin seam of a different soil type, such as a sand seam within a silty clay. The depth interval of any such seam is to be recorded in the field notes, and the material comprising the seam should be described separately using the logging procedure outlined above.

Unless soil sampling is being completed as part of a combined environmental/geotechnical investigation and EDR staff logging the soil samples have the appropriate geotechnical training, avoid the use of geotechnical terms (e.g., stiff, dense, high plasticity, etc.) when logging soil samples. If any geotechnical terms are inadvertently included in the field notes by staff who have not had geotechnical training, they must not be included in the borehole logs provided in our report.

5.3 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

None. Following this SOP will be sufficient to comply with the Ontario Regulation 153/04 requirements for Phase Two ESAs with respect to field logging. Risk assessments completed in accordance with Ontario Regulation 153/04 will typically require soil samples to be submitted to a laboratory for full soil texture analysis, but this is beyond the scope of field logging.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

American Society for Testing and Materials, *ASTM D2487-11 - Standard Practice for Classification of Soils for Engineering Purposes (United Soil Classification System)*, 2011.

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)*, April 2011.

9.0 APPENDICES

Appendix 1 Soil Texture by Feel Chart

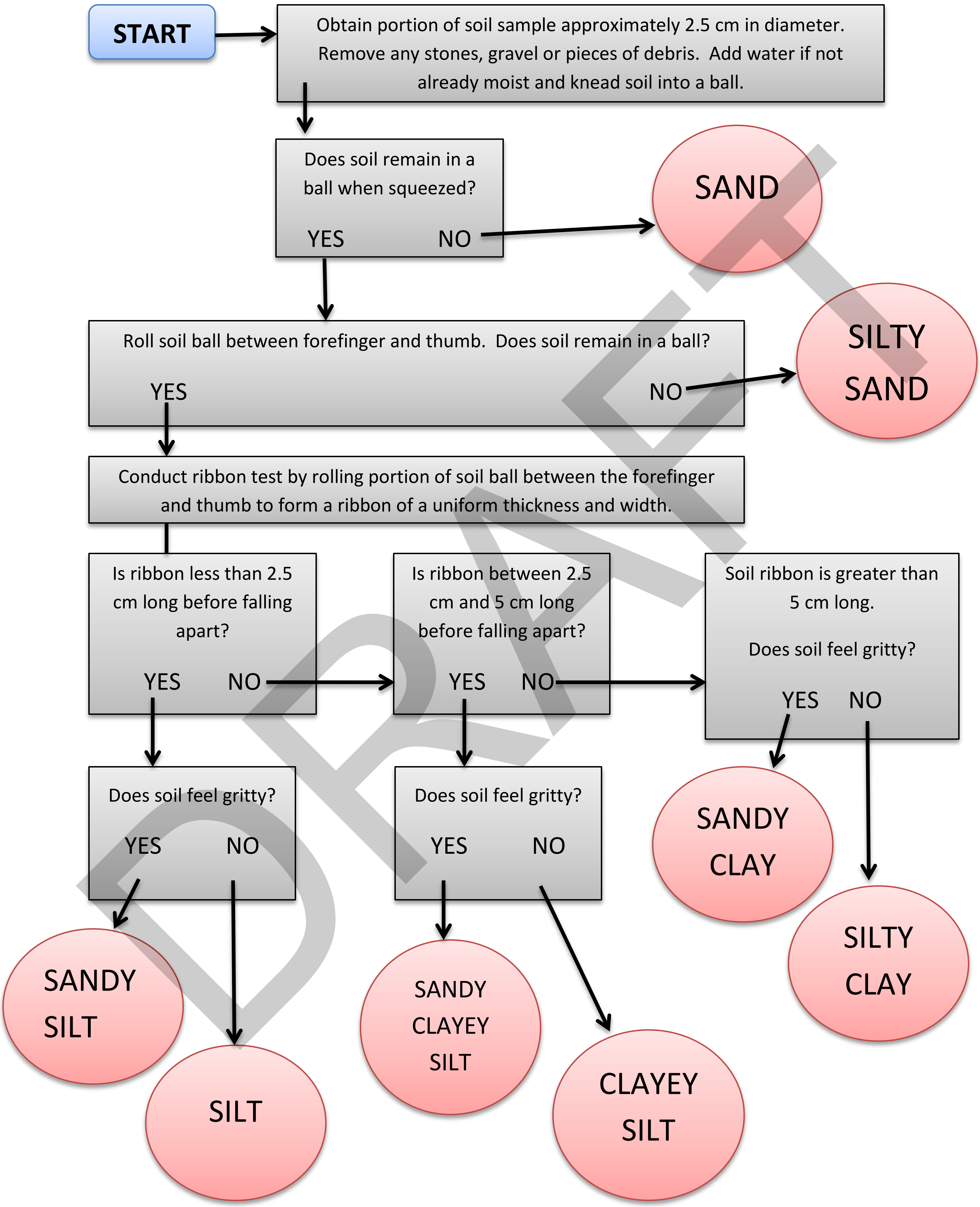
I:\2018 SOP Updates\SOP - EDR019 - REV004 - Soil Sampling Logging.docx

Template: Master SOP Template – February 2014

APPENDIX I

Soil Texture by Feel Chart

Key to Soil Texture by Feel



Obtain portion of soil sample approximately 2.5 cm in diameter. Remove any stones, gravel or pieces of debris. Add water if not already moist and knead soil into a ball.

Does soil remain in a ball when squeezed?

Roll soil ball between forefinger and thumb. Does soil remain in a ball?

Conduct ribbon test by rolling portion of soil ball between the forefinger and thumb to form a ribbon of a uniform thickness and width.

Is ribbon less than 2.5 cm long before falling apart?

Is ribbon between 2.5 cm and 5 cm long before falling apart?

Soil ribbon is greater than 5 cm long.

Does soil feel gritty?

Does soil feel gritty?

Does soil feel gritty?

SOP – EDR023 – REV006 – LOW FLOW GROUNDWATER SAMPLING

Title:	Low Flow Groundwater Sampling
Practice:	EDR
First Effective Date:	July 08, 2011
Version:	006
Version Date:	January 3, 2018
Author:	Paresh Patel and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	July 08, 2011	N/A	PDP
001	April 15, 2013	Streamlined background section/Provided step-by-step summary of field procedure/Added O. Reg. 153/04 compliance items	RLM
002	September 11, 2013	Added centrifugal submersible pump to list of pumps suitable for low flow sampling	RLM
003	January 26, 2015	Adjusted well development, sampling and field parameter measurement procedures to reflect Pinchin West practices.	RLM
004	April 29, 2016	Updated Section 4.0/Updated Section 5.3 to reflect current field documentation requirements and new document retention policy	RLM
005	April 28, 2017	Removed reference to Pinchin West/In Section 5.2, removed the requirement to complete a post-sampling water level and total purge volume, and added requirement to record pump intake depth at the time of sampling	RLM
006	January 3, 2018	Minor wording changes throughout	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for collecting groundwater samples from monitoring wells using low flow (low stress) sampling techniques and provides a description of the equipment required and field procedures.

Low flow sampling provides an alternative to the conventional groundwater purge and sampling technique using inertial pumps, submersible pumps and/or bailers, and emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water level drawdown, and by using low pumping rates during purging and sampling. Rather than removing a specified number of well volumes or purging a well to dryness a specified number of times prior to sampling, purging is completed at a low pumping rate until first, a stable water level is achieved, and second, field parameters such as pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), specific conductance and turbidity, which are monitored during purging, have stabilized indicating that representative formation groundwater is being purged. It is important that water level and field parameter stabilization are achieved prior to groundwater sampling as this indicates that fresh formation water is being purged and not stagnant groundwater from within the well itself.

Low flow groundwater sampling methods work best for moderate to high yield wells (i.e., wells installed in permeable soils such as sand, silty sand and some silts). For low yield wells (e.g., wells installed in silty clay), low flow groundwater sampling may not be suitable and alternate purging and sampling procedures will be required (see SOP-EDR008 for low yield well sampling procedures).

Conventional sampling can result in sediment entrainment in samples which can result in "positive bias" (i.e., reported concentrations greater than actual groundwater concentrations). This is particularly an issue with petroleum hydrocarbons (PHCs) in the F3 and F4 fraction ranges and polycyclic aromatic hydrocarbons (PAHs) and low flow sampling as per this SOP is strongly recommended when sampling for these parameters unless the hybrid sampling method described in SOP-EDR008 is employed.

This SOP is based primarily on the procedures described in the United States Environmental Protection Agency Region 1 document *"Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells"*, revised January 19, 2010.

3.0 OVERVIEW

The low flow sampling technique can be implemented for any size of monitoring well that can accommodate a positive lift pump or tubing assembly. Note that low flow sampling can be conducted for bedrock monitoring wells without well screens (i.e., with an open interval below the well casing) but for simplicity the screen interval or open interval will be referred to collectively in this SOP as the "screen interval".

Advantages of the low flow sampling technique over conventional groundwater sampling techniques include:

- Minimal disturbance at the sampling point, reducing the potential for sediment to be entrained during the purging process which can result in positive bias (elevated and unrepresentative concentrations) of parameters such as heavy fraction range PHCs and PAHs;
- Reduced operator variability resulting in greater operator control;
- Reduced purge water volumes resulting in reduced investigation derived waste disposal costs; and
- Improved sample consistency resulting in more representative (unbiased) and reproducible sample results.

Disadvantages of the low flow sampling technique over conventional groundwater sampling techniques include:

- Purging and sampling typically requires more time than conventional sampling methods;
- Use of non-dedicated equipment (e.g., submersible pumps) that requires cleaning before initial use and between monitoring well locations; and
- Overall project costs for low flow groundwater sampling programs are typically higher than groundwater sampling programs completed using conventional sampling methods.

It is imperative that the monitoring wells to be sampled are properly developed prior to conducting low flow groundwater sampling. This often includes redevelopment of previously installed wells that have not been sampled for a prolonged period of time (i.e., more than one year). During well development or redevelopment, the hydraulic characteristics of each well should be assessed to provide guidance on the suitability of using the low flow groundwater sampling procedure. Well development procedures are provided in SOP-EDR017.

When groundwater conditions are known, sample the background monitoring wells (i.e., outside of the impacted groundwater area) and wells with low concentrations of contaminants of concern first prior to sampling wells with known impacts. Leave impacted wells to the last to minimize the potential for cross contamination.

In Ontario and Manitoba, or where otherwise specified by provincial guidance documents, a peristaltic pump is not to be used for the collection of groundwater samples for analysis of volatile parameters (i.e., volatile organic compounds (VOCs) and PHCs F1 Fraction). When sampling for volatile parameters using low flow groundwater sampling methods, a bladder pump or centrifugal pump (collectively referred to herein as “submersible pumps”) must be used. A “hybrid” groundwater purging and sampling procedure using a peristaltic pump to undertake low flow groundwater sampling for non-volatile parameters as described in this SOP followed by conventional purging and sampling methods for volatile parameters is an acceptable alternative to using a bladder pump or centrifugal pump.

Peristaltic pumps cannot be used where the suction lift (i.e., vertical distance between the pump and ground level) is more than 8.5 metres (28 feet).

It is very important to maintain consistency in applying low flow groundwater sampling procedures to purging and sampling for each monitoring well and for each sampling event. Any deviation from the field procedures described in this SOP can induce variability in the analytical results.

Our primary objective is to obtain unbiased groundwater samples whose analytical results are representative of actual groundwater quality at the property being investigated.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

5.1.1 Documents and Information Gathering

The following documents and information are required to complete low flow groundwater sampling:

- A copy of the proposal or work plan;
- Monitoring well construction details;
- A copy of this SOP;
- Field data from the last sampling event (if available);
- Operation, maintenance and calibration manuals for the multi-parameter water quality meter;
- A site-specific Health and Safety Plan (as per the project requirements); and
- Client or site representative's contact details.

5.1.2 Extraction Devices and Tubing

This SOP will not discuss in detail the various pumps and tubing options that are available for completing low flow groundwater sampling. The following section provides some general guidelines for the use of this equipment and it is recommended that the equipment supplier be consulted when selecting the appropriate pump and tubing, taking into account site-specific parameters (e.g., well depth, well diameter, site accessibility) and the parameters that will be sampled.

5.1.3 Extraction Devices

For purging and sampling using the low flow sampling procedure, submersible pumps (e.g., centrifugal, bladder) and peristaltic pumps are the most commonly used extraction devices. Regardless of the type of extraction device used, the low flow sampling procedure requires precise control over the flow rate during purging and sample collection. A battery-operated pump controller is required to operate submersible pumps and to control the extraction flow rate. Peristaltic pumps have built-in flow rate adjusters.

Submersible pumps with internal parts constructed of stainless-steel or Teflon are preferred. If the internal parts are constructed of other materials, adequate information must be provided by the equipment supplier to show that the substituted materials do not leach contaminants nor cause interference to the analytical procedures to be used. The use of any such substituted materials must be approved by the Project Manager prior to the field program.

If a bladder pump is selected for the collection of samples for volatile parameters analysis, it should be capable of delivering a water volume sufficient to fill a VOC sample vial in one pulse.

5.1.4 Tubing

Teflon, Teflon-lined polyethylene or polyethylene 1/4-inch interior diameter (ID) or 3/8-inch ID tubing is to be used to connect to the pump and the flow-through cell. In the winter time, the use of 3/8-inch ID tubing is recommended to avoid groundwater freezing in the tubing during severe cold weather conditions.

If the tubing is constructed of other materials (other than mentioned above), adequate information must be provided to show that the substitute materials do not leach contaminants nor cause interference with the analytical procedures. The use of any such substituted materials must be approved by the Project Manager prior to the field program.

Direct sunlight and hot ambient air temperatures may cause groundwater in the tubing to heat up and de-gas resulting in loss of volatile parameters. When sampling under these conditions, the length of the tubing between the top of the monitoring well and the flow-through cell should be kept as short as possible to minimize exposure to sunlight or ambient air and heating of the groundwater.

5.1.5 Groundwater Monitoring, Purging and Sampling

The following equipment is required to complete the low flow purging and sampling procedure described in this SOP:

- Well keys;
- Interface probe;
- Assorted tools (e.g., knife, screwdriver, etc.);
- Equipment cleaning reagents required as per SOP-EDR009 (e.g., distilled water, phosphate-free detergent, etc.);
- Multi-parameter water quality meter (including calibration solutions);
- Graduated cylinder, graduated measuring cup or graduated bucket;
- Stopwatch;

- Flow-through cell;
- Peristaltic pump, centrifugal pump or bladder pump;
- Tubing;
- Pails or drums for storing purge water;
- Paper towels or wipes;
- Calculator;
- Field forms (see Section 5.3) and/or field notebook (hereafter the "field notes");
- Waterproof and permanent markers;
- Disposable gloves and appropriate personal protective equipment based on site-specific conditions;
- Cooler and ice packs;
- Sample bottles and labels. Several extra sample bottles of each type should be available in case of breakage or other problems; and
- Laboratory Chain of Custody forms.

The following equipment may be used during well sampling, in addition to the above:

- Disposable field filtration units/filters (if appropriate).

5.2 Low Flow Groundwater Sampling Procedures

The following is the summary of the procedures to be followed for low flow groundwater sampling:

1. Develop the monitoring wells to be sampled (if required) prior to sampling by removing between three and five well volumes or by purging them to dryness between one and three times. Further details regarding well development are provided in SOP-EDR017. Well development is to be completed for all newly installed wells prior to low flow sampling and may be required for previously installed monitoring wells that have not been sampled in more than one year. Ideally, well development should occur at least one day prior to low flow sampling. At the discretion of the Project Manager, low flow sampling can occur on the same day as the well is developed but the well must be allowed to fully recover to its original static level prior to the start of purging;
2. Decontaminate all non-dedicated monitoring and sampling equipment that will be used, including the interface probe, submersible pump (if used), water quality meter probes and flow-through cell in accordance with the procedures described in SOP-EDR009;

3. Calibrate the water quality meter used for field parameter measurement in accordance with the manufacturer's specifications. Wherever possible, arrange for the equipment rental company to calibrate the water quality meter and provide a calibration sheet that contains information such as calibration date and calibration measurements for each parameter. If the water quality meter is to be used for more than a one day, a calibration check shall be performed using standard calibration solutions at the start of each day at a minimum. If the calibration check shows deviations from the standard values that exceed the ranges provided in bullet 10 below, the instrument shall be calibrated prior to further use. A calibration check should also be performed during the course of purging and sampling if the parameter measurements suggest that calibration drift has occurred. Document all calibration activities in the field notes, including date and time of calibration/calibration check, calibration solutions used, probe readings and make, model and serial number of the water quality meter. Note that if the water quality meter manufacturer recommends more frequent calibration/calibration checks than specified above, the manufacturer's recommendations are to be followed. See SOP-EDR016 for additional procedures regarding water quality meter calibration.

   Extra care must be taken when calibrating the multi-parameter probe to prevent cross-contamination. Specifically, following immersion of the probes into each calibration standard, all probes should be thoroughly rinsed in distilled or de-ionized water and the excess water shaken off or blotted dry with a lint-free wipe. Conductivity standards are much more sensitive to cross contamination/dilution than other standards. Besides being easily diluted, conductivity standards also affect other parameters (specifically DO), and the conductivity probe should always be the first probe calibrated. The following order for calibration of a multi-parameter probe is to be followed:

   - Specific Conductance;
   - pH;
   - DO;
   - Turbidity; and
   - All other parameters (there is no recommended order for these parameters).

4. Review the well construction details provided in the well development forms, borehole logs or well construction summary table from a previous report. Determine the well depth, well stick up, length of the screen interval, and depth to the top of the screen interval. If the well depth is unavailable, measure it with the interface probe;

Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well casing) with an interface probe. If measurable free-phase product is present in the well, discuss this with the Project Manager before proceeding further. Using the known well depth, confirm that at least 0.6 metres of water is present within the well. If less than 0.6 metres of water is present, low flow sampling may not be appropriate and the Project Manager is to be contacted before proceeding further;

5. Following decontamination, slowly install the pump or tubing (for peristaltic pumps) to the appropriate depth within the well. Do not connect the pump discharge tubing to the flow-through cell at this time. If the water level in the well is above the top of the screen interval, the pump or tubing intake depth will be the mid-point of the screen interval. If the water level is below the top of the screen interval, the pump or tubing intake will be set at the mid-point of the wetted interval (i.e., the distance between the static water level and the bottom of the well) or 0.6 metres from the bottom of the well, whichever is a greater distance from the bottom of the well. Pumping from within 0.6 metres of the bottom of the well has a higher potential to entrain sediment from the bottom of the well and is not to be completed unless authorized by the Project Manager.

   The pump intake depth may vary from that described above at the discretion of the Project Manager depending on the specific purpose of the groundwater sampling program. For example, if chlorinated solvents that are denser than water are being assessed, it may be desirable to position the pump intake as close to the bottom of the well as possible, or if PHC-related parameters which are lighter than water are being assessed, it may be preferable to position the pump intake as close to the water table as possible. Pump intake depth should be confirmed with the Project Manager prior to the field program;

6. Turn on the pump and discharge groundwater into a purge bucket. Purge initially at a flow rate of approximately 250 millilitres/minute (mL/min). Increase or decrease the flow rate until the water level in the well reaches a steady state condition (i.e., a stabilized water level). The goal is to purge at as high a pumping rate as the well will sustain and still maintain a stabilized water level; however, purging rates should not exceed 500 mL/min during purging and sampling. Also, it is important that during the early phase of purging, emphasis should be put on minimizing pumping stress (i.e., rapid fluctuations in pumping rates).

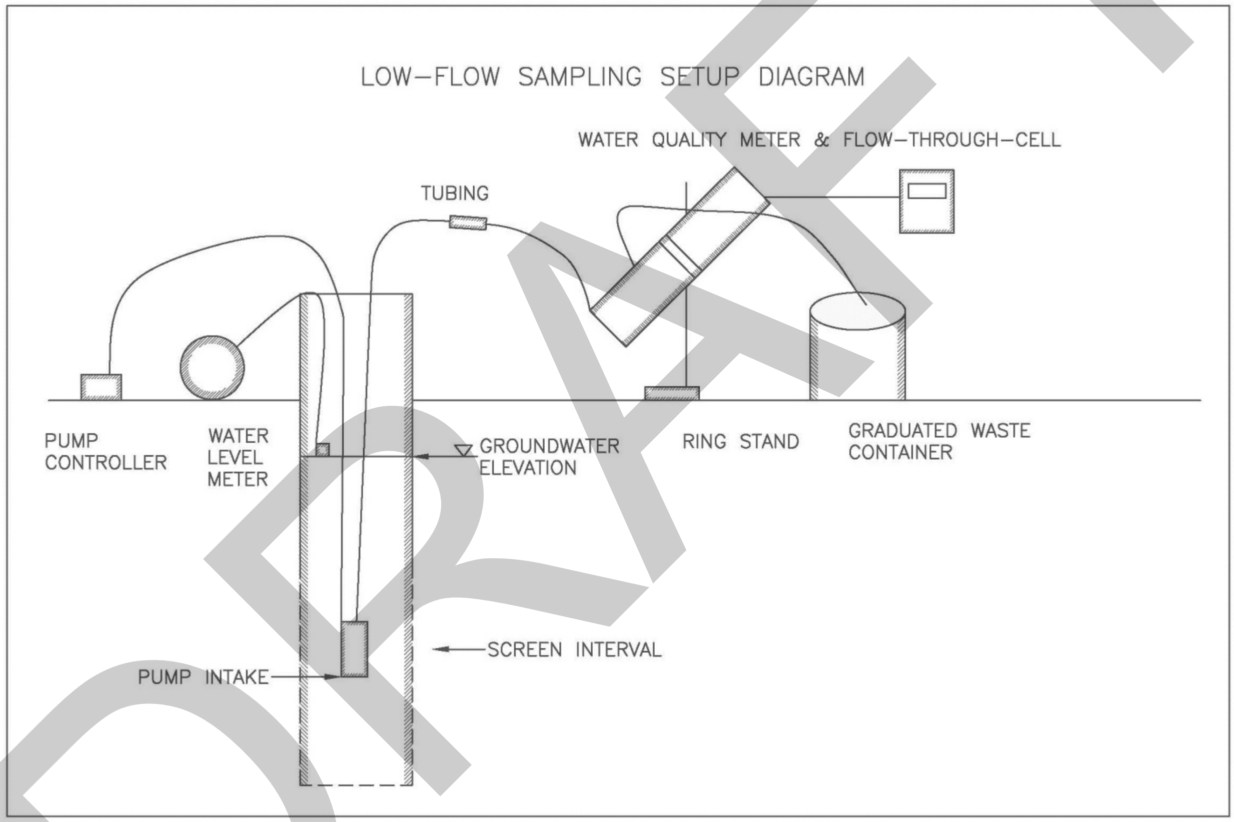
Whenever possible, purge at a pumping rate low enough to keep the total drawdown in the well to less than 10 centimetres although this may not be achievable for low to moderate yield wells. Once a steady state condition is achieved, the purge rate must be maintained constant and should not be changed. Determine the flow rate using a graduated bucket, graduated measuring cup or graduated cylinder and a stop watch. If the well is purged dry even after reducing the flow rate to the minimum practical purging rate of approximately 50 mL/min to 100 mL/min, then low flow sampling procedures will not work for the well and the sampling procedure described in SOP-EDR008 for sampling low yield wells is to be followed. During purging and sampling, it is important to keep the pump intake below the water level in the well at all times to avoid aeration of the groundwater;

7. If the visual appearance of the groundwater is highly turbid once a stabilized water level is achieved, continue to discharge purged water directly into the purge bucket until the groundwater clears, as highly turbid groundwater may foul the flow-through cell. Once the turbidity clears up, connect the flow-through cell to the pump discharge tubing. If the groundwater remains highly turbid after approximately 15 minutes of purging, contact the Project Manager to discuss whether sampling should occur. Further well development may be required to remove excess sediment from the monitoring well before sampling can proceed;
8. Confirm the volume of the flow-through cell excluding the volume of the water quality meter probes. If this information is not readily available, fill the cell with water with the water quality probes inserted and empty its contents into a graduated cylinder or measuring cup to determine the volume. After connecting the discharge tubing to the flow-through cell, continue purging until the flow-through cell is full and turn on the multi-parameter meter. Record the initial field parameter readings in the field notes. At a minimum, the field parameters that are to be monitored are pH, specific conductance, temperature, DO and ORP. The monitoring of turbidity is also a minimum requirement in Ontario and Manitoba. Field parameter readings are to be obtained at a frequency of no less than once every 5 minutes. Obtaining field parameter readings at a spacing of greater than 5 minutes apart may be required if the volume of the flow-through cell is large or pumping occurs at a low rate (e.g., 50 or 100 mL/min). For example, if the flow-through cell has a volume of 300 mL and the pumping rate is 50 mL/min, it will take 6 minutes for the volume of water equivalent to the flow-through cell volume to pass through the cell and field parameter readings should be taken 6 minutes apart. If the pumping rate for the same flow-through cell is 100 mL/min, although it will take only 3

minutes for the volume of water equivalent to the flow-through cell volume to pass through the cell, field parameter readings are to be taken at 5 minute intervals.

Figure 1 shows a typical low flow groundwater sampling set up using a submersible pump. The set up when using a peristaltic pump is similar except that the only part of the extraction system in the well is tubing that is connected to the peristaltic pump at the ground surface (i.e., there is no pump mechanism within the well), and a second section of tubing connects the discharge of the peristaltic pump to the flow-through cell.

Figure 1: Low Flow Sampling Set Up Diagram



Reference: USEPA Region I EQASOP-GW 001, July 30, 1996, Revised January 19, 2010.

Air bubbles in the flow-through cell can result in inaccurate field parameter measurements, in particular for DO. If air bubbles appear in the flow-through cell, check that the discharge tubing is properly connected to the flow-through cell and check that the pump intake is located below the water table by confirming the pump intake depth and checking the water level in the well. If air bubbles persist in the flow-through cell, position the flow-through cell at a 45-degree angle with the ports facing upwards. This configuration should keep any gas bubbles entering the cell away from the multimeter probes and allow the air bubbles to exit the cell easily;

9. Regardless of the frequency of field parameter readings, purging is to be completed until field parameter stabilization is achieved, which occurs when the field parameter measurements for <u>all</u> of the parameters are within the following ranges for <u>three consecutive</u> sets of readings:

pH	±0.1 pH units
Specific Conductance	±3%
Temperature	±3%
DO	±10% for values greater than 0.5 milligrams per litres (mg/L), or three consecutive values less than 0.5 mg/L
ORP	±10 millivolts
Turbidity	±10% for values greater than 5 Nephelometric Turbidity Units (NTUs), or three consecutive values less than 5 NTU

10. Check the water level in the well during purging a minimum of once every 10 minutes to confirm that steady state conditions are being maintained. Although not mandatory, more frequent water level measurements can be made (e.g., at the time of each set of water quality parameters). Reduce the pumping rate if the water level measurements indicate that drawdown is occurring. Confirm the new pumping rate as per Step 7 and record it in the field notes;
11. Record the time of all water level and field parameter measurements in the field notes;
12. Should field parameter stabilization not occur within one hour of the start of purging, contact the Project Manager to discuss whether to continue purging to attempt to achieve field parameter stabilization or whether to proceed with groundwater sample collection. The Project Manager will consider the total volume of water purged to this point and may

deem it suitable to collect the groundwater sample if, for example, three or more well volumes in total have been purged despite the lack of field parameter stability. Note that achieving stabilization of some parameters is more important with respect to certain contaminant types. For example, the stabilization of DO readings is important for volatile parameter sampling because fluctuations in DO concentrations may indicate that the groundwater is being aerated during the purging process which could result in volatile loss from the groundwater samples;

13. Following field parameter stabilization, disconnect the tubing from the flow-through cell and collect the groundwater samples by filling the appropriate laboratory-supplied sample containers directly from the discharge tubing. Note that it is important not to sample groundwater that has passed through the flow-through cell. If pumping at a moderate to high pumping (i.e., > 200 mL/min), the pumping rate should be reduced to prevent overfilling or the splashing of preservatives out of the sample containers. The order of sample collection should be most volatile parameters to least volatile parameters as follows:

    - VOCs and PHCs F1 Fraction;
    - PHCs F2-F4 Fraction;
    - PAHs and Base/Neutral/Acid Extractables;
    - Metals and Inorganics; and
    - Polychlorinated Biphenyls and Organochlorine Pesticides.

    Special Notes for Volatile Parameter Sampling

    When collecting samples for volatile parameter analysis (i.e., VOCs and PHCs F1 Fraction), the tubing must be filled completely and must not contain air bubbles prior to sample collection. If this is observed, increase the pumping rate slightly prior to sample collection until the tubing is filled and/or there are no longer any air bubbles, and then collect the sample. When collecting the groundwater samples for volatile parameter analysis, the sample vials should be tilted to avoid agitation and bubbling to minimize the potential for volatilization.

    Special Notes for Metals Sampling

    Groundwater samples collected for metals analysis will require filtering prior to preservation if dissolved metals concentrations are sought. Depending on the type and diameter of the discharge tubing used, in-line filters can be used for field filtering. Disposable filtration kits (e.g., Nalgene 0.45 micron filters) can also be used for field filtering. When collecting samples in containers that are pre-charged with preservatives, care must be taken not to overfill the containers as some of the preservative may be lost which will result in the sample not being properly preserved. Also, sample containers for metals analysis typically have a fill line marked on the container and the container must not be filled to above this line as this will cause dilution of the preservative and the sample may not be properly preserved.

If field filtering cannot be completed, then the groundwater samples are to be collected in sample containers that do not contain preservatives, and the analytical laboratory is to be instructed to filter and preserve the samples immediately upon receipt. The procedure and necessary equipment required to filter and preserve metals samples using the low flow methods should be discussed with the Project Manager prior to mobilization to the field; and

14. Record the pump intake depth at the time of sample collection. Remove the pump and/or tubing from the well and decontaminate the sampling equipment.

5.3 Fieldwork Records

The purging and sampling of a monitoring well using the low flow groundwater sampling procedure described in this SOP are to be documented through the completion in full of the following field forms located in the Pinchin Orchard:

- EDR-GW-Low Flow Sampling; and
- EDR-GW-Water Quality Parameters.

Any deviations from this SOP along with the rationale for these deviations must be recorded on the forms.

Upon completion of the sampling event, the field notes must be submitted to the Project Manager for review. The field notes must also be scanned and a copy of the scan placed in the project folder on the server.

5.4 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following must be undertaken:

- Calibration checks <u>must</u> be made for the water quality meter used for field parameter measurements at the frequency specified in Step 3 of Section 5.2. Records of the calibration checks must be kept and appended to the Phase Two ESA report;

- At least one field duplicate groundwater sample must be collected for every ten samples submitted for analysis. The frequency is one for one to 10 samples, two for 11 to 20 samples, etc. for all parameters analyzed. For example, even if only one groundwater sample is collected for PAHs analysis, a duplicate of this sample must be collected; and
- When sampling for VOCs, one trip blank sample must be submitted to the laboratory for VOCs analysis for each submission to the laboratory. In other words, if a groundwater sampling program lasts three days and samples are submitted to the laboratory at the end of each day, there must be a total of three trip blanks submitted with the samples (i.e., one per day of sampling). Note that analysis of trip blank samples for other volatile parameters (e.g., PHCs (F1 Fraction)) is not mandatory but can be completed at the discretion of the Qualified Person.

In addition, low flow groundwater sampling using a bladder pump or centrifugal pump should be completed whenever well yields are high enough to permit it for all Phase Two ESAs undertaken to support the filing of a Record of Site Condition. This will minimize potential issues the Ministry of the Environment and Climate Change may have regarding the representativeness of the groundwater analytical data.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

U.S. Environmental Protection Agency Region I, *Low Stress ('low flow') Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells,* EQASOP-GW 001, July 30, 1996, Revised January 19, 2010.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

PINCHIN

SOP – EDR025 – REV004 – QA/QC SAMPLING

Title:	QA/QC Sampling
Practice:	EDR
First Effective Date:	January 17, 2014
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	January 17, 2014	N/A	RLM
001	June 26, 2014	Amended blind duplicate sampling requirements	RLM
002	April 29, 2016	Updated Section 4.0/Amended O.Reg. 153/04 trip blank requirements	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	In Section 5.2.6, clarified order of regular investigative sample and duplicate sample collection	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for collecting soil, water and sediment samples for quality assurance/quality control (QA/QC) purposes.

A QA/QC program is essentially a management system that ensures that quality standards are met within a stated level of confidence. The QC component of the program comprises daily activities in the field and laboratory that are used to control the quality of both the samples collected and the sample analytical data. The QA component of the program is made up of measures used to determine whether the QC activities are effective.

When completing a site investigation, one of our primary goals is to obtain analytical data that are representative of actual soil, water and/or sediment conditions at the site. The completion of a QA/QC program, consisting of the collection and analysis of various QA/QC samples, provides information for use in evaluating the accuracy of the analytical data used to assess the environmental quality of the site.

The type and number of samples comprising the QA/QC program will be determined by the Project Manager on a site-by-site basis, but will typically include at a minimum a trip blank when collecting water samples for volatile parameter analysis and duplicate soil, water or sediment samples. Other types of QA/QC samples may be collected (e.g., equipment or field blanks) to meet project-specific requirements at the discretion of the Project Manager or to meet regulatory requirements.

The QA/QC sampling requirements and procedures for indoor air, soil vapour and sorbent tube samples are described in SOP-EDR012, SOP-EDR018 and SOP-EDR027, respectively.

3.0 OVERVIEW

The types of samples collected for the QA/QC program during site investigations may include the following:

- Trip blanks;
- Field blanks;
- Equipment blanks; and
- Field duplicates.

Trip blanks are used to assess whether ambient air conditions may have resulted in positive bias of water samples collected for volatile parameter analysis during transportation of the sample containers to and from a project site. Note that the term “positive bias” means that reported sample concentrations are greater than actual in situ sample concentrations due to some form of “cross-contamination”.

Field blanks are collected to assess whether ambient air conditions may have resulted in positive bias of samples collected at a project site for volatile parameter analysis at the time of sampling.

Equipment blanks are collected to assess the efficiency of non-dedicated monitoring/sampling equipment cleaning procedures.

Duplicate samples are collected to assess whether field sampling and laboratory analytical methods are suitable and reproducible.

The analytical results of the QA/QC samples are reviewed by the Project Manager to assess whether any data quality issues are evident which may affect the interpretation of the soil, water and/or sediment sample analytical data.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

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5.0 PROCEDURE

5.1 Equipment and Supplies

The equipment/supplies required for QA/QC sample collection are the same as that used for regular investigative sampling, except for the following:

- Volatile organic compound (VOC)-free distilled water supplied by the analytical laboratory for use in the collection of field blanks and/or equipment blanks;
- Additional sample jars supplied by the analytical laboratory for the collection of field blanks, equipment blanks and field duplicates; and
- Trip blanks supplied by the analytical laboratory.

5.2 QA/QC Sampling Procedures

5.2.1 General Procedures for QA/QC Blank Sampling

The analytical laboratory that will be completing the analysis of the regular investigative samples and QA/QC samples for a project must supply the water used to collect field blanks and equipment blanks. Water provided by another analytical laboratory or store-bought distilled water must not be used.

5.2.2 Trip Blanks

A trip blank is a set of VOC sample vials filled by the analytical laboratory with VOC-free distilled water and shipped with the sample containers. A trip blank is to be stored with the sample containers provided by the analytical laboratory during travel to the project site, while on the project site, and during travel from the project site back to the analytical laboratory. The sample containers comprising a trip blank are not to be opened in the field.

For some projects, submissions of volatile parameter samples to the analytical laboratory over several days will be required. In this case, a trip blank sample should accompany each submission to the laboratory. If this situation is anticipated, the Project Manager must request that the analytical laboratory provide sufficient trip blanks so that a trip blank can accompany the submission of each set of samples to the laboratory.

Trip blanks are to be analyzed for the same volatile parameters (i.e., VOCs and/or petroleum hydrocarbons (PHCs) (F1 fraction)) as the regular investigative samples. For example, if the groundwater sampling program includes analysis of VOCs and PHCs (F1-F4 fractions), then the trip blank(s) require analysis of VOCs and PHCs (F1 fraction). If the groundwater sampling program only includes VOC analysis, then the trip blank(s) require analysis of VOCs only.

Unless specified by the Project Manager, trip blanks are not required for soil and sediment sampling, or for water sampling involving only non-volatile parameters. At the discretion of the Project Manager and to meet project-specific requirements, trip blanks for non-volatile parameters can be prepared and analyzed using the same principles as for volatile parameter trip blanks.

5.2.3 Field Blanks

A field blank is a set of VOC sample vials filled during a sampling event at a project site with VOC-free distilled water supplied by the analytical laboratory and submitted for analysis of volatile parameters (i.e., VOCs and/or PHCs (F1 fraction)).

Field blanks are to be collected at a sample location considered "worst case" with respect to ambient air conditions (e.g., adjacent to and downwind of the pump island of an active retail fuel outlet, inside an active on-the-premises dry cleaner, etc.). At project sites where there is no obvious "worst case" ambient air location, the field blank can be collected at a sampling location picked randomly. The field blank collection location and rationale for selecting it must be documented in the field notes.

If a groundwater sampling event at a project site occurs over more than one day, a field blank is to be collected for each day of sampling.

Some project sites may have an isolated area where the ambient air conditions are significantly poorer than the remainder of the site and a field blank collected from this area may not be representative of conditions elsewhere on the site. In this case, at the discretion of the Project Manager, the collection of two field blanks may be appropriate, with one field blank collected from the poor ambient air area and one field blank collected from a location outside of this area.

Unless specified by the Project Manager, field blanks are not required for soil and sediment sampling, or for water sampling involving only non-volatile parameters. At the discretion of the Project Manager and to meet project-specific requirements, field blanks for non-volatile parameters can be collected and analyzed using the same principles as for volatile parameter field blanks.

5.2.4 Equipment Blanks

An equipment blank is collected by pouring VOC-free distilled water supplied by the analytical laboratory either over or through non-dedicated sampling/monitoring equipment that has been cleaned following sampling/monitoring using the procedures outlined in SOP-EDR009. The resulting rinsate is then captured in sample containers appropriate for the intended analysis. Note that the surface over which the distilled water is poured must be the surface from which samples are collected from or that is in contact with the medium being monitored. For example, if an equipment blank is being collected from a split-spoon sampler, the distilled water must be poured through the interior of the sampler, and not the exterior of the sampler.

The Project Manager will be responsible for determining the sampling/monitoring equipment from which equipment blanks will be obtained, the number of equipment blanks and the parameters to be analyzed. Regarding the latter, the parameters analyzed for equipment blanks are typically the parameters of concern for a given project site.

5.2.5 Evaluation of Blank Sample Results

The Project Manager will evaluate the results of the blank sample analysis to assess whether these results show that bias may have been introduced to investigative samples collected during the field sampling activities. Judgement by the Project Manager will be required to assess whether the blank sample results have any effect on the interpretation of the investigative sample results. This is assessed on a case-by-case basis, but the following general principles can be applied:

- If all soil, groundwater and/or sediment samples collected for a site investigation meet the applicable environmental standards/criteria, the presence of detectable or elevated parameter concentrations in the blanks has no effect on the interpretation of the investigative sample results;
- If parameters have detectable or elevated concentrations in the blank samples but none of these parameters are present in the regular investigative samples at concentrations exceeding the applicable environmental standards/criteria, the blank sample results have no effect on the interpretation of the investigative sample results;
- If parameters have detectable or elevated parameter concentrations in the blank samples and one or more of these parameters are present in the regular investigative samples at concentrations exceeding the applicable environmental standards/criteria, then positive bias of the regular investigative samples may have occurred. The Project Manager will need to assess a number of variables, including the relative parameter concentrations in the blank and regular investigative samples, to determine whether the regular investigative sample data are considered representative and usable for assessing the environmental quality of the site. If the regular investigative sample data are questionable, then resampling may be required; and
- If the regular investigative samples have exceedances of the applicable environmental standards/criteria and the blank samples have non-detectable parameter concentrations, the blank sample results have no effect on the interpretation of the investigative sample results.

5.2.6 General Procedures for QA/QC Duplicate Sampling

Whenever possible, duplicate samples are to be collected from "worst case" sample locations. The reason for this is that Relative Percent Differences (RPDs) are calculated using the analytical results of the duplicate and regular investigative samples to evaluate the suitability and reproducibility of field sampling and laboratory analytical methods. However, RPDs for a given parameter can only be calculated if there are detectable concentrations in both samples, and "worst case" sample locations are the most likely to have detectable levels of parameters of concern. The calculation and evaluation of RPDs is discussed at the end of this section.

When filling sample containers, the order of collection is to fill the sample container for a particular parameter or parameters for the regular investigative sample first and then fill the sample container for the same parameter or parameters for the duplicate sample second. For example, if groundwater was being sampled for PAHs and metals and a duplicate sample was required, the order of filling the sample containers would regular investigative sample for PAHs, duplicate sample for PAHs, regular investigative sample for metals and duplicate sample for metals.

5.2.7 Field Duplicate Samples – Soil/Sediment

Soils/sediments are frequently heterogeneous because they are typically deposited in horizontal layers over time, causing both small scale and large scale grain size variations that can often result in significant variations in contaminant concentrations between layers. Because of this, it is important that duplicate soil/sediment samples be collected from the same vertical depths as the regular investigative samples in sample cores or at discrete sampling locations (e.g., grab samples).

When collecting a duplicate soil/sediment sample from a sampling device that provides a soil core (e.g., dual-tube sampler, split-spoon sampler), the soil core is to be split in half vertically (i.e., longitudinally). A portion of one half of the core is used for the regular investigative sample and a portion of the other half of the core is used for the duplicate sample. The portion of each core placed in sample jars for analysis must be obtained from the same depth interval within the cores.

When collecting a duplicate soil/sediment sample from a grab sample (e.g., excavation floor or sidewall), the field duplicate sample must be collected as close as possible to the regular investigative sample location at the sample depth and within the same soil layer.

There are no special procedures for collecting field duplicates of composite soil/sediment samples given that the soil/sediment is homogenized during the composite sample collection procedure.

A field duplicate soil/sediment sample must be collected at the same time as the regular investigative sample. Retroactively splitting a soil/sediment sample to obtain a field duplicate sample is not permitted.

5.2.8 Field Duplicate Samples – Surface Water/Potable Water/Groundwater

There are no special procedures for collecting surface water/potable water/groundwater field duplicate samples with the following exceptions:

- When collecting a duplicate water sample for metals analysis and field filtering is required, a new filter is to be used to collect the duplicate sample unless the groundwater has a low sediment content; and
- When collecting a duplicate surface water sample, the sample containers for the same parameter(s) should be immersed in the surface water body at the same location and at the same time whenever possible.

5.2.9 Duplicate Sample Labelling

The duplicate sample should have the term "DUP" in the sample identifier to distinguish it as a duplicate sample.

5.2.10 Evaluation of Duplicate Sample Results

Duplicate sample results are evaluated by calculating RPDs using the following equation:

$$\text{RPD} = \frac{\text{Absolute Value (Original Concentration – Duplicate Concentration)}}{\text{(Original Concentration + Duplicate Concentration)/2}} \text{ X } 100\%$$

RPDs are not calculated unless the parameter concentrations in both the regular investigative sample and duplicate sample are detectable concentrations above the corresponding practical quantitation limit (PQL) for the parameter, which is equal to five times the lowest laboratory reportable detection limit (RDL).

For example, if the RDL for a parameter is 0.1 parts per million (ppm), and the concentration in the regular investigative sample is 0.4 ppm and the concentration in the duplicate sample is 0.6 ppm, the RPD cannot be calculated because the concentration in the regular investigative sample (0.4 ppm) is less than the PQL of 0.5 ppm (5 times the RDL of 0.1 ppm).

Also, if the regular investigative sample concentration is 2 ppm and the duplicate sample concentration is <1 ppm, then the RPD cannot be calculated regardless of the PQL since detectable concentrations were not reported for both samples.

Calculated RPDs for the regular investigative and field duplicate samples are compared to established performance standards to evaluate the suitability and reproducibility of field sampling and laboratory analytical methods. In Ontario, the Ontario Ministry of the Environment and Climate Change (formerly the Ontario Ministry of the Environment) provides duplicate sample performance standards in the document *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the*

Environmental Protection Act, dated March 9, 2004, amended as of July 1, 2011. Although these performance standards only strictly apply to laboratory duplicate samples, they are considered suitable for comparison to field duplicate samples. Other provinces provide their own similar guidance.

When calculated RPDs exceed the performance standards, the Project Manager will evaluate whether these results have any effect on the interpretation of the investigative sample results. This is judged on a case-by-case basis, but in many situations RPD values above the performance standards can be attributed to small scale heterogeneity inherent in soil samples or variations in the quantity of sediment in groundwater or surface water samples, and are not indicative of poor field sampling or laboratory procedures. The results of internal laboratory QA/QC sampling may provide additional information as to the precision of the data. Furthermore, if all soil, water and/or sediment samples collected for a site investigation meet the applicable environmental standards/criteria, the apparent lack of precision shown by elevated RPD values should not affect the interpretation of the investigative sample results.

Sometimes a regular investigative sample will meet the applicable environmental standards/criteria and its corresponding duplicate sample will fail the applicable environmental standards/criteria (or vice versa). In Ontario, it is permitted to average the parameter concentrations of two samples provided they are collected at the same time and from the same sample location and depth. The resulting average parameter concentrations are then compared with the applicable standards to determine whether the sample meets or fails the standards. This approach is not acceptable in all jurisdictions. In situations where averaging is not acceptable to the regulatory agency, the "worst case" sample result is to be used in assessing the environmental condition of the project site.

5.3 Fieldwork Records

The field notes must include the following information with respect to QA/QC samples:

- The date and time of sampling for all blank/duplicate samples;
- The sample location for field blanks and the rationale for selecting the field blank locations;
- The type of equipment from which a rinsate was collected for equipment blanks and the parameters to be analyzed; and
- The corresponding regular investigative sample location/sample interval for duplicate samples and the parameters to be analyzed.

5.4 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two ESA in accordance with Ontario Regulation 153/04, the QA/QC sampling program must consist of the following as a minimum:

- At least one field duplicate soil, sediment or groundwater sample must be collected for every ten samples submitted for analysis. The frequency is one duplicate sample for one to 10 regular investigative samples, two duplicate samples for 11 to 20 samples, etc. for all parameters analyzed. For example, even if only one groundwater sample is collected for PAHs analysis, a duplicate of this sample must be collected.

When sampling for VOCs, one trip blank sample must be submitted to the laboratory for VOCs analysis for each submission to the laboratory. In other words, if a groundwater sampling program lasts three days and samples are submitted to the laboratory at the end of each day, there must be a total of three trip blanks submitted with the samples (i.e., one per day of sampling). Note that analysis of trip blank samples for other volatile parameters (e.g., PHCs (F1 Fraction)) is not mandatory but can be completed at the discretion of the Qualified Person.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

Ontario Ministry of the Environment and Climate Change, *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 9, 2004, as amended as of July 1, 2011.

Water, Air and Climate Change Branch, Ministry of Water, Land and Air Protection, Province of British Columbia, *British Columbia Field Sampling Manual*, 2003.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR025 - REV004 - QA QC Sampling.docx

Template: Master SOP Template – February 2014

APPENDIX C

Borehole Logs

Log of Borehole: MW-1

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

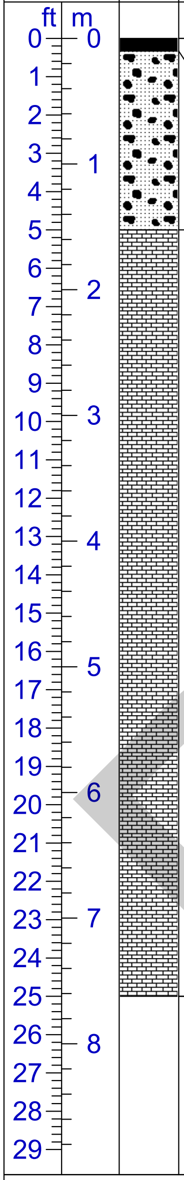
Client: The Great-West Life Assurance Company

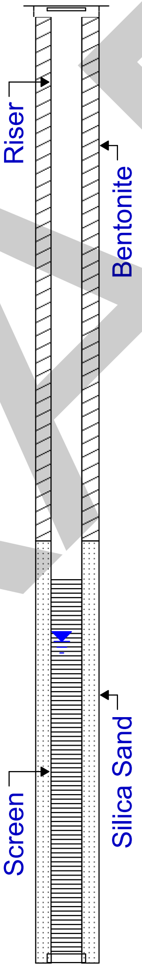
Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 1, 2018

SUBSURFACE PROFILE

SAMPLE





Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
Ground Surface	0.00					
Asphalt						
Sand and Gravel - Fill Brown, damp.			30	SS1	0/0	
	1.52		30	SS2	0/1	Metals, PHCs, PAHs, VOCs, pH
Limestone	7.62					
End of Borehole		Water level measured at 5.07 mbgs on November 13, 2018.				

