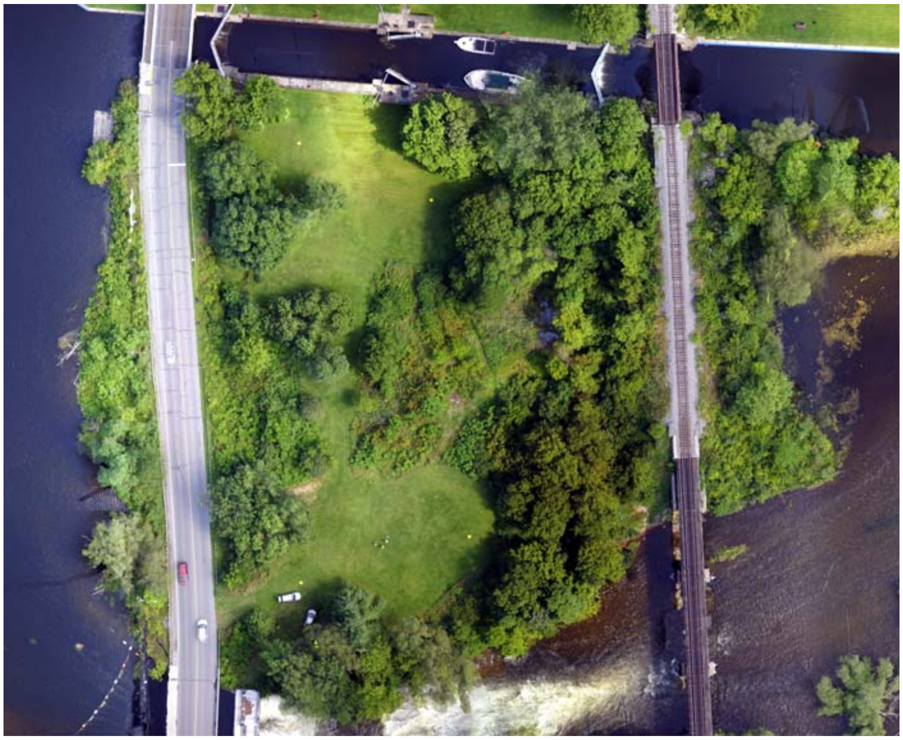
Risk Assessment and Environmental Monitoring
Old Slys Lockstation, Smiths Falls, Ontario
PIN: 052740116 and 052740097
FSCI # 09412002

Prepared For:
Parks Canada Agency
Attn: Viviane Paquin
30 Victoria Street
Gatineau, Quebec J8X 0B3



Source: AEL Site visit, 2017

Prepared by:
AEL environment (a division of Aeon Egmond Ltd.)
1705 Argentia Road, Unit 3,
Mississauga, ON, L5N 3A9
Telephone and Facsimile: (416) 657-2367

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I. Executive Summary

i. Location

Located at 9 Old Slys Road, Smiths Falls, Ontario, the Site is situated on the southeast side of Old Slys Road, south of Old Slys Lockstation. The Site consisted of two (2) adjacent properties, the north property and south property, referred to as 9 Old Slys Road (collectively referred to as "the Site"). For this project, project north was oriented towards Old Slys Lockstation. See Figure 1 for the area defined as the Site.

ii. Objective and Approach

AEL Environment (AEL) was retained by Parks Canada to conduct an Environmental Site Assessment (ESA) as a follow-up to work completed by other consultants and undertake a Detailed Quantitative Human Health and Ecological Risk Assessment (DQ HHERA) for the Site. The work completed as part of this project will address elements of step 8 of the Federal Contaminated Sites Action Plan (FCSAP) 10 step process and will include a human health DQHHERA to improve quantification of site specific risks associated with contaminants of concern (COCs) identified at the Site in soil, groundwater, sediment, and surface water, including the risks associated with select planned Site construction activities. The Site Closure Tool (SCT) will be completed to determine if remediation or risk management actions are required for site closure.

The Site historically operated as a landfill in the mid-1960's, and potential environmental concerns at the Site were identified by previous consultants due to the presence of buried landfill materials. ESAs conducted by previous consultants have concluded that COCs include metals and polycyclic aromatic hydrocarbons (PAHs) in soil, metals and polychlorinated biphenyls (PCBs) in groundwater, and metals in sediment and surface water.

AEL completed an ESA in 2017, which included collection of soil, groundwater, sediment and surface water samples, and analyses for petroleum hydrocarbons (PHCs)/benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), metals and inorganics, PAHs and PCBs.