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Air Rotary

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 100.29

Top of Casing Elevation: 100.19

Sheet: 1 of 1

Log of Borehole: MW-2

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

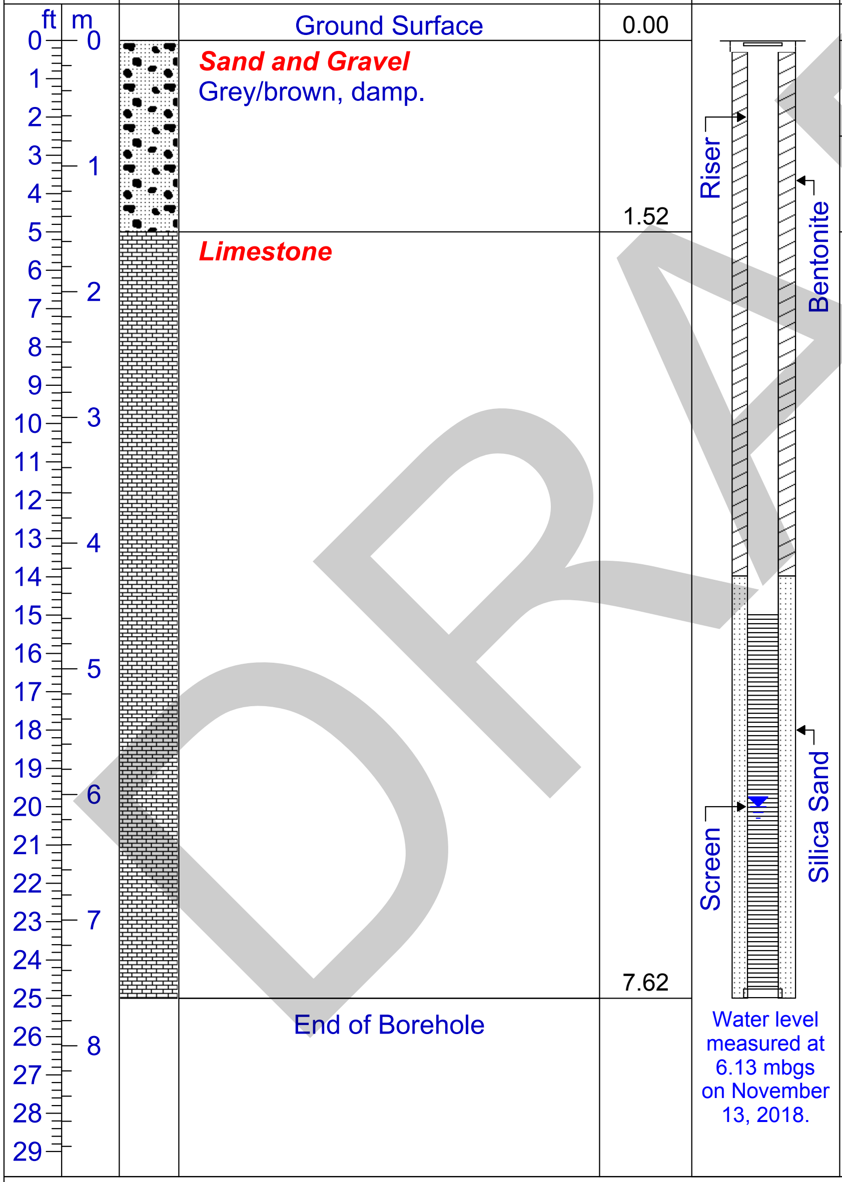
Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 1, 2018

SUBSURFACE PROFILE / SAMPLE

Depth	Symbol	Description	Measured Depth (m)	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft / m: 0 / 0		Ground Surface	0.00				
0–5 ft / 0–1.52 m		***Sand and Gravel*** Grey/brown, damp.		30	SS1	0/1	
			1.52	30	SS2	0/1	Metals, PHCs, PAHs, VOCs
5–25 ft / 1.52–7.62 m		***Limestone***	7.62				
		End of Borehole					



Water level measured at 6.13 mbgs on November 13, 2018.

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Air Rotary

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 100.17

Top of Casing Elevation: 100.28

Sheet: 1 of 1

Log of Borehole: MW-3

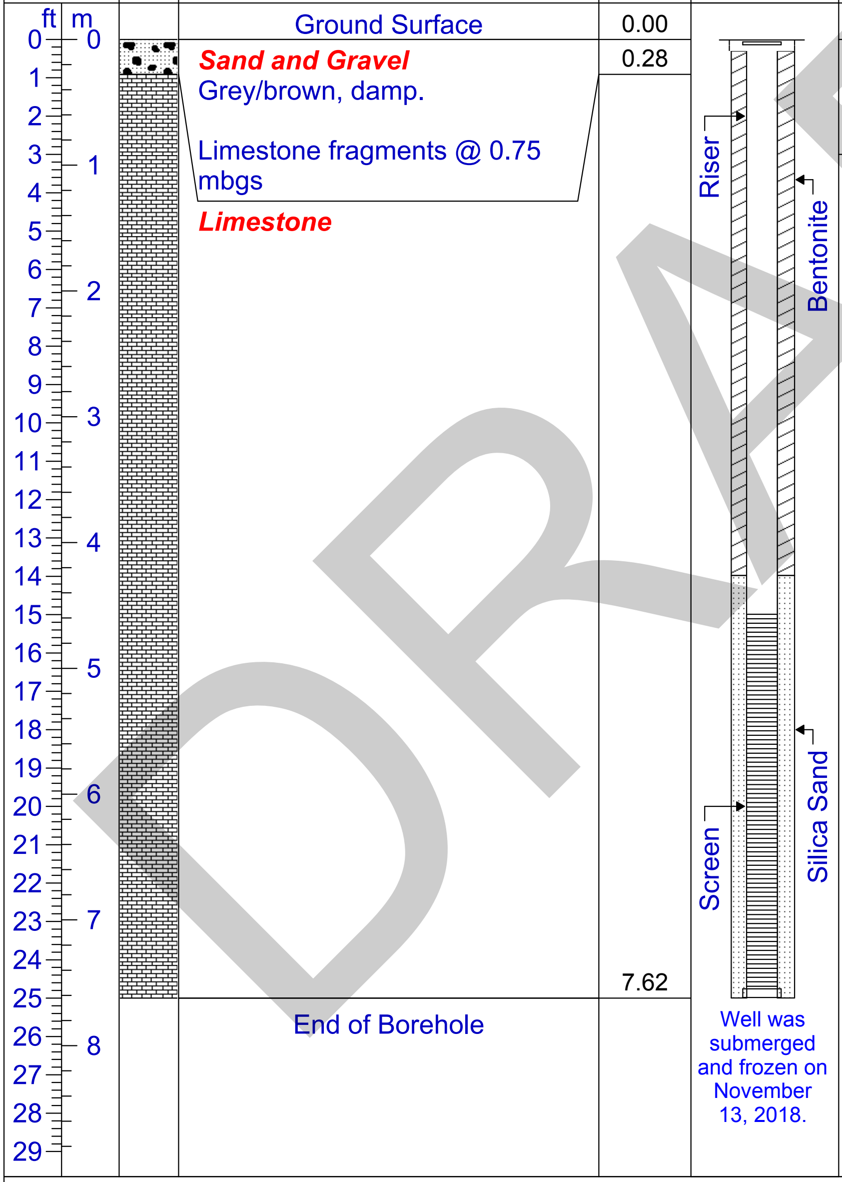
Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 1, 2018



SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
		Ground Surface	0.00					
		Sand and Gravel Grey/brown, damp. Limestone fragments @ 0.75 mbgs	0.28		30	SS1	0/1	PHCs, VOCs, PAHs
		Limestone						
		End of Borehole	7.62	Well was submerged and frozen on November 13, 2018.				

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Air Rotary

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW-4

Project #: 230236.002 ***Logged By:*** MK

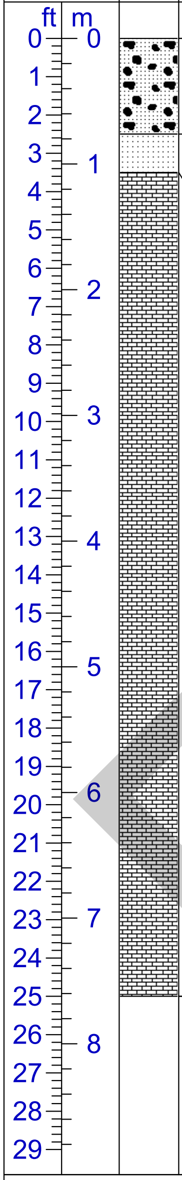
Project: Phase II Environmental Site Assessment

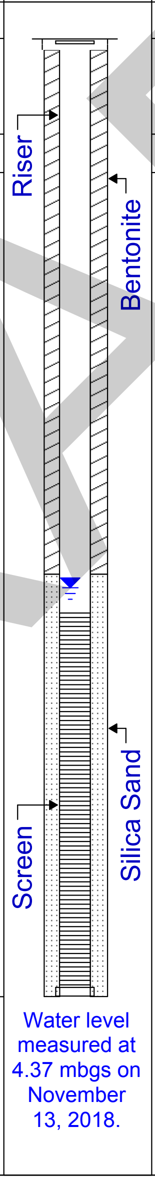
Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE | **SAMPLE**





Water level measured at 4.37 mbgs on November 13, 2018.

SUBSURFACE PROFILE		SAMPLE			
Description	Measured Depth (m)	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
Ground Surface	0.00				
Sand and Gravel With brick fragments, damp.	0.76	50	SS1	0/2	PHCs, VOCs, PAHs, Metals
Fill Sand, brick and glass.	1.07	20	SS2	0/1	
Limestone	7.62				
End of Borehole					

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon / Air Rotary

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 100.81

Top of Casing Elevation: 100.70

Sheet: 1 of 1

Log of Borehole: MW-5

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

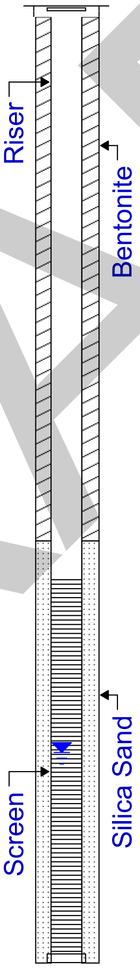
Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft 0 / m 0		Ground Surface	0.00					
		Asphalt						
		Sand and Gravel Grey/brown.			50	SS1	0/2	PHCs, VOCs, PAHs, Metals, Grain Size
					50	SS2	0/3	
		Limestone	1.52					
		End of Borehole	7.62					

Depth scale: ft 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29; m 0, 1, 2, 3, 4, 5, 6, 7, 8



Water level measured at 5.95 mbgs on November 13, 2018.

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon / Air Rotary

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 100.46

Top of Casing Elevation: 100.56

Sheet: 1 of 1

Log of Borehole: BH-6

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft 0 m 0		Ground Surface	0.00					
	■	**Asphalt**	0.15	No Monitoring Well Installed				
1, 2	▨	**Sand and Gravel** Grey/brown, damp.			50	SS1	0/1	
3, 4, 5 m 1	▨		1.52		80	SS2	0/3	PHCs, VOCs, PAHs, Metals, pH
6, 7, 8, 9, 10 m 2, 3		End of Borehole Due to refusal on Bedrock.						

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: BH-7

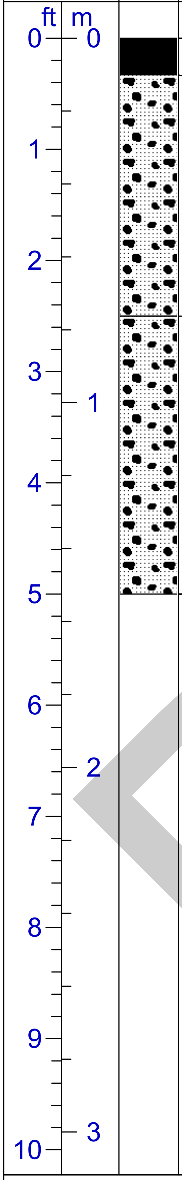
Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018



SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
		Ground Surface	0.00					
		Asphalt	0.10					
		Sand and Gravel With wood fragments, damp, black staining, no odours.	0.76	No Monitoring Well Installed	50	SS1	0/3	PHCs, VOCs, PAHs, Metals, pH
		Sand and Gravel Brown/grey, with silt, damp.	1.52		50	SS2	0/1	
		End of Borehole Due to refusal on Bedrock.						

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: BH-8

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft m 0 0		Ground Surface	0.00					
	■	**Asphalt**	0.10	No Monitoring Well Installed				
1 2	▨	**Sand and Gravel** Brown, with some silt and organics, damp.	0.84		50	SS1	0/1	PHCs, VOCs, PAHs, Metals
3 1 4 5		End of Borehole Due to refusal on Bedrock.						

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NA

Top of Casing Elevation: NA

Sheet: 1 of 1

PINCHIN

Log of Borehole: BH-9

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft m		Ground Surface	0.00					
ft: 0 1 2 3 4 5 6 7 8 9 10 m: 0 1 2 3	▨	***Sand and Gravel*** Brown, damp.		No Monitoring Well Installed	50	SS1	0/2	
					50	SS2	0/1	
					50	SS3	0/2	
			3.29		50	SS4	0/2	PHCs, VOCs, PAHs, Metals, pH, Grain Size
ft: 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 m: 4 5 6 7 8		End of Borehole Due to refusal on Bedrock.						

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: BH-10

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft 0 / m 0		Ground Surface	0.00	No Monitoring Well Installed				
	■	***Asphalt***	0.10		45	SS1	0/2	PHCs, VOCs, PAHs, Metals, pH
	▨		0.76					
ft 3 / m 1	▨	***Sand and Gravel*** Brown/black, with limestone fragments thoughout, damp.	1.68		85	SS2	0/1	
ft 6 / m 2		End of Borehole Due to refusal on Bedrock.						
ft 10 / m 3								

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

PINCHIN

Log of Borehole: BH-11

Project #: 230236.002 **Logged By:** MK

Project: Phase II Environmental Site Assessment

Client: The Great-West Life Assurance Company

Location: 320 McRae Avenue, 1976 Scott Street, 311 and 316 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: November 2, 2018

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm)(HEX/IBL)	Laboratory Analysis
ft m 0 0		Ground Surface	0.00					
	■	**Asphalt**	0.05	No Monitoring Well Installed	75	SS1	0/2	PHCs, VOCs, PAHs, Metals
1 2	▨	**Sand and Gravel** Brown, with large stones, damp.	0.76					
3 1 4 5		End of Borehole Due to refusal on Bedrock.						

Contractor: Strata Drilling Group

Drilling Method: Direct Push / Split Spoon

Well Casing Size: 5.08 cm

Note:
Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: BH101

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft 0 / m 0		Ground Surface	0.00					
	■ ▨	***Concrete*** ***Sand and Gravel*** Brown, damp, no odours.	0.76	No Monitoring Well Intalled	80	BH101 SS1	30/1.0	PHCs, VOCs, PAHs, Metals
		End of Borehole Refusal at 0.76 mbgs on Inferred Bedrock.						

ft: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

m: 0 1 2 3 4

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH102

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface	0.00	No Monitoring Well Intalled				
	▨	***Concrete***	0.15					
1	⁘	***Sand and Gravel*** Brown, trace silt, damp, no odours.			50	BH102 SS1	20/1.0	
3 / 1			1.22			BH102 SS2	30/1.0	PHCs, VOCs, PAHs, Metals
4		End of Borehole Refusal at 1.22 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH103

Project #: 230236.006 ***Logged By:*** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft 0 / m 0		Ground Surface	0.00	No Monitoring Well Intalled				
	▨	***Concrete***	0.15		50	BH103 SS1	5/6.0	PHCs, VOCs, PAHs, Metals
1 ft	▒	***Sand and Gravel*** Grey, moist, organic-like odour.	0.46					
2 ft		End of Borehole Refusal at 0.46 mbgs on Inferred Bedrock.						

Depth scale: ft 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; m 0, 1, 2, 3, 4

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH104

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m 0 0		Ground Surface	0.00	No Monitoring Well Intalled				
	■	***Concrete***	0.15					
	▨	***Sand and Gravel*** Damp, black staining, PHC-like odour.	0.76		40	BH104 SS1	1500/973	PHCs, VOCs, PAHs, Metals
		End of Borehole Refusal at 0.76 mbgs on Inferred Bedrock.						

ft: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

m: 0 1 2 3 4

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH105

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m 0 0		Ground Surface	0.00	No Monitoring Well Intalled				
	▩	***Concrete***	0.15					
1 2	▒	***Sand and Gravel*** Brown, moist, no odours.	0.76		80	BH105 SS1	20/2.0	PHCs, VOCs, PAHs, Metals
3 1 4 5 6 2 7 8 9 3 10 11 12 13 4 14 15 16		End of Borehole Refusal at 0.76 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH106

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 19, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m 0 0		Ground Surface	0.00	No Monitoring Well Intalled				
	■	**Concrete**	0.15		75	BH106 SS1	40/1.6	
1 2 3 1 4	▨	**Sand and Gravel** Brown, moist, no odours.	1.22			BH106 SS2	50/1.0	PHCs, VOCs, PAHs, Metals
5 6 2 7 8 9 3 10 11 12 13 4 14 15 16		End of Borehole Refusal at 1.22 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH107

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 20, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m 0 0		Ground Surface	0.00					
	▇	***Concrete***	0.15					
1 2	▒	***Sand*** Brown, trace gravel, damp, no odours.		No Monitoring Well Intalled	80	BH107 SS1	5/0.0	
3 1 4	▒					BH107 SS2	30/0.0	
5 6	▒	Some brick fragments and large gravel at 1.22 mbgs.			40	BH107 SS3	60/0.0	
2 7 8	▒		2.59			BH107 SS4	75/0.0	PHCs, VOCs, PAHs, Metals
9 10 3 11 12 13 4 14 15 16		End of Borehole Refusal at 2.59 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH108

Project #: 230236.006 **Logged By:** MK

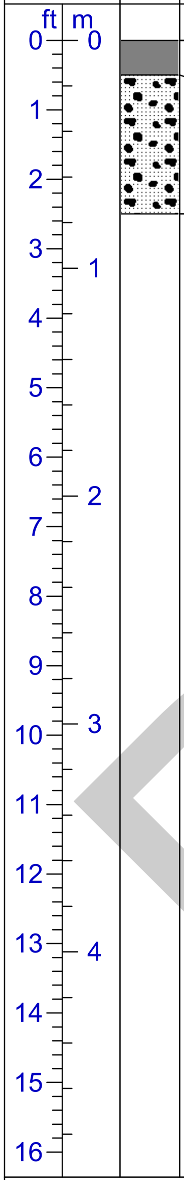
Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 20, 2020

SUBSURFACE PROFILE / SAMPLE



Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
		Ground Surface	0.00	No Monitoring Well Intalled				
		Concrete	0.15					
		Sand and Gravel Fill Brown, damp, no odours.	0.76		75	BH108 SS1	25/1.0	PHCs, VOCs, PAHs, Metals
		End of Borehole Refusal at 0.76 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

PINCHIN

Log of Borehole: BH109

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 20, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m		Floor Surface	0.00					
0 0		***Concrete***	0.15	No Monitoring Well Intalled				
1		***Sand and Gravel Fill*** Brown, damp, brick fragments throughout, no odours.			80	BH109 SS1	20/0.0	
2						BH109 SS2	40/0.0	
3 1								
4		Black colouration at 1.52 mbgs.			50	BH109 SS3	50/0.0	PHCs, VOCs, PAHs, Metals
5								
6								
7 2						BH109 SS4	50/0.0	
8			2.59					
9		End of Borehole						
10 3								
11		Refusal at 2.59 mbgs on Inferred Bedrock.						
12								
13 4								
14								
15								
16								

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: MW110

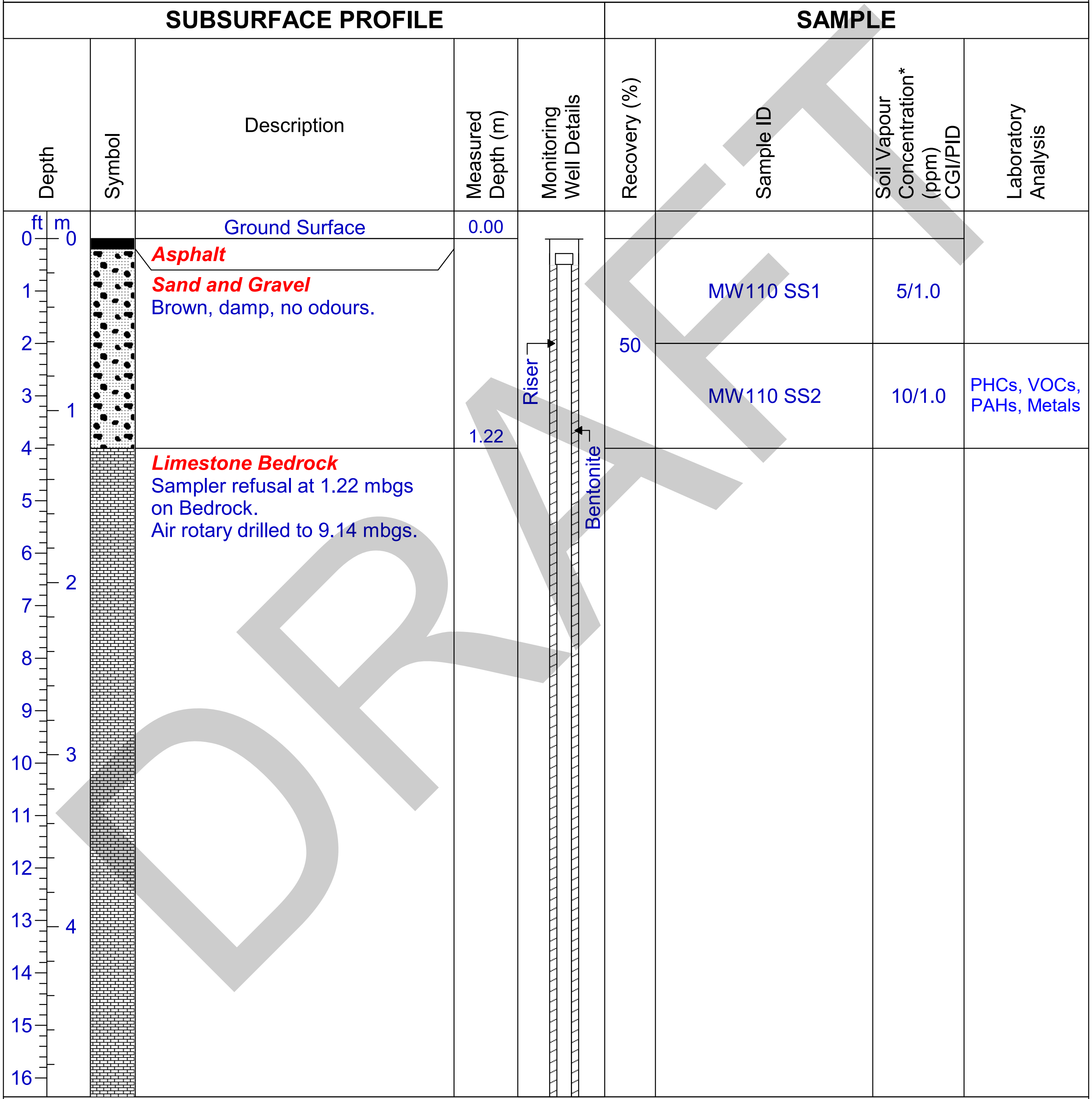
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 21, 2020



SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
		Ground Surface	0.00					
		Asphalt						
		Sand and Gravel Brown, damp, no odours.			50	MW110 SS1	5/1.0	
			1.22			MW110 SS2	10/1.0	PHCs, VOCs, PAHs, Metals
		Limestone Bedrock Sampler refusal at 1.22 mbgs on Bedrock. Air rotary drilled to 9.14 mbgs.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 64.52 mamsl

Top of Casing Elevation: 64.37 mamsl

Sheet: 1 of 2

Log of Borehole: MW110

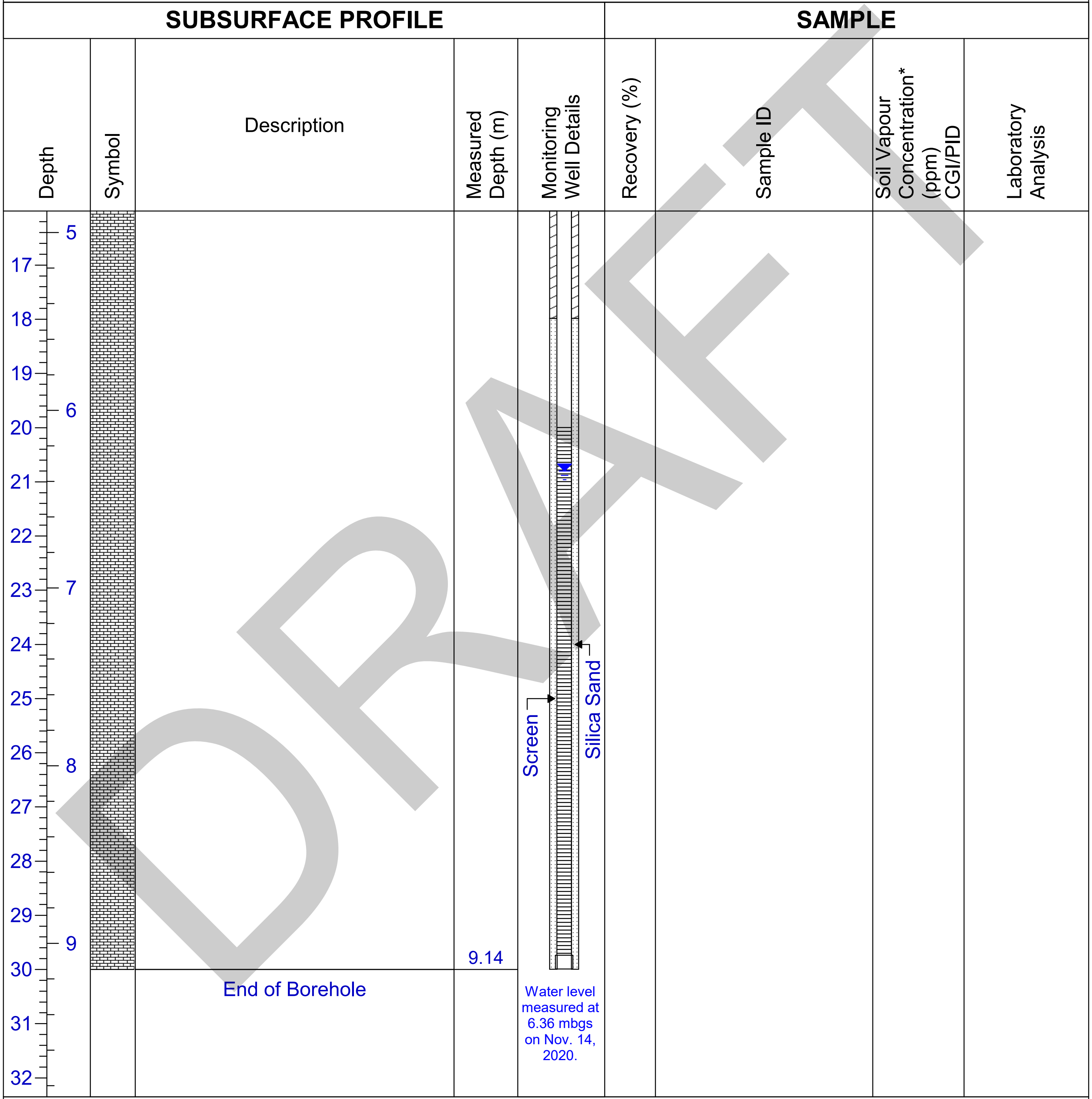
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315

Drill Date: May 21, 2020



Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 64.52 mamsl

Top of Casing Elevation: 64.37 mamsl

Sheet: 2 of 2

Log of Borehole: BH111

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft 0 m 0		Ground Surface	0.00	No Monitoring Well Intalled				
	■	***Asphalt***						
1 2	▨	***Sand and Gravel*** Brown, damp, no odours.	0.76		75	BH111 SS1	25/1.0	PHCs, VOCs, PAHs, Metals
ft 3 4 5 6 7 8 9 10 11 12 13 14 15 16 m 1 2 3 4		End of Borehole						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH112

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020

SUBSURFACE PROFILE						SAMPLE			
Depth ft	Depth m	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
			Ground Surface	0.00					
0	0		**Asphalt**		No Monitoring Well Intalled	55	BH112 SS1	50/1.0	
			Sand and Gravel Brown, damp, no odours.				BH112 SS2	95/1.0	PHCs, VOCs, PAHs, Metals
5			End of Borehole Refusal at 1.52 mbgs on Inferred Bedrock.	1.52					

Depth scale: ft 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; m 0, 1, 2, 3, 4

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH113

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft 0, m 0		Ground Surface	0.00					
		Asphalt		No Monitoring Well Intalled				
		Sand and Gravel Fill Brown grey, with glass and brick fragments, damp, no odours.			50	BH113 SS1	20/1.0	
			1.22			BH113 SS2	180/1.0	PHCs, VOCs, PAHs, Metals
		End of Borehole Refusal at 1.22 mbgs on Inferred Bedrock.						

Depth scale: ft 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16; m 0 1 2 3 4

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: MW114

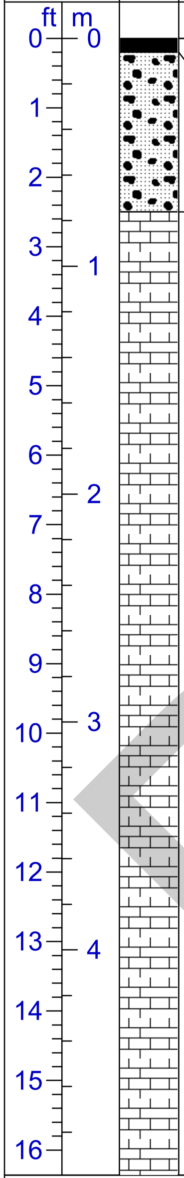
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

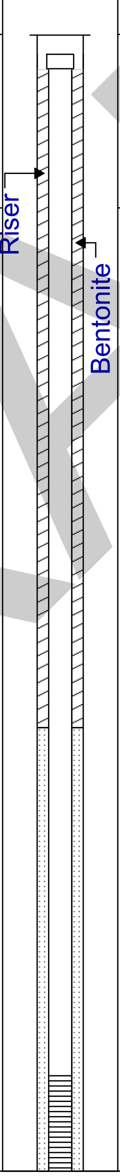
Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020



SUBSURFACE PROFILE				SAMPLE			
Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
Ground Surface	0.00					
Asphalt ***Sand and Gravel Fill*** Grey brown, damp, no odours.	0.76		75	MW114 SS1	50/1.0	PHCs, VOCs, PAHs, Metals
Limestone Sampler refusal at 0.76 mbgs on Inferred Bedrock. Air rotary drilled to 7.62 mbgs.						



Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 62.92 mamsl

Top of Casing Elevation: 62.76 mamsl

Sheet: 1 of 2

Log of Borehole: MW114

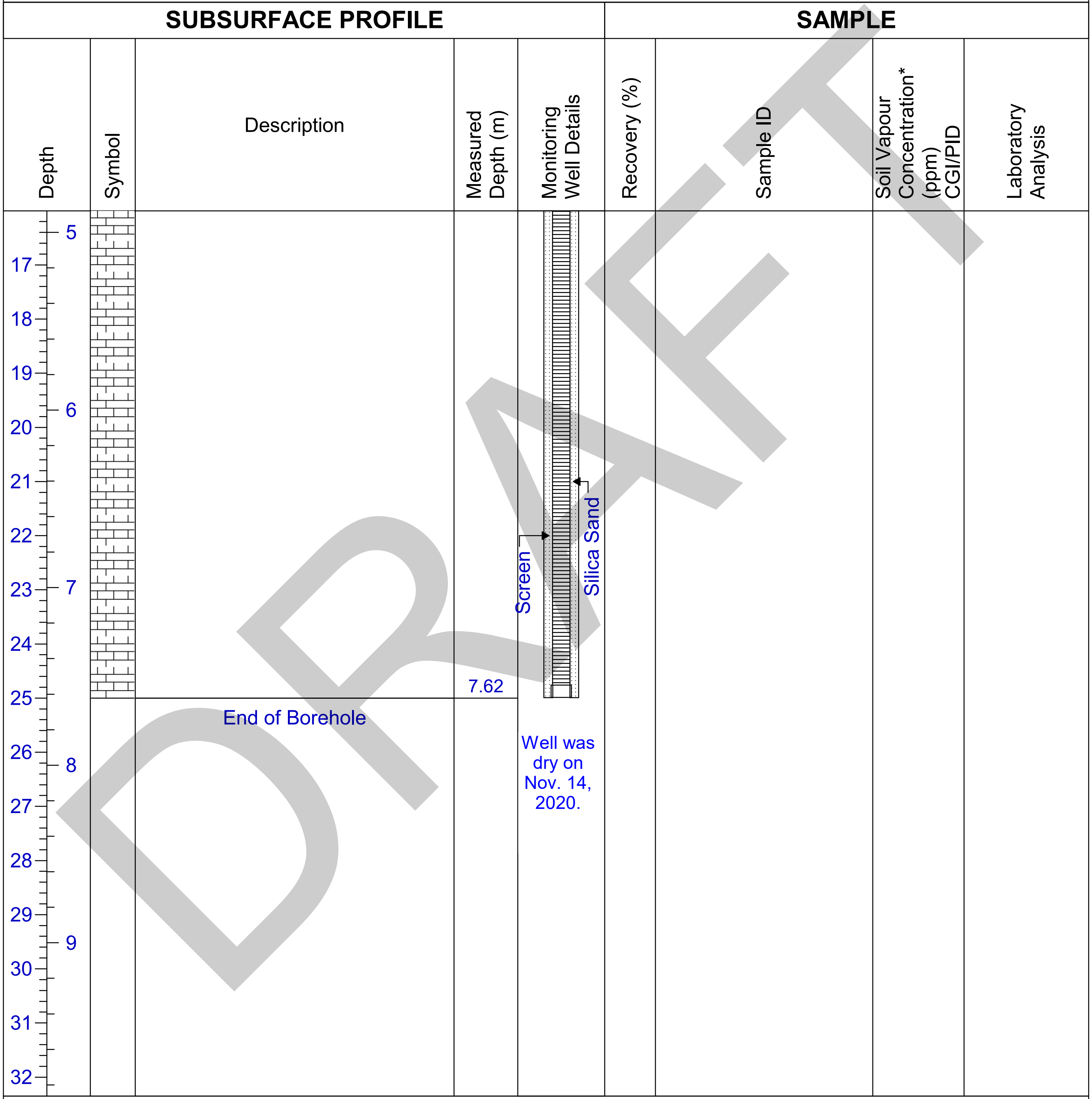
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020



Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: 62.92 mamsl

Top of Casing Elevation: 62.76 mamsl

Sheet: 2 of 2

Log of Borehole: BH115

Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street, and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: May 14, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
ft m		Ground Surface	0.00					
0 0		***Asphalt***		No Monitoring Well Intalled				
1 2		***Sand and Gravel Fill*** Brown, some organics, damp, no odours.			50	BH115 SS1	10/1.0	
3 1 4			1.22			BH115 SS2	10/2.0	PHCs, VOCs, PAHs, Metals
5 6 2 7 8 9 10 3 11 12 13 4 14 15 16		End of Borehole Refusal at 1.22 mbgs on Inferred Bedrock.						

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a photoionization detector (PID) and a combustible gas indicator (CGI).

Grade Elevation: NM

Top of Casing Elevation: NA

Sheet: 1 of 1

PINCHIN

Log of Borehole: MW201

Project #: 230236.006 **Logged By:** MK

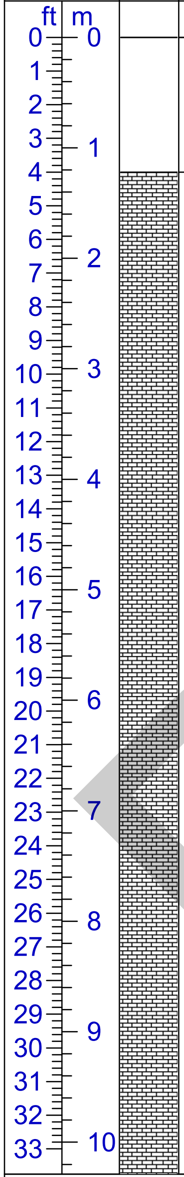
Project: Phase Two Environmental Site Assessment

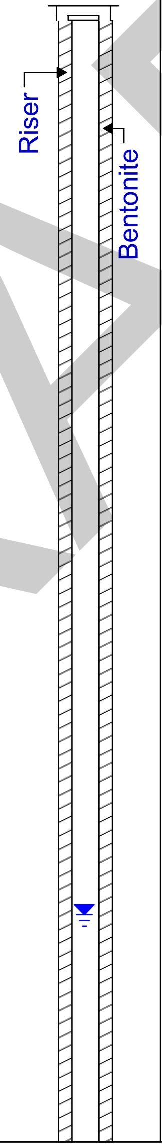
Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: August 25-26, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
		Ground Surface	0.00					
		Overburden (unsampled)	1.22					
	▦	***Limestone*** Sampler refusal at 1.22 mbgs on Bedrock. Air Rotary drilled to 15.24 mbgs.						





Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 63.39 mamsl

Top of Casing Elevation: 63.23 mamsl

Sheet: 1 of 2

Log of Borehole: MW201

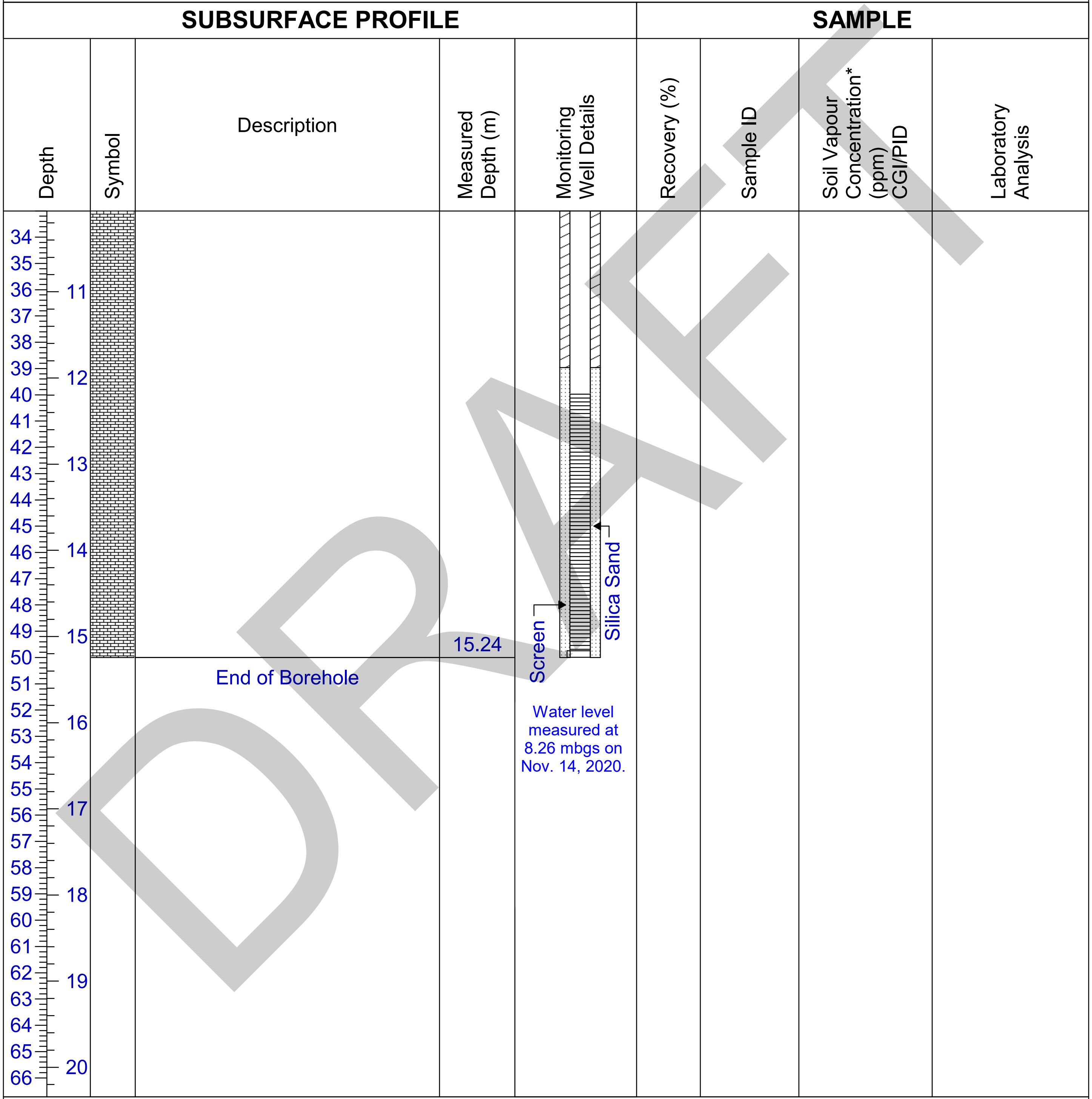
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: August 25-26, 2020



Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 63.39 mamsl

Top of Casing Elevation: 63.23 mamsl

Sheet: 2 of 2

Log of Borehole: MW202

Project #: 230236.006 **Logged By:** MK

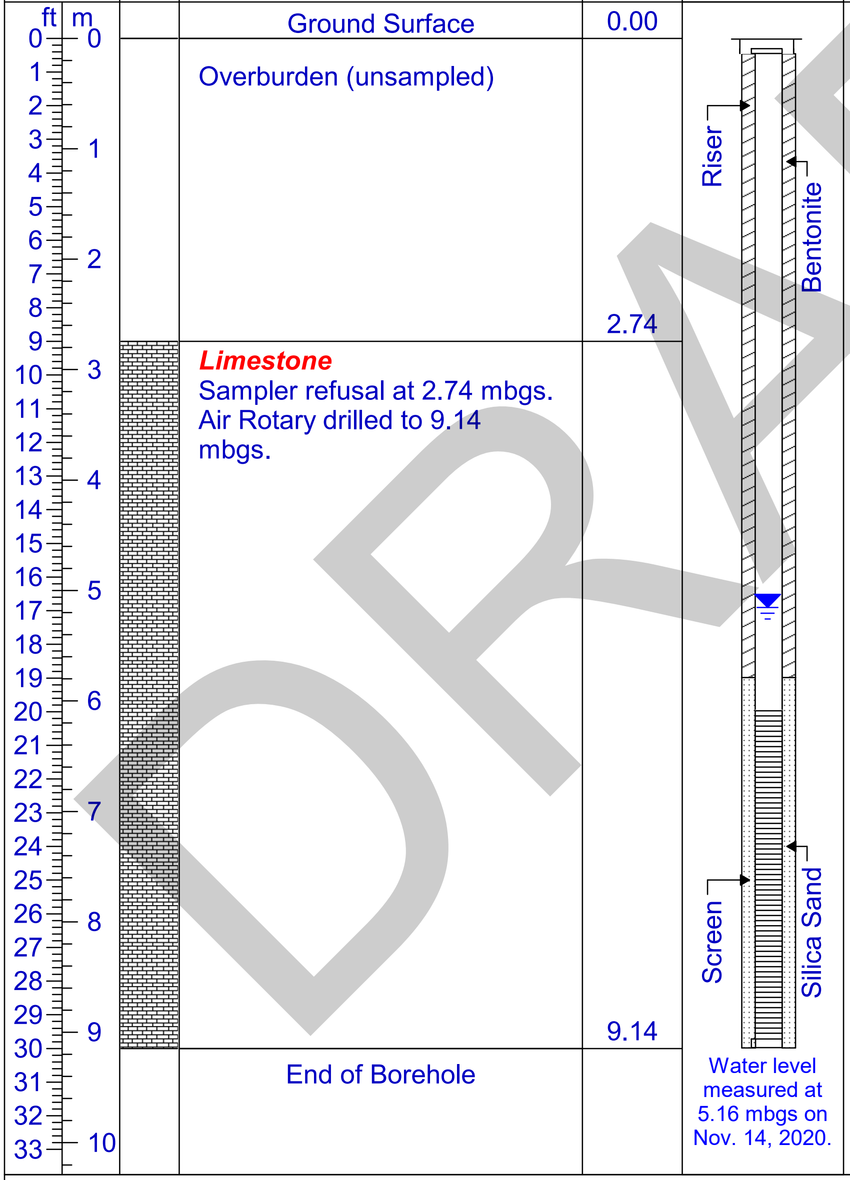
Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: August 24-25, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface	0.00					
0–9 / 0–2.74		Overburden (unsampled)	2.74					
9–30 / 2.74–9.14	▦	***Limestone*** Sampler refusal at 2.74 mbgs. Air Rotary drilled to 9.14 mbgs.	9.14					
30 / 9.14		End of Borehole						



Water level measured at 5.16 mbgs on Nov. 14, 2020.

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 5.1 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 63.09 mamsl

Top of Casing Elevation: 62.95 mamsl

Sheet: 1 of 1

Log of Borehole: MW203

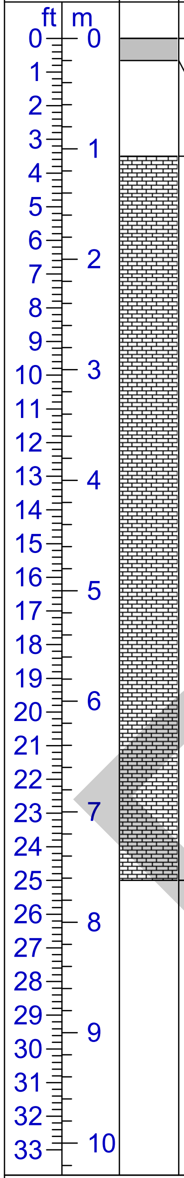
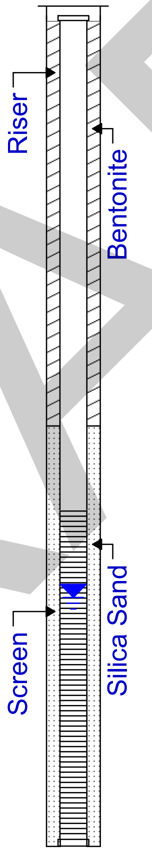
Project #: 230236.006 **Logged By:** MK

Project: Phase Two Environmental Site Assessment

Client: 1213763 Ontario Inc.

Location: 320 McRae Avenue, 1976 Scott Street and 311 and 315 Tweedsmuir Avenue, Ottawa, Ontario

Drill Date: August 25-28, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
		Floor Surface	0.00					
		Concrete Overburden (unsampled)	1.07					
		Limestone Sampler refusal at 1.07 mbgs. Air Rotary drilled to 7.62 mbgs.	7.62					
		End of Borehole		Water level measured at 5.36 mbgs on Nov. 14, 2020.				

Contractor: Strata Drilling Group Inc.

Drilling Method: Direct Push/Air Rotary

Well Casing Size: 3.2 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 63.00 mamsl

Top of Casing Elevation: 62.89 mamsl

Sheet: 1 of 1

APPENDIX D

Laboratory Certificates of Analysis

Your Project #: 230236.006
Your C.O.C. #: 102950, 102951

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/06/01
Report #: R6193966
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0C5456
Received: 2020/05/22, 14:27

Sample Matrix: Soil
Samples Received: 17

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum (1)	17	N/A	2020/05/31	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron (1)	17	2020/05/25	2020/05/29	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum (1)	17	N/A	2020/05/26		EPA 8260C m
Hexavalent Chromium in Soil by IC (1, 2)	17	2020/05/27	2020/05/28	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	17	2020/05/28	2020/05/29	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric) (1)	1	2020/06/01	2020/06/01	CAM SOP-00316	CCME PHC-CWS m
Strong Acid Leachable Metals by ICPMS (1)	15	2020/05/25	2020/05/28	CAM SOP-00447	EPA 6020B m
Strong Acid Leachable Metals by ICPMS (1)	2	2020/05/27	2020/05/27	CAM SOP-00447	EPA 6020B m
Moisture (1)	17	N/A	2020/05/23	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	17	2020/05/29	2020/05/30	CAM SOP-00318	EPA 8270D m
Volatile Organic Compounds and F1 PHCs (1)	17	N/A	2020/05/25	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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 #: 230236.006
Your C.O.C. #: 102950, 102951

Attention: Matt, Ryan, Mike
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Report Date: 2020/06/01
Report #: R6193966
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0C5456
Received: 2020/05/22, 14:27

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: Antonella.Brasil@bvlabs.com
Phone# (905)817-5817
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		MRR527	MRR528	MRR529	MRR530	MRR531	MRR532		
Sampling Date		2020/05/19	2020/05/19	2020/05/19	2020/05/19	2020/05/19	2020/05/19		
COC Number		102950	102950	102950	102950	102950	102950		
	UNITS	**BH101 SS1**	**DUP-1**	**BH102 SS2**	**BH103 SS1**	**BH104 SS1**	**BH105 SS1**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	0.18	6752391
Metals									
Hot Water Ext. Boron (B)	ug/g	0.89	0.80	0.34	0.11	0.083	0.55	0.050	6745825
Acid Extractable Antimony (Sb)	ug/g	0.63	0.61	<0.20	<0.20	<0.20	<0.20	0.20	6746070
Acid Extractable Arsenic (As)	ug/g	2.8	2.5	1.4	<1.0	<1.0	1.9	1.0	6746070
Acid Extractable Barium (Ba)	ug/g	110	110	160	70	30	84	0.50	6746070
Acid Extractable Beryllium (Be)	ug/g	0.47	0.46	0.45	0.24	<0.20	0.45	0.20	6746070
Acid Extractable Boron (B)	ug/g	12	11	16	8.2	<5.0	9.6	5.0	6746070
Acid Extractable Cadmium (Cd)	ug/g	0.29	0.23	<0.10	<0.10	<0.10	<0.10	0.10	6746070
Acid Extractable Chromium (Cr)	ug/g	23	23	19	40	11	21	1.0	6746070
Acid Extractable Cobalt (Co)	ug/g	7.1	7.4	8.6	6.6	4.5	6.5	0.10	6746070
Acid Extractable Copper (Cu)	ug/g	16	15	12	9.5	6.2	9.0	0.50	6746070
Acid Extractable Lead (Pb)	ug/g	41	28	13	6.9	7.6	9.9	1.0	6746070
Acid Extractable Molybdenum (Mo)	ug/g	1.5	1.5	<0.50	<0.50	<0.50	1.2	0.50	6746070
Acid Extractable Nickel (Ni)	ug/g	16	15	17	8.5	5.6	14	0.50	6746070
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6746070
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6746070
Acid Extractable Thallium (Tl)	ug/g	0.21	0.20	0.24	0.085	0.084	0.095	0.050	6746070
Acid Extractable Uranium (U)	ug/g	0.67	0.63	0.55	0.45	0.44	0.66	0.050	6746070
Acid Extractable Vanadium (V)	ug/g	35	35	22	20	18	41	5.0	6746070
Acid Extractable Zinc (Zn)	ug/g	72	59	19	32	14	33	5.0	6746070
Acid Extractable Mercury (Hg)	ug/g	0.075	0.060	<0.050	<0.050	<0.050	0.062	0.050	6746070

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		MRR532			MRR533	MRR534	MRR535	MRR536		
Sampling Date		2020/05/19			2020/05/19	2020/05/20	2020/05/20	2020/05/20		
COC Number		102950			102950	102950	102950	102950		
	UNITS	**BH105 SS1 Lab-Dup**	**RDL**	**QC Batch**	**BH106 SS2**	**BH107 SS4**	**BH108 SS1**	**BH109 SS3**	**RDL**	**QC Batch**
Inorganics										
Chromium (VI)	ug/g				<0.18	<0.18	<0.18	<0.18	0.18	6752391
Metals										
Hot Water Ext. Boron (B)	ug/g	0.55	0.050	6745825	0.19	0.85	2.6	1.6	0.050	6745825
Acid Extractable Antimony (Sb)	ug/g				<0.20	5.9	1.8	3.9	0.20	6746070
Acid Extractable Arsenic (As)	ug/g				<1.0	2.1	7.1	9.8	1.0	6746070
Acid Extractable Barium (Ba)	ug/g				430	150	190	180	0.50	6746070
Acid Extractable Beryllium (Be)	ug/g				0.21	0.32	0.66	0.41	0.20	6746070
Acid Extractable Boron (B)	ug/g				7.9	12	16	16	5.0	6746070
Acid Extractable Cadmium (Cd)	ug/g				<0.10	0.25	0.42	0.53	0.10	6746070
Acid Extractable Chromium (Cr)	ug/g				12	20	27	33	1.0	6746070
Acid Extractable Cobalt (Co)	ug/g				4.7	6.1	12	8.6	0.10	6746070
Acid Extractable Copper (Cu)	ug/g				8.2	59	26	140	0.50	6746070
Acid Extractable Lead (Pb)	ug/g				4.7	150	100	350	1.0	6746070
Acid Extractable Molybdenum (Mo)	ug/g				<0.50	2.1	2.8	7.9	0.50	6746070
Acid Extractable Nickel (Ni)	ug/g				9.0	11	19	76	0.50	6746070
Acid Extractable Selenium (Se)	ug/g				<0.50	<0.50	<0.50	<0.50	0.50	6746070
Acid Extractable Silver (Ag)	ug/g				<0.20	<0.20	0.87	0.22	0.20	6746070
Acid Extractable Thallium (Tl)	ug/g				0.23	0.11	0.21	0.11	0.050	6746070
Acid Extractable Uranium (U)	ug/g				0.29	0.60	0.69	0.64	0.050	6746070
Acid Extractable Vanadium (V)	ug/g				16	21	38	31	5.0	6746070
Acid Extractable Zinc (Zn)	ug/g				14	120	220	310	5.0	6746070
Acid Extractable Mercury (Hg)	ug/g				<0.050	<0.050	0.19	0.19	0.050	6746070

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

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		MRR537	MRR538	MRR539	MRR540			MRR541		
Sampling Date		2020/05/20	2020/05/20	2020/05/14	2020/05/14			2020/05/14		
COC Number		102951	102951	102951	102951			102951		
	UNITS	**MW110 SS2**	**DUP-2**	**BH111 SS1**	**BH112 SS2**	**RDL**	**QC Batch**	**BH113 SS2**	**RDL**	**QC Batch**
Inorganics										
Chromium (VI)	ug/g	<0.18	<0.18	<0.18	<0.18	0.18	6752391	<0.18	0.18	6752391
Metals										
Hot Water Ext. Boron (B)	ug/g	0.21	0.21	0.32	<0.050	0.050	6745825	1.6	0.050	6745825
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	6746070	4.3	0.20	6752874
Acid Extractable Arsenic (As)	ug/g	<1.0	<1.0	<1.0	<1.0	1.0	6746070	18	1.0	6752874
Acid Extractable Barium (Ba)	ug/g	99	82	130	51	0.50	6746070	330	0.50	6752874
Acid Extractable Beryllium (Be)	ug/g	0.30	0.31	0.37	<0.20	0.20	6746070	0.41	0.20	6752874
Acid Extractable Boron (B)	ug/g	9.3	9.8	6.7	<5.0	5.0	6746070	14	5.0	6752874
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	<0.10	<0.10	0.10	6746070	1.8	0.10	6752874
Acid Extractable Chromium (Cr)	ug/g	15	14	21	16	1.0	6746070	45	1.0	6752874
Acid Extractable Cobalt (Co)	ug/g	4.9	4.9	7.0	5.0	0.10	6746070	9.2	0.10	6752874
Acid Extractable Copper (Cu)	ug/g	10	12	14	6.4	0.50	6746070	65	0.50	6752874
Acid Extractable Lead (Pb)	ug/g	3.5	3.4	3.3	2.1	1.0	6746070	720	1.0	6752874
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	<0.50	<0.50	0.50	6746070	2.2	0.50	6752874
Acid Extractable Nickel (Ni)	ug/g	10	9.4	12	7.0	0.50	6746070	22	0.50	6752874
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	0.50	6746070	1.2	0.50	6752874
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	6746070	0.48	0.20	6752874
Acid Extractable Thallium (Tl)	ug/g	0.16	0.16	0.13	0.068	0.050	6746070	0.18	0.050	6752874
Acid Extractable Uranium (U)	ug/g	0.46	0.48	0.53	0.43	0.050	6746070	0.87	0.050	6752874
Acid Extractable Vanadium (V)	ug/g	23	22	37	23	5.0	6746070	32	5.0	6752874
Acid Extractable Zinc (Zn)	ug/g	28	18	34	20	5.0	6746070	1100	5.0	6752874
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	6746070	10	0.25	6752874

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		MRR541			MRR542		MRR543		
Sampling Date		2020/05/14			2020/05/14		2020/05/14		
COC Number		102951			102951		102951		
	UNITS	**BH113 SS2 Lab-Dup**	**RDL**	**QC Batch**	**MW114 SS1**	**QC Batch**	**BH115 SS2**	**RDL**	**QC Batch**
Inorganics									
Chromium (VI)	ug/g	<0.18	0.18	6752391	<0.18	6752391	<0.18	0.18	6752391
Metals									
Hot Water Ext. Boron (B)	ug/g				1.4	6745825	0.18	0.050	6745825
Acid Extractable Antimony (Sb)	ug/g				6.6	6752874	<0.20	0.20	6746070
Acid Extractable Arsenic (As)	ug/g				9.4	6752874	1.2	1.0	6746070
Acid Extractable Barium (Ba)	ug/g				300	6752874	90	0.50	6746070
Acid Extractable Beryllium (Be)	ug/g				0.42	6752874	0.31	0.20	6746070
Acid Extractable Boron (B)	ug/g				11	6752874	9.1	5.0	6746070
Acid Extractable Cadmium (Cd)	ug/g				1.4	6752874	<0.10	0.10	6746070
Acid Extractable Chromium (Cr)	ug/g				21	6752874	15	1.0	6746070
Acid Extractable Cobalt (Co)	ug/g				7.9	6752874	5.2	0.10	6746070
Acid Extractable Copper (Cu)	ug/g				46	6752874	9.6	0.50	6746070
Acid Extractable Lead (Pb)	ug/g				470	6752874	6.8	1.0	6746070
Acid Extractable Molybdenum (Mo)	ug/g				1.4	6752874	0.76	0.50	6746070
Acid Extractable Nickel (Ni)	ug/g				21	6752874	12	0.50	6746070
Acid Extractable Selenium (Se)	ug/g				0.74	6752874	<0.50	0.50	6746070
Acid Extractable Silver (Ag)	ug/g				0.38	6752874	<0.20	0.20	6746070
Acid Extractable Thallium (Tl)	ug/g				0.24	6752874	0.12	0.050	6746070
Acid Extractable Uranium (U)	ug/g				0.74	6752874	0.49	0.050	6746070
Acid Extractable Vanadium (V)	ug/g				24	6752874	22	5.0	6746070
Acid Extractable Zinc (Zn)	ug/g				460	6752874	24	5.0	6746070
Acid Extractable Mercury (Hg)	ug/g				1.3	6752874	<0.050	0.050	6746070

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

O.REG 153 PAHS (SOIL)

BV Labs ID		MRR527	MRR528	MRR529	MRR530	MRR531	MRR532		
Sampling Date		2020/05/19	2020/05/19	2020/05/19	2020/05/19	2020/05/19	2020/05/19		
COC Number		102950	102950	102950	102950	102950	102950		
	UNITS	**BH101 SS1**	**DUP-1**	**BH102 SS2**	**BH103 SS1**	**BH104 SS1**	**BH105 SS1**	**RDL**	**QC Batch**
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	<0.0071	<0.0071	0.012	<0.0071	<0.0071	0.0071	6740896
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Acenaphthylene	ug/g	0.013	0.014	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Anthracene	ug/g	0.0078	0.0085	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Benzo(a)anthracene	ug/g	0.038	0.042	<0.0050	<0.0050	<0.0050	0.0055	0.0050	6761358
Benzo(a)pyrene	ug/g	0.046	0.049	<0.0050	<0.0050	<0.0050	0.0069	0.0050	6761358
Benzo(b/j)fluoranthene	ug/g	0.067	0.071	<0.0050	0.0057	<0.0050	0.010	0.0050	6761358
Benzo(g,h,i)perylene	ug/g	0.038	0.040	<0.0050	<0.0050	<0.0050	0.0058	0.0050	6761358
Benzo(k)fluoranthene	ug/g	0.023	0.025	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Chrysene	ug/g	0.036	0.040	<0.0050	<0.0050	<0.0050	0.0051	0.0050	6761358
Dibenzo(a,h)anthracene	ug/g	0.0088	0.0095	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Fluoranthene	ug/g	0.077	0.083	<0.0050	0.0052	<0.0050	0.012	0.0050	6761358
Fluorene	ug/g	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Indeno(1,2,3-cd)pyrene	ug/g	0.037	0.040	<0.0050	<0.0050	<0.0050	0.0058	0.0050	6761358
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0058	<0.0050	<0.0050	0.0050	6761358
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0060	<0.0050	<0.0050	0.0050	6761358
Naphthalene	ug/g	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	6761358
Phenanthrene	ug/g	0.032	0.034	<0.0050	0.0075	<0.0050	<0.0050	0.0050	6761358
Pyrene	ug/g	0.064	0.069	<0.0050	0.0052	<0.0050	0.011	0.0050	6761358
Surrogate Recovery (%)									
D10-Anthracene	%	96	101	100	100	104	99		6761358
D14-Terphenyl (FS)	%	96	102	93	96	98	94		6761358
D8-Acenaphthylene	%	92	97	93	94	98	92		6761358

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (SOIL)

BV Labs ID		MRR533		MRR534		MRR535	MRR536	MRR537		
Sampling Date		2020/05/19		2020/05/20		2020/05/20	2020/05/20	2020/05/20		
COC Number		102950		102950		102950	102950	102951		
	UNITS	**BH106 SS2**	**RDL**	**BH107 SS4**	**RDL**	**BH108 SS1**	**BH109 SS3**	**MW110 SS2**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	0.0071	1.4	0.071	<0.0071	0.095	<0.0071	0.0071	6740896
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	<0.0050	0.0050	1.5	0.050	0.0083	0.10	<0.0050	0.0050	6761358
Acenaphthylene	ug/g	<0.0050	0.0050	1.1	0.050	0.015	0.097	0.016	0.0050	6761358
Anthracene	ug/g	<0.0050	0.0050	7.8	0.050	0.027	0.41	0.012	0.0050	6761358
Benzo(a)anthracene	ug/g	<0.0050	0.0050	16	0.050	0.089	0.99	0.054	0.0050	6761358
Benzo(a)pyrene	ug/g	<0.0050	0.0050	12	0.050	0.087	0.88	0.059	0.0050	6761358
Benzo(b/j)fluoranthene	ug/g	<0.0050	0.0050	15	0.050	0.12	1.1	0.085	0.0050	6761358
Benzo(g,h,i)perylene	ug/g	<0.0050	0.0050	5.7	0.050	0.063	0.54	0.047	0.0050	6761358
Benzo(k)fluoranthene	ug/g	<0.0050	0.0050	5.6	0.050	0.042	0.39	0.029	0.0050	6761358
Chrysene	ug/g	<0.0050	0.0050	11	0.050	0.080	0.75	0.049	0.0050	6761358
Dibenzo(a,h)anthracene	ug/g	<0.0050	0.0050	2.0	0.050	0.016	0.16	0.011	0.0050	6761358
Fluoranthene	ug/g	<0.0050	0.0050	32	0.050	0.17	2.2	0.091	0.0050	6761358
Fluorene	ug/g	<0.0050	0.0050	3.3	0.050	0.012	0.18	<0.0050	0.0050	6761358
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	0.0050	6.5	0.050	0.063	0.55	0.047	0.0050	6761358
1-Methylnaphthalene	ug/g	<0.0050	0.0050	0.74	0.050	<0.0050	0.050	<0.0050	0.0050	6761358
2-Methylnaphthalene	ug/g	<0.0050	0.0050	0.67	0.050	<0.0050	0.044	<0.0050	0.0050	6761358
Naphthalene	ug/g	<0.0050	0.0050	0.86	0.050	0.012	0.062	<0.0050	0.0050	6761358
Phenanthrene	ug/g	<0.0050	0.0050	24	0.050	0.090	1.5	0.033	0.0050	6761358
Pyrene	ug/g	<0.0050	0.0050	24	0.050	0.15	1.7	0.085	0.0050	6761358
Surrogate Recovery (%)										
D10-Anthracene	%	104		115		103	99	99		6761358
D14-Terphenyl (FS)	%	98		113		106	102	102		6761358
D8-Acenaphthylene	%	95		102		97	94	96		6761358

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (SOIL)

BV Labs ID		MRR538	MRR539	MRR540			MRR540		
Sampling Date		2020/05/20	2020/05/14	2020/05/14			2020/05/14		
COC Number		102951	102951	102951			102951		
	UNITS	**DUP-2**	**BH111 SS1**	**BH112 SS2**	**RDL**	**QC Batch**	**BH112 SS2 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	<0.0071	<0.0071	0.0071	6740896			
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Acenaphthylene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Anthracene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Benzo(a)anthracene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Benzo(a)pyrene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Benzo(b/j)fluoranthene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Benzo(g,h,i)perylene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Benzo(k)fluoranthene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Chrysene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Dibenzo(a,h)anthracene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Fluoranthene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Fluorene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Naphthalene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Phenanthrene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Pyrene	ug/g	<0.0050	<0.0050	<0.0050	0.0050	6761358	<0.0050	0.0050	6761358
Surrogate Recovery (%)									
D10-Anthracene	%	100	107	100		6761358	102		6761358
D14-Terphenyl (FS)	%	95	101	94		6761358	96		6761358
D8-Acenaphthylene	%	96	100	93		6761358	93		6761358

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

O.REG 153 PAHS (SOIL)

BV Labs ID		MRR541	MRR542		MRR543		
Sampling Date		2020/05/14	2020/05/14		2020/05/14		
COC Number		102951	102951		102951		
	UNITS	**BH113 SS2**	**MW114 SS1**	**RDL**	**BH115 SS2**	**RDL**	**QC Batch**
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/g	9.1	<0.071	0.071	<0.0071	0.0071	6740896
Polyaromatic Hydrocarbons							
Acenaphthene	ug/g	5.8	<0.050	0.050	<0.0050	0.0050	6761358
Acenaphthylene	ug/g	13	0.051	0.050	<0.0050	0.0050	6761358
Anthracene	ug/g	22	0.064	0.050	<0.0050	0.0050	6761358
Benzo(a)anthracene	ug/g	67	0.30	0.050	0.0092	0.0050	6761358
Benzo(a)pyrene	ug/g	57	0.32	0.050	0.0086	0.0050	6761358
Benzo(b/j)fluoranthene	ug/g	65	0.43	0.050	0.013	0.0050	6761358
Benzo(g,h,i)perylene	ug/g	27	0.26	0.050	0.0057	0.0050	6761358
Benzo(k)fluoranthene	ug/g	26	0.15	0.050	<0.0050	0.0050	6761358
Chrysene	ug/g	55	0.25	0.050	0.0097	0.0050	6761358
Dibenzo(a,h)anthracene	ug/g	9.1	0.059	0.050	<0.0050	0.0050	6761358
Fluoranthene	ug/g	120	0.57	0.050	0.023	0.0050	6761358
Fluorene	ug/g	10	<0.050	0.050	<0.0050	0.0050	6761358
Indeno(1,2,3-cd)pyrene	ug/g	29	0.26	0.050	0.0058	0.0050	6761358
1-Methylnaphthalene	ug/g	4.9	<0.050	0.050	<0.0050	0.0050	6761358
2-Methylnaphthalene	ug/g	4.2	<0.050	0.050	<0.0050	0.0050	6761358
Naphthalene	ug/g	2.3	<0.050	0.050	<0.0050	0.0050	6761358
Phenanthrene	ug/g	75	0.22	0.050	0.015	0.0050	6761358
Pyrene	ug/g	120	0.49	0.050	0.019	0.0050	6761358
Surrogate Recovery (%)							
D10-Anthracene	%	114	118		101		6761358
D14-Terphenyl (FS)	%	113	104		98		6761358
D8-Acenaphthylene	%	102	104		96		6761358

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR527	MRR528			MRR528		
Sampling Date		2020/05/19	2020/05/19			2020/05/19		
COC Number		102950	102950			102950		
	UNITS	**BH101 SS1**	**DUP-1**	**RDL**	**QC Batch**	**DUP-1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	15	14	1.0	6741312			
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	6740897			
Volatile Organics								
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	6743456	<0.50	0.50	6743456
Benzene	ug/g	<0.020	<0.020	0.020	6743456	<0.020	0.020	6743456
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Bromoform	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Bromomethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Chlorobenzene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Chloroform	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	6743456	<0.030	0.030	6743456
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	6743456	<0.040	0.040	6743456
Ethylbenzene	ug/g	<0.020	<0.020	0.020	6743456	<0.020	0.020	6743456
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Hexane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	6743456	<0.50	0.50	6743456
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	6743456	<0.50	0.50	6743456
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Styrene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456

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

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR527	MRR528			MRR528		
Sampling Date		2020/05/19	2020/05/19			2020/05/19		
COC Number		102950	102950			102950		
	UNITS	**BH101 SS1**	**DUP-1**	**RDL**	**QC Batch**	**DUP-1 Lab-Dup**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Toluene	ug/g	0.047	0.14	0.020	6743456	0.14	0.020	6743456
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Trichloroethylene	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	6743456	<0.050	0.050	6743456
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	6743456	<0.020	0.020	6743456
p+m-Xylene	ug/g	0.050	0.12	0.020	6743456	0.13	0.020	6743456
o-Xylene	ug/g	0.026	0.065	0.020	6743456	0.066	0.020	6743456
Total Xylenes	ug/g	0.077	0.19	0.020	6743456	0.19	0.020	6743456
F1 (C6-C10)	ug/g	<10	<10	10	6743456	<10	10	6743456
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	6743456	<10	10	6743456
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	6756415			
F3 (C16-C34 Hydrocarbons)	ug/g	<50	68	50	6756415			
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	6756415			
Reached Baseline at C50	ug/g	Yes	Yes		6756415			
Surrogate Recovery (%)								
o-Terphenyl	%	79	82		6756415			
4-Bromofluorobenzene	%	96	96		6743456	96		6743456
D10-o-Xylene	%	110	111		6743456	113		6743456
D4-1,2-Dichloroethane	%	100	102		6743456	101		6743456
D8-Toluene	%	95	95		6743456	95		6743456

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

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR529	MRR530		MRR531		MRR532	MRR533		
Sampling Date		2020/05/19	2020/05/19		2020/05/19		2020/05/19	2020/05/19		
COC Number		102950	102950		102950		102950	102950		
	UNITS	**BH102 SS2**	**BH103 SS1**	**RDL**	**BH104 SS1**	**RDL**	**BH105 SS1**	**BH106 SS2**	**RDL**	**QC Batch**
Inorganics										
Moisture	%	8.8	11	1.0	12	1.0	16	8.4	1.0	6741312
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	<0.10	0.10	<0.050	<0.050	0.050	6740897
Volatile Organics										
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	6743456
Benzene	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	<0.020	0.020	6743456
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Bromoform	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Bromomethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Chlorobenzene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Chloroform	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	<0.030	0.030	<0.030	<0.030	0.030	6743456
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	<0.10 (1)	0.10	<0.040	<0.040	0.040	6743456
Ethylbenzene	ug/g	<0.020	1.3	0.020	0.060	0.020	<0.020	<0.020	0.020	6743456
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Hexane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	6743456
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	6743456
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Styrene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) The detection limit was raised due to matrix interference.

BV Labs Job #: C0C5456
Report Date: 2020/06/01

Pinchin Ltd
Client Project #: 230236.006
Sampler Initials: M.K

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR529	MRR530		MRR531		MRR532	MRR533		
Sampling Date		2020/05/19	2020/05/19		2020/05/19		2020/05/19	2020/05/19		
COC Number		102950	102950		102950		102950	102950		
	UNITS	**BH102 SS2**	**BH103 SS1**	**RDL**	**BH104 SS1**	**RDL**	**BH105 SS1**	**BH106 SS2**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Toluene	ug/g	<0.020	0.10	0.020	0.034	0.020	<0.020	<0.020	0.020	6743456
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Trichloroethylene	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	<0.050	0.050	6743456
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	<0.020	0.020	6743456
p+m-Xylene	ug/g	<0.020	1.6	0.020	4.6	0.020	<0.020	<0.020	0.020	6743456
o-Xylene	ug/g	<0.020	0.074	0.020	<0.020	0.020	<0.020	<0.020	0.020	6743456
Total Xylenes	ug/g	<0.020	1.7	0.020	4.6	0.020	<0.020	<0.020	0.020	6743456
F1 (C6-C10)	ug/g	<10	13	10	120	10	<10	<10	10	6743456
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	110	10	<10	<10	10	6743456
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	<10	10	<10	<10	10	6756415
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	<50	50	<50	<50	50	6756415
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	<50	50	<50	<50	50	6756415
Reached Baseline at C50	ug/g	Yes	Yes		Yes		Yes	Yes		6756415
Surrogate Recovery (%)										
o-Terphenyl	%	83	87		81		81	81		6756415
4-Bromofluorobenzene	%	96	98		104		96	96		6743456
D10-o-Xylene	%	105	112		125		111	113		6743456
D4-1,2-Dichloroethane	%	102	102		106		99	100		6743456
D8-Toluene	%	95	96		98		95	95		6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR534	MRR535	MRR536	MRR537	MRR538	MRR539		
Sampling Date		2020/05/20	2020/05/20	2020/05/20	2020/05/20	2020/05/20	2020/05/14		
COC Number		102950	102950	102950	102951	102951	102951		
	UNITS	**BH107 SS4**	**BH108 SS1**	**BH109 SS3**	**MW110 SS2**	**DUP-2**	**BH111 SS1**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	8.1	20	12	6.8	8.2	9.0	1.0	6741312
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6740897
Volatile Organics									
Acetone (2-Propanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6743456
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
Bromodichloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Bromoform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Bromomethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Carbon Tetrachloride	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Chlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Chloroform	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Dibromochloromethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,1-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,2-Dichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,1-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,2-Dichloropropane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.030	6743456
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	6743456
Ethylbenzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
Ethylene Dibromide	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Hexane	ug/g	<0.050	0.063	0.11	<0.050	<0.050	<0.050	0.050	6743456
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6743456
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6743456
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Styrene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR534	MRR535	MRR536	MRR537	MRR538	MRR539		
Sampling Date		2020/05/20	2020/05/20	2020/05/20	2020/05/20	2020/05/20	2020/05/14		
COC Number		102950	102950	102950	102951	102951	102951		
	UNITS	**BH107 SS4**	**BH108 SS1**	**BH109 SS3**	**MW110 SS2**	**DUP-2**	**BH111 SS1**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Toluene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Trichloroethylene	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6743456
Vinyl Chloride	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
p+m-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
Total Xylenes	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6743456
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	10	6743456
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	10	6743456
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	21	<10	<10	<10	<10	<10	10	6756415
F3 (C16-C34 Hydrocarbons)	ug/g	730	66	220	<50	<50	<50	50	6756415
F4 (C34-C50 Hydrocarbons)	ug/g	200	<50	90	<50	<50	<50	50	6756415
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes	Yes		6756415
Surrogate Recovery (%)									
o-Terphenyl	%	77	91	89	89	91	89		6756415
4-Bromofluorobenzene	%	96	96	96	96	95	96		6743456
D10-o-Xylene	%	105	103	111	105	109	107		6743456
D4-1,2-Dichloroethane	%	100	101	100	101	101	102		6743456
D8-Toluene	%	96	95	95	95	95	95		6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR540			MRR540			MRR541	MRR542		
Sampling Date		2020/05/14			2020/05/14			2020/05/14	2020/05/14		
COC Number		102951			102951			102951	102951		
	UNITS	**BH112 SS2**	**RDL**	**QC Batch**	**BH112 SS2 Lab-Dup**	**RDL**	**QC Batch**	**BH113 SS2**	**MW114 SS1**	**RDL**	**QC Batch**
Inorganics											
Moisture	%	10	1.0	6741312				23	15	1.0	6741312
Calculated Parameters											
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	6740897				<0.050	<0.050	0.050	6740897
Volatile Organics											
Acetone (2-Propanone)	ug/g	<0.50	0.50	6743456				<0.50	<0.50	0.50	6743456
Benzene	ug/g	<0.020	0.020	6743456				<0.020	<0.020	0.020	6743456
Bromodichloromethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Bromoform	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Bromomethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Carbon Tetrachloride	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Chlorobenzene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Chloroform	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Dibromochloromethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,2-Dichlorobenzene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,3-Dichlorobenzene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,4-Dichlorobenzene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,1-Dichloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,2-Dichloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,1-Dichloroethylene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,2-Dichloropropane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	6743456				<0.030	<0.030	0.030	6743456
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	6743456				<0.040	<0.040	0.040	6743456
Ethylbenzene	ug/g	<0.020	0.020	6743456				<0.020	<0.020	0.020	6743456
Ethylene Dibromide	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Hexane	ug/g	<0.050	0.050	6743456				0.15	0.090	0.050	6743456
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	6743456				<0.50	<0.50	0.50	6743456
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	6743456				<0.50	<0.50	0.50	6743456
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Styrene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456

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

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR540			MRR540			MRR541	MRR542		
Sampling Date		2020/05/14			2020/05/14			2020/05/14	2020/05/14		
COC Number		102951			102951			102951	102951		
	UNITS	**BH112 SS2**	**RDL**	**QC Batch**	**BH112 SS2 Lab-Dup**	**RDL**	**QC Batch**	**BH113 SS2**	**MW114 SS1**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Tetrachloroethylene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Toluene	ug/g	<0.020	0.020	6743456				0.038	0.035	0.020	6743456
1,1,1-Trichloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
1,1,2-Trichloroethane	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Trichloroethylene	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	6743456				<0.050	<0.050	0.050	6743456
Vinyl Chloride	ug/g	<0.020	0.020	6743456				<0.020	<0.020	0.020	6743456
p+m-Xylene	ug/g	<0.020	0.020	6743456				0.23	0.040	0.020	6743456
o-Xylene	ug/g	<0.020	0.020	6743456				0.077	<0.020	0.020	6743456
Total Xylenes	ug/g	<0.020	0.020	6743456				0.31	0.040	0.020	6743456
F1 (C6-C10)	ug/g	<10	10	6743456				<10	<10	10	6743456
F1 (C6-C10) - BTEX	ug/g	<10	10	6743456				<10	<10	10	6743456
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	6756415	<10	10	6756415	220	<10	10	6756415
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	6756415	60	50	6756415	4500	430	50	6756415
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	6756415	<50	50	6756415	990	630	50	6756415
Reached Baseline at C50	ug/g	Yes		6756415	Yes		6756415	Yes	No		6756415
Surrogate Recovery (%)											
o-Terphenyl	%	92		6756415	89		6756415	104	89		6756415
4-Bromofluorobenzene	%	95		6743456				95	95		6743456
D10-o-Xylene	%	104		6743456				118	106		6743456
D4-1,2-Dichloroethane	%	101		6743456				102	103		6743456
D8-Toluene	%	95		6743456				95	94		6743456

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

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR543		
Sampling Date		2020/05/14		
COC Number		102951		
	UNITS	**BH115 SS2**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	9.2	1.0	6741312
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	6740897
Volatile Organics				
Acetone (2-Propanone)	ug/g	<0.50	0.50	6743456
Benzene	ug/g	<0.020	0.020	6743456
Bromodichloromethane	ug/g	<0.050	0.050	6743456
Bromoform	ug/g	<0.050	0.050	6743456
Bromomethane	ug/g	<0.050	0.050	6743456
Carbon Tetrachloride	ug/g	<0.050	0.050	6743456
Chlorobenzene	ug/g	<0.050	0.050	6743456
Chloroform	ug/g	<0.050	0.050	6743456
Dibromochloromethane	ug/g	<0.050	0.050	6743456
1,2-Dichlorobenzene	ug/g	<0.050	0.050	6743456
1,3-Dichlorobenzene	ug/g	<0.050	0.050	6743456
1,4-Dichlorobenzene	ug/g	<0.050	0.050	6743456
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	6743456
1,1-Dichloroethane	ug/g	<0.050	0.050	6743456
1,2-Dichloroethane	ug/g	<0.050	0.050	6743456
1,1-Dichloroethylene	ug/g	<0.050	0.050	6743456
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	6743456
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	6743456
1,2-Dichloropropane	ug/g	<0.050	0.050	6743456
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	6743456
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	6743456
Ethylbenzene	ug/g	<0.020	0.020	6743456
Ethylene Dibromide	ug/g	<0.050	0.050	6743456
Hexane	ug/g	<0.050	0.050	6743456
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	6743456
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	6743456
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	6743456
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	6743456
Styrene	ug/g	<0.050	0.050	6743456
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	6743456
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		MRR543		
Sampling Date		2020/05/14		
COC Number		102951		
	UNITS	**BH115 SS2**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/g	<0.050	0.050	6743456
Toluene	ug/g	0.030	0.020	6743456
1,1,1-Trichloroethane	ug/g	<0.050	0.050	6743456
1,1,2-Trichloroethane	ug/g	<0.050	0.050	6743456
Trichloroethylene	ug/g	<0.050	0.050	6743456
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	6743456
Vinyl Chloride	ug/g	<0.020	0.020	6743456
p+m-Xylene	ug/g	<0.020	0.020	6743456
o-Xylene	ug/g	<0.020	0.020	6743456
Total Xylenes	ug/g	<0.020	0.020	6743456
F1 (C6-C10)	ug/g	<10	10	6743456
F1 (C6-C10) - BTEX	ug/g	<10	10	6743456
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	6756415
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	6756415
F4 (C34-C50 Hydrocarbons)	ug/g	63	50	6756415
Reached Baseline at C50	ug/g	Yes		6756415
Surrogate Recovery (%)				
o-Terphenyl	%	95		6756415
4-Bromofluorobenzene	%	95		6743456
D10-o-Xylene	%	97		6743456
D4-1,2-Dichloroethane	%	103		6743456
D8-Toluene	%	95		6743456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		MRR542		
Sampling Date		2020/05/14		
COC Number		102951		
	UNITS	**MW114 SS1**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons				
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	2500	100	6762955

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

BV Labs ID: MRR527
Sample ID: BH101 SS1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR528
Sample ID: DUP-1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR528 Dup
Sample ID: DUP-1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR529
Sample ID: BH102 SS2
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

TEST SUMMARY

BV Labs ID: MRR530
Sample ID: BH103 SS1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR531
Sample ID: BH104 SS1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR532
Sample ID: BH105 SS1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR532 Dup
Sample ID: BH105 SS1
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel

TEST SUMMARY

BV Labs ID: MRR533
Sample ID: BH106 SS2
Matrix: Soil

Collected: 2020/05/19
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR534
Sample ID: BH107 SS4
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR535
Sample ID: BH108 SS1
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR536
Sample ID: BH109 SS3
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk

TEST SUMMARY

BV Labs ID: MRR536
Sample ID: BH109 SS3
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR537
Sample ID: MW110 SS2
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR538
Sample ID: DUP-2
Matrix: Soil

Collected: 2020/05/20
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR539
Sample ID: BH111 SS1
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel

TEST SUMMARY

BV Labs ID: MRR539
Sample ID: BH111 SS1
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR540
Sample ID: BH112 SS2
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR540 Dup
Sample ID: BH112 SS2
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu

BV Labs ID: MRR541
Sample ID: BH113 SS2
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6752874	2020/05/27	2020/05/27	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

TEST SUMMARY

BV Labs ID: MRR541 Dup
Sample ID: BH113 SS2
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila

BV Labs ID: MRR542
Sample ID: MW114 SS1
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6762955	2020/06/01	2020/06/01	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6752874	2020/05/27	2020/05/27	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

BV Labs ID: MRR543
Sample ID: BH115 SS2
Matrix: Soil

Collected: 2020/05/14
Shipped:
Received: 2020/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6740896	N/A	2020/05/31	Automated Statchk
Hot Water Extractable Boron	ICP	6745825	2020/05/25	2020/05/29	Archana Patel
1,3-Dichloropropene Sum	CALC	6740897	N/A	2020/05/26	Automated Statchk
Hexavalent Chromium in Soil by IC	IC/SPEC	6752391	2020/05/27	2020/05/28	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6756415	2020/05/28	2020/05/29	Prabhjot Gulati
Strong Acid Leachable Metals by ICPMS	ICP/MS	6746070	2020/05/25	2020/05/28	Viviana Canzonieri
Moisture	BAL	6741312	N/A	2020/05/23	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6761358	2020/05/29	2020/05/30	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6743456	N/A	2020/05/25	Denis Reid

GENERAL COMMENTS

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

Package 1	6.3°C

Cooler custody seal was present and intact .

Sample MRR534 [BH107 SS4] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample MRR541 [BH113 SS2] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample MRR542 [MW114 SS1] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were 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
6741312	KJP	RPD	Moisture	2020/05/23	2.9		%	20
6743456	DR1	Matrix Spike [MRR528-02]	4-Bromofluorobenzene	2020/05/25		101	%	60 - 140
			D10-o-Xylene	2020/05/25		119	%	60 - 130
			D4-1,2-Dichloroethane	2020/05/25		100	%	60 - 140
			D8-Toluene	2020/05/25		100	%	60 - 140
			Acetone (2-Propanone)	2020/05/25		98	%	60 - 140
			Benzene	2020/05/25		94	%	60 - 140
			Bromodichloromethane	2020/05/25		90	%	60 - 140
			Bromoform	2020/05/25		91	%	60 - 140
			Bromomethane	2020/05/25		93	%	60 - 140
			Carbon Tetrachloride	2020/05/25		94	%	60 - 140
			Chlorobenzene	2020/05/25		89	%	60 - 140
			Chloroform	2020/05/25		90	%	60 - 140
			Dibromochloromethane	2020/05/25		93	%	60 - 140
			1,2-Dichlorobenzene	2020/05/25		84	%	60 - 140
			1,3-Dichlorobenzene	2020/05/25		90	%	60 - 140
			1,4-Dichlorobenzene	2020/05/25		95	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2020/05/25		96	%	60 - 140
			1,1-Dichloroethane	2020/05/25		94	%	60 - 140
			1,2-Dichloroethane	2020/05/25		95	%	60 - 140
			1,1-Dichloroethylene	2020/05/25		104	%	60 - 140
			cis-1,2-Dichloroethylene	2020/05/25		89	%	60 - 140
			trans-1,2-Dichloroethylene	2020/05/25		97	%	60 - 140
			1,2-Dichloropropane	2020/05/25		91	%	60 - 140
			cis-1,3-Dichloropropene	2020/05/25		95	%	60 - 140
			trans-1,3-Dichloropropene	2020/05/25		96	%	60 - 140
			Ethylbenzene	2020/05/25		91	%	60 - 140
			Ethylene Dibromide	2020/05/25		93	%	60 - 140
			Hexane	2020/05/25		104	%	60 - 140
			Methylene Chloride(Dichloromethane)	2020/05/25		100	%	60 - 140
			Methyl Ethyl Ketone (2-Butanone)	2020/05/25		90	%	60 - 140
			Methyl Isobutyl Ketone	2020/05/25		101	%	60 - 140
			Methyl t-butyl ether (MTBE)	2020/05/25		86	%	60 - 140
			Styrene	2020/05/25		95	%	60 - 140
			1,1,1,2-Tetrachloroethane	2020/05/25		97	%	60 - 140
			1,1,2,2-Tetrachloroethane	2020/05/25		93	%	60 - 140
			Tetrachloroethylene	2020/05/25		86	%	60 - 140
			Toluene	2020/05/25		88	%	60 - 140
			1,1,1-Trichloroethane	2020/05/25		95	%	60 - 140
			1,1,2-Trichloroethane	2020/05/25		88	%	60 - 140
			Trichloroethylene	2020/05/25		96	%	60 - 140
			Trichlorofluoromethane (FREON 11)	2020/05/25		101	%	60 - 140
			Vinyl Chloride	2020/05/25		97	%	60 - 140
			p+m-Xylene	2020/05/25		97	%	60 - 140
			o-Xylene	2020/05/25		93	%	60 - 140
			F1 (C6-C10)	2020/05/25		98	%	60 - 140
6743456	DR1	Spiked Blank	4-Bromofluorobenzene	2020/05/25		101	%	60 - 140
			D10-o-Xylene	2020/05/25		106	%	60 - 130
			D4-1,2-Dichloroethane	2020/05/25		104	%	60 - 140
			D8-Toluene	2020/05/25		100	%	60 - 140
			Acetone (2-Propanone)	2020/05/25		103	%	60 - 140
			Benzene	2020/05/25		96	%	60 - 130
			Bromodichloromethane	2020/05/25		93	%	60 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromoform	2020/05/25		98	%	60 - 130
			Bromomethane	2020/05/25		92	%	60 - 140
			Carbon Tetrachloride	2020/05/25		94	%	60 - 130
			Chlorobenzene	2020/05/25		89	%	60 - 130
			Chloroform	2020/05/25		91	%	60 - 130
			Dibromochloromethane	2020/05/25		97	%	60 - 130
			1,2-Dichlorobenzene	2020/05/25		86	%	60 - 130
			1,3-Dichlorobenzene	2020/05/25		90	%	60 - 130
			1,4-Dichlorobenzene	2020/05/25		94	%	60 - 130
			Dichlorodifluoromethane (FREON 12)	2020/05/25		94	%	60 - 140
			1,1-Dichloroethane	2020/05/25		95	%	60 - 130
			1,2-Dichloroethane	2020/05/25		100	%	60 - 130
			1,1-Dichloroethylene	2020/05/25		102	%	60 - 130
			cis-1,2-Dichloroethylene	2020/05/25		91	%	60 - 130
			trans-1,2-Dichloroethylene	2020/05/25		97	%	60 - 130
			1,2-Dichloropropane	2020/05/25		93	%	60 - 130
			cis-1,3-Dichloropropene	2020/05/25		97	%	60 - 130
			trans-1,3-Dichloropropene	2020/05/25		97	%	60 - 130
			Ethylbenzene	2020/05/25		88	%	60 - 130
			Ethylene Dibromide	2020/05/25		97	%	60 - 130
			Hexane	2020/05/25		102	%	60 - 130
			Methylene Chloride(Dichloromethane)	2020/05/25		102	%	60 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/05/25		99	%	60 - 140
			Methyl Isobutyl Ketone	2020/05/25		113	%	60 - 130
			Methyl t-butyl ether (MTBE)	2020/05/25		88	%	60 - 130
			Styrene	2020/05/25		94	%	60 - 130
			1,1,1,2-Tetrachloroethane	2020/05/25		98	%	60 - 130
			1,1,2,2-Tetrachloroethane	2020/05/25		100	%	60 - 130
			Tetrachloroethylene	2020/05/25		84	%	60 - 130
			Toluene	2020/05/25		87	%	60 - 130
			1,1,1-Trichloroethane	2020/05/25		95	%	60 - 130
			1,1,2-Trichloroethane	2020/05/25		93	%	60 - 130
			Trichloroethylene	2020/05/25		96	%	60 - 130
			Trichlorofluoromethane (FREON 11)	2020/05/25		99	%	60 - 130
			Vinyl Chloride	2020/05/25		96	%	60 - 130
			p+m-Xylene	2020/05/25		94	%	60 - 130
			o-Xylene	2020/05/25		91	%	60 - 130
			F1 (C6-C10)	2020/05/25		94	%	80 - 120
6743456	DR1	Method Blank	4-Bromofluorobenzene	2020/05/25		97	%	60 - 140
			D10-o-Xylene	2020/05/25		111	%	60 - 130
			D4-1,2-Dichloroethane	2020/05/25		99	%	60 - 140
			D8-Toluene	2020/05/25		95	%	60 - 140
			Acetone (2-Propanone)	2020/05/25	<0.50		ug/g	
			Benzene	2020/05/25	<0.020		ug/g	
			Bromodichloromethane	2020/05/25	<0.050		ug/g	
			Bromoform	2020/05/25	<0.050		ug/g	
			Bromomethane	2020/05/25	<0.050		ug/g	
			Carbon Tetrachloride	2020/05/25	<0.050		ug/g	
			Chlorobenzene	2020/05/25	<0.050		ug/g	
			Chloroform	2020/05/25	<0.050		ug/g	
			Dibromochloromethane	2020/05/25	<0.050		ug/g	
			1,2-Dichlorobenzene	2020/05/25	<0.050		ug/g	
			1,3-Dichlorobenzene	2020/05/25	<0.050		ug/g	
			1,4-Dichlorobenzene	2020/05/25	<0.050		ug/g	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dichlorodifluoromethane (FREON 12)	2020/05/25	<0.050		ug/g	
			1,1-Dichloroethane	2020/05/25	<0.050		ug/g	
			1,2-Dichloroethane	2020/05/25	<0.050		ug/g	
			1,1-Dichloroethylene	2020/05/25	<0.050		ug/g	
			cis-1,2-Dichloroethylene	2020/05/25	<0.050		ug/g	
			trans-1,2-Dichloroethylene	2020/05/25	<0.050		ug/g	
			1,2-Dichloropropane	2020/05/25	<0.050		ug/g	
			cis-1,3-Dichloropropene	2020/05/25	<0.030		ug/g	
			trans-1,3-Dichloropropene	2020/05/25	<0.040		ug/g	
			Ethylbenzene	2020/05/25	<0.020		ug/g	
			Ethylene Dibromide	2020/05/25	<0.050		ug/g	
			Hexane	2020/05/25	<0.050		ug/g	
			Methylene Chloride(Dichloromethane)	2020/05/25	<0.050		ug/g	
			Methyl Ethyl Ketone (2-Butanone)	2020/05/25	<0.50		ug/g	
			Methyl Isobutyl Ketone	2020/05/25	<0.50		ug/g	
			Methyl t-butyl ether (MTBE)	2020/05/25	<0.050		ug/g	
			Styrene	2020/05/25	<0.050		ug/g	
			1,1,1,2-Tetrachloroethane	2020/05/25	<0.050		ug/g	
			1,1,2,2-Tetrachloroethane	2020/05/25	<0.050		ug/g	
			Tetrachloroethylene	2020/05/25	<0.050		ug/g	
			Toluene	2020/05/25	<0.020		ug/g	
			1,1,1-Trichloroethane	2020/05/25	<0.050		ug/g	
			1,1,2-Trichloroethane	2020/05/25	<0.050		ug/g	
			Trichloroethylene	2020/05/25	<0.050		ug/g	
			Trichlorofluoromethane (FREON 11)	2020/05/25	<0.050		ug/g	
			Vinyl Chloride	2020/05/25	<0.020		ug/g	
			p+m-Xylene	2020/05/25	<0.020		ug/g	
			o-Xylene	2020/05/25	<0.020		ug/g	
			Total Xylenes	2020/05/25	<0.020		ug/g	
			F1 (C6-C10)	2020/05/25	<10		ug/g	
			F1 (C6-C10) - BTEX	2020/05/25	<10		ug/g	
6743456	DR1	RPD [MRR528-02]	Acetone (2-Propanone)	2020/05/25	NC		%	50
			Benzene	2020/05/25	NC		%	50
			Bromodichloromethane	2020/05/25	NC		%	50
			Bromoform	2020/05/25	NC		%	50
			Bromomethane	2020/05/25	NC		%	50
			Carbon Tetrachloride	2020/05/25	NC		%	50
			Chlorobenzene	2020/05/25	NC		%	50
			Chloroform	2020/05/25	NC		%	50
			Dibromochloromethane	2020/05/25	NC		%	50
			1,2-Dichlorobenzene	2020/05/25	NC		%	50
			1,3-Dichlorobenzene	2020/05/25	NC		%	50
			1,4-Dichlorobenzene	2020/05/25	NC		%	50
			Dichlorodifluoromethane (FREON 12)	2020/05/25	NC		%	50
			1,1-Dichloroethane	2020/05/25	NC		%	50
			1,2-Dichloroethane	2020/05/25	NC		%	50
			1,1-Dichloroethylene	2020/05/25	NC		%	50
			cis-1,2-Dichloroethylene	2020/05/25	NC		%	50
			trans-1,2-Dichloroethylene	2020/05/25	NC		%	50
			1,2-Dichloropropane	2020/05/25	NC		%	50
			cis-1,3-Dichloropropene	2020/05/25	NC		%	50
			trans-1,3-Dichloropropene	2020/05/25	NC		%	50
			Ethylbenzene	2020/05/25	NC		%	50
			Ethylene Dibromide	2020/05/25	NC		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Hexane	2020/05/25	NC		%	50
			Methylene Chloride(Dichloromethane)	2020/05/25	NC		%	50
			Methyl Ethyl Ketone (2-Butanone)	2020/05/25	NC		%	50
			Methyl Isobutyl Ketone	2020/05/25	NC		%	50
			Methyl t-butyl ether (MTBE)	2020/05/25	NC		%	50
			Styrene	2020/05/25	NC		%	50
			1,1,1,2-Tetrachloroethane	2020/05/25	NC		%	50
			1,1,2,2-Tetrachloroethane	2020/05/25	NC		%	50
			Tetrachloroethylene	2020/05/25	NC		%	50
			Toluene	2020/05/25	1.3		%	50
			1,1,1-Trichloroethane	2020/05/25	NC		%	50
			1,1,2-Trichloroethane	2020/05/25	NC		%	50
			Trichloroethylene	2020/05/25	NC		%	50
			Trichlorofluoromethane (FREON 11)	2020/05/25	NC		%	50
			Vinyl Chloride	2020/05/25	NC		%	50
			p+m-Xylene	2020/05/25	1.4		%	50
			o-Xylene	2020/05/25	2.0		%	50
			Total Xylenes	2020/05/25	1.6		%	50
			F1 (C6-C10)	2020/05/25	NC		%	30
			F1 (C6-C10) - BTEX	2020/05/25	NC		%	30
6745825	APT	Matrix Spike [MRR532-01]	Hot Water Ext. Boron (B)	2020/05/29		101	%	75 - 125
6745825	APT	Spiked Blank	Hot Water Ext. Boron (B)	2020/05/29		103	%	75 - 125
6745825	APT	Method Blank	Hot Water Ext. Boron (B)	2020/05/29	<0.050		ug/g	
6745825	APT	RPD [MRR532-01]	Hot Water Ext. Boron (B)	2020/05/29	0.72		%	40
6746070	VIV	Matrix Spike	Acid Extractable Antimony (Sb)	2020/05/28		101	%	75 - 125
			Acid Extractable Arsenic (As)	2020/05/28		104	%	75 - 125
			Acid Extractable Barium (Ba)	2020/05/28		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2020/05/28		103	%	75 - 125
			Acid Extractable Boron (B)	2020/05/28		105	%	75 - 125
			Acid Extractable Cadmium (Cd)	2020/05/28		105	%	75 - 125
			Acid Extractable Chromium (Cr)	2020/05/28		104	%	75 - 125
			Acid Extractable Cobalt (Co)	2020/05/28		102	%	75 - 125
			Acid Extractable Copper (Cu)	2020/05/28		100	%	75 - 125
			Acid Extractable Lead (Pb)	2020/05/28		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2020/05/28		105	%	75 - 125
			Acid Extractable Nickel (Ni)	2020/05/28		101	%	75 - 125
			Acid Extractable Selenium (Se)	2020/05/28		106	%	75 - 125
			Acid Extractable Silver (Ag)	2020/05/28		105	%	75 - 125
			Acid Extractable Thallium (Tl)	2020/05/28		102	%	75 - 125
			Acid Extractable Uranium (U)	2020/05/28		105	%	75 - 125
			Acid Extractable Vanadium (V)	2020/05/28		105	%	75 - 125
			Acid Extractable Zinc (Zn)	2020/05/28		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2020/05/28		95	%	75 - 125
6746070	VIV	Spiked Blank	Acid Extractable Antimony (Sb)	2020/05/28		112	%	80 - 120
			Acid Extractable Arsenic (As)	2020/05/28		105	%	80 - 120
			Acid Extractable Barium (Ba)	2020/05/28		105	%	80 - 120
			Acid Extractable Beryllium (Be)	2020/05/28		104	%	80 - 120
			Acid Extractable Boron (B)	2020/05/28		111	%	80 - 120
			Acid Extractable Cadmium (Cd)	2020/05/28		107	%	80 - 120
			Acid Extractable Chromium (Cr)	2020/05/28		105	%	80 - 120
			Acid Extractable Cobalt (Co)	2020/05/28		105	%	80 - 120
			Acid Extractable Copper (Cu)	2020/05/28		108	%	80 - 120
			Acid Extractable Lead (Pb)	2020/05/28		105	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Molybdenum (Mo)	2020/05/28		106	%	80 - 120
			Acid Extractable Nickel (Ni)	2020/05/28		105	%	80 - 120
			Acid Extractable Selenium (Se)	2020/05/28		108	%	80 - 120
			Acid Extractable Silver (Ag)	2020/05/28		111	%	80 - 120
			Acid Extractable Thallium (Tl)	2020/05/28		106	%	80 - 120
			Acid Extractable Uranium (U)	2020/05/28		106	%	80 - 120
			Acid Extractable Vanadium (V)	2020/05/28		106	%	80 - 120
			Acid Extractable Zinc (Zn)	2020/05/28		109	%	80 - 120
			Acid Extractable Mercury (Hg)	2020/05/28		97	%	80 - 120
6746070	VIV	Method Blank	Acid Extractable Antimony (Sb)	2020/05/28	<0.20		ug/g	
			Acid Extractable Arsenic (As)	2020/05/28	<1.0		ug/g	
			Acid Extractable Barium (Ba)	2020/05/28	<0.50		ug/g	
			Acid Extractable Beryllium (Be)	2020/05/28	<0.20		ug/g	
			Acid Extractable Boron (B)	2020/05/28	<5.0		ug/g	
			Acid Extractable Cadmium (Cd)	2020/05/28	<0.10		ug/g	
			Acid Extractable Chromium (Cr)	2020/05/28	<1.0		ug/g	
			Acid Extractable Cobalt (Co)	2020/05/28	<0.10		ug/g	
			Acid Extractable Copper (Cu)	2020/05/28	<0.50		ug/g	
			Acid Extractable Lead (Pb)	2020/05/28	<1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2020/05/28	<0.50		ug/g	
			Acid Extractable Nickel (Ni)	2020/05/28	<0.50		ug/g	
			Acid Extractable Selenium (Se)	2020/05/28	<0.50		ug/g	
			Acid Extractable Silver (Ag)	2020/05/28	<0.20		ug/g	
			Acid Extractable Thallium (Tl)	2020/05/28	<0.050		ug/g	
			Acid Extractable Uranium (U)	2020/05/28	<0.050		ug/g	
			Acid Extractable Vanadium (V)	2020/05/28	<5.0		ug/g	
			Acid Extractable Zinc (Zn)	2020/05/28	<5.0		ug/g	
			Acid Extractable Mercury (Hg)	2020/05/28	<0.050		ug/g	
6746070	VIV	RPD	Acid Extractable Antimony (Sb)	2020/05/28	NC		%	30
			Acid Extractable Arsenic (As)	2020/05/28	7.5		%	30
			Acid Extractable Barium (Ba)	2020/05/28	5.4		%	30
			Acid Extractable Beryllium (Be)	2020/05/28	4.5		%	30
			Acid Extractable Boron (B)	2020/05/28	1.5		%	30
			Acid Extractable Cadmium (Cd)	2020/05/28	NC		%	30
			Acid Extractable Chromium (Cr)	2020/05/28	2.2		%	30
			Acid Extractable Cobalt (Co)	2020/05/28	2.7		%	30
			Acid Extractable Copper (Cu)	2020/05/28	4.6		%	30
			Acid Extractable Lead (Pb)	2020/05/28	18		%	30
			Acid Extractable Molybdenum (Mo)	2020/05/28	NC		%	30
			Acid Extractable Nickel (Ni)	2020/05/28	1.2		%	30
			Acid Extractable Selenium (Se)	2020/05/28	NC		%	30
			Acid Extractable Silver (Ag)	2020/05/28	NC		%	30
			Acid Extractable Thallium (Tl)	2020/05/28	1.2		%	30
			Acid Extractable Uranium (U)	2020/05/28	5.7		%	30
			Acid Extractable Vanadium (V)	2020/05/28	2.4		%	30
			Acid Extractable Zinc (Zn)	2020/05/28	17		%	30
			Acid Extractable Mercury (Hg)	2020/05/28	NC		%	30
6752391	VP2	Matrix Spike [MRR541-01]	Chromium (VI)	2020/05/28		0 (1)	%	70 - 130
6752391	VP2	Spiked Blank	Chromium (VI)	2020/05/28		89	%	80 - 120
6752391	VP2	Method Blank	Chromium (VI)	2020/05/28	<0.18		ug/g	
6752391	VP2	RPD [MRR541-01]	Chromium (VI)	2020/05/28	NC		%	35
6752874	VIV	Matrix Spike	Acid Extractable Antimony (Sb)	2020/05/27		99	%	75 - 125
			Acid Extractable Arsenic (As)	2020/05/27		103	%	75 - 125