From August 28th to September 1st, 2017, eight (8) boreholes were advanced at the Site, in which five (5) monitoring wells were installed. Based on field observations, AEL selected soil samples from all eight (8) boreholes and groundwater samples from the five (5) newly installed monitoring wells, along with groundwater samples from four (4) existing monitoring wells, for analysis by a laboratory certified by the Canadian Association of Laboratory Accreditation (CALA). Soil samples were collected at different depths, from ground surface to about 4.57 meters (m) below the ground surface (bgs) and all monitoring wells were purged prior to sampling. During this time, AEL also collected seven (7) surface water samples and six (6) sediment samples, from locations on-Site, as well as up- and down-stream of the Site. A groundwater seepage sample was collected from both the upper and lower lock walls. Samples were submitted for analyses of PHCs, VOCs, metals and inorganics, PAHs and PCBs. The results of the laboratory analyses were compared with the applicable federal, or provincial guidelines.

The following parameters were identified as COCs:

- Surface soil: PHCs, metals, VOCs and PAHs.
- Subsurface soil: PHCs, metals and VOCs.
- Groundwater: PHCs, metals and inorganics, VOCs and PAHs.
- Sediment: Metals and PAHs.
- Surface Water: Inorganics.

Based on the results of sediment monitoring, Parks Canada requested that a benthic invertebrate study be conducted, to assess the health of benthic invertebrate communities on-site, in comparison to up- and down-stream communities. This investigation was undertaken in November 2017.

iii. Results and Recommendations

Analytical Results: Analytical results were compared against the applicable federal guidelines. Where no federal guidelines existed, or where federal guidelines were not considered sufficiently protective within 10 m of surface water, provincial standards were used for comparison.

Soil: Laboratory results showed that two (2) locations exhibited surface soil exceedances for one or more of Ethylbenzene, PHCs F3 and F4 Gravimetric; one (1) location exhibited surface soil exceedances for Copper; and two locations exhibited surface soil exceedances for one or more of Methylnaphthalene, 2-(1-), Naphthalene and Phenanthrene by generally 1 to 6 times guideline levels (less than 1 order of magnitude), with the exception of Naphthalene which exhibited an exceedance by approximately 285 times guideline level (greater than 2 orders of magnitude).

Laboratory results showed that five (5) locations exhibited subsurface soil exceedances for one or more of Ethylbenzene, Toluene and Total Xylenes, and PHCs F2, F3, F4 and F4 Gravimetric; and three (3) locations exhibited subsurface soil exceedances for one or more of Antimony, Arsenic, Cadmium, Copper, Lead, Nickel, Tin and Zinc by generally 1 to 6 times guideline levels (less than 1 order of magnitude.)

Previous investigations, completed in 1994, identified two (2) locations which exhibited subsurface soil exceedances for Lead and Zinc; one (1) location which exhibited subsurface soil exceedances for Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene and Phenanthrene; and two (2) locations which exhibited subsurface soil exceedances for total DDD and Methoxychlor.

Exceedances in surface and subsurface soil were found across the Site and are likely related to the placement of impacted fill.

Groundwater: Laboratory results showed that four (4) locations exhibited groundwater exceedances for one or more of PHCs F3, F4 and F4 Gravimetric; eight (8) on-site locations and one (1) off-site trans-gradient location exhibited groundwater exceedances for one or more of Arsenic, Barium, Cadmium, Iron, Chloride and Cyanide; and three (3) locations exhibited groundwater exceedances for one or more of Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Fluoranthene, Naphthalene, Phenanthrene and Pyrene by generally 1 to 60 times guideline levels (1 to 2 orders of magnitude.) with the exception of Iron and Cyanide exceedances approximately 115 to 2300 times the FCSAP guideline (2 to 3 orders of magnitude).

Previous investigations, conducted from 1994 to 2011, also identified exceedances of Cobalt and Zinc at two (2) of these on-site locations, total PCBs at one of these on-Site locations and exceedances of one or more of Arsenic, Cadmium, Iron, Mercury and Zinc at three (3) additional on-Site locations.

In general, the variable distribution of impacts suggest impacts are associated with the nature of fill materials used for infilling, and this source is reflected in the horizontal distribution of groundwater impacts which are largely limited to those areas of the Site where infilling occurred.

Sediment: Laboratory results showed that three (3) on-site locations, one (1) off-site up-stream location and one (1) off-site down-stream location, exhibited exceedances for one or more of Arsenic, Cobalt, Lead, Mercury, Nickel and Cyanide; and three (3) locations on-Site and one (1) off-Site up-stream location exhibited exceedances for one or more of Acenaphthene, Acenaphthylene, Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Phenanthrene and Pyrene by generally 1 to 13 times guideline levels (1 to 2 orders of magnitude).