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Barium (Ba)	2020/05/27		97	%	75 - 125
			Acid Extractable Beryllium (Be)	2020/05/27		104	%	75 - 125
			Acid Extractable Boron (B)	2020/05/27		103	%	75 - 125
			Acid Extractable Cadmium (Cd)	2020/05/27		101	%	75 - 125
			Acid Extractable Chromium (Cr)	2020/05/27		104	%	75 - 125
			Acid Extractable Cobalt (Co)	2020/05/27		102	%	75 - 125
			Acid Extractable Copper (Cu)	2020/05/27		101	%	75 - 125
			Acid Extractable Lead (Pb)	2020/05/27		101	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2020/05/27		102	%	75 - 125
			Acid Extractable Nickel (Ni)	2020/05/27		102	%	75 - 125
			Acid Extractable Selenium (Se)	2020/05/27		103	%	75 - 125
			Acid Extractable Silver (Ag)	2020/05/27		102	%	75 - 125
			Acid Extractable Thallium (Tl)	2020/05/27		102	%	75 - 125
			Acid Extractable Uranium (U)	2020/05/27		106	%	75 - 125
			Acid Extractable Vanadium (V)	2020/05/27		105	%	75 - 125
			Acid Extractable Zinc (Zn)	2020/05/27		102	%	75 - 125
			Acid Extractable Mercury (Hg)	2020/05/27		96	%	75 - 125
6752874	VIV	Spiked Blank	Acid Extractable Antimony (Sb)	2020/05/27		104	%	80 - 120
			Acid Extractable Arsenic (As)	2020/05/27		102	%	80 - 120
			Acid Extractable Barium (Ba)	2020/05/27		106	%	80 - 120
			Acid Extractable Beryllium (Be)	2020/05/27		98	%	80 - 120
			Acid Extractable Boron (B)	2020/05/27		93	%	80 - 120
			Acid Extractable Cadmium (Cd)	2020/05/27		100	%	80 - 120
			Acid Extractable Chromium (Cr)	2020/05/27		104	%	80 - 120
			Acid Extractable Cobalt (Co)	2020/05/27		103	%	80 - 120
			Acid Extractable Copper (Cu)	2020/05/27		105	%	80 - 120
			Acid Extractable Lead (Pb)	2020/05/27		105	%	80 - 120
			Acid Extractable Molybdenum (Mo)	2020/05/27		100	%	80 - 120
			Acid Extractable Nickel (Ni)	2020/05/27		103	%	80 - 120
			Acid Extractable Selenium (Se)	2020/05/27		104	%	80 - 120
			Acid Extractable Silver (Ag)	2020/05/27		103	%	80 - 120
			Acid Extractable Thallium (Tl)	2020/05/27		102	%	80 - 120
			Acid Extractable Uranium (U)	2020/05/27		105	%	80 - 120
			Acid Extractable Vanadium (V)	2020/05/27		105	%	80 - 120
			Acid Extractable Zinc (Zn)	2020/05/27		105	%	80 - 120
			Acid Extractable Mercury (Hg)	2020/05/27		97	%	80 - 120
6752874	VIV	Method Blank	Acid Extractable Antimony (Sb)	2020/05/27	<0.20		ug/g	
			Acid Extractable Arsenic (As)	2020/05/27	<1.0		ug/g	
			Acid Extractable Barium (Ba)	2020/05/27	<0.50		ug/g	
			Acid Extractable Beryllium (Be)	2020/05/27	<0.20		ug/g	
			Acid Extractable Boron (B)	2020/05/27	<5.0		ug/g	
			Acid Extractable Cadmium (Cd)	2020/05/27	<0.10		ug/g	
			Acid Extractable Chromium (Cr)	2020/05/27	<1.0		ug/g	
			Acid Extractable Cobalt (Co)	2020/05/27	<0.10		ug/g	
			Acid Extractable Copper (Cu)	2020/05/27	<0.50		ug/g	
			Acid Extractable Lead (Pb)	2020/05/27	<1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2020/05/27	<0.50		ug/g	
			Acid Extractable Nickel (Ni)	2020/05/27	<0.50		ug/g	
			Acid Extractable Selenium (Se)	2020/05/27	<0.50		ug/g	
			Acid Extractable Silver (Ag)	2020/05/27	<0.20		ug/g	
			Acid Extractable Thallium (Tl)	2020/05/27	<0.050		ug/g	
			Acid Extractable Uranium (U)	2020/05/27	<0.050		ug/g	
			Acid Extractable Vanadium (V)	2020/05/27	<5.0		ug/g	
			Acid Extractable Zinc (Zn)	2020/05/27	<5.0		ug/g	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Mercury (Hg)	2020/05/27	<0.050		ug/g	
6752874	VIV	RPD	Acid Extractable Antimony (Sb)	2020/05/27	NC		%	30
			Acid Extractable Arsenic (As)	2020/05/27	NC		%	30
			Acid Extractable Barium (Ba)	2020/05/27	5.2		%	30
			Acid Extractable Beryllium (Be)	2020/05/27	NC		%	30
			Acid Extractable Boron (B)	2020/05/27	NC		%	30
			Acid Extractable Cadmium (Cd)	2020/05/27	NC		%	30
			Acid Extractable Chromium (Cr)	2020/05/27	11		%	30
			Acid Extractable Cobalt (Co)	2020/05/27	1.2		%	30
			Acid Extractable Copper (Cu)	2020/05/27	1.2		%	30
			Acid Extractable Lead (Pb)	2020/05/27	1.1		%	30
			Acid Extractable Molybdenum (Mo)	2020/05/27	NC		%	30
			Acid Extractable Nickel (Ni)	2020/05/27	0.72		%	30
			Acid Extractable Selenium (Se)	2020/05/27	NC		%	30
			Acid Extractable Silver (Ag)	2020/05/27	NC		%	30
			Acid Extractable Thallium (Tl)	2020/05/27	NC		%	30
			Acid Extractable Uranium (U)	2020/05/27	8.5		%	30
			Acid Extractable Vanadium (V)	2020/05/27	8.4		%	30
			Acid Extractable Zinc (Zn)	2020/05/27	3.2		%	30
			Acid Extractable Mercury (Hg)	2020/05/27	NC		%	30
6756415	GUL	Matrix Spike [MRR540-01]	o-Terphenyl	2020/05/29		77	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/05/29		77	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2020/05/29		89	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2020/05/29		89	%	50 - 130
6756415	GUL	Spiked Blank	o-Terphenyl	2020/05/29		100	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/05/29		106	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2020/05/29		111	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2020/05/29		111	%	80 - 120
6756415	GUL	Method Blank	o-Terphenyl	2020/05/29		77	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/05/29	<10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2020/05/29	<50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2020/05/29	<50		ug/g	
6756415	GUL	RPD [MRR540-01]	F2 (C10-C16 Hydrocarbons)	2020/05/29	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2020/05/29	18		%	30
			F4 (C34-C50 Hydrocarbons)	2020/05/29	NC		%	30
6761358	JET	Matrix Spike [MRR540-01]	D10-Anthracene	2020/05/30		102	%	50 - 130
			D14-Terphenyl (FS)	2020/05/30		101	%	50 - 130
			D8-Acenaphthylene	2020/05/30		96	%	50 - 130
			Acenaphthene	2020/05/30		90	%	50 - 130
			Acenaphthylene	2020/05/30		85	%	50 - 130
			Anthracene	2020/05/30		92	%	50 - 130
			Benzo(a)anthracene	2020/05/30		96	%	50 - 130
			Benzo(a)pyrene	2020/05/30		93	%	50 - 130
			Benzo(b/j)fluoranthene	2020/05/30		95	%	50 - 130
			Benzo(g,h,i)perylene	2020/05/30		91	%	50 - 130
			Benzo(k)fluoranthene	2020/05/30		92	%	50 - 130
			Chrysene	2020/05/30		97	%	50 - 130
			Dibenzo(a,h)anthracene	2020/05/30		91	%	50 - 130
			Fluoranthene	2020/05/30		101	%	50 - 130
			Fluorene	2020/05/30		92	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/05/30		89	%	50 - 130
			1-Methylnaphthalene	2020/05/30		97	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			2-Methylnaphthalene	2020/05/30		95	%	50 - 130
			Naphthalene	2020/05/30		84	%	50 - 130
			Phenanthrene	2020/05/30		93	%	50 - 130
			Pyrene	2020/05/30		99	%	50 - 130
6761358	JET	Spiked Blank	D10-Anthracene	2020/05/30		103	%	50 - 130
			D14-Terphenyl (FS)	2020/05/30		95	%	50 - 130
			D8-Acenaphthylene	2020/05/30		98	%	50 - 130
			Acenaphthene	2020/05/30		93	%	50 - 130
			Acenaphthylene	2020/05/30		88	%	50 - 130
			Anthracene	2020/05/30		96	%	50 - 130
			Benzo(a)anthracene	2020/05/30		94	%	50 - 130
			Benzo(a)pyrene	2020/05/30		94	%	50 - 130
			Benzo(b/j)fluoranthene	2020/05/30		98	%	50 - 130
			Benzo(g,h,i)perylene	2020/05/30		94	%	50 - 130
			Benzo(k)fluoranthene	2020/05/30		94	%	50 - 130
			Chrysene	2020/05/30		100	%	50 - 130
			Dibenzo(a,h)anthracene	2020/05/30		92	%	50 - 130
			Fluoranthene	2020/05/30		100	%	50 - 130
			Fluorene	2020/05/30		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/05/30		92	%	50 - 130
			1-Methylnaphthalene	2020/05/30		101	%	50 - 130
			2-Methylnaphthalene	2020/05/30		99	%	50 - 130
			Naphthalene	2020/05/30		89	%	50 - 130
			Phenanthrene	2020/05/30		95	%	50 - 130
			Pyrene	2020/05/30		98	%	50 - 130
6761358	JET	Method Blank	D10-Anthracene	2020/05/30		104	%	50 - 130
			D14-Terphenyl (FS)	2020/05/30		94	%	50 - 130
			D8-Acenaphthylene	2020/05/30		99	%	50 - 130
			Acenaphthene	2020/05/30	<0.0050		ug/g	
			Acenaphthylene	2020/05/30	<0.0050		ug/g	
			Anthracene	2020/05/30	<0.0050		ug/g	
			Benzo(a)anthracene	2020/05/30	<0.0050		ug/g	
			Benzo(a)pyrene	2020/05/30	<0.0050		ug/g	
			Benzo(b/j)fluoranthene	2020/05/30	<0.0050		ug/g	
			Benzo(g,h,i)perylene	2020/05/30	<0.0050		ug/g	
			Benzo(k)fluoranthene	2020/05/30	<0.0050		ug/g	
			Chrysene	2020/05/30	<0.0050		ug/g	
			Dibenzo(a,h)anthracene	2020/05/30	<0.0050		ug/g	
			Fluoranthene	2020/05/30	<0.0050		ug/g	
			Fluorene	2020/05/30	<0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2020/05/30	<0.0050		ug/g	
			1-Methylnaphthalene	2020/05/30	<0.0050		ug/g	
			2-Methylnaphthalene	2020/05/30	<0.0050		ug/g	
			Naphthalene	2020/05/30	<0.0050		ug/g	
			Phenanthrene	2020/05/30	<0.0050		ug/g	
			Pyrene	2020/05/30	<0.0050		ug/g	
6761358	JET	RPD [MRR540-01]	Acenaphthene	2020/05/30	NC		%	40
			Acenaphthylene	2020/05/30	NC		%	40
			Anthracene	2020/05/30	NC		%	40
			Benzo(a)anthracene	2020/05/30	NC		%	40
			Benzo(a)pyrene	2020/05/30	NC		%	40
			Benzo(b/j)fluoranthene	2020/05/30	NC		%	40
			Benzo(g,h,i)perylene	2020/05/30	NC		%	40
			Benzo(k)fluoranthene	2020/05/30	NC		%	40

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2020/05/30	NC		%	40
			Dibenzo(a,h)anthracene	2020/05/30	NC		%	40
			Fluoranthene	2020/05/30	NC		%	40
			Fluorene	2020/05/30	NC		%	40
			Indeno(1,2,3-cd)pyrene	2020/05/30	NC		%	40
			1-Methylnaphthalene	2020/05/30	NC		%	40
			2-Methylnaphthalene	2020/05/30	NC		%	40
			Naphthalene	2020/05/30	NC		%	40
			Phenanthrene	2020/05/30	NC		%	40
			Pyrene	2020/05/30	NC		%	40
6762955	RDU	Matrix Spike [MRR542-01]	F4G-sg (Grav. Heavy Hydrocarbons)	2020/06/01		73	%	65 - 135
6762955	RDU	Spiked Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2020/06/01		103	%	65 - 135
6762955	RDU	Method Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2020/06/01	<100		ug/g	
6762955	RDU	RPD	F4G-sg (Grav. Heavy Hydrocarbons)	2020/06/01	0		%	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).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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

Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECQRD

102950 Page 1 of 2

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	Pinchin Ltd.	Company Name:		Quotation #:	
Contact Name:	Mike Kosiw	Contact Name:		P.O. #/ AFE#:	
Address:	M. Ryan.	Address:	SAME	Project #:	230236.006
				Site Location:	
Phone: Fax:	1 Hines Rd Kanata	Phone: Fax:		Site #:	
Email:	ON	Email:		Sampled By:	MKosiw

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:

Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 7

FOR RSC (PLEASE CIRCLE) [✓ Y] / N

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / [✓ N]

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

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] N		COOLER TEMPERATURES
Present	Intact	
Y	Y	4/11/4
		5/14/11

COOLING MEDIA PRESENT: [✓ Y] N

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	HOLD- DO NOT ANALYZE	COMMENTS
1	BH101 SS1	May 19 2020	AM	SOIL	3		X	X	X			X	X		
2	Dup-1														
3	BH102 SS2														
4	BH103 SS1														
5	BH104 SS1														
6	BH105SS1		Pm												
7	BH106 SS2														
8	BH107 SS4	May 20 2020	AM												
9	BH108 SS1														
10	BH109 SS3														

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Mike Kosiw	May 22 2020	10:00AM	Katie Szczela Katie Szczela	2020/05/22	14:27
			Ashlethe Mckellar Ashlethe McKellar	2020/05/23	07:44

22-May-20 14:27
Antonella Brasil
C0C5456
MAF ENV-760

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COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

102951 Page 2 of 2

Invoice Information

Company Name: Pinchin Ltd
Contact Name: M. Kosin
Address: c/o Ryan
1 Hines Rd
Phone: Fax:
Email:

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address: SAME
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 236236.006
Site Location:
Site #:
Sampled By: M. Kosin

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)
☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:
Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 2
FOR RSC (PLEASE CIRCLE) [✓ Y] / N

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / [✓ N]

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

LABORATORY USE ONLY

CUSTODY SEAL Y / N
Present Intact
COOLER TEMPERATURES
COOLING MEDIA PRESENT: Y / N

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs								HOLD- DO NOT ANALYZE	COMMENTS
1	MW110 SS2	May 20	AM	SOIL	3		X	X	X			X	X									
2	Dup-2	2020	AM																			
3	BH111 SS1	May 14	PM																			
4	BH112 SS2	2020																				
5	BH113 SS2																					
6	MW114 SS1		AM																			
7	BH115 SS2		PM																			
8																						
9																						
10																						

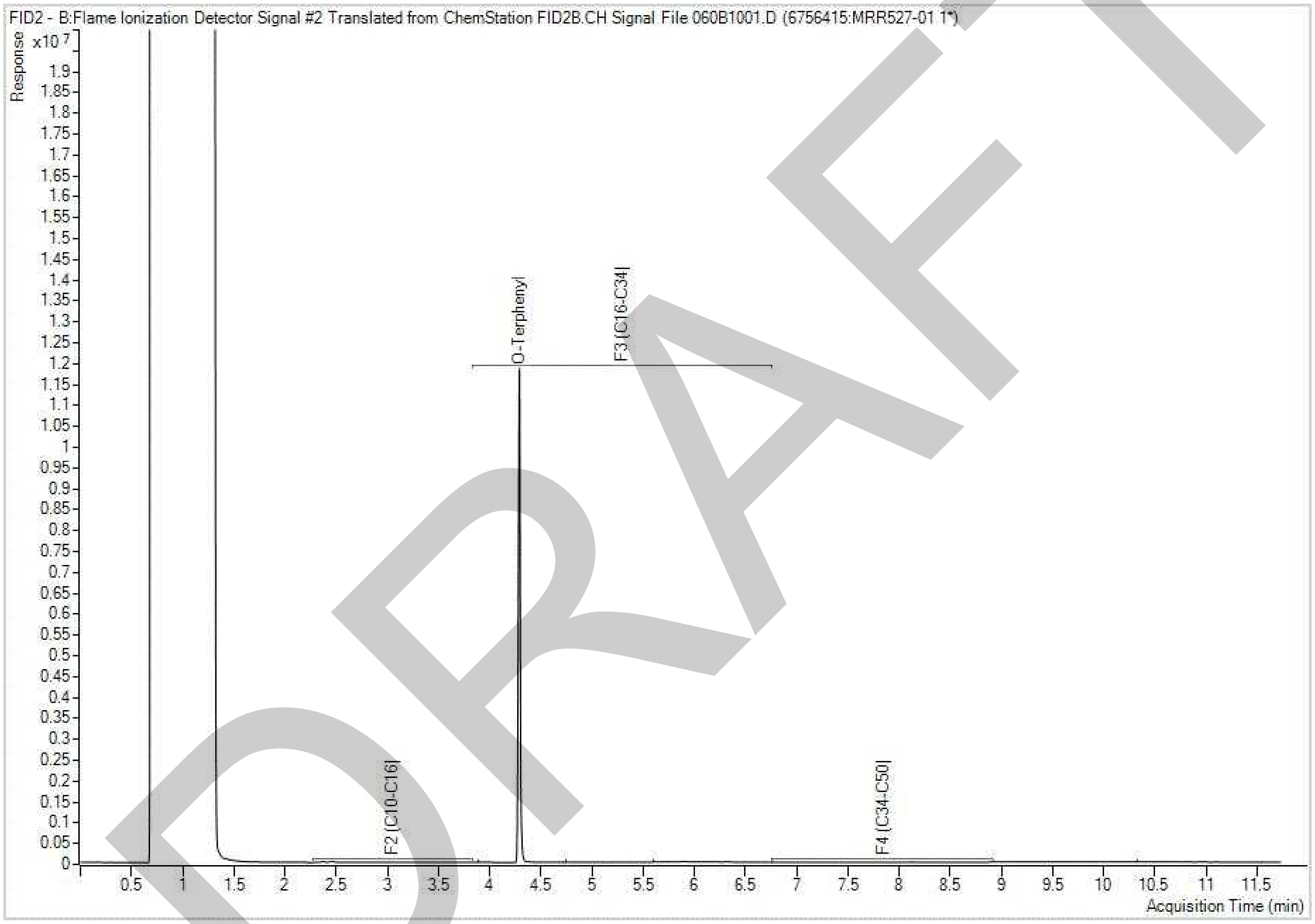
RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Kosin	May 22 2020	10:00AM	Katie Szozda Katie Szozda See Page 1	2020/05/22	14:27	COC5456 MK

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. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

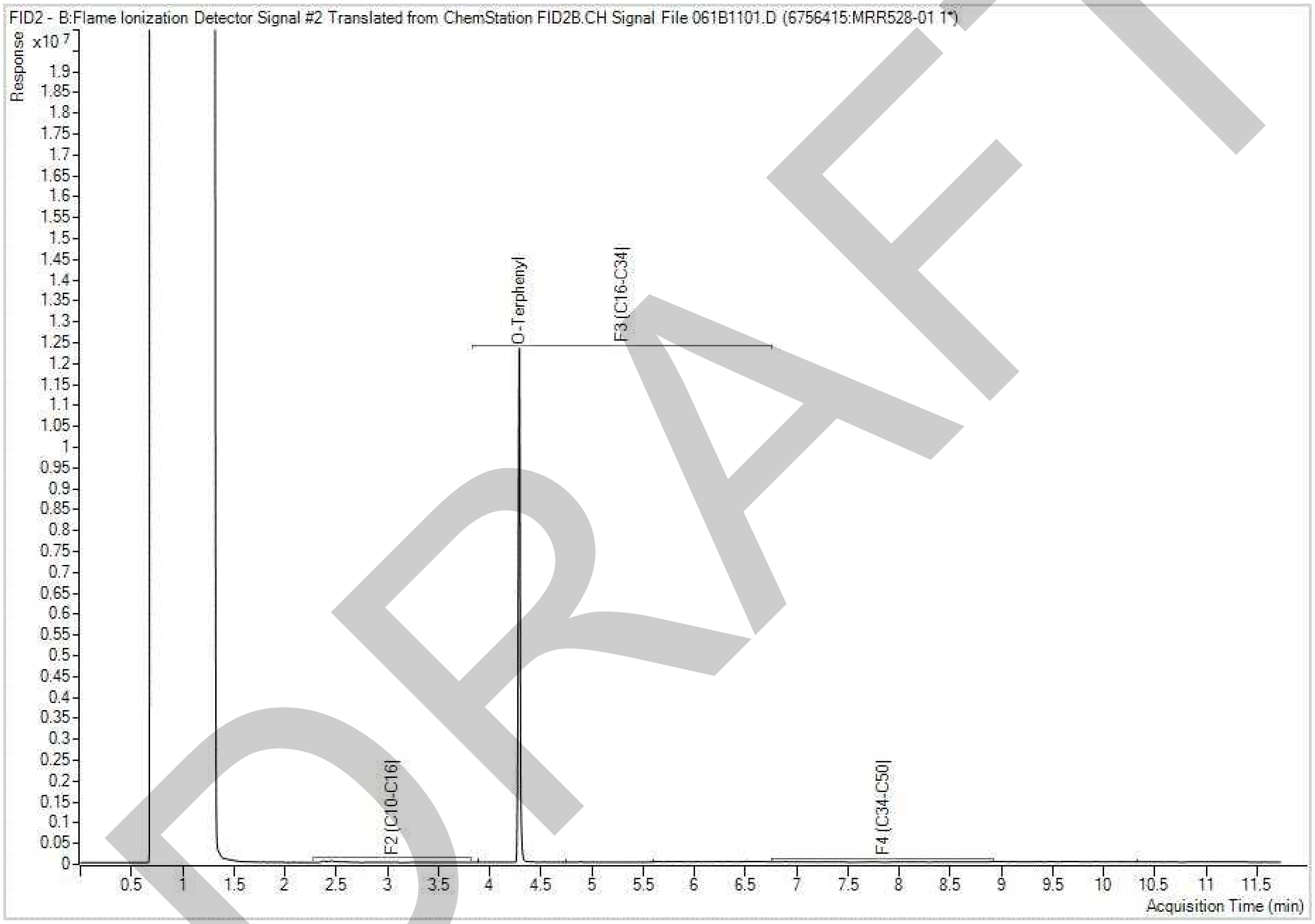


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR528

Pinchin Ltd
Client Project #: 230236.006
Client ID: DUP-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

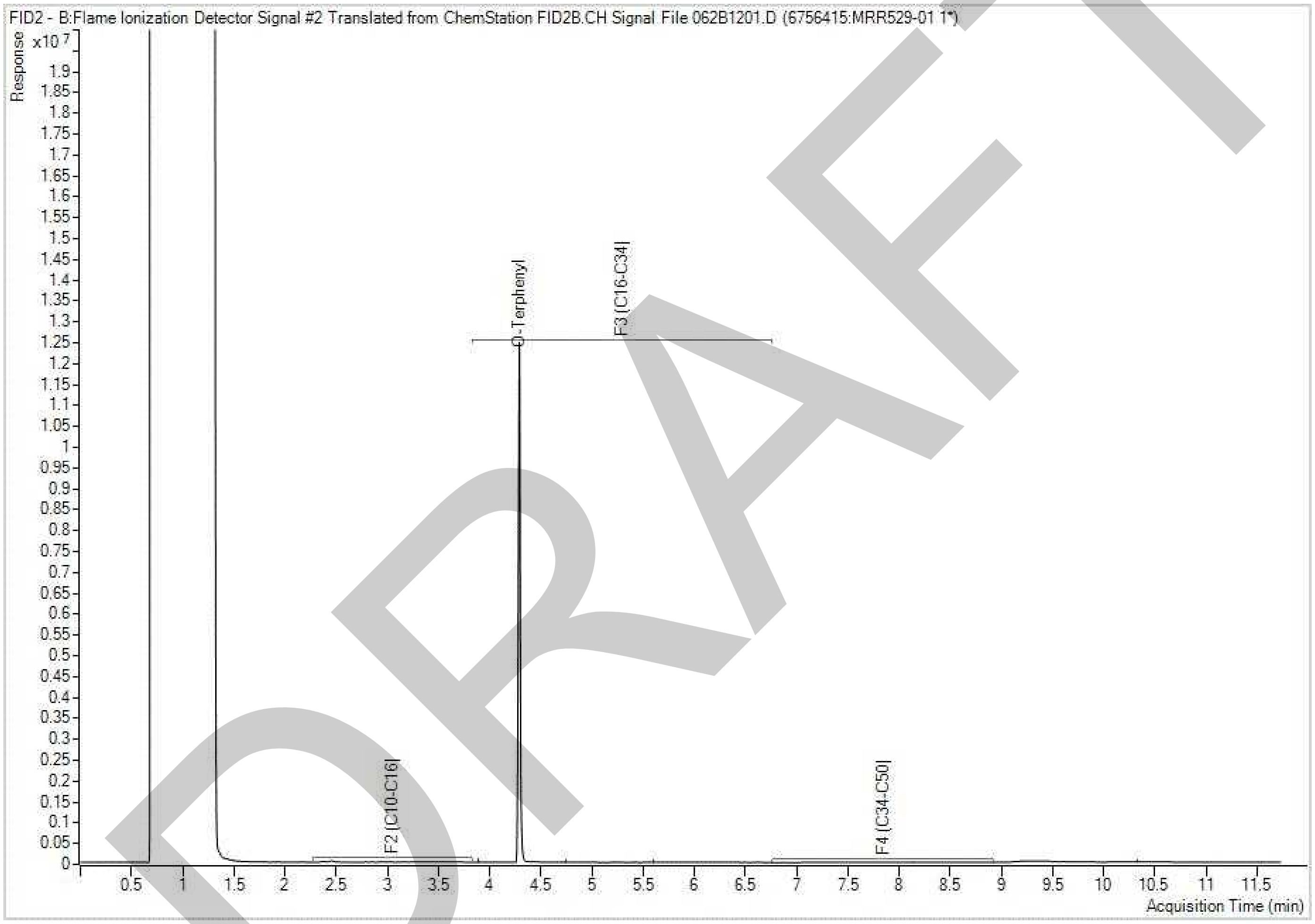


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR529

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH102 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

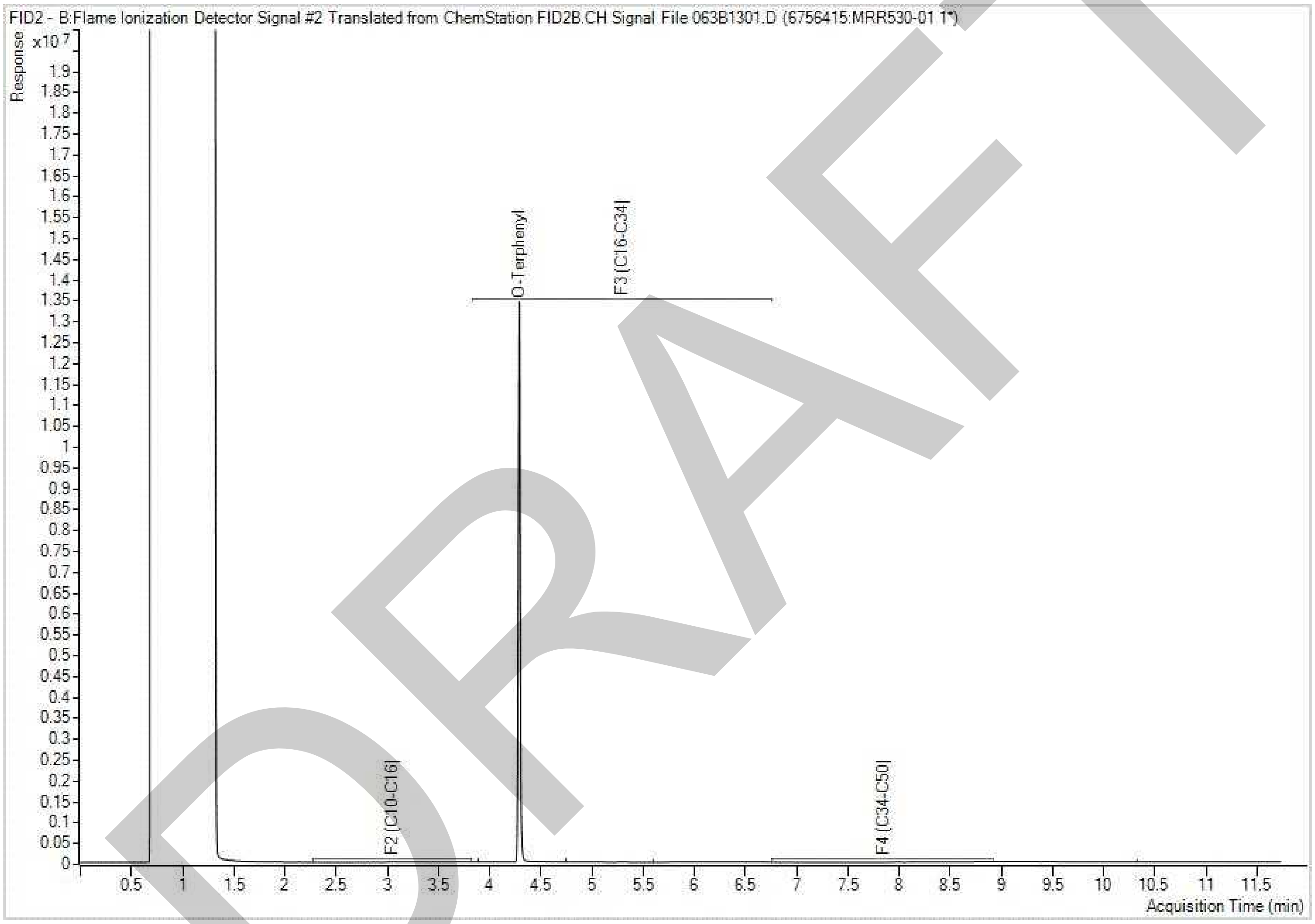


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR530

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH103 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

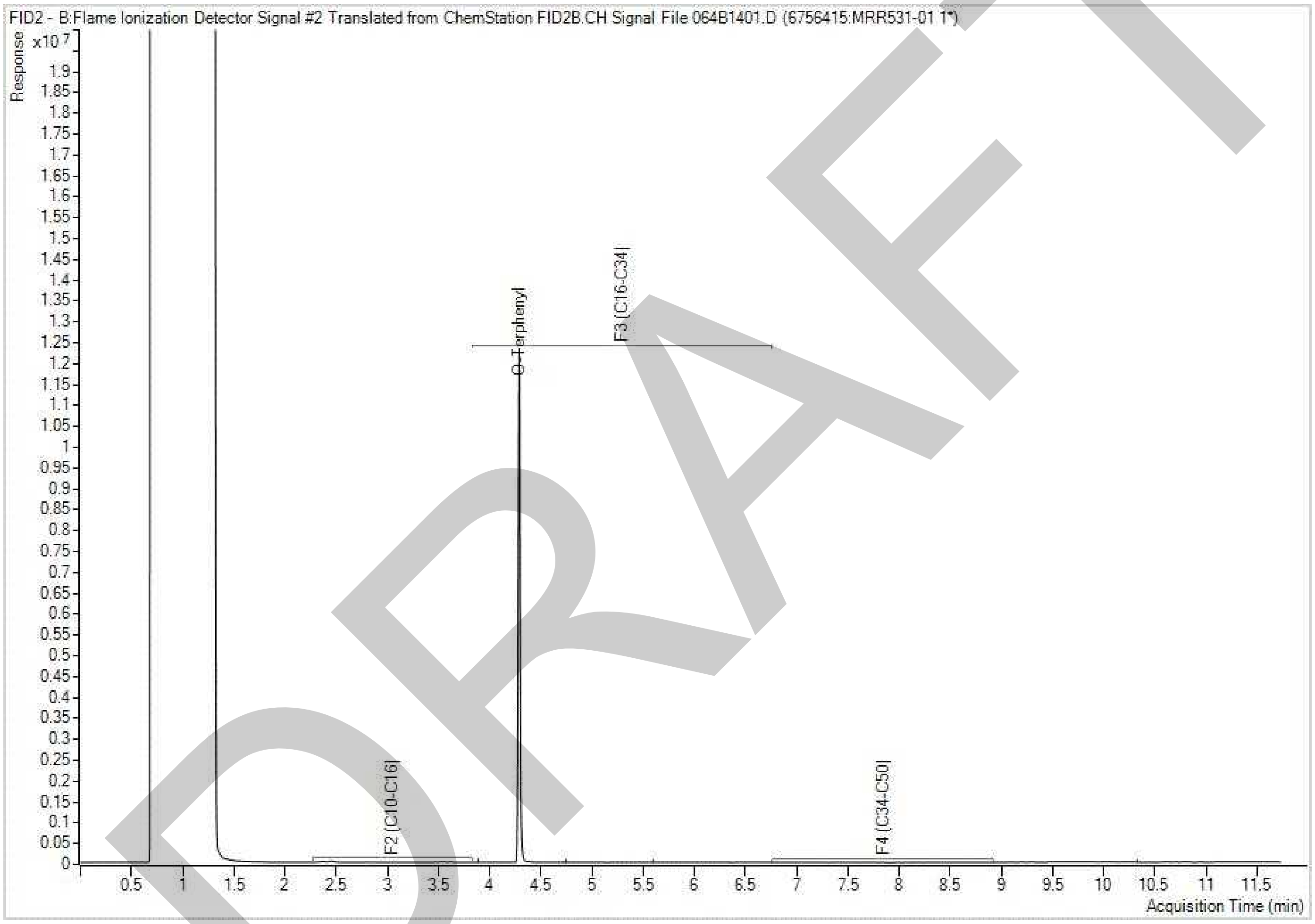


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR531

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH104 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

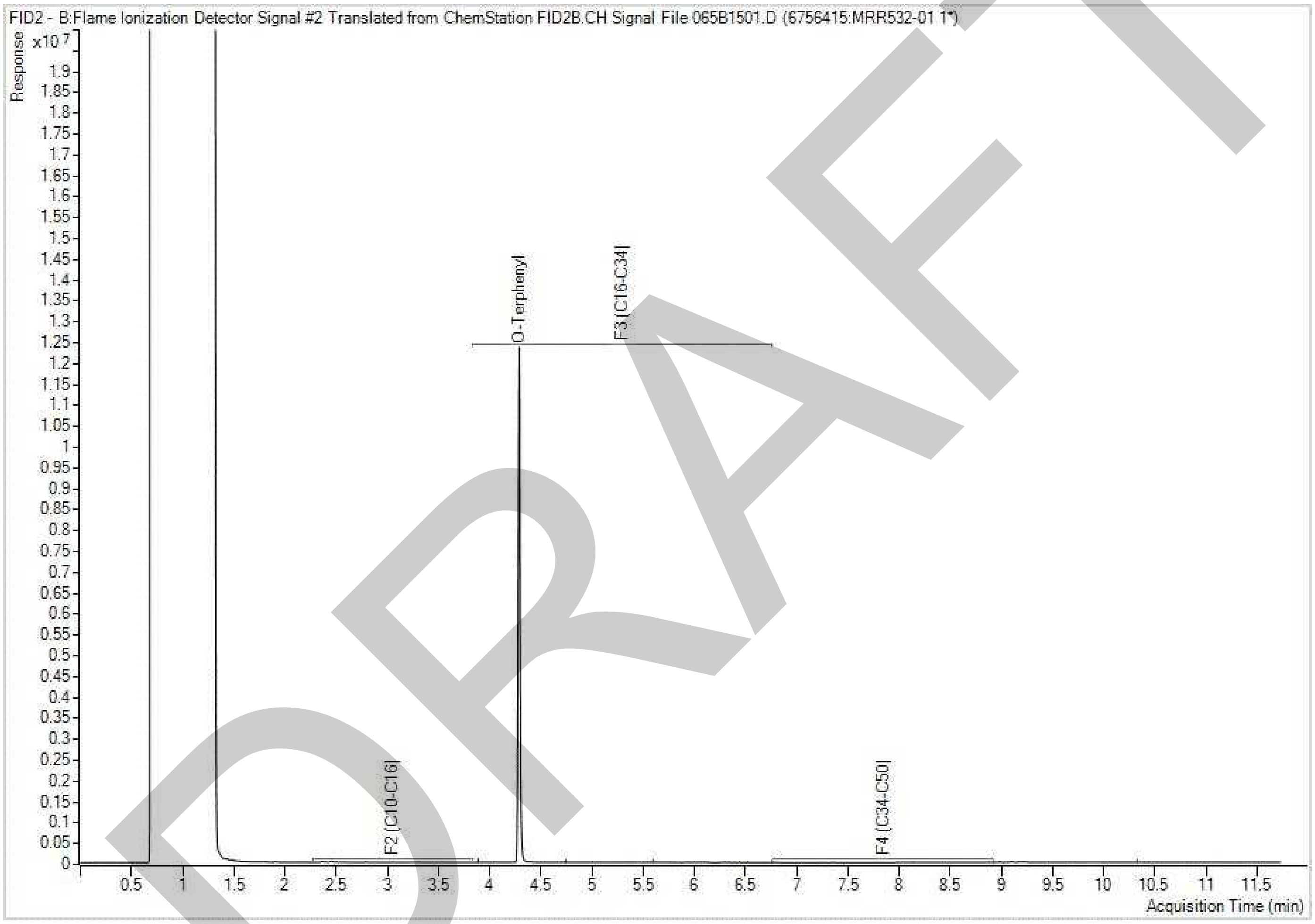


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR532

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH105 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