Previous investigations, conducted from 1994 to 2011, also identified exceedances of Cadmium, Chromium and Zinc at one (1) of the on-site and the off-site up-stream location, and exceedances of one or more of Lead, Mercury and Zinc at additional locations, one (1) located on-site and one (1) located off-site up-stream.

Surface Water: Laboratory results showed that one (1) on-Site location, one off-Site up-stream location and one (1) off-Site down-stream location exhibited exceedances for one or more of Cyanide and Total Un-ionized ammonia. by generally 1 to 2 times guideline levels (less than 1 order of magnitude).

Previous investigations, conducted from 1994 to 2011, also identified exceedances of Iron and Mercury at one (1) additional on-Site location. In general, the variable distribution of metals and inorganics impacts suggest impacts are associated with the Site, and specifically from surface runoff of contaminated surface soil, groundwater seepage of contaminated groundwater and/or leaching from buried infill materials.

Risk Assessment Results: The human receptors potentially exposed to the COCs at the Site are members of the public of all ages using the park or the Lockstation; long-term and short-term workers operating the Lockstation or completing routine maintenance of the Site; and construction/remediation workers completing proposed construction activities. The exposure pathways for the human receptors are incidental ingestion of soil, dermal contact with soil, inhalation of particulate matter, incidental ingestion of groundwater, and dermal contact with groundwater.

Typical terrestrial ecological receptors include soil invertebrates, vegetation, birds, and small mammals; for example, earthworms, trees, grasses and shrubs; American Robin, Song Sparrow Meadow Vole, and Red Fox. Aquatic ecological receptors include invertebrates, plants, and fish. The primary exposure pathways for terrestrial ecological receptors are contact with soil, root uptake, and ingestion of soil and food. Aquatic receptors may be exposed to the COCs via direct contact with surface water and ingestion of water and food.

Recommendation: The results of the HHRA indicate that risk management measures are not required for the protection of site visitors or Long-term workers due to exposure to the identified COCs in soil, groundwater, surface water, or sediment. For Construction workers, typical Health and Safety measures (i.e., the wearing of pants, long sleeves, and gloves) are recommended to limit dermal contact with groundwater containing PHCs; no risk management measures are required for the other COCs/exposure pathways.

The results of the ERA suggest the possibility of some adverse effects on plants and soil invertebrates in the vicinity of MW10/17, due to the presence of naphthalene in surface soil. The results of the ERA do not indicate that risk management measures are required for the protection of terrestrial VECs due to exposure to the remaining identified COCs in soil. It is recommended that the surface soils in the vicinity of MW10/17 be excavated as part of the construction activities on-site, and closure samples from the sidewalls and floor of the excavation taken to confirm the concentration of naphthalene in surface soil meets the CCME Soil Quality Guidelines applicable to the Site.

The results of the benthic invertebrate survey indicated that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the area of the Old Sly Locks, and as such risk management measures are not required for the protection of aquatic VECs due to exposure to identified COCs in surface water and sediment. There is some indication that the area of SED7 is experiencing anthropogenic impacts which are likely unrelated to the presence of the historic landfill (see Section 4.0 of Appendix 4). While the benthic community at station SED7 had Hilsenhoff values that indicated poor water quality this could be due to other anthropogenic influences that may influence the area (municipal waste and/or runoff, upstream agriculture, residential fertilizer application). The change in community function is due to filter feeders which is an indication of increased nutrient load (see Figure 3-3 in appendix 4). In particular, the trichopteran family Hydroposychidae is only present at SED7 (see Appendix Table A-6 in appendix 4) and is used as an indicator of nutrient loading (Merritt et al., 2008).

Personal Protective Equipment (PPE), above the ministry of labour mandated construction site PPE, should be worn to be protective of workers in surface water or working with groundwater given conservative working average times as provided by Parks Canada as follows on site:

- Construction workers who come into contact with subsurface groundwater should wear gloves, long pants, and sleeves to minimize dermal contact with groundwater in areas containing PHCs,
- Construction workers acting as divers contacting sediment during repairs should wear a wet suit while submerged in the lock water body to minimize dermal contact with sediment.

iv. Limitations

The report was completed for the sole use of the client and AEL only in accordance with the terms of reference and the limitations, during the 2017/2018 site evaluation stage. Others with an interest in the Site must decide on the Site conditions and conduct their own investigation to determine how or if the Site affects them.

v. Conflict of Interest

Neither AEL nor its officers know of any conflicts of interest AEL has respecting the Site or the owner of the Site.

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II. Tables

1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367 Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367 Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

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1. Introduction

1.1 Site Description

1.1.1 Site Location

Located at 9 Old Slys Road, Smiths Falls, Ontario, the Site is situated on the southeast side of Old Slys Road, south of Old Slys Lockstation. The Site consisted of the island bounded by Old Slys Lockstation to the north, Old Slys Road to the west, CP rail tracks to the east and the Old Slys Weir to the south. For this project, project north was oriented towards Old Slys Lockstation. See Figure 1 for the area defined as the Site.

The Site has a total area of about 11,700 m^2 (1.17 Ha), according to measurements obtained from aerial survey completed as part of the environmental site assessment (ESA) work. The Site is located in an area of parkland use, as determined from the Site walkover and from records reviewed.

1.1.2 Legal Description

The Site consisted of two (2) adjacent properties, the north property and south property, referred to as 9 Old Slys Road (collectively referred to as "the Site" or "Old Sly Island"). For this investigation, only a portion of the north property was investigated, at the direction of Parks Canada, and included only those lands that formed the northern portion of the above described island. The remainder of the property to the north, south and west were not part of the "Site" investigated at this time. A surveyor or lawyer shall be retained to obtain the exact title and encumbrances if needed.

1.1.2.1 Northern Parcel

Based on a titles review the Site legal description for the northern property is: Bed of Rideau River Montague lying south of the rdal between Con 3 and Con 4 Montague and east of the rdal between Twp of South Elmsley and Twp of Montague; Pt Lt 30 Con 3 Montague Pt 11 27R2419, Pt 2 & 3 27R9018, Pt 4 & 5 27R9486 except Part 7 on 27R7052 Town of Smiths Falls. The property identification number (PIN) is 05274-0116.

1.1.2.2 Southern Parcel

Based on a titles review the Site legal description for the southern property is: Lt 4 Government Res Pl 13884 Lanark S Wolford; Smiths Falls. The property identification number (PIN) is 05274-0097.

1.1.3 Geographic Centre

The Site is centered on approximately 18T 420,684 m east, 4,971,500 m north based on data derived from Google Earth. The Site is at a surface elevation of about 110 meters above sea level (m asl) according to contour map estimates from Land Information Ontario (LIO).

1.2 Property Ownership

1.2.1 Owner

The owner of record for both land parcels was:

Her Majesty The Queen In Right of Canada

1.2.2 Client

The client of record was:

Parks Canada Agency
Attn: Viviane Paquin
30 Victoria Street
Gatineau, Quebec J8X 0B3

1.3 Current and Proposed Future Uses

At the time of the field work the Site was parkland, consisting of a mix of natural and maintained parkland. Access to the park can be gained from the north, via Old Slys Lockstation, and gated vehicle access can be gained from the southwest.

At the time of this report, the future use of the property was to remain parkland, and was completed as part of a follow-up to work completed by other consultants, in preparation for select construction activities to be undertaken on the lock in 2018.

1.4 Applicable Criteria

AEL used the information as follows in determining the applicable criteria for use at the Site.

1.4.1 Land Use

The current classification of the Site is parkland. The surrounding area was a mix of parkland and residential land use.

1.4.2 Non-Potable Groundwater Criteria and Well Head Protection

Well records searched on the Ministry of Environment and Climate Change (MOECC) online database found one well record for wells located on the Site. This record was reviewed, and indicated use was water supply for domestic livestock, installed in 1958. This well is no longer in use, and the exact location is unknown. There were no well records for wells located on surrounding lands within 250 m of the Site.

AEL noted the presence of five (5) monitoring wells on-Site, and previous reports reviewed indicated the presence of an additional two (2) monitoring wells on-Site, which could not be located by AEL.

Groundwater flow in the area is expected to be to the east, towards the Rideau River.

The Town of Smiths Falls was contacted in relation to non-potable groundwater criteria at the Site. Based on the absence of potable water wells on or around the Site and the absence of source water protection or wellhead protection zones on or around the Site, AEL consider the Site to be in an area of non-potable water use.

1.4.3 Criteria Used to Evaluate the Results

As stated in the scope of work, results were compared to appropriate federal standards. Where federal standards did not exist for a particular parameter, provincial standards were applied.

In addition, it was determined that the Canadian Council of Ministers of the Environment (CCME) guidelines for soil and groundwater may not be sufficiently protective for sampling locations which fall within 10 m of a surface water body. As the Site is adjacent to the Rideau River, AEL used more conservative provincial standards for those sampling locations which fall within 10 m of a surface water body.