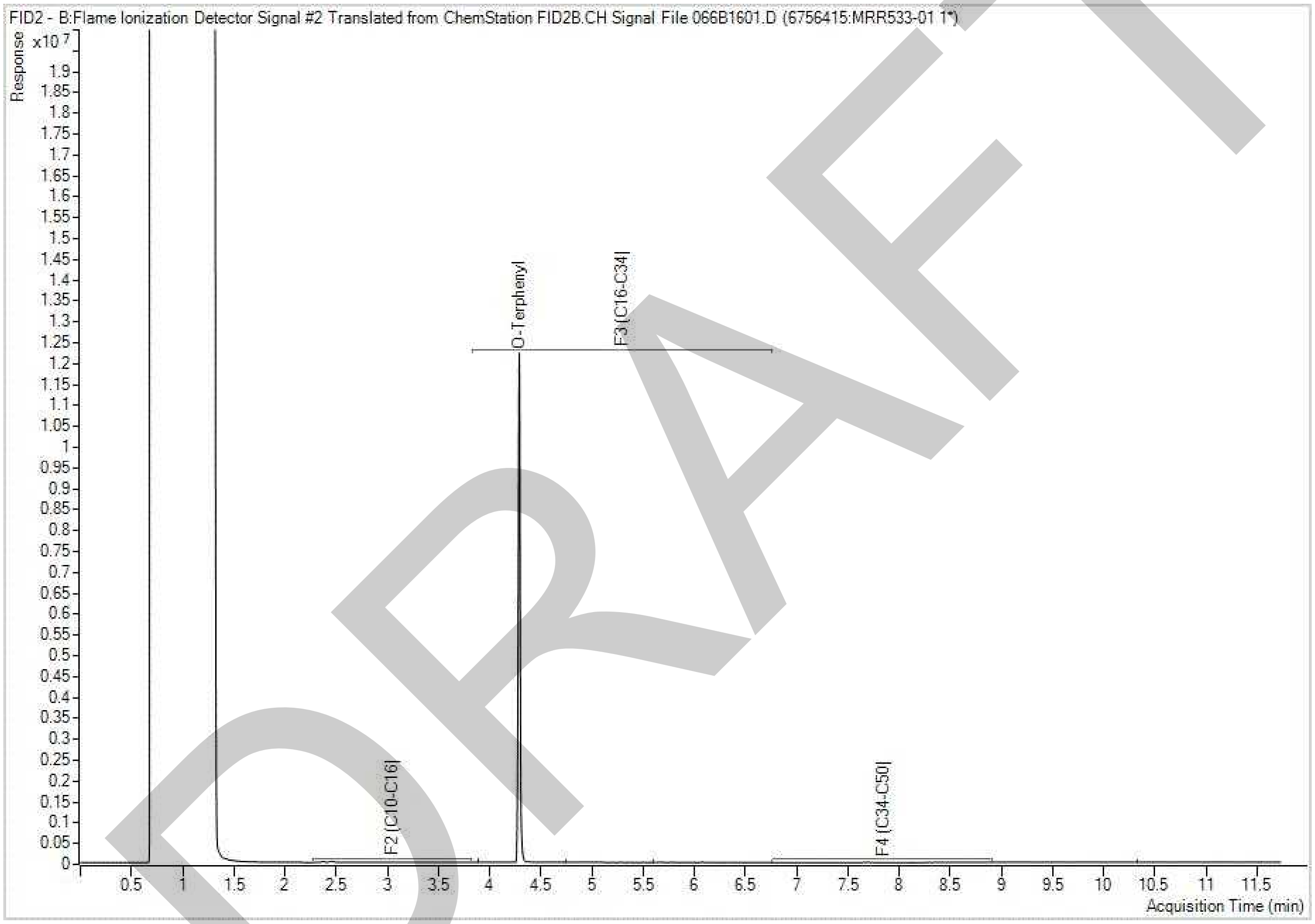


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR533

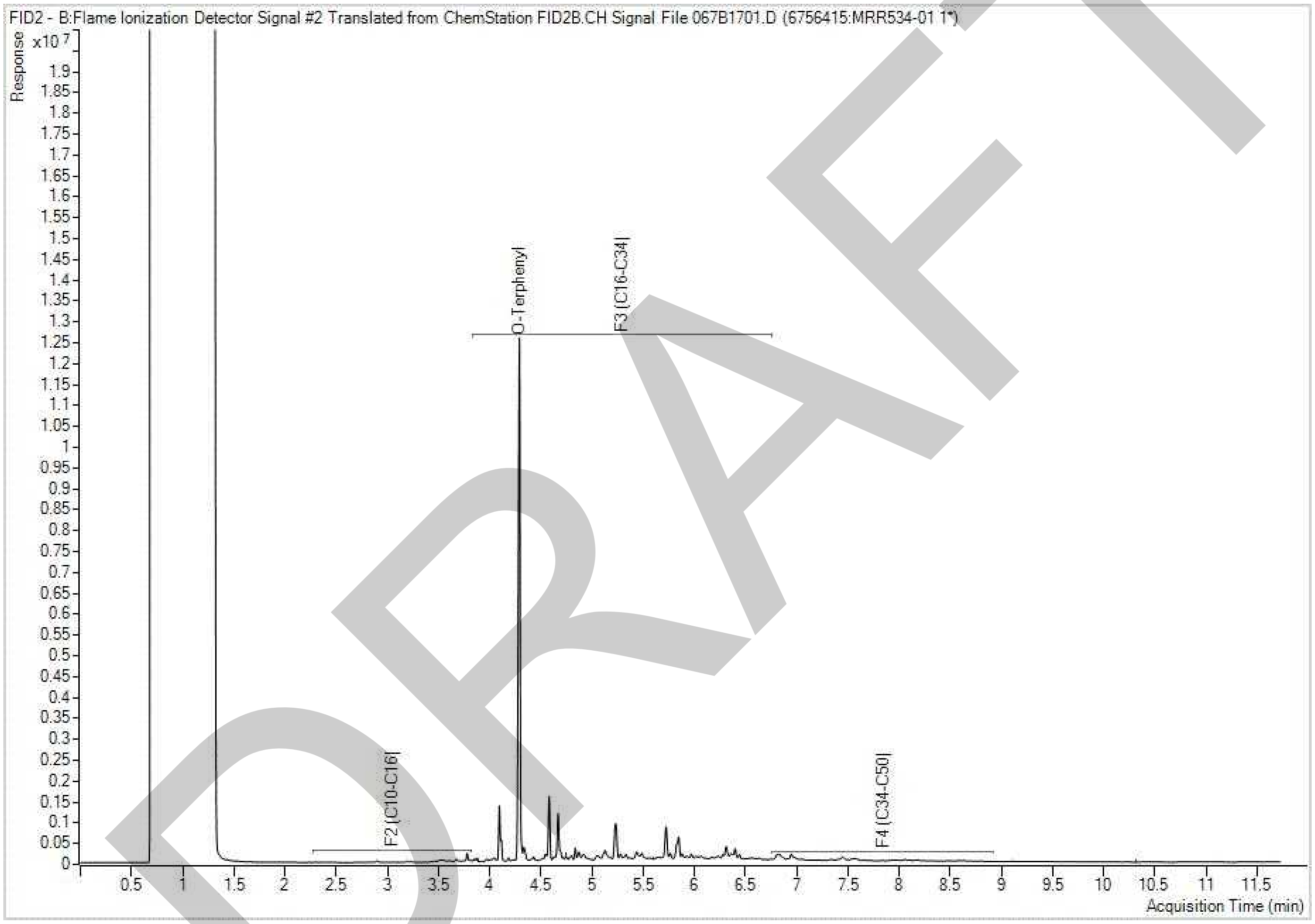
Pinchin Ltd
Client Project #: 230236.006
Client ID: BH106 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



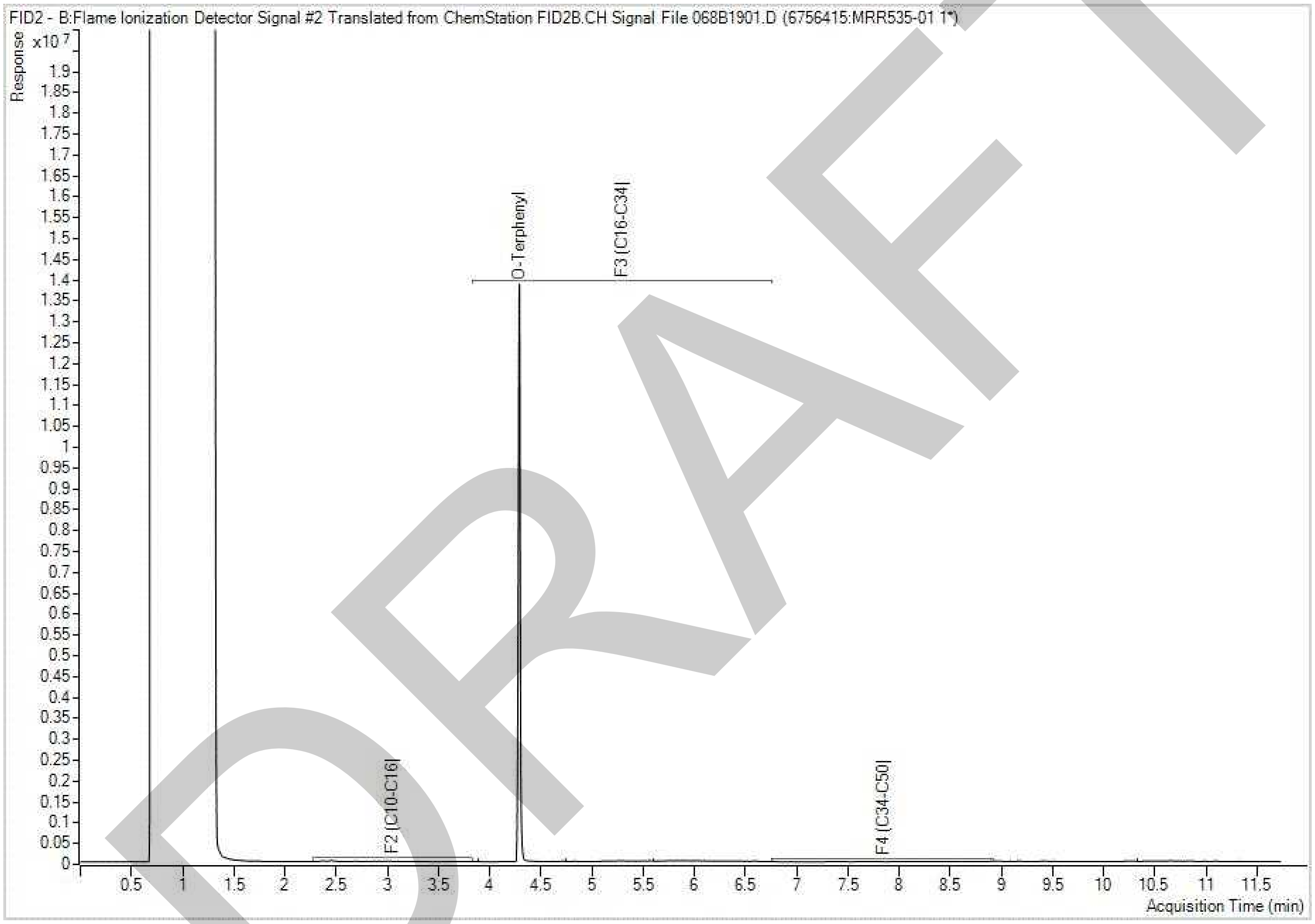
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



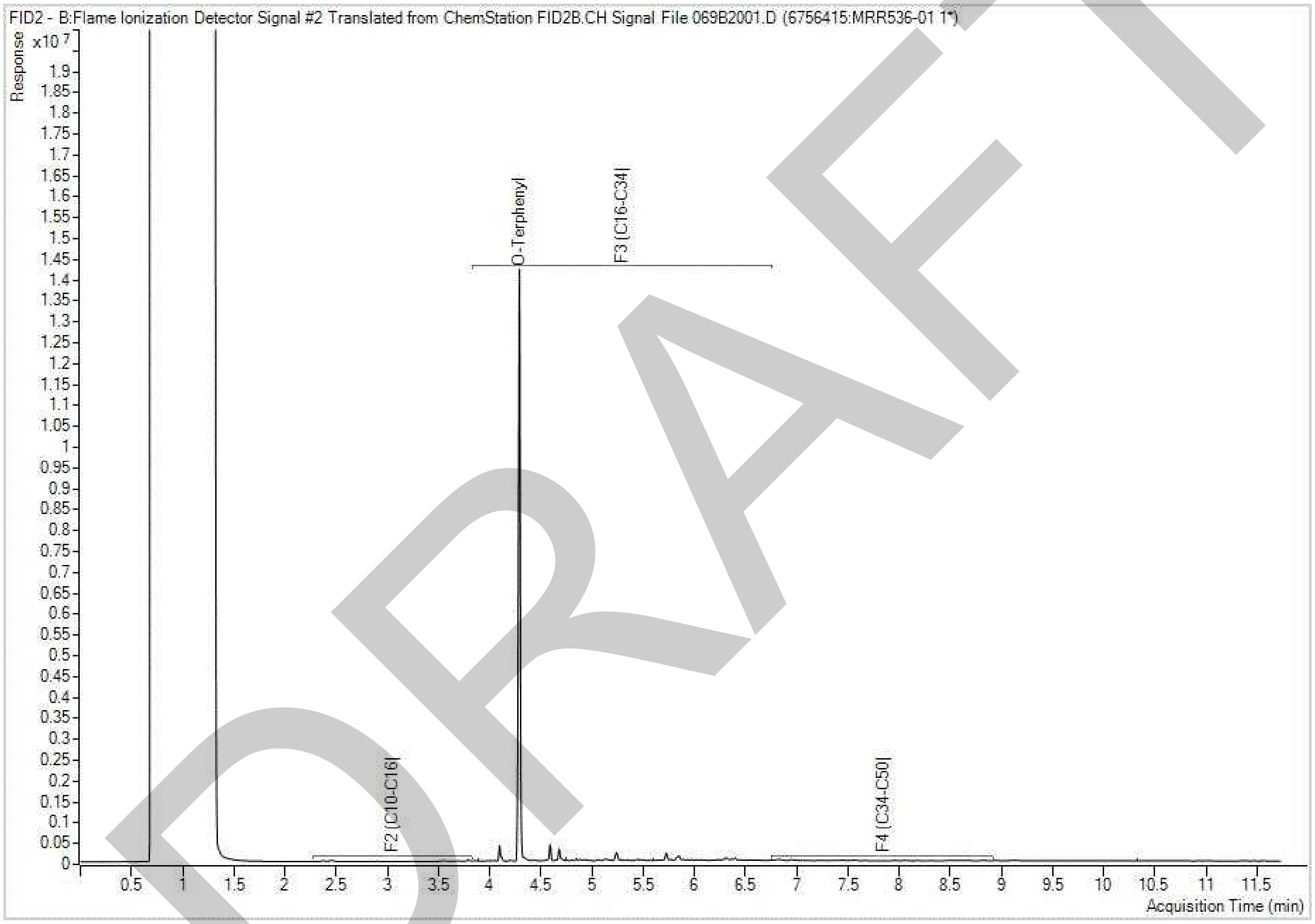
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

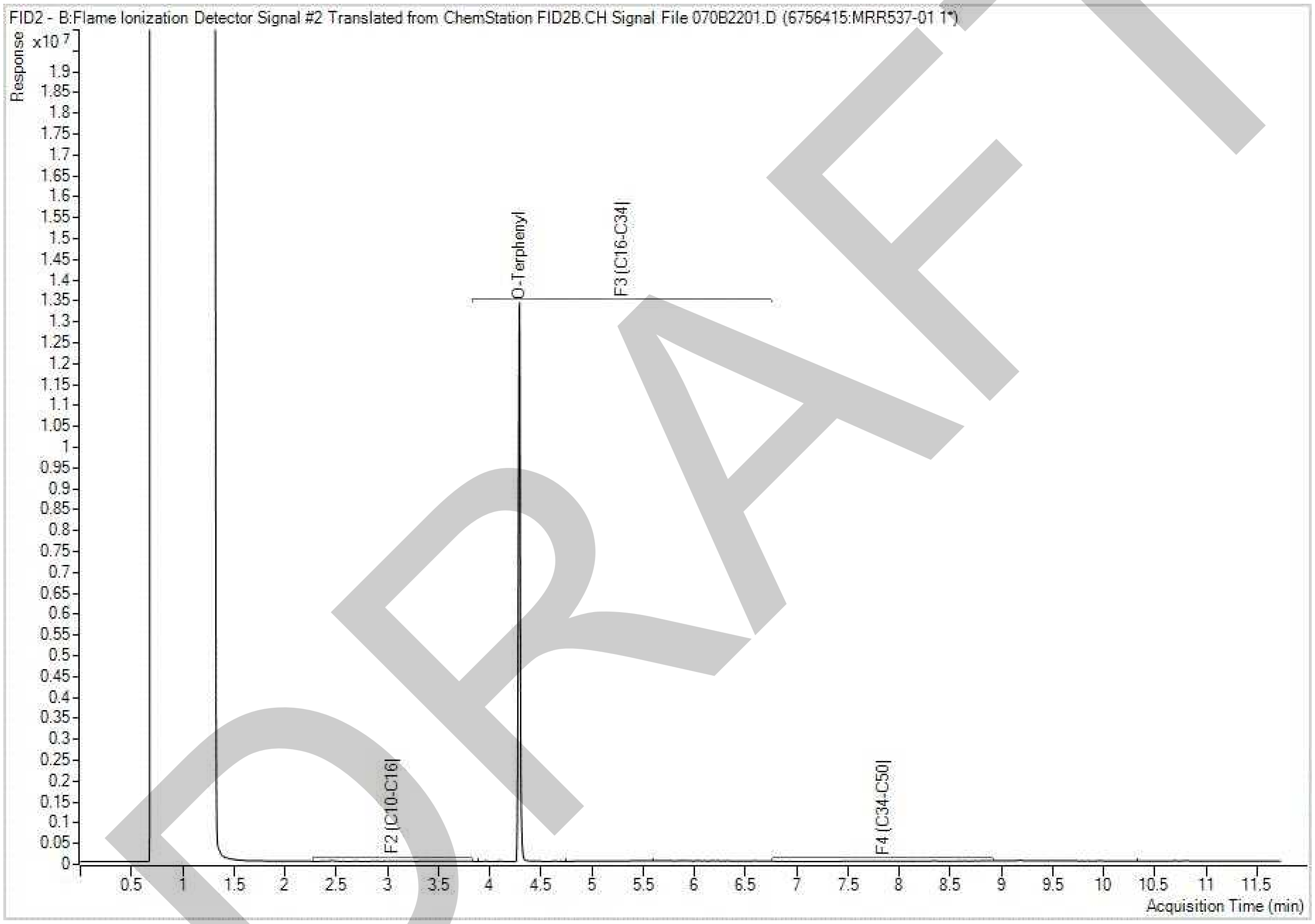


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR537

Pinchin Ltd
Client Project #: 230236.006
Client ID: MW110 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

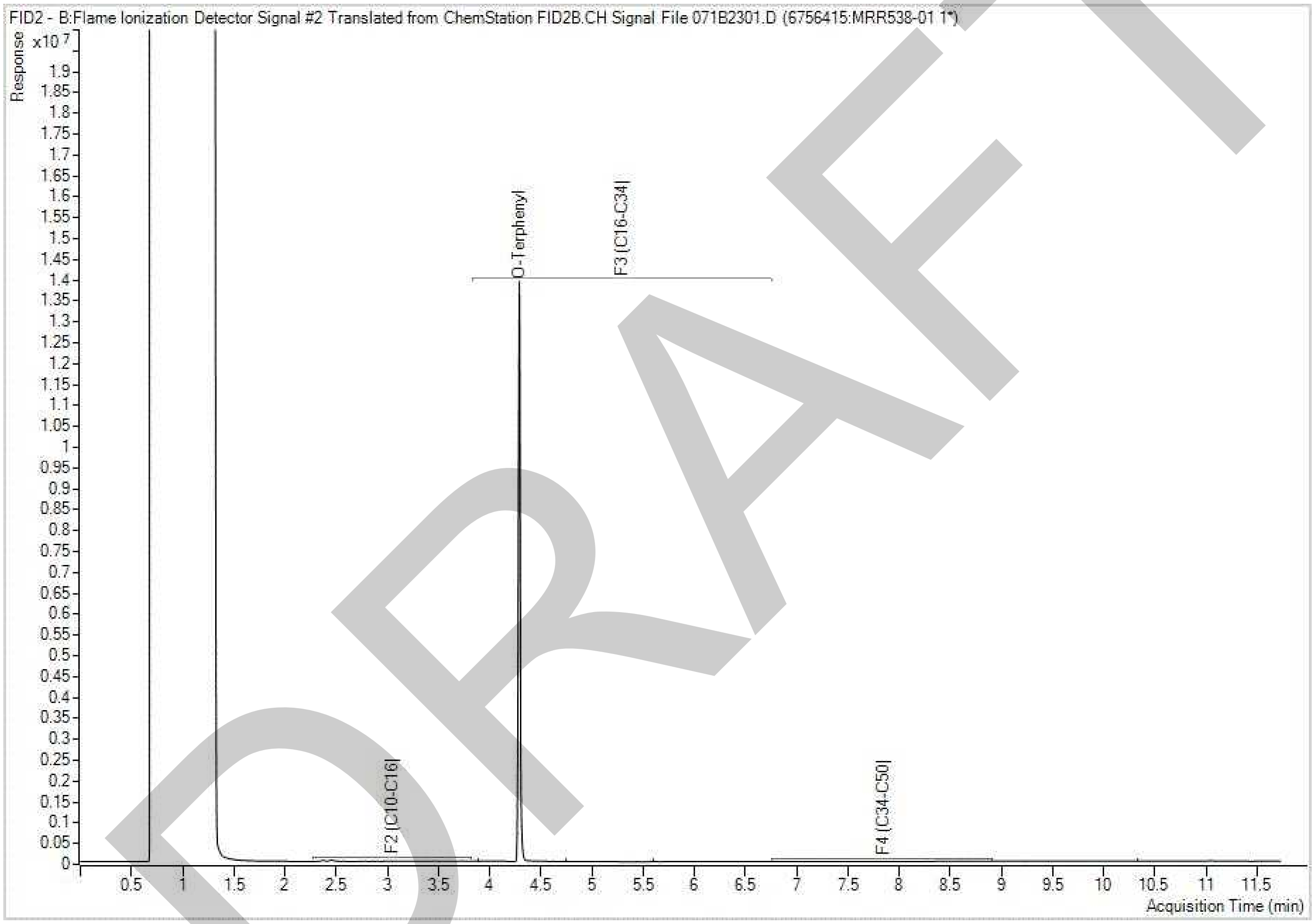


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR538

Pinchin Ltd
Client Project #: 230236.006
Client ID: DUP-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

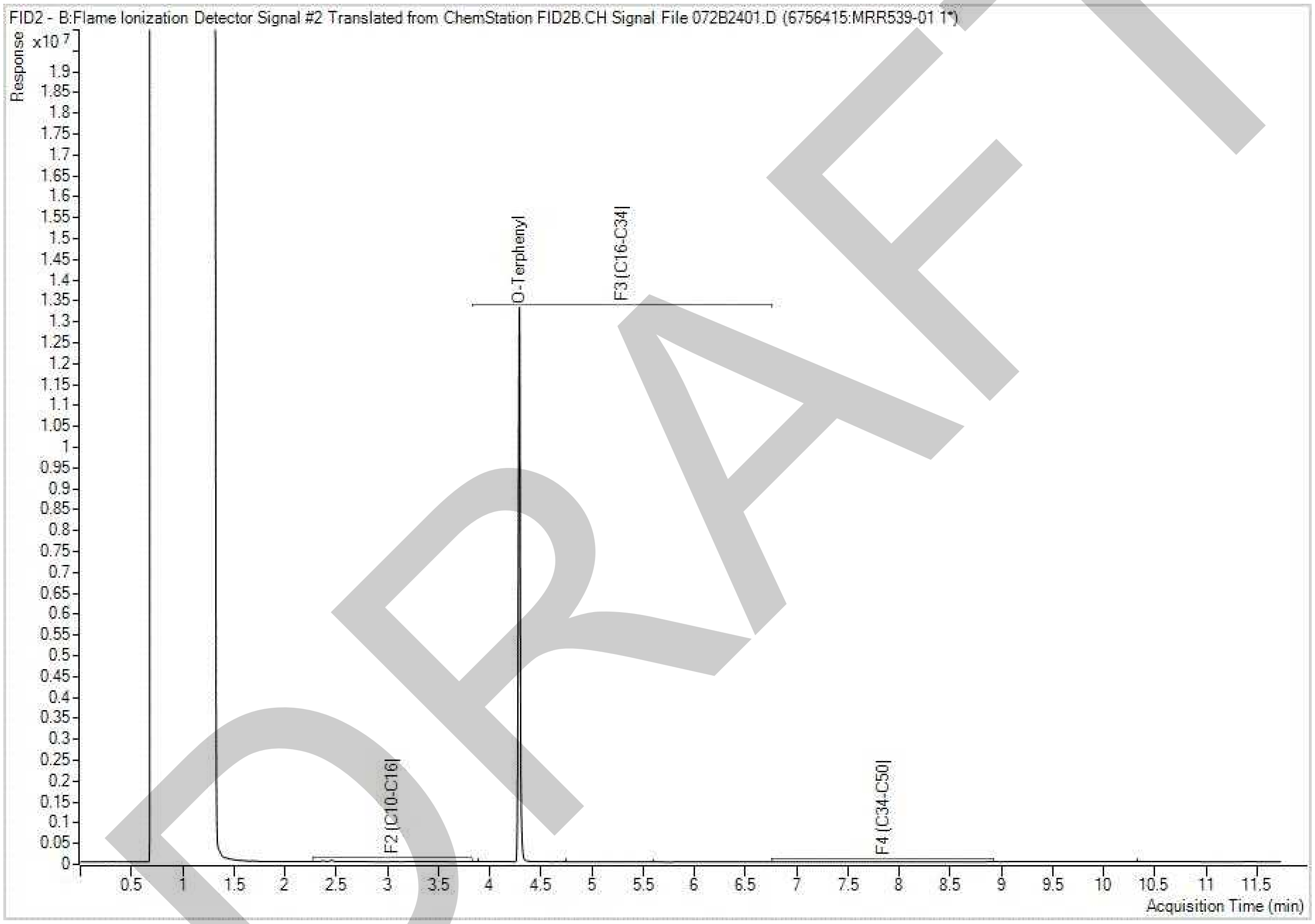


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR539

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH111 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

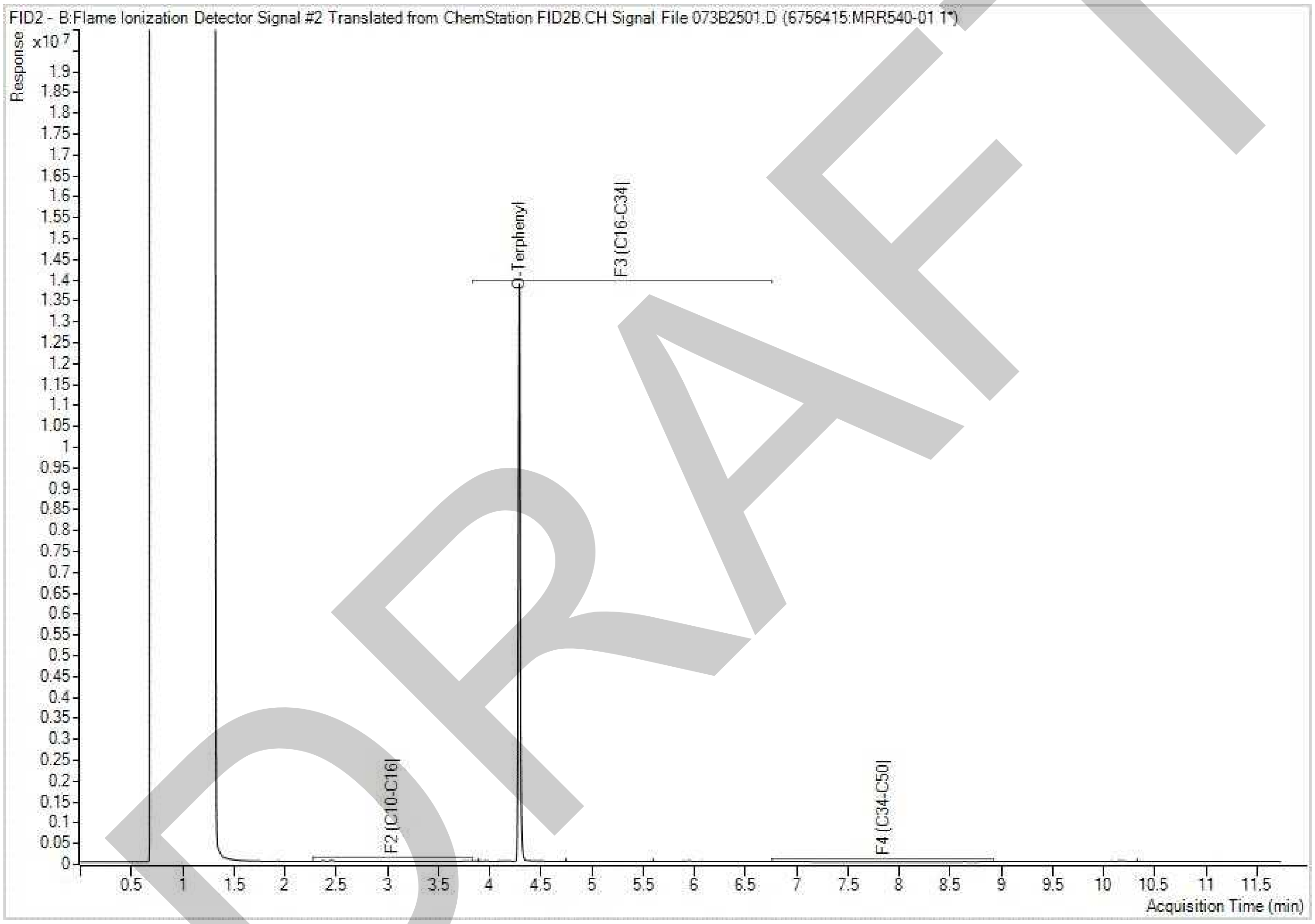


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR540

Pinchin Ltd
Client Project #: 230236.006
Client ID: BH112 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

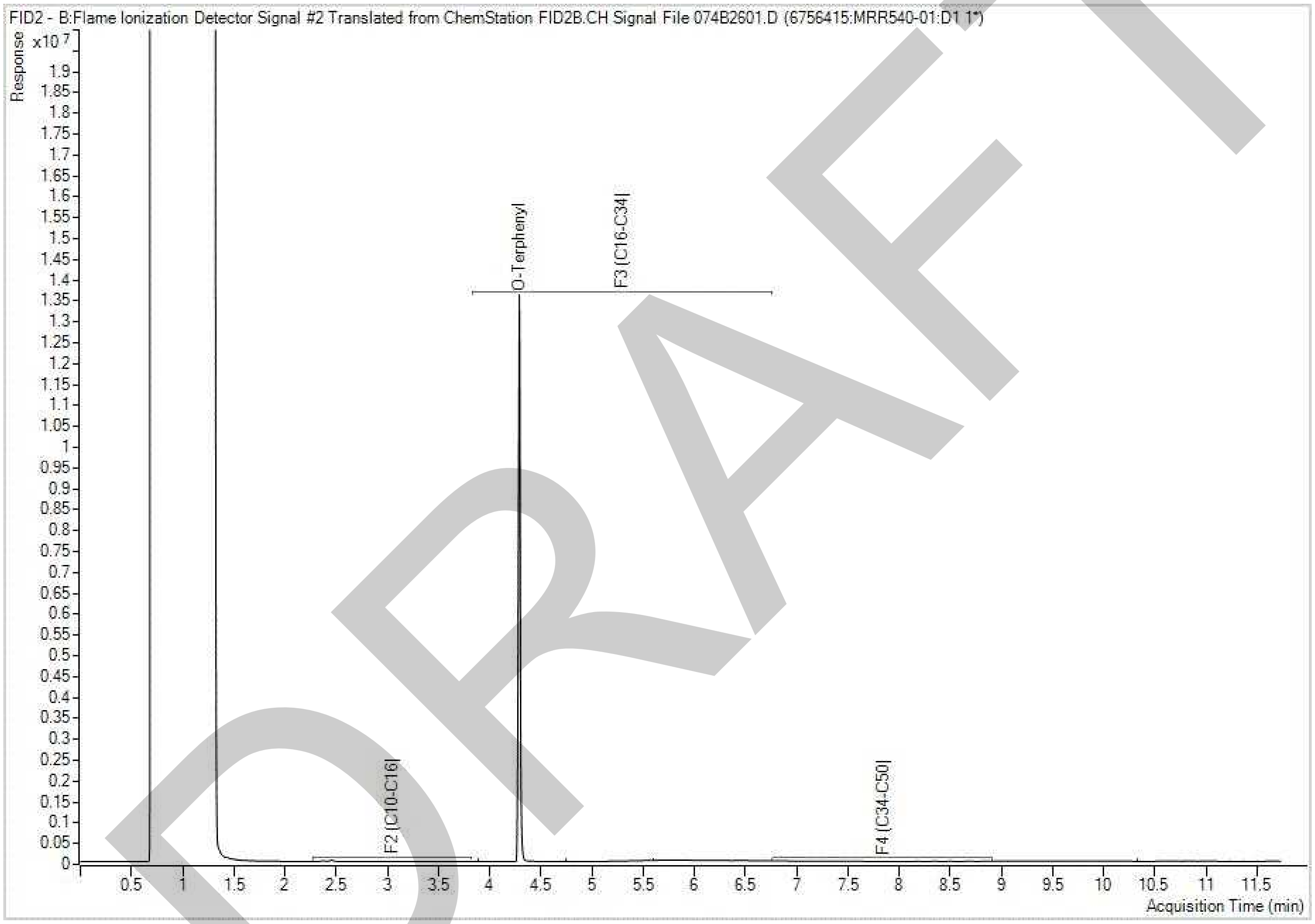


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0C5456
Report Date: 2020/06/01
BV Labs Sample: MRR540 Lab-Dup

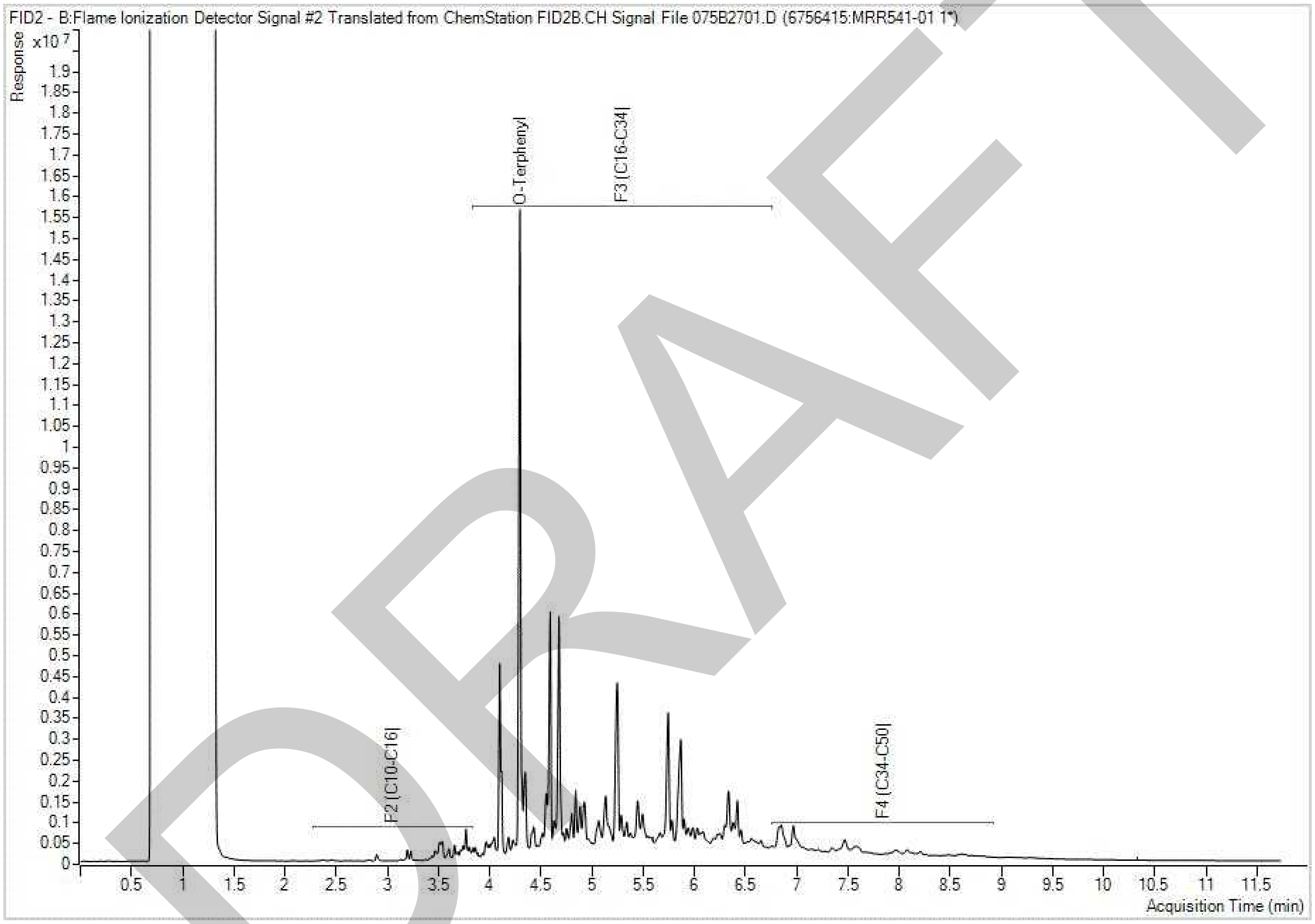
Pinchin Ltd
Client Project #: 230236.006
Client ID: BH112 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



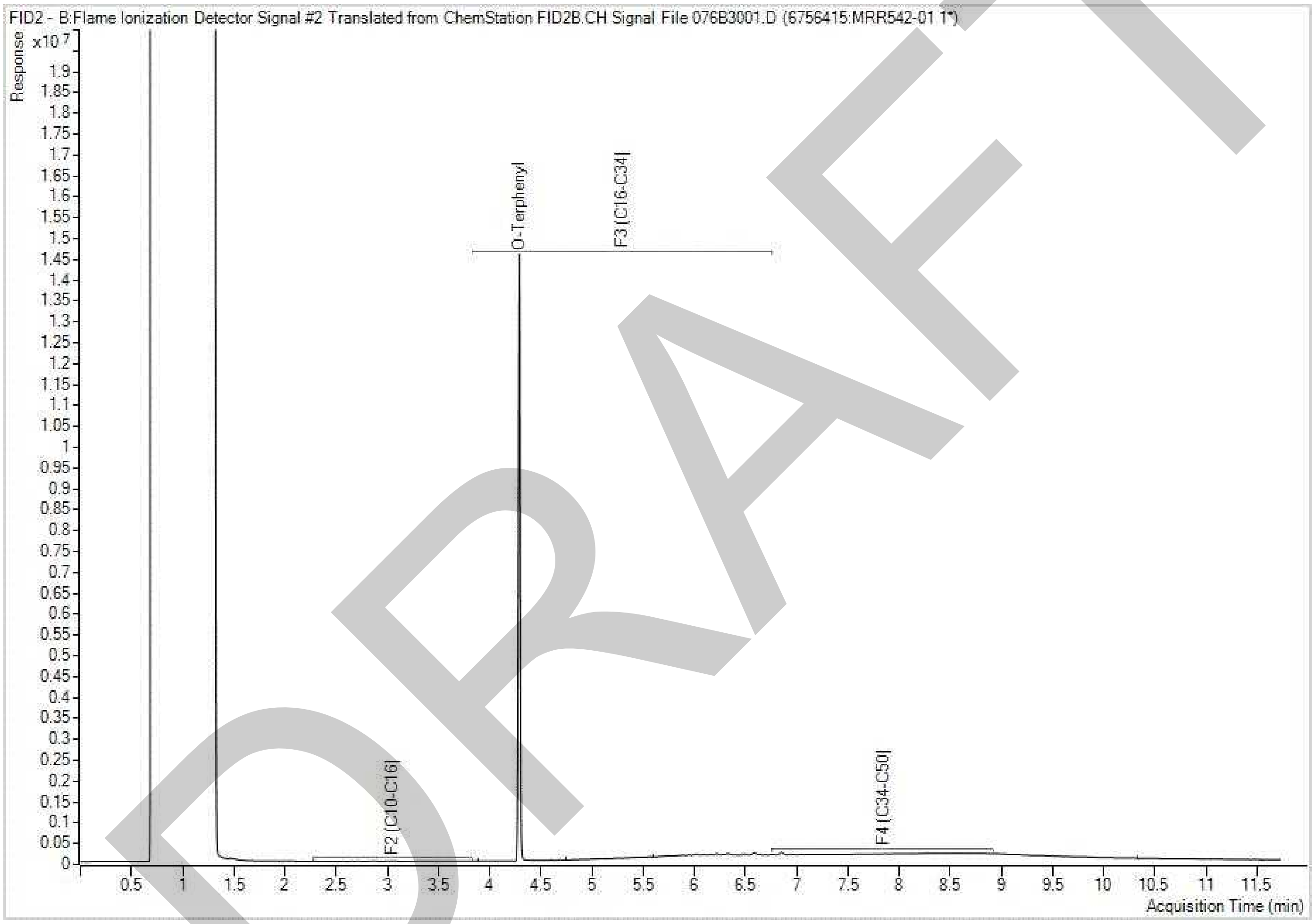
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



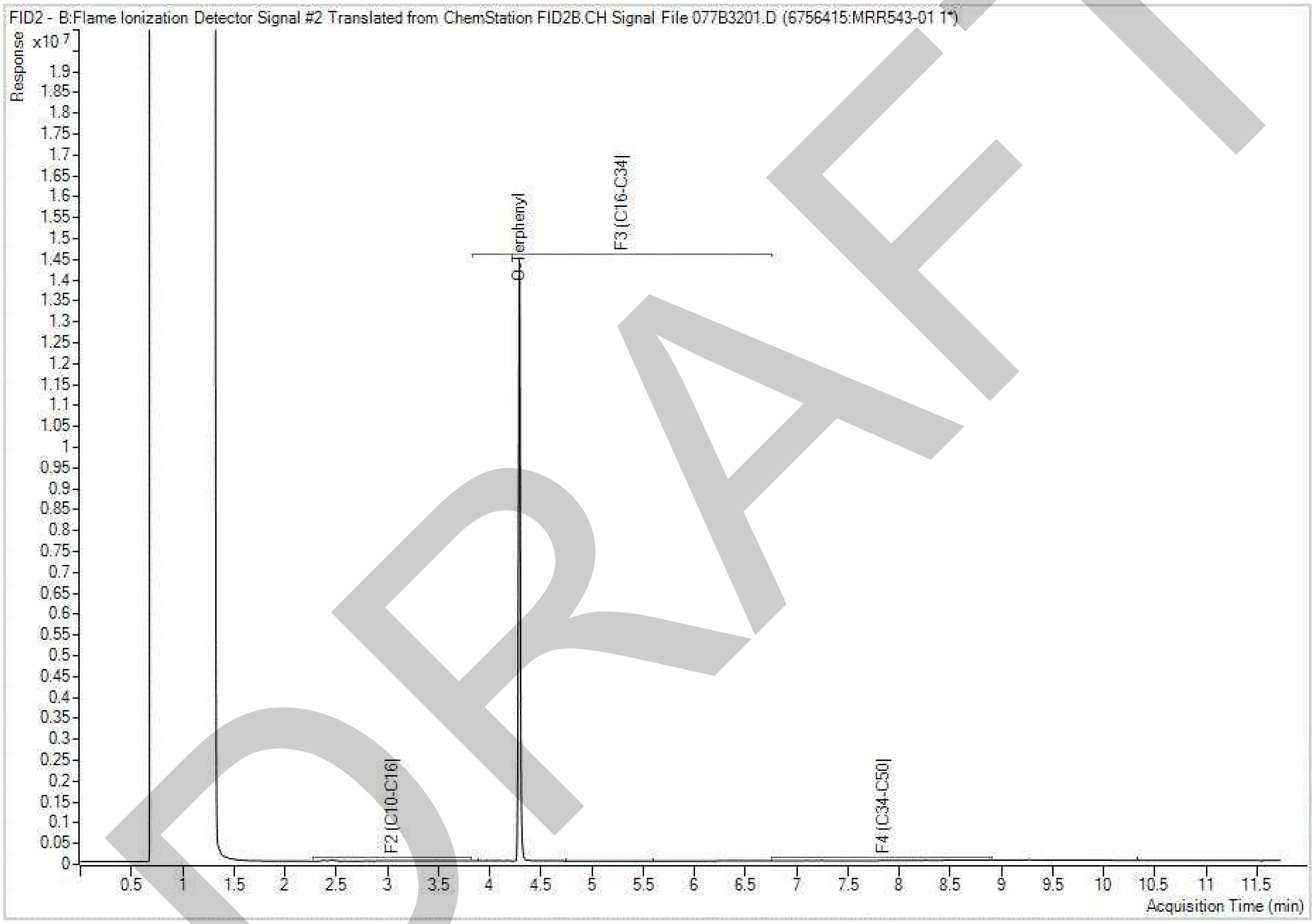
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Your Project #: 230236.006
Your C.O.C. #: 102953

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/06/12
Report #: R6208082
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0E0707
Received: 2020/06/08, 15:40

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum (1)	3	N/A	2020/06/12	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	4	N/A	2020/06/12		EPA 8260C m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	3	2020/06/11	2020/06/12	CAM SOP-00316	CCME PHC-CWS m
PAH Compounds in Water by GC/MS (SIM) (1)	2	2020/06/11	2020/06/11	CAM SOP-00318	EPA 8270D m
PAH Compounds in Water by GC/MS (SIM) (1)	1	2020/06/11	2020/06/12	CAM SOP-00318	EPA 8270D m
Volatile Organic Compounds and F1 PHCs (1)	4	N/A	2020/06/11	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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 Bureau Veritas Laboratories Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your Project #: 230236.006
Your C.O.C. #: 102953

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/06/12
Report #: R6208082
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0E0707
Received: 2020/06/08, 15:40

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: Antonella.Brasil@bvlabs.com
Phone# (905)817-5817
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		MVA166		
Sampling Date		2020/06/08		
COC Number		102953		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6777036
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	6779064
Benzene	ug/L	<0.20	0.20	6779064
Bromodichloromethane	ug/L	<0.50	0.50	6779064
Bromoform	ug/L	<1.0	1.0	6779064
Bromomethane	ug/L	<0.50	0.50	6779064
Carbon Tetrachloride	ug/L	<0.20	0.20	6779064
Chlorobenzene	ug/L	<0.20	0.20	6779064
Chloroform	ug/L	<0.20	0.20	6779064
Dibromochloromethane	ug/L	<0.50	0.50	6779064
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6779064
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6779064
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6779064
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6779064
1,1-Dichloroethane	ug/L	<0.20	0.20	6779064
1,2-Dichloroethane	ug/L	<0.50	0.50	6779064
1,1-Dichloroethylene	ug/L	<0.20	0.20	6779064
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6779064
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6779064
1,2-Dichloropropane	ug/L	<0.20	0.20	6779064
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6779064
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6779064
Ethylbenzene	ug/L	<0.20	0.20	6779064
Ethylene Dibromide	ug/L	<0.20	0.20	6779064
Hexane	ug/L	<1.0	1.0	6779064
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6779064
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6779064
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6779064
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6779064
Styrene	ug/L	<0.50	0.50	6779064
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6779064
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6779064
Tetrachloroethylene	ug/L	<0.20	0.20	6779064
Toluene	ug/L	<0.20	0.20	6779064
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6779064

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		MVA166		
Sampling Date		2020/06/08		
COC Number		102953		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6779064
Trichloroethylene	ug/L	<0.20	0.20	6779064
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6779064
Vinyl Chloride	ug/L	<0.20	0.20	6779064
p+m-Xylene	ug/L	<0.20	0.20	6779064
o-Xylene	ug/L	<0.20	0.20	6779064
Total Xylenes	ug/L	<0.20	0.20	6779064
F1 (C6-C10)	ug/L	<25	25	6779064
F1 (C6-C10) - BTEX	ug/L	<25	25	6779064
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	88		6779064
D4-1,2-Dichloroethane	%	101		6779064
D8-Toluene	%	94		6779064

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (WATER)

BV Labs ID		MVA163	MVA164	MVA165		
Sampling Date		2020/06/08	2020/06/08	2020/06/08		
COC Number		102953	102953	102953		
	UNITS	**MW-1**	**MW-3**	**DUP-3**	**RDL**	**QC Batch**
Calculated Parameters						
Methylnaphthalene, 2-(1-)	ug/L	2.1	<0.071	2.0	0.071	6777035
Polyaromatic Hydrocarbons						
Acenaphthene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Anthracene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	0.0090	6782239
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Chrysene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Dibenzo(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Fluoranthene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Fluorene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
1-Methylnaphthalene	ug/L	2.1	<0.050	2.0	0.050	6782239
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Naphthalene	ug/L	2.5	<0.050	2.3	0.050	6782239
Phenanthrene	ug/L	<0.030	<0.030	<0.030	0.030	6782239
Pyrene	ug/L	<0.050	<0.050	<0.050	0.050	6782239
Surrogate Recovery (%)						
D10-Anthracene	%	113	112	108		6782239
D14-Terphenyl (FS)	%	95	93	89		6782239
D8-Acenaphthylene	%	100	94	95		6782239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		MVA163		MVA164		MVA165		
Sampling Date		2020/06/08		2020/06/08		2020/06/08		
COC Number		102953		102953		102953		
	UNITS	**MW-1**	**RDL**	**MW-3**	**RDL**	**DUP-3**	**RDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6777036
Volatile Organics								
Acetone (2-Propanone)	ug/L	<15 (1)	15	<10	10	<15 (1)	15	6779064
Benzene	ug/L	23	0.20	<0.20	0.20	21	0.20	6779064
Bromodichloromethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Bromoform	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	6779064
Bromomethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Carbon Tetrachloride	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Chlorobenzene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Chloroform	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Dibromochloromethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,2-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,3-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,4-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	6779064
1,1-Dichloroethane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
1,2-Dichloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,1-Dichloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,2-Dichloropropane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	<0.30	0.30	<0.30	0.30	6779064
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	<0.40	0.40	<0.40	0.40	6779064
Ethylbenzene	ug/L	66	0.20	<0.20	0.20	73	0.20	6779064
Ethylene Dibromide	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Hexane	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	6779064
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	6779064
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	<10	10	<10	10	6779064
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	6779064
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Styrene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Tetrachloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Toluene	ug/L	1.7	0.20	<0.20	0.20	2.1	0.20	6779064

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

(1) The detection limit was raised due to matrix interference.

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		MVA163		MVA164		MVA165		
Sampling Date		2020/06/08		2020/06/08		2020/06/08		
COC Number		102953		102953		102953		
	UNITS	**MW-1**	**RDL**	**MW-3**	**RDL**	**DUP-3**	**RDL**	**QC Batch**
1,1,1-Trichloroethane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
1,1,2-Trichloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Trichloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	6779064
Vinyl Chloride	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	6779064
p+m-Xylene	ug/L	4.4	0.20	<0.20	0.20	5.8	0.20	6779064
o-Xylene	ug/L	3.2	0.20	<0.20	0.20	4.1	0.20	6779064
Total Xylenes	ug/L	7.5	0.20	<0.20	0.20	9.9	0.20	6779064
F1 (C6-C10)	ug/L	440	25	<25	25	460	25	6779064
F1 (C6-C10) - BTEX	ug/L	350	25	<25	25	350	25	6779064
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	120	100	<100	100	130	100	6782240
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	<200	200	540	200	6782240
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	<200	200	390	200	6782240
Reached Baseline at C50	ug/L	Yes		Yes		Yes		6782240
Surrogate Recovery (%)								
o-Terphenyl	%	84		86		84		6782240
4-Bromofluorobenzene	%	98		86		98		6779064
D4-1,2-Dichloroethane	%	100		102		98		6779064
D8-Toluene	%	95		94		96		6779064

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

BV Labs ID: MVA163
Sample ID: MW-1
Matrix: Water

Collected: 2020/06/08
Shipped:
Received: 2020/06/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6777035	N/A	2020/06/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	6777036	N/A	2020/06/12	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6782240	2020/06/11	2020/06/12	Prabhjot Gulati
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6782239	2020/06/11	2020/06/11	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6779064	N/A	2020/06/11	Manpreet Sarao

BV Labs ID: MVA164
Sample ID: MW-3
Matrix: Water

Collected: 2020/06/08
Shipped:
Received: 2020/06/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6777035	N/A	2020/06/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	6777036	N/A	2020/06/12	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6782240	2020/06/11	2020/06/12	Prabhjot Gulati
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6782239	2020/06/11	2020/06/11	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6779064	N/A	2020/06/11	Manpreet Sarao

BV Labs ID: MVA165
Sample ID: DUP-3
Matrix: Water

Collected: 2020/06/08
Shipped:
Received: 2020/06/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6777035	N/A	2020/06/12	Automated Statchk
1,3-Dichloropropene Sum	CALC	6777036	N/A	2020/06/12	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6782240	2020/06/11	2020/06/12	Prabhjot Gulati
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6782239	2020/06/11	2020/06/12	Jett Wu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6779064	N/A	2020/06/11	Manpreet Sarao

BV Labs ID: MVA166
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2020/06/08
Shipped:
Received: 2020/06/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6777036	N/A	2020/06/12	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6779064	N/A	2020/06/11	Manpreet Sarao

GENERAL COMMENTS

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

Package 1	12.3°C

Cooler custody seal was present and intact .

All 40 ml vials for VOC and F1 analyses contained visible sediment, except for the Trip Blamk.

All 100 ml amber glass bottles for F2-F4 and PAH analyses contained visible sediment, which was included in the extraction .

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6779064	MS4	Matrix Spike	4-Bromofluorobenzene	2020/06/11		102	%	70 - 130
			D4-1,2-Dichloroethane	2020/06/11		102	%	70 - 130
			D8-Toluene	2020/06/11		98	%	70 - 130
			Acetone (2-Propanone)	2020/06/11		101	%	60 - 140
			Benzene	2020/06/11		100	%	70 - 130
			Bromodichloromethane	2020/06/11		94	%	70 - 130
			Bromoform	2020/06/11		104	%	70 - 130
			Bromomethane	2020/06/11		95	%	60 - 140
			Carbon Tetrachloride	2020/06/11		92	%	70 - 130
			Chlorobenzene	2020/06/11		92	%	70 - 130
			Chloroform	2020/06/11		95	%	70 - 130
			Dibromochloromethane	2020/06/11		104	%	70 - 130
			1,2-Dichlorobenzene	2020/06/11		95	%	70 - 130
			1,3-Dichlorobenzene	2020/06/11		92	%	70 - 130
			1,4-Dichlorobenzene	2020/06/11		102	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/06/11		85	%	60 - 140
			1,1-Dichloroethane	2020/06/11		93	%	70 - 130
			1,2-Dichloroethane	2020/06/11		94	%	70 - 130
			1,1-Dichloroethylene	2020/06/11		97	%	70 - 130
			cis-1,2-Dichloroethylene	2020/06/11		97	%	70 - 130
			trans-1,2-Dichloroethylene	2020/06/11		98	%	70 - 130
			1,2-Dichloropropane	2020/06/11		94	%	70 - 130
			cis-1,3-Dichloropropene	2020/06/11		88	%	70 - 130
			trans-1,3-Dichloropropene	2020/06/11		91	%	70 - 130
			Ethylbenzene	2020/06/11		81	%	70 - 130
			Ethylene Dibromide	2020/06/11		104	%	70 - 130
			Hexane	2020/06/11		90	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/06/11		102	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/06/11		105	%	60 - 140
			Methyl Isobutyl Ketone	2020/06/11		92	%	70 - 130
			Methyl t-butyl ether (MTBE)	2020/06/11		77	%	70 - 130
			Styrene	2020/06/11		86	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/06/11		101	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/06/11		108	%	70 - 130
			Tetrachloroethylene	2020/06/11		95	%	70 - 130
			Toluene	2020/06/11		87	%	70 - 130
			1,1,1-Trichloroethane	2020/06/11		93	%	70 - 130
			1,1,2-Trichloroethane	2020/06/11		100	%	70 - 130
			Trichloroethylene	2020/06/11		101	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2020/06/11		98	%	70 - 130
			Vinyl Chloride	2020/06/11		96	%	70 - 130
			p+m-Xylene	2020/06/11		83	%	70 - 130
			o-Xylene	2020/06/11		85	%	70 - 130
			F1 (C6-C10)	2020/06/11		109	%	60 - 140
6779064	MS4	Spiked Blank	4-Bromofluorobenzene	2020/06/11		100	%	70 - 130
			D4-1,2-Dichloroethane	2020/06/11		94	%	70 - 130
			D8-Toluene	2020/06/11		101	%	70 - 130
			Acetone (2-Propanone)	2020/06/11		85	%	60 - 140
			Benzene	2020/06/11		100	%	70 - 130
			Bromodichloromethane	2020/06/11		90	%	70 - 130
			Bromoform	2020/06/11		94	%	70 - 130
			Bromomethane	2020/06/11		96	%	60 - 140
			Carbon Tetrachloride	2020/06/11		96	%	70 - 130
			Chlorobenzene	2020/06/11		91	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chloroform	2020/06/11		93	%	70 - 130
			Dibromochloromethane	2020/06/11		97	%	70 - 130
			1,2-Dichlorobenzene	2020/06/11		95	%	70 - 130
			1,3-Dichlorobenzene	2020/06/11		96	%	70 - 130
			1,4-Dichlorobenzene	2020/06/11		106	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/06/11		92	%	60 - 140
			1,1-Dichloroethane	2020/06/11		97	%	70 - 130
			1,2-Dichloroethane	2020/06/11		86	%	70 - 130
			1,1-Dichloroethylene	2020/06/11		97	%	70 - 130
			cis-1,2-Dichloroethylene	2020/06/11		94	%	70 - 130
			trans-1,2-Dichloroethylene	2020/06/11		104	%	70 - 130
			1,2-Dichloropropane	2020/06/11		89	%	70 - 130
			cis-1,3-Dichloropropene	2020/06/11		81	%	70 - 130
			trans-1,3-Dichloropropene	2020/06/11		81	%	70 - 130
			Ethylbenzene	2020/06/11		83	%	70 - 130
			Ethylene Dibromide	2020/06/11		93	%	70 - 130
			Hexane	2020/06/11		101	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/06/11		95	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/06/11		89	%	60 - 140
			Methyl Isobutyl Ketone	2020/06/11		79	%	70 - 130
			Methyl t-butyl ether (MTBE)	2020/06/11		79	%	70 - 130
			Styrene	2020/06/11		86	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/06/11		99	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/06/11		97	%	70 - 130
			Tetrachloroethylene	2020/06/11		99	%	70 - 130
			Toluene	2020/06/11		88	%	70 - 130
			1,1,1-Trichloroethane	2020/06/11		96	%	70 - 130
			1,1,2-Trichloroethane	2020/06/11		91	%	70 - 130
			Trichloroethylene	2020/06/11		103	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2020/06/11		99	%	70 - 130
			Vinyl Chloride	2020/06/11		99	%	70 - 130
			p+m-Xylene	2020/06/11		87	%	70 - 130
			o-Xylene	2020/06/11		88	%	70 - 130
			F1 (C6-C10)	2020/06/11		99	%	60 - 140
6779064	MS4	Method Blank	4-Bromofluorobenzene	2020/06/11		88	%	70 - 130
			D4-1,2-Dichloroethane	2020/06/11		99	%	70 - 130
			D8-Toluene	2020/06/11		95	%	70 - 130
			Acetone (2-Propanone)	2020/06/11	<10		ug/L	
			Benzene	2020/06/11	<0.20		ug/L	
			Bromodichloromethane	2020/06/11	<0.50		ug/L	
			Bromoform	2020/06/11	<1.0		ug/L	
			Bromomethane	2020/06/11	<0.50		ug/L	
			Carbon Tetrachloride	2020/06/11	<0.20		ug/L	
			Chlorobenzene	2020/06/11	<0.20		ug/L	
			Chloroform	2020/06/11	<0.20		ug/L	
			Dibromochloromethane	2020/06/11	<0.50		ug/L	
			1,2-Dichlorobenzene	2020/06/11	<0.50		ug/L	
			1,3-Dichlorobenzene	2020/06/11	<0.50		ug/L	
			1,4-Dichlorobenzene	2020/06/11	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2020/06/11	<1.0		ug/L	
			1,1-Dichloroethane	2020/06/11	<0.20		ug/L	
			1,2-Dichloroethane	2020/06/11	<0.50		ug/L	
			1,1-Dichloroethylene	2020/06/11	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2020/06/11	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			trans-1,2-Dichloroethylene	2020/06/11	<0.50		ug/L	
			1,2-Dichloropropane	2020/06/11	<0.20		ug/L	
			cis-1,3-Dichloropropene	2020/06/11	<0.30		ug/L	
			trans-1,3-Dichloropropene	2020/06/11	<0.40		ug/L	
			Ethylbenzene	2020/06/11	<0.20		ug/L	
			Ethylene Dibromide	2020/06/11	<0.20		ug/L	
			Hexane	2020/06/11	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2020/06/11	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2020/06/11	<10		ug/L	
			Methyl Isobutyl Ketone	2020/06/11	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2020/06/11	<0.50		ug/L	
			Styrene	2020/06/11	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2020/06/11	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2020/06/11	<0.50		ug/L	
			Tetrachloroethylene	2020/06/11	<0.20		ug/L	
			Toluene	2020/06/11	<0.20		ug/L	
			1,1,1-Trichloroethane	2020/06/11	<0.20		ug/L	
			1,1,2-Trichloroethane	2020/06/11	<0.50		ug/L	
			Trichloroethylene	2020/06/11	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2020/06/11	<0.50		ug/L	
			Vinyl Chloride	2020/06/11	<0.20		ug/L	
			p+m-Xylene	2020/06/11	<0.20		ug/L	
			o-Xylene	2020/06/11	<0.20		ug/L	
			Total Xylenes	2020/06/11	<0.20		ug/L	
			F1 (C6-C10)	2020/06/11	<25		ug/L	
			F1 (C6-C10) - BTEX	2020/06/11	<25		ug/L	
6779064	MS4	RPD	Acetone (2-Propanone)	2020/06/11	NC		%	30
			Benzene	2020/06/11	NC		%	30
			Bromodichloromethane	2020/06/11	NC		%	30
			Bromoform	2020/06/11	NC		%	30
			Bromomethane	2020/06/11	NC		%	30
			Carbon Tetrachloride	2020/06/11	NC		%	30
			Chlorobenzene	2020/06/11	NC		%	30
			Chloroform	2020/06/11	NC		%	30
			Dibromochloromethane	2020/06/11	NC		%	30
			1,2-Dichlorobenzene	2020/06/11	NC		%	30
			1,3-Dichlorobenzene	2020/06/11	NC		%	30
			1,4-Dichlorobenzene	2020/06/11	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2020/06/11	NC		%	30
			1,1-Dichloroethane	2020/06/11	NC		%	30
			1,2-Dichloroethane	2020/06/11	NC		%	30
			1,1-Dichloroethylene	2020/06/11	NC		%	30
			cis-1,2-Dichloroethylene	2020/06/11	0.35		%	30
			trans-1,2-Dichloroethylene	2020/06/11	NC		%	30
			1,2-Dichloropropane	2020/06/11	NC		%	30
			cis-1,3-Dichloropropene	2020/06/11	NC		%	30
			trans-1,3-Dichloropropene	2020/06/11	NC		%	30
			Ethylbenzene	2020/06/11	NC		%	30
			Ethylene Dibromide	2020/06/11	NC		%	30
			Hexane	2020/06/11	NC		%	30
			Methylene Chloride(Dichloromethane)	2020/06/11	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2020/06/11	NC		%	30
			Methyl Isobutyl Ketone	2020/06/11	NC		%	30
			Methyl t-butyl ether (MTBE)	2020/06/11	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Styrene	2020/06/11	NC		%	30
			1,1,1,2-Tetrachloroethane	2020/06/11	NC		%	30
			1,1,2,2-Tetrachloroethane	2020/06/11	NC		%	30
			Tetrachloroethylene	2020/06/11	5.9		%	30
			Toluene	2020/06/11	NC		%	30
			1,1,1-Trichloroethane	2020/06/11	NC		%	30
			1,1,2-Trichloroethane	2020/06/11	NC		%	30
			Trichloroethylene	2020/06/11	3.0		%	30
			Trichlorofluoromethane (FREON 11)	2020/06/11	NC		%	30
			Vinyl Chloride	2020/06/11	3.7		%	30
			p+m-Xylene	2020/06/11	NC		%	30
			o-Xylene	2020/06/11	NC		%	30
			Total Xylenes	2020/06/11	NC		%	30
			F1 (C6-C10)	2020/06/11	NC		%	30
			F1 (C6-C10) - BTEX	2020/06/11	NC		%	30
6782239	JET	Matrix Spike	D10-Anthracene	2020/06/11		106	%	50 - 130
			D14-Terphenyl (FS)	2020/06/11		91	%	50 - 130
			D8-Acenaphthylene	2020/06/11		93	%	50 - 130
			Acenaphthene	2020/06/11		102	%	50 - 130
			Acenaphthylene	2020/06/11		98	%	50 - 130
			Anthracene	2020/06/11		107	%	50 - 130
			Benzo(a)anthracene	2020/06/11		102	%	50 - 130
			Benzo(a)pyrene	2020/06/11		100	%	50 - 130
			Benzo(b/j)fluoranthene	2020/06/11		112	%	50 - 130
			Benzo(g,h,i)perylene	2020/06/11		107	%	50 - 130
			Benzo(k)fluoranthene	2020/06/11		99	%	50 - 130
			Chrysene	2020/06/11		106	%	50 - 130
			Dibenzo(a,h)anthracene	2020/06/11		112	%	50 - 130
			Fluoranthene	2020/06/11		112	%	50 - 130
			Fluorene	2020/06/11		100	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/06/11		108	%	50 - 130
			1-Methylnaphthalene	2020/06/11		109	%	50 - 130
			2-Methylnaphthalene	2020/06/11		106	%	50 - 130
			Naphthalene	2020/06/11		98	%	50 - 130
			Phenanthrene	2020/06/11		107	%	50 - 130
			Pyrene	2020/06/11		112	%	50 - 130
6782239	JET	Spiked Blank	D10-Anthracene	2020/06/11		113	%	50 - 130
			D14-Terphenyl (FS)	2020/06/11		96	%	50 - 130
			D8-Acenaphthylene	2020/06/11		101	%	50 - 130
			Acenaphthene	2020/06/11		105	%	50 - 130
			Acenaphthylene	2020/06/11		100	%	50 - 130
			Anthracene	2020/06/11		107	%	50 - 130
			Benzo(a)anthracene	2020/06/11		101	%	50 - 130
			Benzo(a)pyrene	2020/06/11		100	%	50 - 130
			Benzo(b/j)fluoranthene	2020/06/11		112	%	50 - 130
			Benzo(g,h,i)perylene	2020/06/11		109	%	50 - 130
			Benzo(k)fluoranthene	2020/06/11		97	%	50 - 130
			Chrysene	2020/06/11		106	%	50 - 130
			Dibenzo(a,h)anthracene	2020/06/11		91	%	50 - 130
			Fluoranthene	2020/06/11		112	%	50 - 130
			Fluorene	2020/06/11		102	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/06/11		109	%	50 - 130
			1-Methylnaphthalene	2020/06/11		111	%	50 - 130
			2-Methylnaphthalene	2020/06/11		109	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Naphthalene	2020/06/11		99	%	50 - 130
			Phenanthrene	2020/06/11		108	%	50 - 130
			Pyrene	2020/06/11		112	%	50 - 130
6782239	JET	Method Blank	D10-Anthracene	2020/06/11		120	%	50 - 130
			D14-Terphenyl (FS)	2020/06/11		103	%	50 - 130
			D8-Acenaphthylene	2020/06/11		95	%	50 - 130
			Acenaphthene	2020/06/11	<0.050		ug/L	
			Acenaphthylene	2020/06/11	<0.050		ug/L	
			Anthracene	2020/06/11	<0.050		ug/L	
			Benzo(a)anthracene	2020/06/11	<0.050		ug/L	
			Benzo(a)pyrene	2020/06/11	<0.0090		ug/L	
			Benzo(b/j)fluoranthene	2020/06/11	<0.050		ug/L	
			Benzo(g,h,i)perylene	2020/06/11	<0.050		ug/L	
			Benzo(k)fluoranthene	2020/06/11	<0.050		ug/L	
			Chrysene	2020/06/11	<0.050		ug/L	
			Dibenzo(a,h)anthracene	2020/06/11	<0.050		ug/L	
			Fluoranthene	2020/06/11	<0.050		ug/L	
			Fluorene	2020/06/11	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2020/06/11	<0.050		ug/L	
			1-Methylnaphthalene	2020/06/11	<0.050		ug/L	
			2-Methylnaphthalene	2020/06/11	<0.050		ug/L	
			Naphthalene	2020/06/11	<0.050		ug/L	
			Phenanthrene	2020/06/11	<0.030		ug/L	
			Pyrene	2020/06/11	<0.050		ug/L	
6782239	JET	RPD	Acenaphthene	2020/06/11	NC		%	30
			Acenaphthylene	2020/06/11	NC		%	30
			Anthracene	2020/06/11	NC		%	30
			Benzo(a)anthracene	2020/06/11	NC		%	30
			Benzo(a)pyrene	2020/06/11	NC		%	30
			Benzo(b/j)fluoranthene	2020/06/11	NC		%	30
			Benzo(g,h,i)perylene	2020/06/11	NC		%	30
			Benzo(k)fluoranthene	2020/06/11	NC		%	30
			Chrysene	2020/06/11	NC		%	30
			Dibenzo(a,h)anthracene	2020/06/11	NC		%	30
			Fluoranthene	2020/06/11	NC		%	30
			Fluorene	2020/06/11	NC		%	30
			Indeno(1,2,3-cd)pyrene	2020/06/11	NC		%	30
			1-Methylnaphthalene	2020/06/11	NC		%	30
			2-Methylnaphthalene	2020/06/11	NC		%	30
			Naphthalene	2020/06/11	NC		%	30
			Phenanthrene	2020/06/11	NC		%	30
			Pyrene	2020/06/11	NC		%	30
6782240	GUL	Matrix Spike	o-Terphenyl	2020/06/12		88	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/06/12		96	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2020/06/12		98	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2020/06/12		90	%	50 - 130
6782240	GUL	Spiked Blank	o-Terphenyl	2020/06/12		88	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/06/12		94	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2020/06/12		97	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2020/06/12		88	%	60 - 130
6782240	GUL	Method Blank	o-Terphenyl	2020/06/12		87	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/06/12	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2020/06/12	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2020/06/12	<200		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6782240	GUL	RPD	F2 (C10-C16 Hydrocarbons)	2020/06/12	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2020/06/12	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2020/06/12	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).

VALIDATION SIGNATURE PAGE

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

Anastassia Hamanov, Scientific Specialist

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

08-Jun-20 15:40
Antonella Brasil
C0E0707

MAF ENV-939

Maxxam Analytics
CAM FCD-01013/5
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Presence of Visible Particulate/Sediment

When there is >1cm of visible particulate/sediment, the amount will be recorded in the field below

Bottle Types

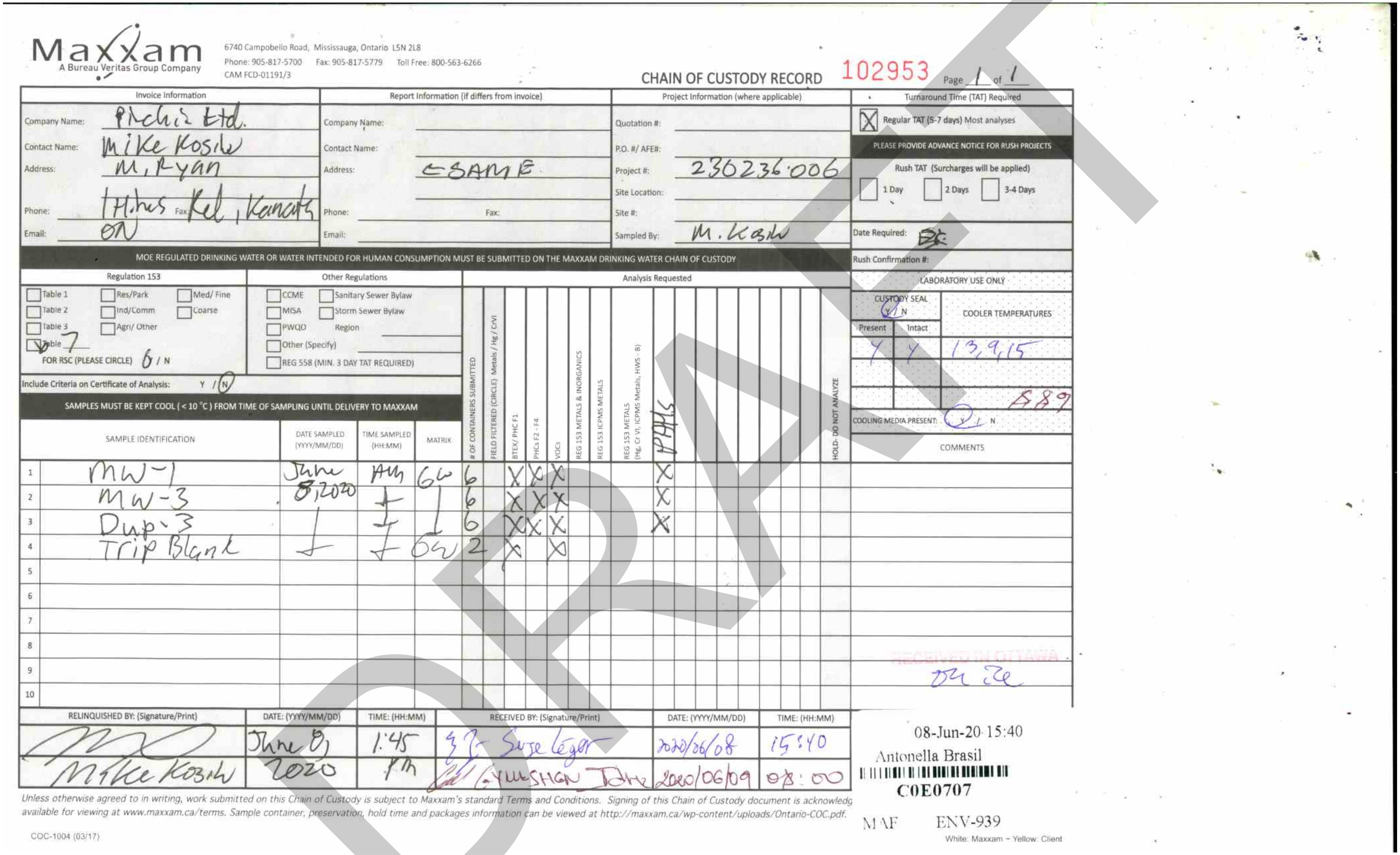
				Inorganics				Organics											Hydrocarbons							Volatiles				Other
	Sample ID	All	CrVI	CN	General	Hg	Metals (Diss.)	Organic 1 of 2	Organic 2 of 2	PCB 1 of 2	PCB 2 of 2	Pest/ Herb 1 of 2	Pest/ Herb 2 of 2	SVOC/ ABN 1 of 2	SVOC/ ABN 2 of 2	PAH 1 of 2	PAH 2 of 2	Dioxin /Furan	F1 Vial 1	F1 Vial 2	F1 Vial 3	F1 Vial 4	F2-F4 1 of 2	F2-F4 2 of 2	F4G	VOC Vial 1	VOC Vial 2	VOC Vial 3	VOC Vial 4	
1	Mw-1	TS																												
2	Mw-3	TS																												
3	Dup-3	TS																												
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Comments:

Legend:

P	Suspended Particulate
TS	Trace Settled Sediment (just covers bottom of container or less)
S	Sediment greater than (>) Trace, but less than (<) 1 cm

Recorded By: (signature/print)



Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 102953

Page 1 of 1

Invoice Information

Company Name: Pinchin Ltd.
Contact Name: Mike Kosiw
Address: M, Ryan
1 Hines Rd, Kanata
ON
Phone:
Fax:
Email:

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address: ⟸ SAME
Phone:
Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 230236.006
Site Location:
Site #:
Sampled By: M. Kosiw

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)
☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required: RE
Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☐ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/ Other
☑ Table 7
FOR RSC (PLEASE CIRCLE) [✓ Y] / N

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / [✓ N]

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	HOLD- DO NOT ANALYZE
1	MW-1	June	AM	GW	6		X	X	X				X	
2	MW-3	8,2020	↓	↓	6		X	X	X				X	
3	Dup-3	↓	↓	↓	6		X	X	X				X	
4	Trip Blank	↓	↓	GW	2		X		X					
5														
6														
7														
8														
9														
10														

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] / N		COOLER TEMPERATURES
Present	Intact	
Y	Y	13,9,15
		589

COOLING MEDIA PRESENT: [✓ Y] / N

COMMENTS

RECEIVED IN OTTAWA
DM ZE

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Mike Kosiw	June 8, 2020	1:45 PM	Suze Léger	2020/06/08	15:40
			YUUSHAN JOHN	2020/06/09	08:00

08-Jun-20 15:40
Antonella Brasil
C0E0707
MAF ENV-939

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 acknowledg available for viewing at www.maxxam.ca/terms. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

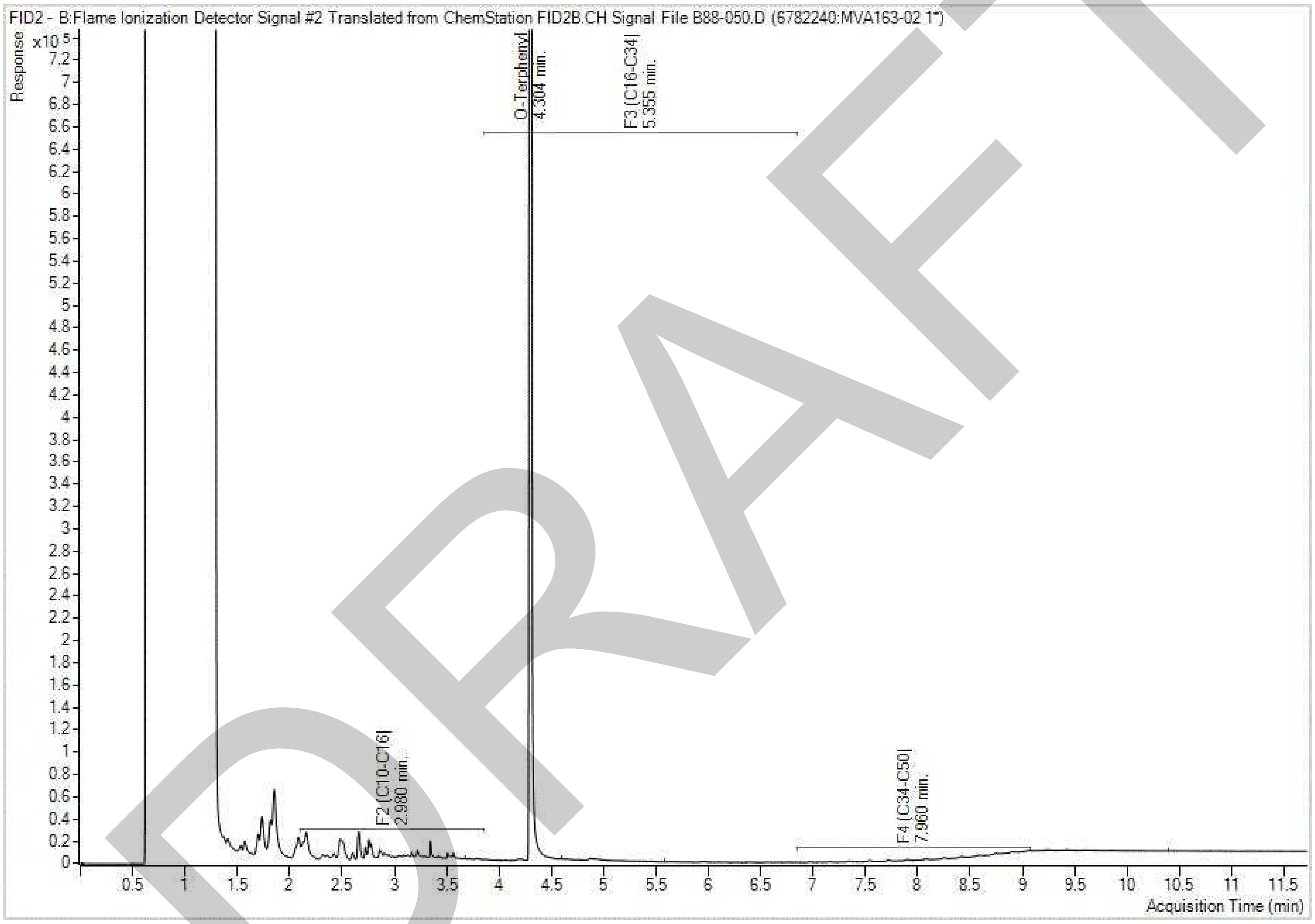
COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

BV Labs Job #: C0E0707
Report Date: 2020/06/12
BV Labs Sample: MVA163

Pinchin Ltd
Client Project #: 230236.006
Client ID: MW-1

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

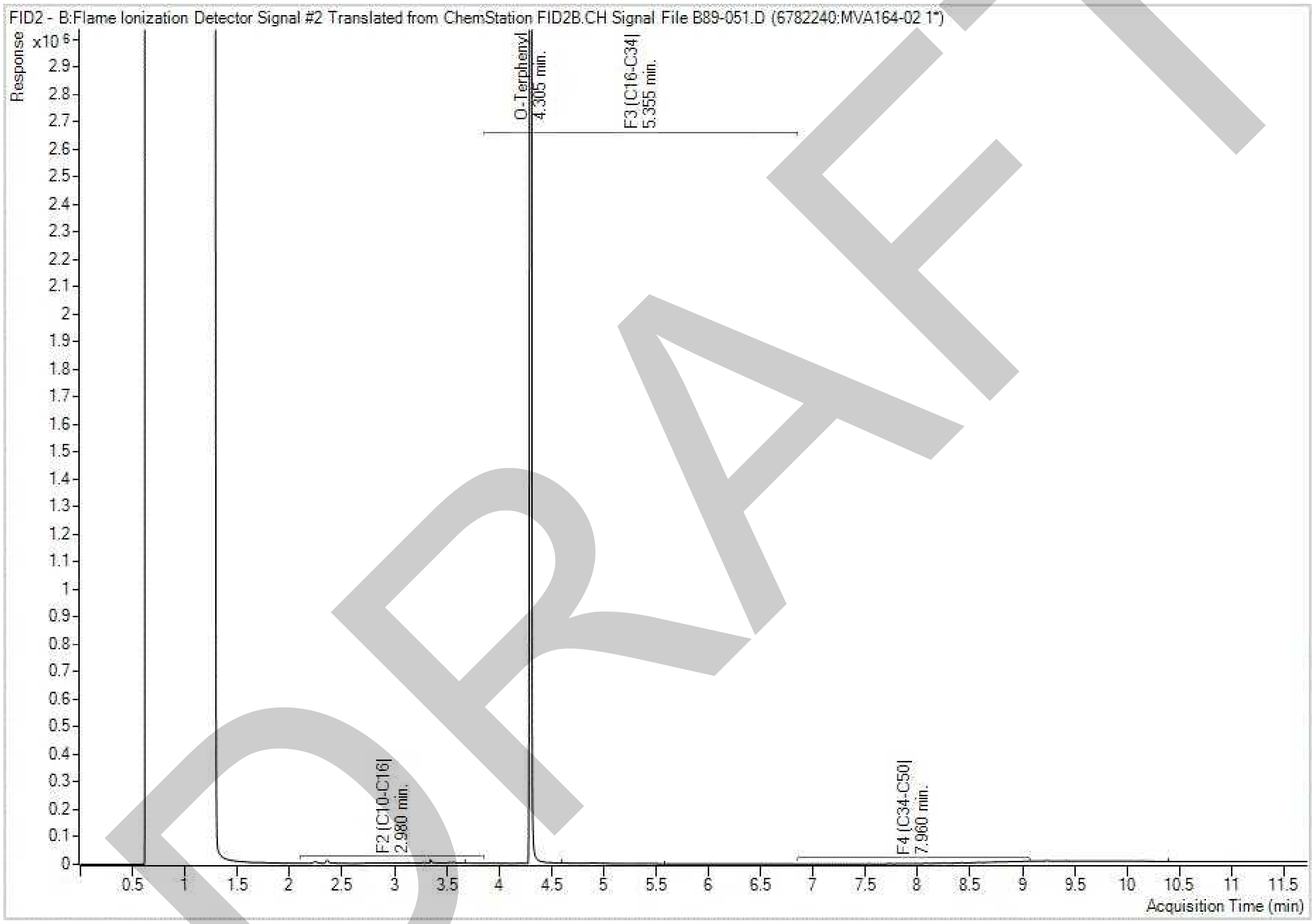


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0E0707
Report Date: 2020/06/12
BV Labs Sample: MVA164

Pinchin Ltd
Client Project #: 230236.006
Client ID: MW-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

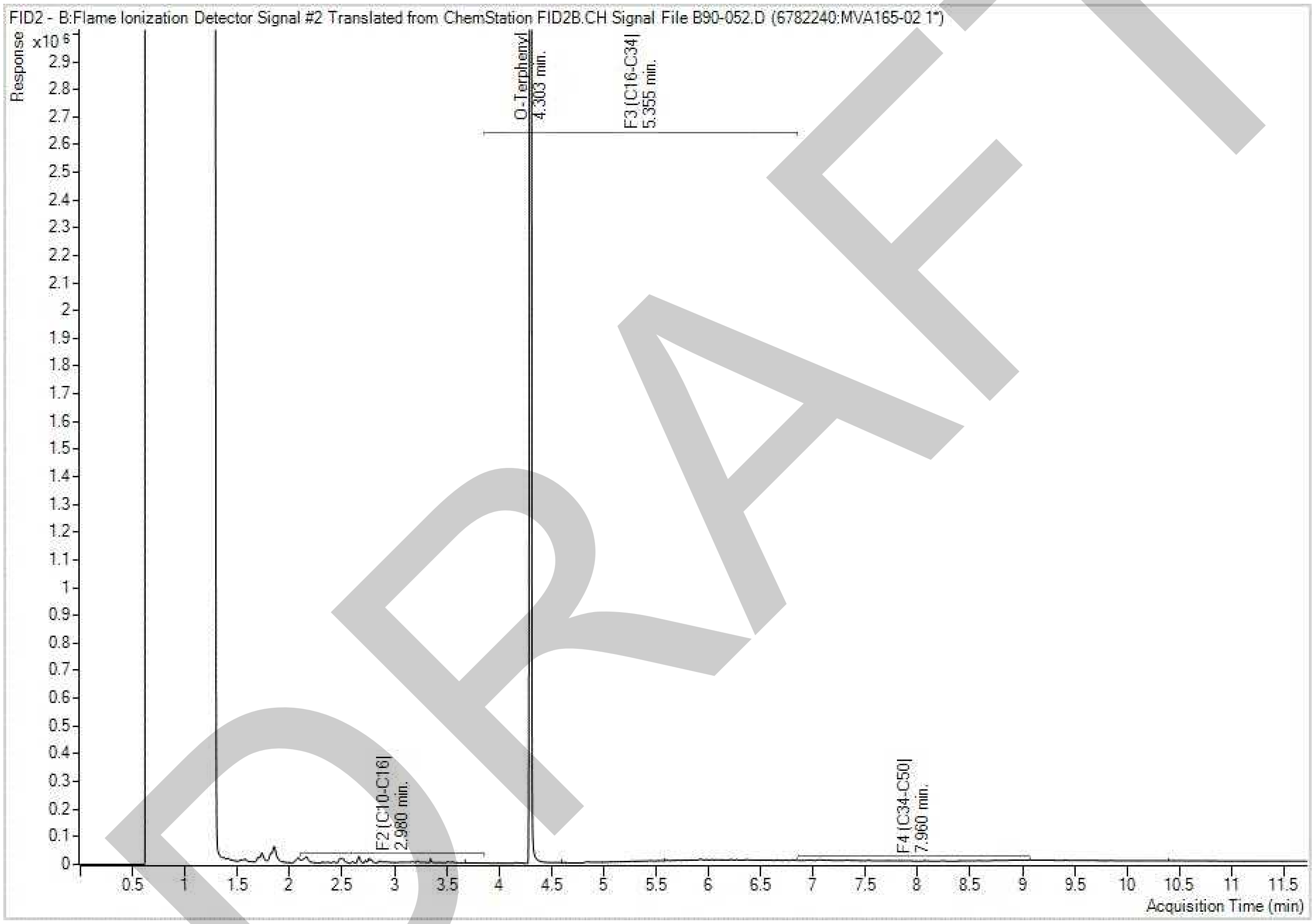


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0E0707
Report Date: 2020/06/12
BV Labs Sample: MVA165

Pinchin Ltd
Client Project #: 230236.006
Client ID: DUP-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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

Your Project #: 230236.006
Site Location: MCRAE
Your C.O.C. #: 770951-02-01

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/07/10
Report #: R6240901
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0G4922
Received: 2020/07/02, 14:27

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum (1)	1	N/A	2020/07/09	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	2	N/A	2020/07/08		EPA 8260C m
Chromium (VI) in Water (1)	1	N/A	2020/07/07	CAM SOP-00436	EPA 7199 m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	1	2020/07/07	2020/07/09	CAM SOP-00316	CCME PHC-CWS m
Mercury (1)	1	2020/07/07	2020/07/07	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS (1)	1	N/A	2020/07/06	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM) (1)	1	2020/07/07	2020/07/08	CAM SOP-00318	EPA 8270D m
Volatile Organic Compounds and F1 PHCs (1)	2	N/A	2020/07/07	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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 Bureau Veritas Laboratories Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta

Your Project #: 230236.006
Site Location: MCRAE
Your C.O.C. #: 770951-02-01

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/07/10
Report #: R6240901
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0G4922
Received: 2020/07/02, 14:27

Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: Antonella.Brasil@bvlabs.com
Phone# (905)817-5817
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		NAF023		
Sampling Date		2020/07/02		
COC Number		770951-02-01		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6817347
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	6819523
Benzene	ug/L	<0.20	0.20	6819523
Bromodichloromethane	ug/L	<0.50	0.50	6819523
Bromoform	ug/L	<1.0	1.0	6819523
Bromomethane	ug/L	<0.50	0.50	6819523
Carbon Tetrachloride	ug/L	<0.20	0.20	6819523
Chlorobenzene	ug/L	<0.20	0.20	6819523
Chloroform	ug/L	<0.20	0.20	6819523
Dibromochloromethane	ug/L	<0.50	0.50	6819523
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6819523
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6819523
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6819523
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6819523
1,1-Dichloroethane	ug/L	<0.20	0.20	6819523
1,2-Dichloroethane	ug/L	<0.50	0.50	6819523
1,1-Dichloroethylene	ug/L	<0.20	0.20	6819523
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6819523
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6819523
1,2-Dichloropropane	ug/L	<0.20	0.20	6819523
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6819523
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6819523
Ethylbenzene	ug/L	<0.20	0.20	6819523
Ethylene Dibromide	ug/L	<0.20	0.20	6819523
Hexane	ug/L	<1.0	1.0	6819523
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6819523
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6819523
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6819523
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6819523
Styrene	ug/L	<0.50	0.50	6819523
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6819523
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6819523
Tetrachloroethylene	ug/L	<0.20	0.20	6819523

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		NAF023		
Sampling Date		2020/07/02		
COC Number		770951-02-01		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6819523
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6819523
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6819523
Trichloroethylene	ug/L	<0.20	0.20	6819523
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6819523
Vinyl Chloride	ug/L	<0.20	0.20	6819523
p+m-Xylene	ug/L	<0.20	0.20	6819523
o-Xylene	ug/L	<0.20	0.20	6819523
Total Xylenes	ug/L	<0.20	0.20	6819523
F1 (C6-C10)	ug/L	<25	25	6819523
F1 (C6-C10) - BTEX	ug/L	<25	25	6819523
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	82		6819523
D4-1,2-Dichloroethane	%	110		6819523
D8-Toluene	%	92		6819523

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (WATER)

BV Labs ID		NAF022			NAF022		
Sampling Date		2020/07/02			2020/07/02		
COC Number		770951-02-01			770951-02-01		
	UNITS	**MW110**	**RDL**	**QC Batch**	**MW110 Lab-Dup**	**RDL**	**QC Batch**
Metals							
Chromium (VI)	ug/L	<0.50	0.50	6821181			
Mercury (Hg)	ug/L	<0.10	0.10	6821829			
Dissolved Antimony (Sb)	ug/L	<0.50	0.50	6819419	<0.50	0.50	6819419
Dissolved Arsenic (As)	ug/L	<1.0	1.0	6819419	<1.0	1.0	6819419
Dissolved Barium (Ba)	ug/L	130	2.0	6819419	130	2.0	6819419
Dissolved Beryllium (Be)	ug/L	<0.40	0.40	6819419	<0.40	0.40	6819419
Dissolved Boron (B)	ug/L	190	10	6819419	200	10	6819419
Dissolved Cadmium (Cd)	ug/L	<0.090	0.090	6819419	<0.090	0.090	6819419
Dissolved Chromium (Cr)	ug/L	<5.0	5.0	6819419	<5.0	5.0	6819419
Dissolved Cobalt (Co)	ug/L	0.81	0.50	6819419	0.85	0.50	6819419
Dissolved Copper (Cu)	ug/L	<0.90	0.90	6819419	<0.90	0.90	6819419
Dissolved Lead (Pb)	ug/L	<0.50	0.50	6819419	<0.50	0.50	6819419
Dissolved Molybdenum (Mo)	ug/L	0.79	0.50	6819419	0.89	0.50	6819419
Dissolved Nickel (Ni)	ug/L	4.8	1.0	6819419	5.0	1.0	6819419
Dissolved Selenium (Se)	ug/L	<2.0	2.0	6819419	<2.0	2.0	6819419
Dissolved Silver (Ag)	ug/L	<0.090	0.090	6819419	<0.090	0.090	6819419
Dissolved Sodium (Na)	ug/L	92000	100	6819419	95000	100	6819419
Dissolved Thallium (Tl)	ug/L	0.064	0.050	6819419	0.071	0.050	6819419
Dissolved Uranium (U)	ug/L	0.99	0.10	6819419	1.0	0.10	6819419
Dissolved Vanadium (V)	ug/L	<0.50	0.50	6819419	<0.50	0.50	6819419
Dissolved Zinc (Zn)	ug/L	5.3	5.0	6819419	5.5	5.0	6819419

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

O.REG 153 PAHS (WATER)

BV Labs ID		NAF022		
Sampling Date		2020/07/02		
COC Number		770951-02-01		
	UNITS	**MW110**	**RDL**	**QC Batch**
Calculated Parameters				
Methylnaphthalene, 2-(1-)	ug/L	<0.071	0.071	6817637
Polyaromatic Hydrocarbons				
Acenaphthene	ug/L	<0.050	0.050	6822930
Acenaphthylene	ug/L	<0.050	0.050	6822930
Anthracene	ug/L	<0.050	0.050	6822930
Benzo(a)anthracene	ug/L	<0.050	0.050	6822930
Benzo(a)pyrene	ug/L	<0.0090	0.0090	6822930
Benzo(b/j)fluoranthene	ug/L	<0.050	0.050	6822930
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	6822930
Benzo(k)fluoranthene	ug/L	<0.050	0.050	6822930
Chrysene	ug/L	<0.050	0.050	6822930
Dibenzo(a,h)anthracene	ug/L	<0.050	0.050	6822930
Fluoranthene	ug/L	<0.050	0.050	6822930
Fluorene	ug/L	<0.050	0.050	6822930
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	6822930
1-Methylnaphthalene	ug/L	<0.050	0.050	6822930
2-Methylnaphthalene	ug/L	<0.050	0.050	6822930
Naphthalene	ug/L	<0.050	0.050	6822930
Phenanthrene	ug/L	<0.030	0.030	6822930
Pyrene	ug/L	<0.050	0.050	6822930
Surrogate Recovery (%)				
D10-Anthracene	%	114		6822930
D14-Terphenyl (FS)	%	119		6822930
D8-Acenaphthylene	%	101		6822930

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		NAF022			NAF022		
Sampling Date		2020/07/02			2020/07/02		
COC Number		770951-02-01			770951-02-01		
	UNITS	**MW110**	**RDL**	**QC Batch**	**MW110 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters							
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6817347			
Volatile Organics							
Acetone (2-Propanone)	ug/L	<10	10	6819523	<10	10	6819523
Benzene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Bromodichloromethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Bromoform	ug/L	<1.0	1.0	6819523	<1.0	1.0	6819523
Bromomethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Carbon Tetrachloride	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Chlorobenzene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Chloroform	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Dibromochloromethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6819523	<1.0	1.0	6819523
1,1-Dichloroethane	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
1,2-Dichloroethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,1-Dichloroethylene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,2-Dichloropropane	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6819523	<0.30	0.30	6819523
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6819523	<0.40	0.40	6819523
Ethylbenzene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Ethylene Dibromide	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Hexane	ug/L	<1.0	1.0	6819523	<1.0	1.0	6819523
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6819523	<2.0	2.0	6819523
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6819523	<10	10	6819523
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6819523	<5.0	5.0	6819523
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Styrene	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Tetrachloroethylene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523

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

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		NAF022			NAF022		
Sampling Date		2020/07/02			2020/07/02		
COC Number		770951-02-01			770951-02-01		
	UNITS	**MW110**	**RDL**	**QC Batch**	**MW110 Lab-Dup**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Trichloroethylene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6819523	<0.50	0.50	6819523
Vinyl Chloride	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
p+m-Xylene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
o-Xylene	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
Total Xylenes	ug/L	<0.20	0.20	6819523	<0.20	0.20	6819523
F1 (C6-C10)	ug/L	<25	25	6819523	<25	25	6819523
F1 (C6-C10) - BTEX	ug/L	<25	25	6819523	<25	25	6819523
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	6822941			
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	6822941			
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	6822941			
Reached Baseline at C50	ug/L	Yes		6822941			
Surrogate Recovery (%)							
o-Terphenyl	%	108		6822941			
4-Bromofluorobenzene	%	84		6819523	82		6819523
D4-1,2-Dichloroethane	%	111		6819523	112		6819523
D8-Toluene	%	91		6819523	92		6819523

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

TEST SUMMARY

BV Labs ID: NAF022
Sample ID: MW110
Matrix: Water

Collected: 2020/07/02
Shipped:
Received: 2020/07/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6817637	N/A	2020/07/09	Automated Statchk
1,3-Dichloropropene Sum	CALC	6817347	N/A	2020/07/08	Automated Statchk
Chromium (VI) in Water	IC	6821181	N/A	2020/07/07	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6822941	2020/07/07	2020/07/09	Prabhjot Gulati
Mercury	CV/AA	6821829	2020/07/07	2020/07/07	Meghaben Patel
Dissolved Metals by ICPMS	ICP/MS	6819419	N/A	2020/07/06	Daniel Teclu
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6822930	2020/07/07	2020/07/08	Bibin Alias Paul
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6819523	N/A	2020/07/07	John Wu

BV Labs ID: NAF022 Dup
Sample ID: MW110
Matrix: Water

Collected: 2020/07/02
Shipped:
Received: 2020/07/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	6819419	N/A	2020/07/06	Daniel Teclu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6819523	N/A	2020/07/07	John Wu

BV Labs ID: NAF023
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2020/07/02
Shipped:
Received: 2020/07/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6817347	N/A	2020/07/08	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6819523	N/A	2020/07/07	John Wu

GENERAL COMMENTS

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

Package 1	4.0°C

Cooler custody seal was present and intact .

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6819419	DT1	Matrix Spike [NAF022-05]	Dissolved Antimony (Sb)	2020/07/06		97	%	80 - 120
			Dissolved Arsenic (As)	2020/07/06		94	%	80 - 120
			Dissolved Barium (Ba)	2020/07/06		92	%	80 - 120
			Dissolved Beryllium (Be)	2020/07/06		90	%	80 - 120
			Dissolved Boron (B)	2020/07/06		92	%	80 - 120
			Dissolved Cadmium (Cd)	2020/07/06		93	%	80 - 120
			Dissolved Chromium (Cr)	2020/07/06		92	%	80 - 120
			Dissolved Cobalt (Co)	2020/07/06		92	%	80 - 120
			Dissolved Copper (Cu)	2020/07/06		92	%	80 - 120
			Dissolved Lead (Pb)	2020/07/06		91	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/07/06		95	%	80 - 120
			Dissolved Nickel (Ni)	2020/07/06		91	%	80 - 120
			Dissolved Selenium (Se)	2020/07/06		89	%	80 - 120
			Dissolved Silver (Ag)	2020/07/06		92	%	80 - 120
			Dissolved Sodium (Na)	2020/07/06		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/07/06		88	%	80 - 120
			Dissolved Uranium (U)	2020/07/06		94	%	80 - 120
			Dissolved Vanadium (V)	2020/07/06		95	%	80 - 120
			Dissolved Zinc (Zn)	2020/07/06		91	%	80 - 120
6819419	DT1	Spiked Blank	Dissolved Antimony (Sb)	2020/07/06		104	%	80 - 120
			Dissolved Arsenic (As)	2020/07/06		101	%	80 - 120
			Dissolved Barium (Ba)	2020/07/06		101	%	80 - 120
			Dissolved Beryllium (Be)	2020/07/06		95	%	80 - 120
			Dissolved Boron (B)	2020/07/06		93	%	80 - 120
			Dissolved Cadmium (Cd)	2020/07/06		101	%	80 - 120
			Dissolved Chromium (Cr)	2020/07/06		99	%	80 - 120
			Dissolved Cobalt (Co)	2020/07/06		101	%	80 - 120
			Dissolved Copper (Cu)	2020/07/06		101	%	80 - 120
			Dissolved Lead (Pb)	2020/07/06		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/07/06		102	%	80 - 120
			Dissolved Nickel (Ni)	2020/07/06		100	%	80 - 120
			Dissolved Selenium (Se)	2020/07/06		99	%	80 - 120
			Dissolved Silver (Ag)	2020/07/06		101	%	80 - 120
			Dissolved Sodium (Na)	2020/07/06		107	%	80 - 120
			Dissolved Thallium (Tl)	2020/07/06		99	%	80 - 120
			Dissolved Uranium (U)	2020/07/06		100	%	80 - 120
			Dissolved Vanadium (V)	2020/07/06		103	%	80 - 120
			Dissolved Zinc (Zn)	2020/07/06		101	%	80 - 120
6819419	DT1	Method Blank	Dissolved Antimony (Sb)	2020/07/06	<0.50		ug/L	
			Dissolved Arsenic (As)	2020/07/06	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/07/06	<2.0		ug/L	
			Dissolved Beryllium (Be)	2020/07/06	<0.40		ug/L	
			Dissolved Boron (B)	2020/07/06	<10		ug/L	
			Dissolved Cadmium (Cd)	2020/07/06	<0.090		ug/L	
			Dissolved Chromium (Cr)	2020/07/06	<5.0		ug/L	
			Dissolved Cobalt (Co)	2020/07/06	<0.50		ug/L	
			Dissolved Copper (Cu)	2020/07/06	<0.90		ug/L	
			Dissolved Lead (Pb)	2020/07/06	<0.50		ug/L	
			Dissolved Molybdenum (Mo)	2020/07/06	<0.50		ug/L	
			Dissolved Nickel (Ni)	2020/07/06	<1.0		ug/L	
			Dissolved Selenium (Se)	2020/07/06	<2.0		ug/L	
			Dissolved Silver (Ag)	2020/07/06	<0.090		ug/L	
			Dissolved Sodium (Na)	2020/07/06	<100		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2020/07/06	<0.050		ug/L	
			Dissolved Uranium (U)	2020/07/06	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/07/06	<0.50		ug/L	
			Dissolved Zinc (Zn)	2020/07/06	<5.0		ug/L	
6819419	DT1	RPD [NAF022-05]	Dissolved Antimony (Sb)	2020/07/06	NC		%	20
			Dissolved Arsenic (As)	2020/07/06	NC		%	20
			Dissolved Barium (Ba)	2020/07/06	0.49		%	20
			Dissolved Beryllium (Be)	2020/07/06	NC		%	20
			Dissolved Boron (B)	2020/07/06	3.3		%	20
			Dissolved Cadmium (Cd)	2020/07/06	NC		%	20
			Dissolved Chromium (Cr)	2020/07/06	NC		%	20
			Dissolved Cobalt (Co)	2020/07/06	5.4		%	20
			Dissolved Copper (Cu)	2020/07/06	NC		%	20
			Dissolved Lead (Pb)	2020/07/06	NC		%	20
			Dissolved Molybdenum (Mo)	2020/07/06	12		%	20
			Dissolved Nickel (Ni)	2020/07/06	4.7		%	20
			Dissolved Selenium (Se)	2020/07/06	NC		%	20
			Dissolved Silver (Ag)	2020/07/06	NC		%	20
			Dissolved Sodium (Na)	2020/07/06	2.7		%	20
			Dissolved Thallium (Tl)	2020/07/06	10		%	20
			Dissolved Uranium (U)	2020/07/06	3.0		%	20
			Dissolved Vanadium (V)	2020/07/06	NC		%	20
			Dissolved Zinc (Zn)	2020/07/06	3.9		%	20
6819523	J_W	Matrix Spike [NAF022-06]	4-Bromofluorobenzene	2020/07/07		91	%	70 - 130
			D4-1,2-Dichloroethane	2020/07/07		96	%	70 - 130
			D8-Toluene	2020/07/07		112	%	70 - 130
			Acetone (2-Propanone)	2020/07/07		79	%	60 - 140
			Benzene	2020/07/07		99	%	70 - 130
			Bromodichloromethane	2020/07/07		91	%	70 - 130
			Bromoform	2020/07/07		87	%	70 - 130
			Bromomethane	2020/07/07		94	%	60 - 140
			Carbon Tetrachloride	2020/07/07		107	%	70 - 130
			Chlorobenzene	2020/07/07		93	%	70 - 130
			Chloroform	2020/07/07		95	%	70 - 130
			Dibromochloromethane	2020/07/07		93	%	70 - 130
			1,2-Dichlorobenzene	2020/07/07		94	%	70 - 130
			1,3-Dichlorobenzene	2020/07/07		99	%	70 - 130
			1,4-Dichlorobenzene	2020/07/07		103	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/07/07		108	%	60 - 140
			1,1-Dichloroethane	2020/07/07		100	%	70 - 130
			1,2-Dichloroethane	2020/07/07		87	%	70 - 130
			1,1-Dichloroethylene	2020/07/07		114	%	70 - 130
			cis-1,2-Dichloroethylene	2020/07/07		89	%	70 - 130
			trans-1,2-Dichloroethylene	2020/07/07		105	%	70 - 130
			1,2-Dichloropropane	2020/07/07		90	%	70 - 130
			cis-1,3-Dichloropropene	2020/07/07		80	%	70 - 130
			trans-1,3-Dichloropropene	2020/07/07		87	%	70 - 130
			Ethylbenzene	2020/07/07		88	%	70 - 130
			Ethylene Dibromide	2020/07/07		87	%	70 - 130
			Hexane	2020/07/07		114	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/07/07		87	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/07/07		67	%	60 - 140
			Methyl Isobutyl Ketone	2020/07/07		70 (1)	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methyl t-butyl ether (MTBE)	2020/07/07		78	%	70 - 130
			Styrene	2020/07/07		68 (1)	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/07/07		107	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/07/07		82	%	70 - 130
			Tetrachloroethylene	2020/07/07		103	%	70 - 130
			Toluene	2020/07/07		96	%	70 - 130
			1,1,1-Trichloroethane	2020/07/07		107	%	70 - 130
			1,1,2-Trichloroethane	2020/07/07		96	%	70 - 130
			Trichloroethylene	2020/07/07		104	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2020/07/07		113	%	70 - 130
			Vinyl Chloride	2020/07/07		105	%	70 - 130
			p+m-Xylene	2020/07/07		93	%	70 - 130
			o-Xylene	2020/07/07		88	%	70 - 130
			F1 (C6-C10)	2020/07/07		97	%	60 - 140
6819523	J_W	Spiked Blank	4-Bromofluorobenzene	2020/07/07		91	%	70 - 130
			D4-1,2-Dichloroethane	2020/07/07		97	%	70 - 130
			D8-Toluene	2020/07/07		112	%	70 - 130
			Acetone (2-Propanone)	2020/07/07		81	%	60 - 140
			Benzene	2020/07/07		97	%	70 - 130
			Bromodichloromethane	2020/07/07		89	%	70 - 130
			Bromoform	2020/07/07		87	%	70 - 130
			Bromomethane	2020/07/07		96	%	60 - 140
			Carbon Tetrachloride	2020/07/07		106	%	70 - 130
			Chlorobenzene	2020/07/07		91	%	70 - 130
			Chloroform	2020/07/07		94	%	70 - 130
			Dibromochloromethane	2020/07/07		93	%	70 - 130
			1,2-Dichlorobenzene	2020/07/07		92	%	70 - 130
			1,3-Dichlorobenzene	2020/07/07		97	%	70 - 130
			1,4-Dichlorobenzene	2020/07/07		101	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/07/07		106	%	60 - 140
			1,1-Dichloroethane	2020/07/07		99	%	70 - 130
			1,2-Dichloroethane	2020/07/07		86	%	70 - 130
			1,1-Dichloroethylene	2020/07/07		112	%	70 - 130
			cis-1,2-Dichloroethylene	2020/07/07		88	%	70 - 130
			trans-1,2-Dichloroethylene	2020/07/07		103	%	70 - 130
			1,2-Dichloropropane	2020/07/07		88	%	70 - 130
			cis-1,3-Dichloropropene	2020/07/07		79	%	70 - 130
			trans-1,3-Dichloropropene	2020/07/07		87	%	70 - 130
			Ethylbenzene	2020/07/07		87	%	70 - 130
			Ethylene Dibromide	2020/07/07		86	%	70 - 130
			Hexane	2020/07/07		115	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/07/07		87	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/07/07		67	%	60 - 140
			Methyl Isobutyl Ketone	2020/07/07		67 (1)	%	70 - 130
			Methyl t-butyl ether (MTBE)	2020/07/07		76	%	70 - 130
			Styrene	2020/07/07		66 (1)	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/07/07		106	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/07/07		81	%	70 - 130
			Tetrachloroethylene	2020/07/07		102	%	70 - 130
			Toluene	2020/07/07		95	%	70 - 130
			1,1,1-Trichloroethane	2020/07/07		105	%	70 - 130
			1,1,2-Trichloroethane	2020/07/07		95	%	70 - 130
			Trichloroethylene	2020/07/07		102	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Trichlorofluoromethane (FREON 11)	2020/07/07		112	%	70 - 130
			Vinyl Chloride	2020/07/07		103	%	70 - 130
			p+m-Xylene	2020/07/07		92	%	70 - 130
			o-Xylene	2020/07/07		86	%	70 - 130
			F1 (C6-C10)	2020/07/07		99	%	60 - 140
6819523	J_W	Method Blank	4-Bromofluorobenzene	2020/07/07		81	%	70 - 130
			D4-1,2-Dichloroethane	2020/07/07		103	%	70 - 130
			D8-Toluene	2020/07/07		95	%	70 - 130
			Acetone (2-Propanone)	2020/07/07	<10		ug/L	
			Benzene	2020/07/07	<0.20		ug/L	
			Bromodichloromethane	2020/07/07	<0.50		ug/L	
			Bromoform	2020/07/07	<1.0		ug/L	
			Bromomethane	2020/07/07	<0.50		ug/L	
			Carbon Tetrachloride	2020/07/07	<0.20		ug/L	
			Chlorobenzene	2020/07/07	<0.20		ug/L	
			Chloroform	2020/07/07	<0.20		ug/L	
			Dibromochloromethane	2020/07/07	<0.50		ug/L	
			1,2-Dichlorobenzene	2020/07/07	<0.50		ug/L	
			1,3-Dichlorobenzene	2020/07/07	<0.50		ug/L	
			1,4-Dichlorobenzene	2020/07/07	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2020/07/07	<1.0		ug/L	
			1,1-Dichloroethane	2020/07/07	<0.20		ug/L	
			1,2-Dichloroethane	2020/07/07	<0.50		ug/L	
			1,1-Dichloroethylene	2020/07/07	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2020/07/07	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2020/07/07	<0.50		ug/L	
			1,2-Dichloropropane	2020/07/07	<0.20		ug/L	
			cis-1,3-Dichloropropene	2020/07/07	<0.30		ug/L	
			trans-1,3-Dichloropropene	2020/07/07	<0.40		ug/L	
			Ethylbenzene	2020/07/07	<0.20		ug/L	
			Ethylene Dibromide	2020/07/07	<0.20		ug/L	
			Hexane	2020/07/07	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2020/07/07	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2020/07/07	<10		ug/L	
			Methyl Isobutyl Ketone	2020/07/07	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2020/07/07	<0.50		ug/L	
			Styrene	2020/07/07	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2020/07/07	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2020/07/07	<0.50		ug/L	
			Tetrachloroethylene	2020/07/07	<0.20		ug/L	
			Toluene	2020/07/07	<0.20		ug/L	
			1,1,1-Trichloroethane	2020/07/07	<0.20		ug/L	
			1,1,2-Trichloroethane	2020/07/07	<0.50		ug/L	
			Trichloroethylene	2020/07/07	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2020/07/07	<0.50		ug/L	
			Vinyl Chloride	2020/07/07	<0.20		ug/L	
			p+m-Xylene	2020/07/07	<0.20		ug/L	
			o-Xylene	2020/07/07	<0.20		ug/L	
			Total Xylenes	2020/07/07	<0.20		ug/L	
			F1 (C6-C10)	2020/07/07	<25		ug/L	
			F1 (C6-C10) - BTEX	2020/07/07	<25		ug/L	
6819523	J_W	RPD [NAF022-06]	Acetone (2-Propanone)	2020/07/07	NC		%	30
			Benzene	2020/07/07	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromodichloromethane	2020/07/07	NC		%	30
			Bromoform	2020/07/07	NC		%	30
			Bromomethane	2020/07/07	NC		%	30
			Carbon Tetrachloride	2020/07/07	NC		%	30
			Chlorobenzene	2020/07/07	NC		%	30
			Chloroform	2020/07/07	NC		%	30
			Dibromochloromethane	2020/07/07	NC		%	30
			1,2-Dichlorobenzene	2020/07/07	NC		%	30
			1,3-Dichlorobenzene	2020/07/07	NC		%	30
			1,4-Dichlorobenzene	2020/07/07	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2020/07/07	NC		%	30
			1,1-Dichloroethane	2020/07/07	NC		%	30
			1,2-Dichloroethane	2020/07/07	NC		%	30
			1,1-Dichloroethylene	2020/07/07	NC		%	30
			cis-1,2-Dichloroethylene	2020/07/07	NC		%	30
			trans-1,2-Dichloroethylene	2020/07/07	NC		%	30
			1,2-Dichloropropane	2020/07/07	NC		%	30
			cis-1,3-Dichloropropene	2020/07/07	NC		%	30
			trans-1,3-Dichloropropene	2020/07/07	NC		%	30
			Ethylbenzene	2020/07/07	NC		%	30
			Ethylene Dibromide	2020/07/07	NC		%	30
			Hexane	2020/07/07	NC		%	30
			Methylene Chloride(Dichloromethane)	2020/07/07	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2020/07/07	NC		%	30
			Methyl Isobutyl Ketone	2020/07/07	NC		%	30
			Methyl t-butyl ether (MTBE)	2020/07/07	NC		%	30
			Styrene	2020/07/07	NC		%	30
			1,1,1,2-Tetrachloroethane	2020/07/07	NC		%	30
			1,1,2,2-Tetrachloroethane	2020/07/07	NC		%	30
			Tetrachloroethylene	2020/07/07	NC		%	30
			Toluene	2020/07/07	NC		%	30
			1,1,1-Trichloroethane	2020/07/07	NC		%	30
			1,1,2-Trichloroethane	2020/07/07	NC		%	30
			Trichloroethylene	2020/07/07	NC		%	30
			Trichlorofluoromethane (FREON 11)	2020/07/07	NC		%	30
			Vinyl Chloride	2020/07/07	NC		%	30
			p+m-Xylene	2020/07/07	NC		%	30
			o-Xylene	2020/07/07	NC		%	30
			Total Xylenes	2020/07/07	NC		%	30
			F1 (C6-C10)	2020/07/07	NC		%	30
			F1 (C6-C10) - BTEX	2020/07/07	NC		%	30
6821181	LLE	Matrix Spike	Chromium (VI)	2020/07/07		97	%	80 - 120
6821181	LLE	Spiked Blank	Chromium (VI)	2020/07/07		99	%	80 - 120
6821181	LLE	Method Blank	Chromium (VI)	2020/07/07	<0.50		ug/L	
6821181	LLE	RPD	Chromium (VI)	2020/07/07	NC		%	20
6821829	MPD	Matrix Spike	Mercury (Hg)	2020/07/07		94	%	75 - 125
6821829	MPD	Spiked Blank	Mercury (Hg)	2020/07/07		93	%	80 - 120
6821829	MPD	Method Blank	Mercury (Hg)	2020/07/07	<0.10		ug/L	
6821829	MPD	RPD	Mercury (Hg)	2020/07/07	NC		%	20
6822930	PP4	Matrix Spike	D10-Anthracene	2020/07/08		118	%	50 - 130
			D14-Terphenyl (FS)	2020/07/08		129	%	50 - 130
			D8-Acenaphthylene	2020/07/08		105	%	50 - 130
			Acenaphthene	2020/07/08		113	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthylene	2020/07/08		108	%	50 - 130
			Anthracene	2020/07/08		116	%	50 - 130
			Benzo(a)anthracene	2020/07/08		120	%	50 - 130
			Benzo(a)pyrene	2020/07/08		113	%	50 - 130
			Benzo(b/j)fluoranthene	2020/07/08		120	%	50 - 130
			Benzo(g,h,i)perylene	2020/07/08		115	%	50 - 130
			Benzo(k)fluoranthene	2020/07/08		112	%	50 - 130
			Chrysene	2020/07/08		120	%	50 - 130
			Dibenzo(a,h)anthracene	2020/07/08		118	%	50 - 130
			Fluoranthene	2020/07/08		147 (2)	%	50 - 130
			Fluorene	2020/07/08		109	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/07/08		114	%	50 - 130
			1-Methylnaphthalene	2020/07/08		97	%	50 - 130
			2-Methylnaphthalene	2020/07/08		96	%	50 - 130
			Naphthalene	2020/07/08		106	%	50 - 130
			Phenanthrene	2020/07/08		118	%	50 - 130
			Pyrene	2020/07/08		143 (2)	%	50 - 130
6822930	PP4	Spiked Blank	D10-Anthracene	2020/07/07		106	%	50 - 130
			D14-Terphenyl (FS)	2020/07/07		104	%	50 - 130
			D8-Acenaphthylene	2020/07/07		93	%	50 - 130
			Acenaphthene	2020/07/07		106	%	50 - 130
			Acenaphthylene	2020/07/07		100	%	50 - 130
			Anthracene	2020/07/07		108	%	50 - 130
			Benzo(a)anthracene	2020/07/07		105	%	50 - 130
			Benzo(a)pyrene	2020/07/07		100	%	50 - 130
			Benzo(b/j)fluoranthene	2020/07/07		105	%	50 - 130
			Benzo(g,h,i)perylene	2020/07/07		98	%	50 - 130
			Benzo(k)fluoranthene	2020/07/07		101	%	50 - 130
			Chrysene	2020/07/07		105	%	50 - 130
			Dibenzo(a,h)anthracene	2020/07/07		101	%	50 - 130
			Fluoranthene	2020/07/07		126	%	50 - 130
			Fluorene	2020/07/07		107	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/07/07		102	%	50 - 130
			1-Methylnaphthalene	2020/07/07		92	%	50 - 130
			2-Methylnaphthalene	2020/07/07		92	%	50 - 130
			Naphthalene	2020/07/07		99	%	50 - 130
			Phenanthrene	2020/07/07		112	%	50 - 130
			Pyrene	2020/07/07		122	%	50 - 130
6822930	PP4	Method Blank	D10-Anthracene	2020/07/07		111	%	50 - 130
			D14-Terphenyl (FS)	2020/07/07		119	%	50 - 130
			D8-Acenaphthylene	2020/07/07		87	%	50 - 130
			Acenaphthene	2020/07/07	<0.050		ug/L	
			Acenaphthylene	2020/07/07	<0.050		ug/L	
			Anthracene	2020/07/07	<0.050		ug/L	
			Benzo(a)anthracene	2020/07/07	<0.050		ug/L	
			Benzo(a)pyrene	2020/07/07	<0.0090		ug/L	
			Benzo(b/j)fluoranthene	2020/07/07	<0.050		ug/L	
			Benzo(g,h,i)perylene	2020/07/07	<0.050		ug/L	
			Benzo(k)fluoranthene	2020/07/07	<0.050		ug/L	
			Chrysene	2020/07/07	<0.050		ug/L	
			Dibenzo(a,h)anthracene	2020/07/07	<0.050		ug/L	
			Fluoranthene	2020/07/07	<0.050		ug/L	
			Fluorene	2020/07/07	<0.050		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Indeno(1,2,3-cd)pyrene	2020/07/07	<0.050		ug/L	
			1-Methylnaphthalene	2020/07/07	<0.050		ug/L	
			2-Methylnaphthalene	2020/07/07	<0.050		ug/L	
			Naphthalene	2020/07/07	<0.050		ug/L	
			Phenanthrene	2020/07/07	<0.030		ug/L	
			Pyrene	2020/07/07	<0.050		ug/L	
6822930	PP4	RPD	Acenaphthene	2020/07/08	NC		%	30
			Acenaphthylene	2020/07/08	NC		%	30
			Anthracene	2020/07/08	NC		%	30
			Benzo(a)anthracene	2020/07/08	NC		%	30
			Benzo(a)pyrene	2020/07/08	NC		%	30
			Benzo(b/j)fluoranthene	2020/07/08	NC		%	30
			Benzo(g,h,i)perylene	2020/07/08	NC		%	30
			Benzo(k)fluoranthene	2020/07/08	NC		%	30
			Chrysene	2020/07/08	NC		%	30
			Dibenzo(a,h)anthracene	2020/07/08	NC		%	30
			Fluoranthene	2020/07/08	NC		%	30
			Fluorene	2020/07/08	NC		%	30
			Indeno(1,2,3-cd)pyrene	2020/07/08	NC		%	30
			1-Methylnaphthalene	2020/07/08	NC		%	30
			2-Methylnaphthalene	2020/07/08	NC		%	30
			Naphthalene	2020/07/08	NC		%	30
			Phenanthrene	2020/07/08	NC		%	30
			Pyrene	2020/07/08	NC		%	30
6822941	GUL	Matrix Spike	o-Terphenyl	2020/07/09		111	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/07/09		101	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2020/07/09		105	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2020/07/09		104	%	50 - 130
6822941	GUL	Spiked Blank	o-Terphenyl	2020/07/09		115	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/07/09		103	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2020/07/09		109	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2020/07/09		106	%	60 - 130
6822941	GUL	Method Blank	o-Terphenyl	2020/07/09		110	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/07/09	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2020/07/09	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2020/07/09	<200		ug/L	
6822941	GUL	RPD	F2 (C10-C16 Hydrocarbons)	2020/07/09	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2020/07/09	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			F4 (C34-C50 Hydrocarbons)	2020/07/09	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).

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

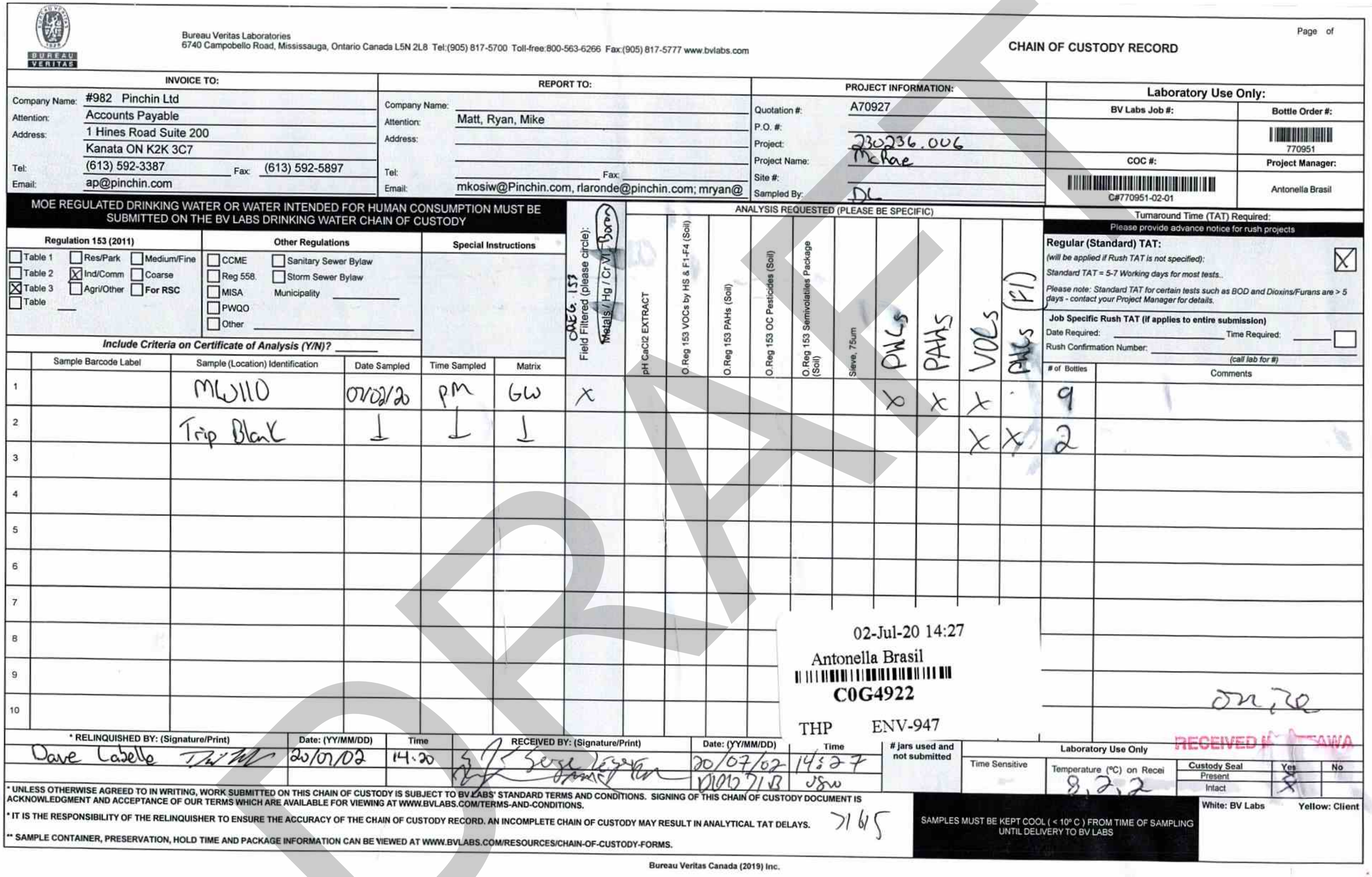
(2) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

VALIDATION SIGNATURE PAGE

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

Brad Newman, Scientific Service Specialist

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



Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:

Company Name: #982 Pinchin Ltd
Attention: Accounts Payable
Address: 1 Hines Road Suite 200
Kanata ON K2K 3C7
Tel: (613) 592-3387 Fax: (613) 592-5897
Email: ap@pinchin.com

REPORT TO:

Company Name:
Attention: Matt, Ryan, Mike
Address:
Tel: Fax:
Email: mkosiw@Pinchin.com, rlaronde@pinchin.com; mryan@

PROJECT INFORMATION:

Quotation #: A70927
P.O. #:
Project: 230236.006
Project Name: McRae
Site #:
Sampled By: DL

Laboratory Use Only:

BV Labs Job #:
Bottle Order #: 770951
COC #: C#770951-02-01
Project Manager: Antonella Brasil

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

Regulation 153 (2011)

☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☒ Ind/Comm ☐ Coarse
☒ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality
☐ PWQO
☐ Other

Special Instructions

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	O.REG. 153 Field Filtered (please circle): [✓ Metals / Hg / Cr VI / Boron]	pH CaCl2 EXTRACT	O.Reg 153 VOCs by HS & F1-F4 (Soil)	O.Reg 153 PAHs (Soil)	O.Reg 153 OC Pesticides (Soil)	O.Reg 153 Semivolatiles Package (Soil)	Sieve, 75um	PHCs	PAHs	VOCs	PHCs (F1)	# of Bottles	Comments
1		MW110	07/02/20	PM	GW	X							X	X	X	.	9	
2		Trip Blank	↓	↓	↓										X	X	2	
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		on ice

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 #)*

02-Jul-20 14:27
Antonella Brasil
C0G4922
THP ENV-947

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dave Labelle	20/07/02	14:20	Serge	20/07/02	14:27	
				[illegible]	[illegible]	

Laboratory Use Only

RECEIVED IN OTTAWA

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	8, 2, 2	Present	X	
		Intact		

White: BV Labs Yellow: Client

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

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS. 7165

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

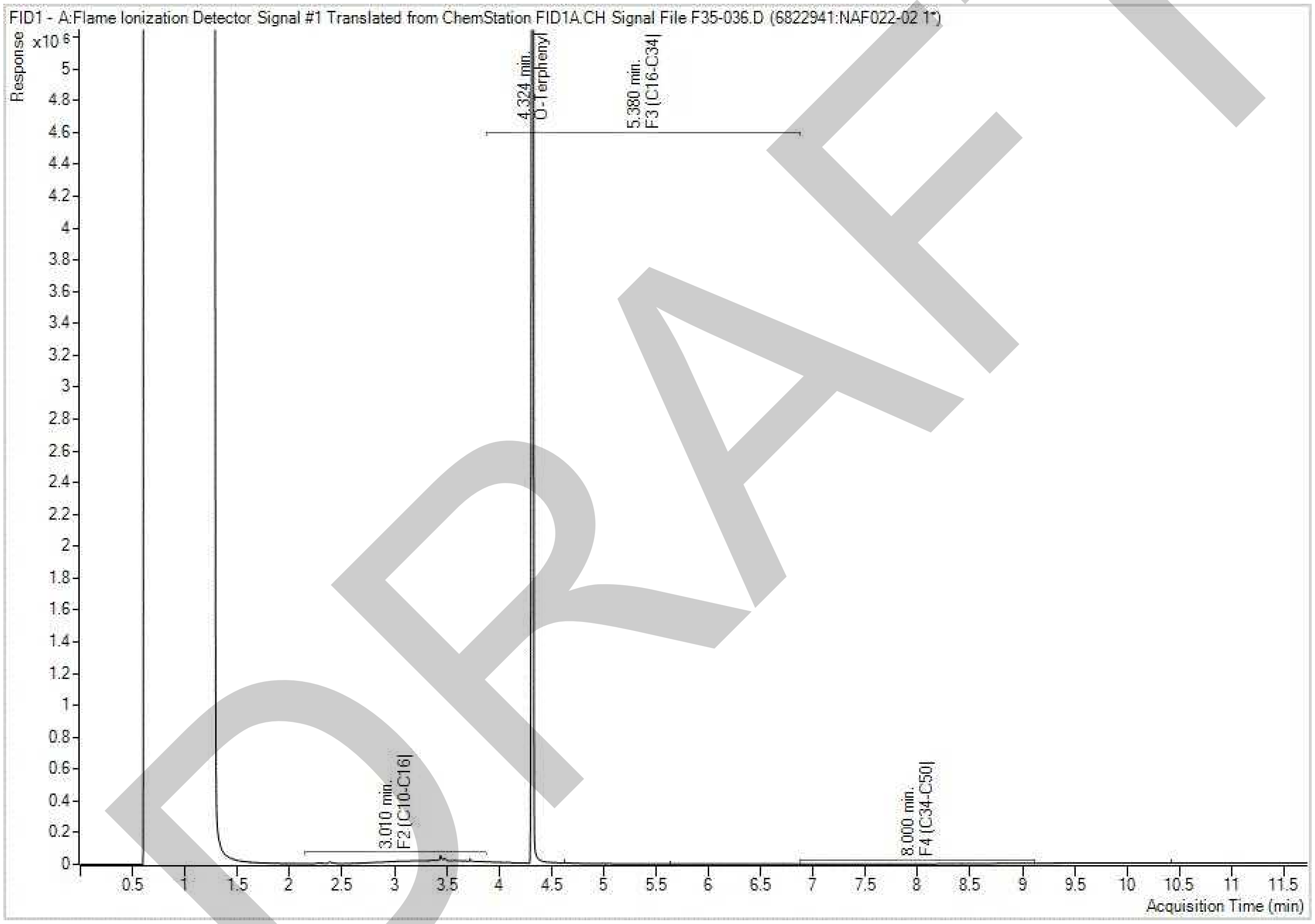
SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BV LABS

Bureau Veritas Canada (2019) Inc.

BV Labs Job #: C0G4922
Report Date: 2020/07/10
BV Labs Sample: NAF022

Pinchin Ltd
Client Project #: 230236.006
Project name: MCRAE
Client ID: MW110

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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

Your Project #: 230236.006
Site Location: 320 MCRAE
Your C.O.C. #: 126417

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/09/17
Report #: R6334154
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0N4811
Received: 2020/09/10, 15:47

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum (1)	4	N/A	2020/09/16	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum (1)	5	N/A	2020/09/14		EPA 8260C m
Chromium (VI) in Water (1)	2	N/A	2020/09/16	CAM SOP-00436	EPA 7199 m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	4	2020/09/15	2020/09/16	CAM SOP-00316	CCME PHC-CWS m
Mercury (1)	3	2020/09/16	2020/09/16	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS (1)	2	N/A	2020/09/15	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM) (1)	4	2020/09/15	2020/09/16	CAM SOP-00318	EPA 8270D m
Volatile Organic Compounds and F1 PHCs (1)	5	N/A	2020/09/14	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
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 Bureau Veritas Laboratories Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta

Your Project #: 230236.006
Site Location: 320 MCRAE
Your C.O.C. #: 126417

Attention: Matt, Ryan, Mike

Pinchin Ltd
Ottawa
1 Hines Road
Suite 200
Kanata, ON
CANADA K2K 3C7

Report Date: 2020/09/17
Report #: R6334154
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0N4811
Received: 2020/09/10, 15:47

Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: Antonella.Brasil@bvlabs.com
Phone# (905)817-5817
==
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		NPE734		
Sampling Date		2020/09/09		
COC Number		126417		
	UNITS	**MW201**	**RDL**	**QC Batch**
Metals				
Mercury (Hg)	ug/L	<0.10	0.10	6946362

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		NPE733		
Sampling Date		2020/09/09		
COC Number		126417		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6938423
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	6938101
Benzene	ug/L	<0.20	0.20	6938101
Bromodichloromethane	ug/L	<0.50	0.50	6938101
Bromoform	ug/L	<1.0	1.0	6938101
Bromomethane	ug/L	<0.50	0.50	6938101
Carbon Tetrachloride	ug/L	<0.20	0.20	6938101
Chlorobenzene	ug/L	<0.20	0.20	6938101
Chloroform	ug/L	<0.20	0.20	6938101
Dibromochloromethane	ug/L	<0.50	0.50	6938101
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6938101
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6938101
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6938101
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6938101
1,1-Dichloroethane	ug/L	<0.20	0.20	6938101
1,2-Dichloroethane	ug/L	<0.50	0.50	6938101
1,1-Dichloroethylene	ug/L	<0.20	0.20	6938101
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6938101
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6938101
1,2-Dichloropropane	ug/L	<0.20	0.20	6938101
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6938101
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6938101
Ethylbenzene	ug/L	<0.20	0.20	6938101
Ethylene Dibromide	ug/L	<0.20	0.20	6938101
Hexane	ug/L	<1.0	1.0	6938101
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6938101
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6938101
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6938101
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6938101
Styrene	ug/L	<0.50	0.50	6938101
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6938101
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6938101
Tetrachloroethylene	ug/L	<0.20	0.20	6938101

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (WATER)

BV Labs ID		NPE733		
Sampling Date		2020/09/09		
COC Number		126417		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	6938101
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6938101
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6938101
Trichloroethylene	ug/L	<0.20	0.20	6938101
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6938101
Vinyl Chloride	ug/L	<0.20	0.20	6938101
p+m-Xylene	ug/L	<0.20	0.20	6938101
o-Xylene	ug/L	<0.20	0.20	6938101
Total Xylenes	ug/L	<0.20	0.20	6938101
F1 (C6-C10)	ug/L	<25	25	6938101
F1 (C6-C10) - BTEX	ug/L	<25	25	6938101
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	89		6938101
D4-1,2-Dichloroethane	%	96		6938101
D8-Toluene	%	99		6938101

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS PACKAGE (WATER)

BV Labs ID		NPE736	NPE737		
Sampling Date		2020/09/09	2020/09/09		
COC Number		126417	126417		
	UNITS	**MW202**	**DUP-202**	**RDL**	**QC Batch**
Metals					
Chromium (VI)	ug/L	<0.50	<0.50	0.50	6939491
Mercury (Hg)	ug/L	<0.10	<0.10	0.10	6946362
Dissolved Antimony (Sb)	ug/L	0.71	0.64	0.50	6940590
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	1.0	6940590
Dissolved Barium (Ba)	ug/L	130	130	2.0	6940590
Dissolved Beryllium (Be)	ug/L	<0.40	<0.40	0.40	6940590
Dissolved Boron (B)	ug/L	690	660	10	6940590
Dissolved Cadmium (Cd)	ug/L	<0.090	<0.090	0.090	6940590
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	6940590
Dissolved Cobalt (Co)	ug/L	5.1	5.2	0.50	6940590
Dissolved Copper (Cu)	ug/L	2.2	2.7	0.90	6940590
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	6940590
Dissolved Molybdenum (Mo)	ug/L	3.3	3.4	0.50	6940590
Dissolved Nickel (Ni)	ug/L	15	16	1.0	6940590
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	2.0	6940590
Dissolved Silver (Ag)	ug/L	<0.090	<0.090	0.090	6940590
Dissolved Sodium (Na)	ug/L	990000	990000	500	6940590
Dissolved Thallium (Tl)	ug/L	0.21	0.21	0.050	6940590
Dissolved Uranium (U)	ug/L	5.0	5.1	0.10	6940590
Dissolved Vanadium (V)	ug/L	1.1	1.1	0.50	6940590
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	6940590

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PAHS (WATER)

BV Labs ID		NPE734	NPE735	NPE736	NPE738		
Sampling Date		2020/09/09	2020/09/09	2020/09/09	2020/09/09		
COC Number		126417	126417	126417	126417		
	UNITS	**MW201**	**DUP-201**	**MW202**	**MW203**	**RDL**	**QC Batch**
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/L	<0.071	<0.071	<0.071	<0.071	0.071	6938737
Polyaromatic Hydrocarbons							
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Benzo(a)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	<0.0090	0.0090	6945027
Benzo(b/j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Dibenzo(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Naphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Phenanthrene	ug/L	<0.030	<0.030	<0.030	<0.030	0.030	6945027
Pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	6945027
Surrogate Recovery (%)							
D10-Anthracene	%	105	102	116	103		6945027
D14-Terphenyl (FS)	%	93	88	107	78		6945027
D8-Acenaphthylene	%	94	91	106	94		6945027

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		NPE734		NPE735		NPE736		NPE738		
Sampling Date		2020/09/09		2020/09/09		2020/09/09		2020/09/09		
COC Number		126417		126417		126417		126417		
	UNITS	**MW201**	**RDL**	**DUP-201**	**RDL**	**MW202**	**RDL**	**MW203**	**RDL**	**QC Batch**
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938423
Volatile Organics										
Acetone (2-Propanone)	ug/L	<10	10	<10	10	<10	10	<10	10	6938101
Benzene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Bromodichloromethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Bromoform	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	6938101
Bromomethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Carbon Tetrachloride	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Chlorobenzene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Chloroform	ug/L	0.64	0.20	0.75	0.20	<0.20	0.20	0.23	0.20	6938101
Dibromochloromethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,2-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,3-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,4-Dichlorobenzene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	6938101
1,1-Dichloroethane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
1,2-Dichloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,1-Dichloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,2-Dichloropropane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	<0.30	0.30	<0.30	0.30	<0.30	0.30	6938101
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	<0.40	0.40	<0.40	0.40	<0.40	0.40	6938101
Ethylbenzene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Ethylene Dibromide	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Hexane	ug/L	<1.0	1.0	<1.0	1.0	<1.0	1.0	<1.0	1.0	6938101
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	<2.0	2.0	<2.0	2.0	<2.0	2.0	6938101
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	<10	10	<10	10	<10	10	6938101
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	6938101
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Styrene	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Tetrachloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		NPE734		NPE735		NPE736		NPE738		
Sampling Date		2020/09/09		2020/09/09		2020/09/09		2020/09/09		
COC Number		126417		126417		126417		126417		
	UNITS	**MW201**	**RDL**	**DUP-201**	**RDL**	**MW202**	**RDL**	**MW203**	**RDL**	**QC Batch**
Toluene	ug/L	<0.20	0.20	<0.30 (1)	0.30	<0.20	0.20	<0.40 (1)	0.40	6938101
1,1,1-Trichloroethane	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
1,1,2-Trichloroethane	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Trichloroethylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	6938101
Vinyl Chloride	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
p+m-Xylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	0.22	0.20	6938101
o-Xylene	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	6938101
Total Xylenes	ug/L	<0.20	0.20	<0.20	0.20	<0.20	0.20	0.22	0.20	6938101
F1 (C6-C10)	ug/L	<25	25	<25	25	<25	25	<25	25	6938101
F1 (C6-C10) - BTEX	ug/L	<25	25	<25	25	<25	25	<25	25	6938101
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	<100	100	<100	100	<100	100	6945037
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	<200	200	<200	200	<200	200	6945037
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	<200	200	<200	200	<200	200	6945037
Reached Baseline at C50	ug/L	Yes		Yes		Yes		Yes		6945037
Surrogate Recovery (%)										
o-Terphenyl	%	104		104		102		103		6945037
4-Bromofluorobenzene	%	89		103		89		90		6938101
D4-1,2-Dichloroethane	%	91		95		98		94		6938101
D8-Toluene	%	100		97		99		99		6938101

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) The detection limit was raised due to laboratory background interference.

TEST SUMMARY

BV Labs ID: NPE733
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6938423	N/A	2020/09/14	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6938101	N/A	2020/09/14	Xueming Jiang

BV Labs ID: NPE734
Sample ID: MW201
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6938737	N/A	2020/09/16	Automated Statchk
1,3-Dichloropropene Sum	CALC	6938423	N/A	2020/09/14	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6945037	2020/09/15	2020/09/16	Margaret Kulczyk-Stanko
Mercury	CV/AA	6946362	2020/09/16	2020/09/16	Medhat Nasr
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6945027	2020/09/15	2020/09/16	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6938101	N/A	2020/09/14	Xueming Jiang

BV Labs ID: NPE735
Sample ID: DUP-201
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6938737	N/A	2020/09/16	Automated Statchk
1,3-Dichloropropene Sum	CALC	6938423	N/A	2020/09/14	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6945037	2020/09/15	2020/09/16	Margaret Kulczyk-Stanko
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6945027	2020/09/15	2020/09/16	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6938101	N/A	2020/09/14	Xueming Jiang

BV Labs ID: NPE736
Sample ID: MW202
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6938737	N/A	2020/09/16	Automated Statchk
1,3-Dichloropropene Sum	CALC	6938423	N/A	2020/09/14	Automated Statchk
Chromium (VI) in Water	IC	6939491	N/A	2020/09/16	Lang Le
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6945037	2020/09/15	2020/09/16	Margaret Kulczyk-Stanko
Mercury	CV/AA	6946362	2020/09/16	2020/09/16	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6940590	N/A	2020/09/15	Arefa Dabhad
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6945027	2020/09/15	2020/09/16	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6938101	N/A	2020/09/14	Xueming Jiang

BV Labs ID: NPE737
Sample ID: DUP-202
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chromium (VI) in Water	IC	6939491	N/A	2020/09/16	Lang Le

TEST SUMMARY

BV Labs ID: NPE737
Sample ID: DUP-202
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	6946362	2020/09/16	2020/09/16	Medhat Nasr
Dissolved Metals by ICPMS	ICP/MS	6940590	N/A	2020/09/15	Arefa Dabhad

BV Labs ID: NPE738
Sample ID: MW203
Matrix: Water

Collected: 2020/09/09
Shipped:
Received: 2020/09/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6938737	N/A	2020/09/16	Automated Statchk
1,3-Dichloropropene Sum	CALC	6938423	N/A	2020/09/14	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6945037	2020/09/15	2020/09/16	Margaret Kulczyk-Stanko
PAH Compounds in Water by GC/MS (SIM)	GC/MS	6945027	2020/09/15	2020/09/16	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6938101	N/A	2020/09/14	Xueming Jiang

GENERAL COMMENTS

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

Package 1	1.7°C

Cooler custody seal was present and intact.

The following sediment comments apply to sample MW203.

All 40 ml vials for F1BTEX and VOC analyses contained visible sediment.
All 100 ml amber glass bottles for F2-F4 and PAH analyses contained visible sediment, which was included in the extraction .

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6938101	XJI	Matrix Spike	4-Bromofluorobenzene	2020/09/14		104	%	70 - 130
			D4-1,2-Dichloroethane	2020/09/14		97	%	70 - 130
			D8-Toluene	2020/09/14		103	%	70 - 130
			Acetone (2-Propanone)	2020/09/14		81	%	60 - 140
			Benzene	2020/09/14		97	%	70 - 130
			Bromodichloromethane	2020/09/14		91	%	70 - 130
			Bromoform	2020/09/14		99	%	70 - 130
			Bromomethane	2020/09/14		80	%	60 - 140
			Carbon Tetrachloride	2020/09/14		90	%	70 - 130
			Chlorobenzene	2020/09/14		96	%	70 - 130
			Chloroform	2020/09/14		87	%	70 - 130
			Dibromochloromethane	2020/09/14		99	%	70 - 130
			1,2-Dichlorobenzene	2020/09/14		96	%	70 - 130
			1,3-Dichlorobenzene	2020/09/14		101	%	70 - 130
			1,4-Dichlorobenzene	2020/09/14		113	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/09/14		97	%	60 - 140
			1,1-Dichloroethane	2020/09/14		92	%	70 - 130
			1,2-Dichloroethane	2020/09/14		96	%	70 - 130
			1,1-Dichloroethylene	2020/09/14		82	%	70 - 130
			cis-1,2-Dichloroethylene	2020/09/14		92	%	70 - 130
			trans-1,2-Dichloroethylene	2020/09/14		92	%	70 - 130
			1,2-Dichloropropane	2020/09/14		89	%	70 - 130
			cis-1,3-Dichloropropene	2020/09/14		95	%	70 - 130
			trans-1,3-Dichloropropene	2020/09/14		98	%	70 - 130
			Ethylbenzene	2020/09/14		98	%	70 - 130
			Ethylene Dibromide	2020/09/14		101	%	70 - 130
			Hexane	2020/09/14		103	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/09/14		78	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/09/14		107	%	60 - 140
			Methyl Isobutyl Ketone	2020/09/14		103	%	70 - 130
			Methyl t-butyl ether (MTBE)	2020/09/14		92	%	70 - 130
			Styrene	2020/09/14		101	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/09/14		98	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/09/14		98	%	70 - 130
			Tetrachloroethylene	2020/09/14		90	%	70 - 130
			Toluene	2020/09/14		96	%	70 - 130
			1,1,1-Trichloroethane	2020/09/14		92	%	70 - 130
			1,1,2-Trichloroethane	2020/09/14		98	%	70 - 130
			Trichloroethylene	2020/09/14		95	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2020/09/14		77	%	70 - 130
			Vinyl Chloride	2020/09/14		85	%	70 - 130
			p+m-Xylene	2020/09/14		107	%	70 - 130
			o-Xylene	2020/09/14		103	%	70 - 130
			F1 (C6-C10)	2020/09/14		101	%	60 - 140
6938101	XJI	Spiked Blank	4-Bromofluorobenzene	2020/09/13		103	%	70 - 130
			D4-1,2-Dichloroethane	2020/09/13		97	%	70 - 130
			D8-Toluene	2020/09/13		104	%	70 - 130
			Acetone (2-Propanone)	2020/09/13		82	%	60 - 140
			Benzene	2020/09/13		99	%	70 - 130
			Bromodichloromethane	2020/09/13		93	%	70 - 130
			Bromoform	2020/09/13		103	%	70 - 130
			Bromomethane	2020/09/13		79	%	60 - 140
			Carbon Tetrachloride	2020/09/13		93	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chlorobenzene	2020/09/13		98	%	70 - 130
			Chloroform	2020/09/13		90	%	70 - 130
			Dibromochloromethane	2020/09/13		103	%	70 - 130
			1,2-Dichlorobenzene	2020/09/13		99	%	70 - 130
			1,3-Dichlorobenzene	2020/09/13		102	%	70 - 130
			1,4-Dichlorobenzene	2020/09/13		114	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2020/09/13		102	%	60 - 140
			1,1-Dichloroethane	2020/09/13		95	%	70 - 130
			1,2-Dichloroethane	2020/09/13		98	%	70 - 130
			1,1-Dichloroethylene	2020/09/13		83	%	70 - 130
			cis-1,2-Dichloroethylene	2020/09/13		93	%	70 - 130
			trans-1,2-Dichloroethylene	2020/09/13		92	%	70 - 130
			1,2-Dichloropropane	2020/09/13		92	%	70 - 130
			cis-1,3-Dichloropropene	2020/09/13		88	%	70 - 130
			trans-1,3-Dichloropropene	2020/09/13		89	%	70 - 130
			Ethylbenzene	2020/09/13		101	%	70 - 130
			Ethylene Dibromide	2020/09/13		104	%	70 - 130
			Hexane	2020/09/13		106	%	70 - 130
			Methylene Chloride(Dichloromethane)	2020/09/13		78	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2020/09/13		110	%	60 - 140
			Methyl Isobutyl Ketone	2020/09/13		105	%	70 - 130
			Methyl t-butyl ether (MTBE)	2020/09/13		94	%	70 - 130
			Styrene	2020/09/13		105	%	70 - 130
			1,1,1,2-Tetrachloroethane	2020/09/13		102	%	70 - 130
			1,1,2,2-Tetrachloroethane	2020/09/13		101	%	70 - 130
			Tetrachloroethylene	2020/09/13		91	%	70 - 130
			Toluene	2020/09/13		98	%	70 - 130
			1,1,1-Trichloroethane	2020/09/13		95	%	70 - 130
			1,1,2-Trichloroethane	2020/09/13		100	%	70 - 130
			Trichloroethylene	2020/09/13		97	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2020/09/13		78	%	70 - 130
			Vinyl Chloride	2020/09/13		92	%	70 - 130
			p+m-Xylene	2020/09/13		111	%	70 - 130
			o-Xylene	2020/09/13		106	%	70 - 130
			F1 (C6-C10)	2020/09/13		99	%	60 - 140
6938101	XJI	Method Blank	4-Bromofluorobenzene	2020/09/13		89	%	70 - 130
			D4-1,2-Dichloroethane	2020/09/13		93	%	70 - 130
			D8-Toluene	2020/09/13		102	%	70 - 130
			Acetone (2-Propanone)	2020/09/13	<10		ug/L	
			Benzene	2020/09/13	<0.20		ug/L	
			Bromodichloromethane	2020/09/13	<0.50		ug/L	
			Bromoform	2020/09/13	<1.0		ug/L	
			Bromomethane	2020/09/13	<0.50		ug/L	
			Carbon Tetrachloride	2020/09/13	<0.20		ug/L	
			Chlorobenzene	2020/09/13	<0.20		ug/L	
			Chloroform	2020/09/13	<0.20		ug/L	
			Dibromochloromethane	2020/09/13	<0.50		ug/L	
			1,2-Dichlorobenzene	2020/09/13	<0.50		ug/L	
			1,3-Dichlorobenzene	2020/09/13	<0.50		ug/L	
			1,4-Dichlorobenzene	2020/09/13	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2020/09/13	<1.0		ug/L	
			1,1-Dichloroethane	2020/09/13	<0.20		ug/L	
			1,2-Dichloroethane	2020/09/13	<0.50		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1-Dichloroethylene	2020/09/13	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2020/09/13	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2020/09/13	<0.50		ug/L	
			1,2-Dichloropropane	2020/09/13	<0.20		ug/L	
			cis-1,3-Dichloropropene	2020/09/13	<0.30		ug/L	
			trans-1,3-Dichloropropene	2020/09/13	<0.40		ug/L	
			Ethylbenzene	2020/09/13	<0.20		ug/L	
			Ethylene Dibromide	2020/09/13	<0.20		ug/L	
			Hexane	2020/09/13	<1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2020/09/13	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2020/09/13	<10		ug/L	
			Methyl Isobutyl Ketone	2020/09/13	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2020/09/13	<0.50		ug/L	
			Styrene	2020/09/13	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2020/09/13	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2020/09/13	<0.50		ug/L	
			Tetrachloroethylene	2020/09/13	<0.20		ug/L	
			Toluene	2020/09/13	<0.40 (1)		ug/L	
			1,1,1-Trichloroethane	2020/09/13	<0.20		ug/L	
			1,1,2-Trichloroethane	2020/09/13	<0.50		ug/L	
			Trichloroethylene	2020/09/13	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2020/09/13	<0.50		ug/L	
			Vinyl Chloride	2020/09/13	<0.20		ug/L	
			p+m-Xylene	2020/09/13	<0.20		ug/L	
			o-Xylene	2020/09/13	<0.20		ug/L	
			Total Xylenes	2020/09/13	<0.20		ug/L	
			F1 (C6-C10)	2020/09/13	<25		ug/L	
			F1 (C6-C10) - BTEX	2020/09/13	<25		ug/L	
6938101	XJI	RPD	Acetone (2-Propanone)	2020/09/14	NC		%	30
			Benzene	2020/09/14	NC		%	30
			Bromodichloromethane	2020/09/14	NC		%	30
			Bromoform	2020/09/14	NC		%	30
			Bromomethane	2020/09/14	NC		%	30
			Carbon Tetrachloride	2020/09/14	NC		%	30
			Chlorobenzene	2020/09/14	NC		%	30
			Chloroform	2020/09/14	NC		%	30
			Dibromochloromethane	2020/09/14	NC		%	30
			1,2-Dichlorobenzene	2020/09/14	NC		%	30
			1,3-Dichlorobenzene	2020/09/14	NC		%	30
			1,4-Dichlorobenzene	2020/09/14	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2020/09/14	NC		%	30
			1,1-Dichloroethane	2020/09/14	NC		%	30
			1,2-Dichloroethane	2020/09/14	NC		%	30
			1,1-Dichloroethylene	2020/09/14	NC		%	30
			cis-1,2-Dichloroethylene	2020/09/14	NC		%	30
			trans-1,2-Dichloroethylene	2020/09/14	NC		%	30
			1,2-Dichloropropane	2020/09/14	NC		%	30
			cis-1,3-Dichloropropene	2020/09/14	NC		%	30
			trans-1,3-Dichloropropene	2020/09/14	NC		%	30
			Ethylbenzene	2020/09/14	NC		%	30
			Ethylene Dibromide	2020/09/14	NC		%	30
			Hexane	2020/09/14	NC		%	30
			Methylene Chloride(Dichloromethane)	2020/09/14	NC		%	30

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methyl Ethyl Ketone (2-Butanone)	2020/09/14	NC		%	30
			Methyl Isobutyl Ketone	2020/09/14	NC		%	30
			Methyl t-butyl ether (MTBE)	2020/09/14	NC		%	30
			Styrene	2020/09/14	NC		%	30
			1,1,1,2-Tetrachloroethane	2020/09/14	NC		%	30
			1,1,2,2-Tetrachloroethane	2020/09/14	NC		%	30
			Tetrachloroethylene	2020/09/14	NC		%	30
			Toluene	2020/09/14	NC		%	30
			1,1,1-Trichloroethane	2020/09/14	NC		%	30
			1,1,2-Trichloroethane	2020/09/14	NC		%	30
			Trichloroethylene	2020/09/14	NC		%	30
			Trichlorofluoromethane (FREON 11)	2020/09/14	NC		%	30
			Vinyl Chloride	2020/09/14	NC		%	30
			p+m-Xylene	2020/09/14	NC		%	30
			o-Xylene	2020/09/14	NC		%	30
			Total Xylenes	2020/09/14	NC		%	30
			F1 (C6-C10)	2020/09/14	NC		%	30
			F1 (C6-C10) - BTEX	2020/09/14	NC		%	30
6939491	LLE	Matrix Spike	Chromium (VI)	2020/09/16		102	%	80 - 120
6939491	LLE	Spiked Blank	Chromium (VI)	2020/09/16		101	%	80 - 120
6939491	LLE	Method Blank	Chromium (VI)	2020/09/16	<0.50		ug/L	
6939491	LLE	RPD	Chromium (VI)	2020/09/16	NC		%	20
6940590	ADA	Matrix Spike	Dissolved Antimony (Sb)	2020/09/14		104	%	80 - 120
			Dissolved Arsenic (As)	2020/09/14		98	%	80 - 120
			Dissolved Barium (Ba)	2020/09/14		96	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/14		98	%	80 - 120
			Dissolved Boron (B)	2020/09/14		101	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/14		100	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/14		92	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/14		95	%	80 - 120
			Dissolved Copper (Cu)	2020/09/14		95	%	80 - 120
			Dissolved Lead (Pb)	2020/09/14		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/14		97	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/14		93	%	80 - 120
			Dissolved Selenium (Se)	2020/09/14		96	%	80 - 120
			Dissolved Silver (Ag)	2020/09/14		77 (2)	%	80 - 120
			Dissolved Sodium (Na)	2020/09/14		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/14		96	%	80 - 120
			Dissolved Uranium (U)	2020/09/14		98	%	80 - 120
			Dissolved Vanadium (V)	2020/09/14		93	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/14		96	%	80 - 120
6940590	ADA	Spiked Blank	Dissolved Antimony (Sb)	2020/09/14		104	%	80 - 120
			Dissolved Arsenic (As)	2020/09/14		99	%	80 - 120
			Dissolved Barium (Ba)	2020/09/14		99	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/14		100	%	80 - 120
			Dissolved Boron (B)	2020/09/14		107	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/14		101	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/14		95	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/14		100	%	80 - 120
			Dissolved Copper (Cu)	2020/09/14		97	%	80 - 120
			Dissolved Lead (Pb)	2020/09/14		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/14		97	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/14		97	%	80 - 120

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/09/14		96	%	80 - 120
			Dissolved Silver (Ag)	2020/09/14		97	%	80 - 120
			Dissolved Sodium (Na)	2020/09/14		92	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/14		99	%	80 - 120
			Dissolved Uranium (U)	2020/09/14		97	%	80 - 120
			Dissolved Vanadium (V)	2020/09/14		95	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/14		98	%	80 - 120
6940590	ADA	Method Blank	Dissolved Antimony (Sb)	2020/09/14	<0.50		ug/L	
			Dissolved Arsenic (As)	2020/09/14	<1.0		ug/L	
			Dissolved Barium (Ba)	2020/09/14	<2.0		ug/L	
			Dissolved Beryllium (Be)	2020/09/14	<0.40		ug/L	
			Dissolved Boron (B)	2020/09/14	<10		ug/L	
			Dissolved Cadmium (Cd)	2020/09/14	<0.090		ug/L	
			Dissolved Chromium (Cr)	2020/09/14	<5.0		ug/L	
			Dissolved Cobalt (Co)	2020/09/14	<0.50		ug/L	
			Dissolved Copper (Cu)	2020/09/14	<0.90		ug/L	
			Dissolved Lead (Pb)	2020/09/14	<0.50		ug/L	
			Dissolved Molybdenum (Mo)	2020/09/14	<0.50		ug/L	
			Dissolved Nickel (Ni)	2020/09/14	<1.0		ug/L	
			Dissolved Selenium (Se)	2020/09/14	<2.0		ug/L	
			Dissolved Silver (Ag)	2020/09/14	<0.090		ug/L	
			Dissolved Sodium (Na)	2020/09/14	<100		ug/L	
			Dissolved Thallium (Tl)	2020/09/14	<0.050		ug/L	
			Dissolved Uranium (U)	2020/09/14	<0.10		ug/L	
			Dissolved Vanadium (V)	2020/09/14	<0.50		ug/L	
			Dissolved Zinc (Zn)	2020/09/14	<5.0		ug/L	
6940590	ADA	RPD	Dissolved Antimony (Sb)	2020/09/14	NC		%	20
			Dissolved Arsenic (As)	2020/09/14	7.7		%	20
			Dissolved Barium (Ba)	2020/09/14	1.3		%	20
			Dissolved Beryllium (Be)	2020/09/14	NC		%	20
			Dissolved Boron (B)	2020/09/14	0.58		%	20
			Dissolved Cadmium (Cd)	2020/09/14	NC		%	20
			Dissolved Chromium (Cr)	2020/09/14	NC		%	20
			Dissolved Cobalt (Co)	2020/09/14	NC		%	20
			Dissolved Copper (Cu)	2020/09/14	NC		%	20
			Dissolved Lead (Pb)	2020/09/14	NC		%	20
			Dissolved Molybdenum (Mo)	2020/09/14	3.4		%	20
			Dissolved Nickel (Ni)	2020/09/14	NC		%	20
			Dissolved Selenium (Se)	2020/09/14	NC		%	20
			Dissolved Silver (Ag)	2020/09/14	NC		%	20
			Dissolved Sodium (Na)	2020/09/14	0.36		%	20
			Dissolved Thallium (Tl)	2020/09/14	NC		%	20
			Dissolved Uranium (U)	2020/09/14	0		%	20
			Dissolved Vanadium (V)	2020/09/14	1.5		%	20
			Dissolved Zinc (Zn)	2020/09/14	NC		%	20
6945027	RAJ	Matrix Spike	D10-Anthracene	2020/09/16		105	%	50 - 130
			D14-Terphenyl (FS)	2020/09/16		91	%	50 - 130
			D8-Acenaphthylene	2020/09/16		97	%	50 - 130
			Acenaphthene	2020/09/16		103	%	50 - 130
			Acenaphthylene	2020/09/16		98	%	50 - 130
			Anthracene	2020/09/16		95	%	50 - 130
			Benzo(a)anthracene	2020/09/16		69	%	50 - 130
			Benzo(a)pyrene	2020/09/16		56	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(b/j)fluoranthene	2020/09/16		66	%	50 - 130
			Benzo(g,h,i)perylene	2020/09/16		65	%	50 - 130
			Benzo(k)fluoranthene	2020/09/16		65	%	50 - 130
			Chrysene	2020/09/16		68	%	50 - 130
			Dibenzo(a,h)anthracene	2020/09/16		65	%	50 - 130
			Fluoranthene	2020/09/16		96	%	50 - 130
			Fluorene	2020/09/16		100	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/09/16		67	%	50 - 130
			1-Methylnaphthalene	2020/09/16		108	%	50 - 130
			2-Methylnaphthalene	2020/09/16		107	%	50 - 130
			Naphthalene	2020/09/16		99	%	50 - 130
			Phenanthrene	2020/09/16		102	%	50 - 130
			Pyrene	2020/09/16		92	%	50 - 130
6945027	RAJ	Spiked Blank	D10-Anthracene	2020/09/16		115	%	50 - 130
			D14-Terphenyl (FS)	2020/09/16		110	%	50 - 130
			D8-Acenaphthylene	2020/09/16		104	%	50 - 130
			Acenaphthene	2020/09/16		103	%	50 - 130
			Acenaphthylene	2020/09/16		98	%	50 - 130
			Anthracene	2020/09/16		110	%	50 - 130
			Benzo(a)anthracene	2020/09/16		106	%	50 - 130
			Benzo(a)pyrene	2020/09/16		95	%	50 - 130
			Benzo(b/j)fluoranthene	2020/09/16		109	%	50 - 130
			Benzo(g,h,i)perylene	2020/09/16		114	%	50 - 130
			Benzo(k)fluoranthene	2020/09/16		110	%	50 - 130
			Chrysene	2020/09/16		111	%	50 - 130
			Dibenzo(a,h)anthracene	2020/09/16		113	%	50 - 130
			Fluoranthene	2020/09/16		114	%	50 - 130
			Fluorene	2020/09/16		104	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/09/16		118	%	50 - 130
			1-Methylnaphthalene	2020/09/16		106	%	50 - 130
			2-Methylnaphthalene	2020/09/16		106	%	50 - 130
			Naphthalene	2020/09/16		95	%	50 - 130
			Phenanthrene	2020/09/16		109	%	50 - 130
			Pyrene	2020/09/16		113	%	50 - 130
6945027	RAJ	Method Blank	D10-Anthracene	2020/09/16		116	%	50 - 130
			D14-Terphenyl (FS)	2020/09/16		106	%	50 - 130
			D8-Acenaphthylene	2020/09/16		93	%	50 - 130
			Acenaphthene	2020/09/16	<0.050		ug/L	
			Acenaphthylene	2020/09/16	<0.050		ug/L	
			Anthracene	2020/09/16	<0.050		ug/L	
			Benzo(a)anthracene	2020/09/16	<0.050		ug/L	
			Benzo(a)pyrene	2020/09/16	<0.0090		ug/L	
			Benzo(b/j)fluoranthene	2020/09/16	<0.050		ug/L	
			Benzo(g,h,i)perylene	2020/09/16	<0.050		ug/L	
			Benzo(k)fluoranthene	2020/09/16	<0.050		ug/L	
			Chrysene	2020/09/16	<0.050		ug/L	
			Dibenzo(a,h)anthracene	2020/09/16	<0.050		ug/L	
			Fluoranthene	2020/09/16	<0.050		ug/L	
			Fluorene	2020/09/16	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2020/09/16	<0.050		ug/L	
			1-Methylnaphthalene	2020/09/16	<0.050		ug/L	
			2-Methylnaphthalene	2020/09/16	<0.050		ug/L	
			Naphthalene	2020/09/16	<0.050		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2020/09/16	<0.030		ug/L	
			Pyrene	2020/09/16	<0.050		ug/L	
6945027	RAJ	RPD	Acenaphthene	2020/09/16	2.1		%	30
			Acenaphthylene	2020/09/16	NC		%	30
			Anthracene	2020/09/16	3.9		%	30
			Benzo(a)anthracene	2020/09/16	NC		%	30
			Benzo(a)pyrene	2020/09/16	NC		%	30
			Benzo(b/j)fluoranthene	2020/09/16	NC		%	30
			Benzo(g,h,i)perylene	2020/09/16	NC		%	30
			Benzo(k)fluoranthene	2020/09/16	NC		%	30
			Chrysene	2020/09/16	NC		%	30
			Dibenzo(a,h)anthracene	2020/09/16	NC		%	30
			Fluoranthene	2020/09/16	2.0		%	30
			Fluorene	2020/09/16	4.9		%	30
			Indeno(1,2,3-cd)pyrene	2020/09/16	NC		%	30
			1-Methylnaphthalene	2020/09/16	4.9		%	30
			2-Methylnaphthalene	2020/09/16	2.7		%	30
			Naphthalene	2020/09/16	1.2		%	30
			Phenanthrene	2020/09/16	0.21		%	30
			Pyrene	2020/09/16	NC		%	30
6945037	MKS	Matrix Spike	o-Terphenyl	2020/09/16		105	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/09/16		94	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2020/09/16		102	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2020/09/16		97	%	50 - 130
6945037	MKS	Spiked Blank	o-Terphenyl	2020/09/16		105	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/09/16		104	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2020/09/16		114	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2020/09/16		110	%	60 - 130
6945037	MKS	Method Blank	o-Terphenyl	2020/09/16		103	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2020/09/16	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2020/09/16	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2020/09/16	<200		ug/L	
6945037	MKS	RPD	F2 (C10-C16 Hydrocarbons)	2020/09/16	1.4		%	30
			F3 (C16-C34 Hydrocarbons)	2020/09/16	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2020/09/16	NC		%	30
6946362	MEN	Matrix Spike	Mercury (Hg)	2020/09/16		91	%	75 - 125
6946362	MEN	Spiked Blank	Mercury (Hg)	2020/09/16		94	%	80 - 120
6946362	MEN	Method Blank	Mercury (Hg)	2020/09/16	<0.10		ug/L	
6946362	MEN	RPD	Mercury (Hg)	2020/09/16	NC		%	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).

(1) The detection limit was raised due to laboratory background interference.

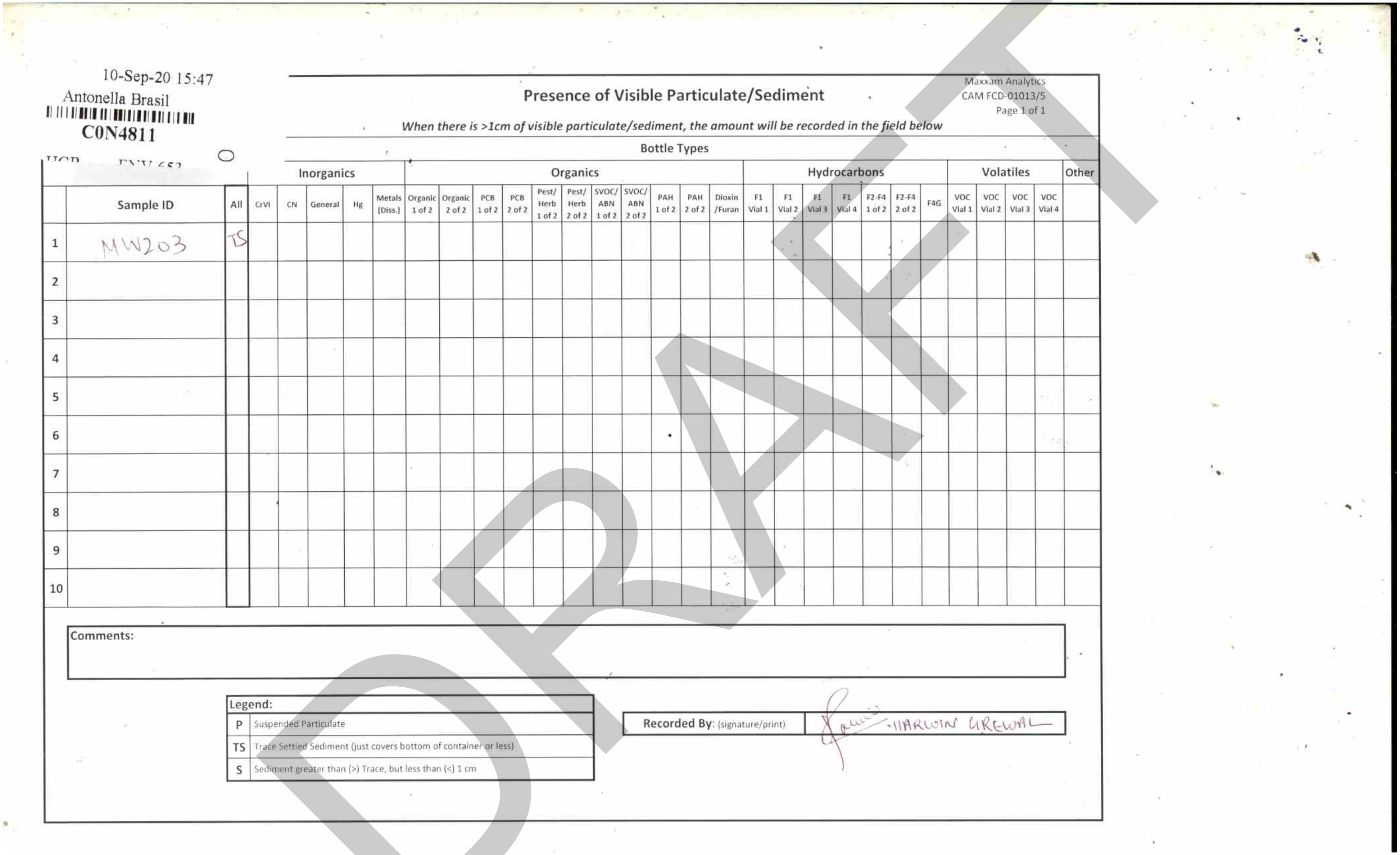
(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

VALIDATION SIGNATURE PAGE

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

Brad Newman, Scientific Service Specialist

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



10-Sep-20 15:47
Antonella Brasil
C0N4811

Presence of Visible Particulate/Sediment

Maxxam Analytics
CAM FCD-01013/5
Page 1 of 1

When there is >1cm of visible particulate/sediment, the amount will be recorded in the field below

Bottle Types

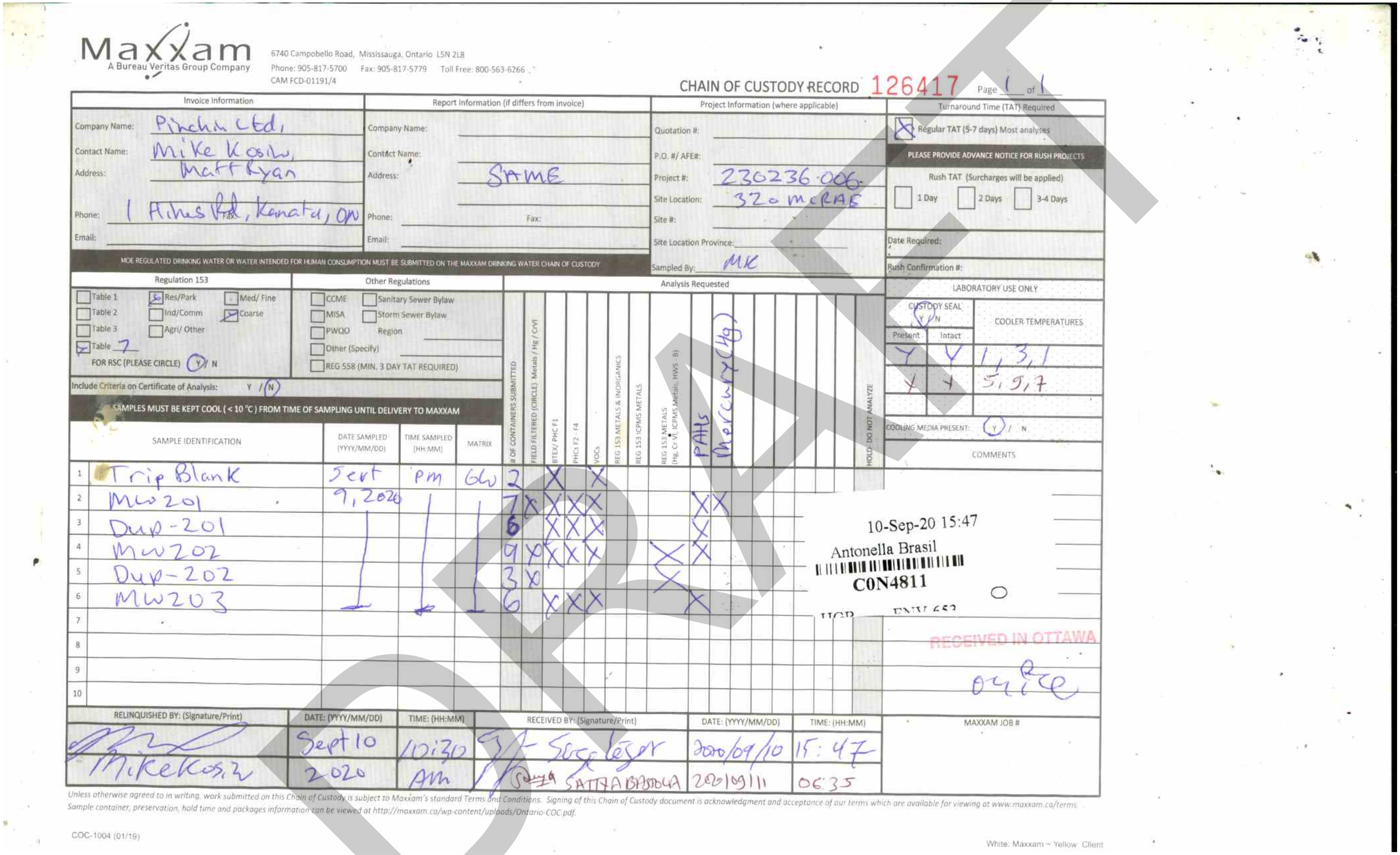
			Inorganics					Organics											Hydrocarbons							Volatiles				Other
	Sample ID	All	CrVI	CN	General	Hg	Metals (Diss.)	Organic 1 of 2	Organic 2 of 2	PCB 1 of 2	PCB 2 of 2	Pest/ Herb 1 of 2	Pest/ Herb 2 of 2	SVOC/ ABN 1 of 2	SVOC/ ABN 2 of 2	PAH 1 of 2	PAH 2 of 2	Dioxin /Furan	F1 Vial 1	F1 Vial 2	F1 Vial 3	F1 Vial 4	F2-F4 1 of 2	F2-F4 2 of 2	F4G	VOC Vial 1	VOC Vial 2	VOC Vial 3	VOC Vial 4	
1	MW203	TS																												
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Comments:

Legend:

P	Suspended Particulate
TS	Trace Settled Sediment (just covers bottom of container or less)
S	Sediment greater than (>) Trace, but less than (<) 1 cm

Recorded By: (signature/print) HARWIN GREWAL



Maxxam
A Bureau Veritas Group Company

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/4

CHAIN OF CUSTODY RECORD 126417

Page 1 of 1

Invoice Information

Company Name: Pinchin Ltd,
Contact Name: Mike Kosiw, Matt Ryan
Address: 1 Hines Rd, Kanata, ON
Phone: Fax:
Email:

Report Information (if differs from invoice)

Company Name:
Contact Name:
Address: SAME
Phone: Fax:
Email:

Project Information (where applicable)

Quotation #:
P.O. #/ AFE#:
Project #: 230236.006
Site Location: 320 McRAE
Site #:
Site Location Province:
Sampled By: MK

Turnaround Time (TAT) Required

☒ Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)
☐ 1 Day ☐ 2 Days ☐ 3-4 Days

Date Required:
Rush Confirmation #:

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

Regulation 153

☐ Table 1 ☒ Res/Park ☐ Med/ Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/ Other
☒ Table 7
FOR RSC (PLEASE CIRCLE) [✓ Y] / N

Other Regulations

☐ CCME ☐ Sanitary Sewer Bylaw
☐ MISA ☐ Storm Sewer Bylaw
☐ PWQO Region
☐ Other (Specify)
☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / [✓ N]

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	Mercury (Hg)	HOLD- DO NOT ANALYZE
1	Trip Blank	Sept	pm	GW	2		X		X						
2	MW201	9, 2020			7	X	X	X	X				X	X	
3	Dup-201				6		X	X	X				X		
4	MW202				9	X	X	X	X			X	X		
5	Dup-202				3	X						X			
6	MW203				6		X	X	X				X		
7															
8															
9															
10															

LABORATORY USE ONLY

CUSTODY SEAL [✓ Y] / N Present	Intact	COOLER TEMPERATURES
Y	Y	1, 3, 1
Y	Y	5, 9, 7

COOLING MEDIA PRESENT: [✓ Y] / N

COMMENTS

10-Sep-20 15:47
Antonella Brasil
C0N4811

RECEIVED IN OTTAWA

on ice

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mike Kosiw	Sept 10 2020	10:30 AM	Serge Léger	2020/09/10	15:47	
			SATYA BASTOLA	2020/09/11	06:35	

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. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

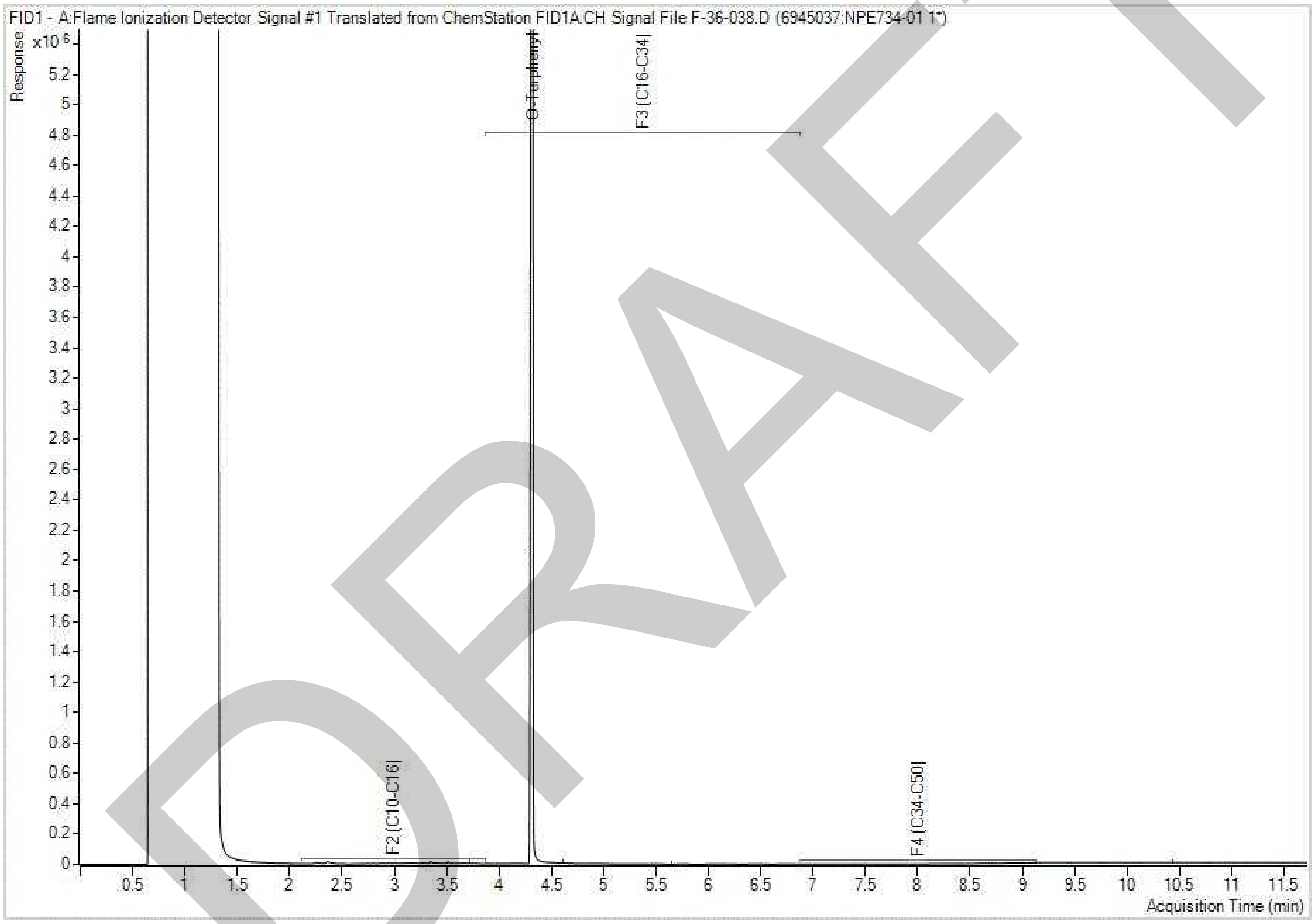
COC-1004 (01/19)

White: Maxxam - Yellow: Client

BV Labs Job #: C0N4811
Report Date: 2020/09/17
BV Labs Sample: NPE734

Pinchin Ltd
Client Project #: 230236.006
Project name: 320 MCRAE
Client ID: MW201

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

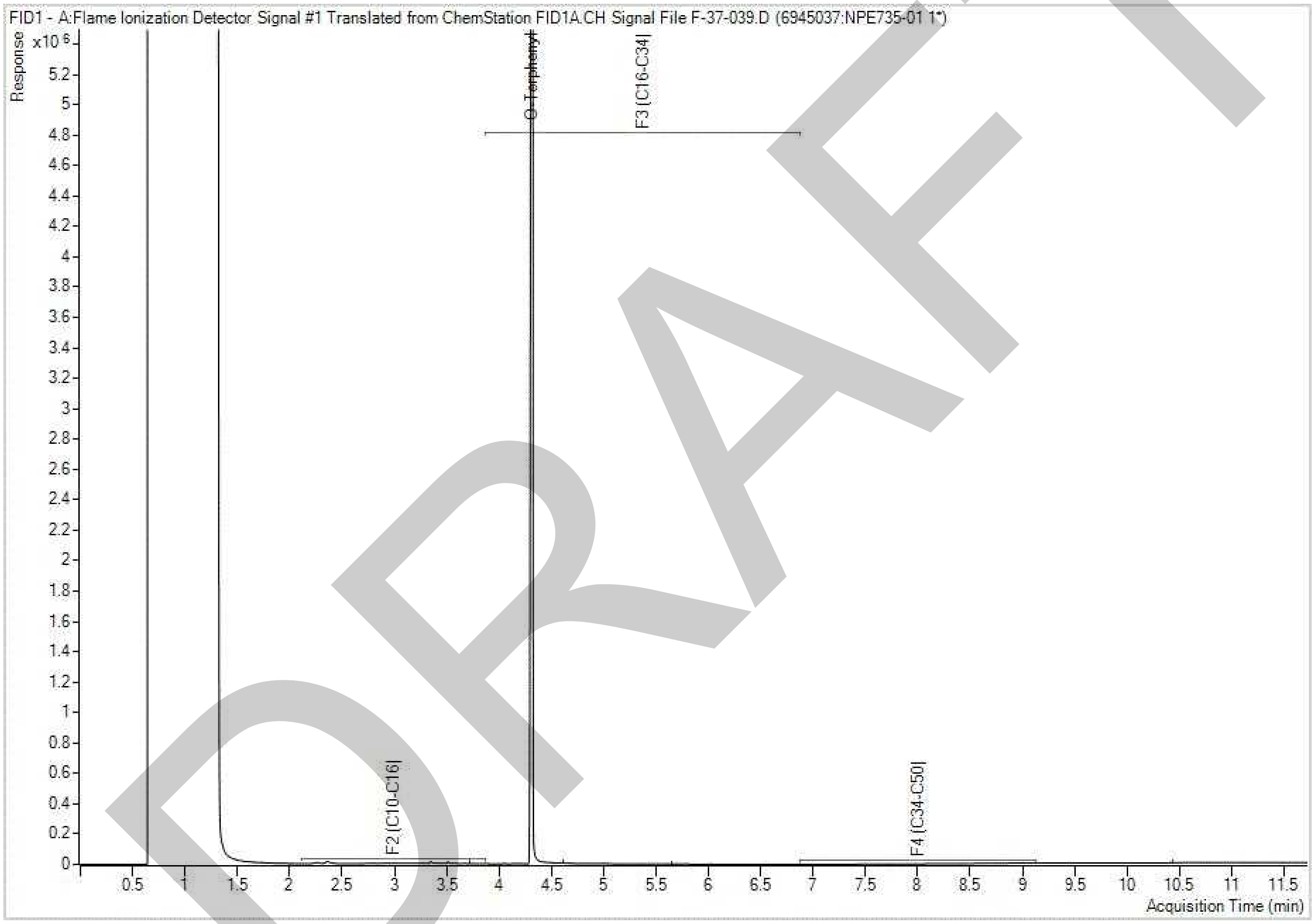


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0N4811
Report Date: 2020/09/17
BV Labs Sample: NPE735

Pinchin Ltd
Client Project #: 230236.006
Project name: 320 MCRAE
Client ID: DUP-201

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

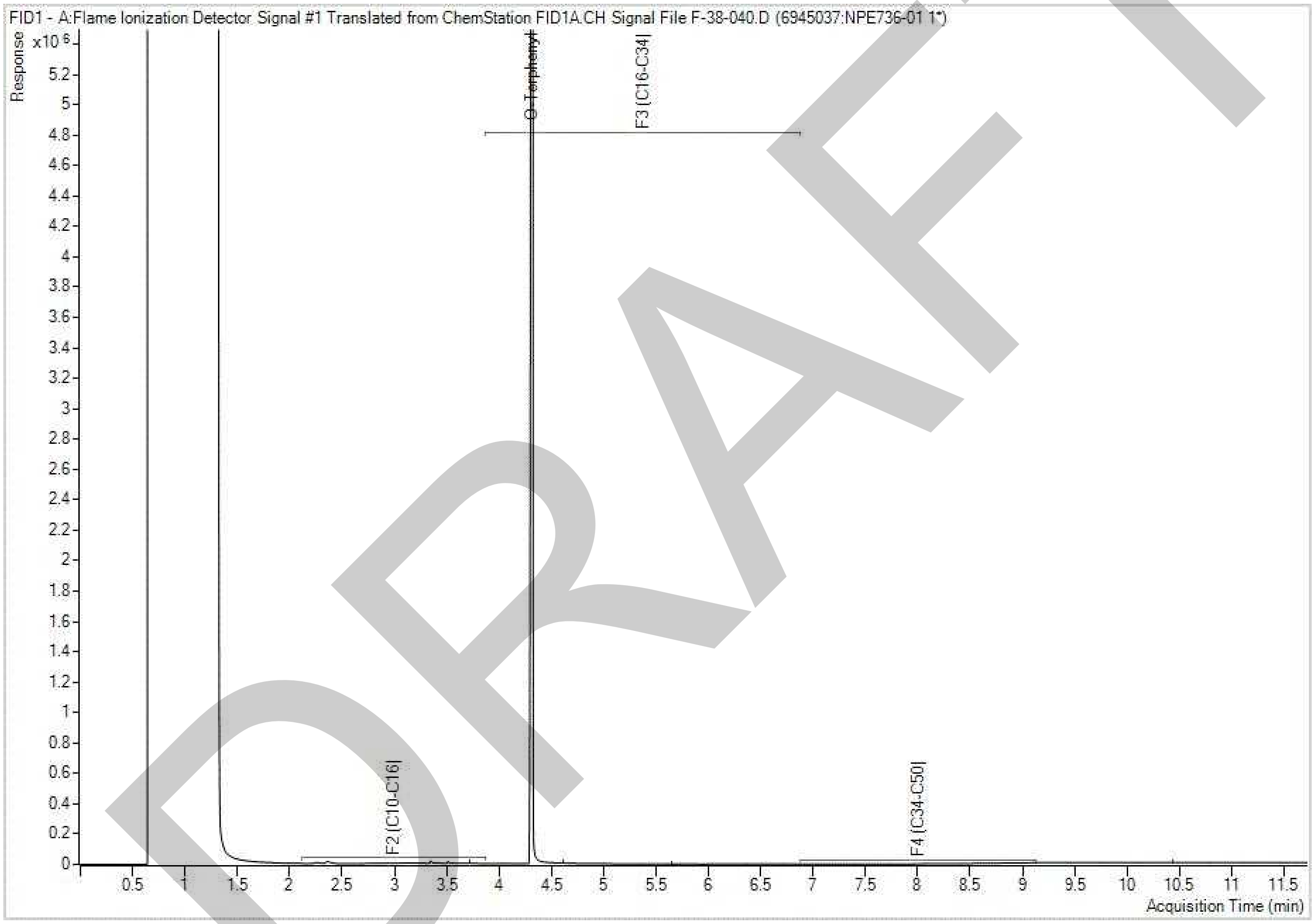


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0N4811
Report Date: 2020/09/17
BV Labs Sample: NPE736

Pinchin Ltd
Client Project #: 230236.006
Project name: 320 MCRAE
Client ID: MW202

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

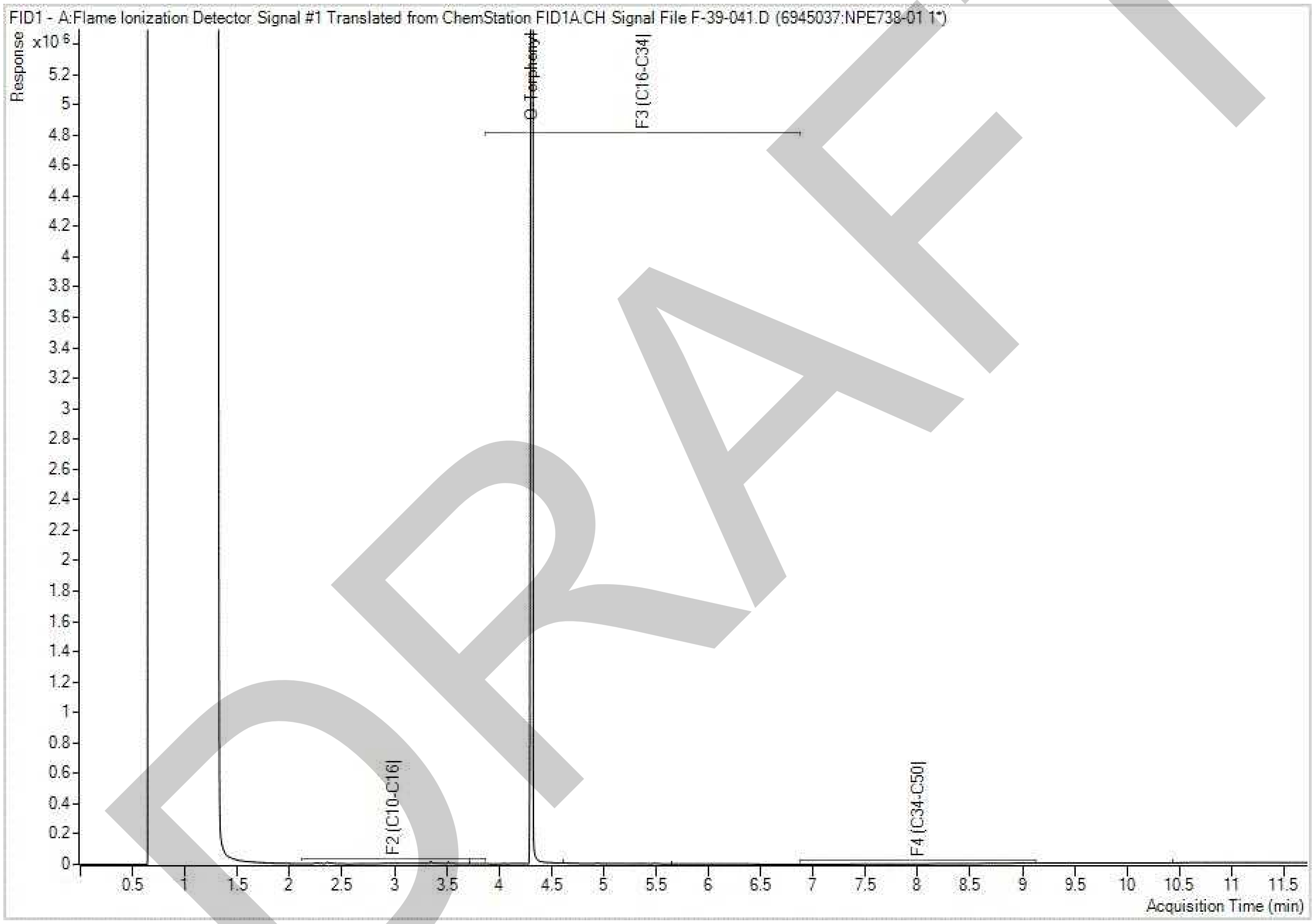


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

BV Labs Job #: C0N4811
Report Date: 2020/09/17
BV Labs Sample: NPE738

Pinchin Ltd
Client Project #: 230236.006
Project name: 320 MCRAE
Client ID: MW203

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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