AEL considered soil pH for the Site based on samples taken from the site and analysed by a CALA certified laboratory. AEL sent sixteen (16) soil samples to confirm soil pH. Thirteen (13) of the samples ranged from 6.80 – 7.83, within the acceptable range of greater than 6 and less than 8 (See Table 3 and Appendix 3). Two samples (A0228 – BH11/17: 1.52 – 3.05 m; and A0232 – BH13/17: 3.05 – 4.57 m), had a pH of 11.6 and 8.9, respectively, indicating a tendency towards basic; One sample (A0258 – Pond: 0.00 – 0.20 m), and its duplicate sample, had a pH of 5.78 and 5.99, indicating a tendency towards acidic. As the majority of the Site samples measured were within the acceptable range for application of the CCME guidelines of above 6 and less than 8, the CCME guidelines are considered applicable at the Site.

The following guidelines were deemed applicable to the Site:

Soil

- For sampling locations more than 10 m from a surface water body: CCME, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 – 2015, Residential/Parkland property use, coarse textured soil.
- For sampling locations less than 10 m from a surface water body: the lower of MOECC, Ontario Regulation (O. Reg.) 153/04 (as amended), “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act” dated April 15, 2011, Table 9 Standards, generic site condition standards for use within 30 m of a water body in a non-potable groundwater condition and coarse textured soil,, All Types of Property Use and the CCME Soil Quality Guidelines.

- For parameters for which no federal guidelines exist, and a sampling location falls more than 30 m from a surface water body: MOECC, O. Reg. 153/04, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011, Table 3 Standards, full depth generic site condition standards in a non-potable groundwater condition, Residential/Parkland/Institutional Property Use, coarse textured soil.

Groundwater

- Federal Contaminated Sites Action Plan (FCSAP) Guidance Document on Federal Interim Groundwater Quality Guidelines (IGQG) for Federal Contaminated Sites, May 2010 (updated November 2012), Tier 1 Guidelines for Residential/Parkland Land Use with coarse textured soil (herein referred to as the FCSAP IGQGs).
- For sampling locations less than 10 m from a surface water body, where the FCSAP IGQGs may not be sufficiently protective: MOECC, O. Reg. 153/04, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011, Table 9 Standards, generic site condition standards for use within 30 m of a water body in a non-potable groundwater condition, All Types of Property Use, coarse textured soil.
- For parameters for which no federal guidelines exist, and a sampling location falls more than 30 m from a surface water body: MOECC, O. Reg. 153/04, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011, Table 3 Standards, full depth generic site condition standards in a non-potable groundwater condition, Residential/Parkland/Institutional Property Use, coarse textured soil.

Sediment

- CCME Sediment Quality Guidelines for the Protection of Aquatic Life, 1997 – 2015, Freshwater. Concentrations were compared to both the interim sediment quality guidelines (ISQG) and the probable effect level (PEL). The ISQG defines the concentration below which adverse biological effects are expected to occur rarely. The PEL defines the level above which adverse effects are expected to occur frequently (more than 50% adverse effects occur above the PEL).
- For parameters for which no federal guidelines exist: MOECC, O. Reg. 153/04, "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" dated April 15, 2011, Table 9 Standards, generic site condition standards for use

within 30 m of a water body in a non-potable groundwater condition, All Types of Property Use.

Surface Water

- CCME Water Quality Guidelines for the Protection of Aquatic Life, 1997 – 2015, Freshwater.
- For parameters for which no federal guidelines exist: Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQOs), 1994 (updated 1999).

The report was prepared on the understanding and assumption that any work recommended or required and any materials found will be completed and dealt with in accordance with any applicable law.

2. Background Information

2.1 Physical Setting

2.1.1 Site Topography

According to LIO, the Site sits at an elevation of approximately 110 m asl. The local site topography is sloped to the east. The closest visible body of water is the Rideau River, which is present at the north and south sides of the Site. Groundwater was anticipated to flow east, towards the Rideau River.

2.1.2 Site Geology

2.1.2.1 Surficial Soils

The regional physiography is dominated by the Smiths Falls limestone plain. This is a nearly continuous tract of shallow soil over limestone that covers 3600 square kilometres centred on Smiths Falls.

Upon review of the Ministry of Northern Development and Mine's "Surficial Geology of Southern Ontario" layer from OGSEarth, the surficial soils consist of bedrock-drift complex in Paleozoic terrain, which are characterized by till components. These materials may resist the infiltration of fluids, with higher surface runoff.

2.1.2.2 Bedrock

Upon review of the Ministry of Northern Development and Mine's "Bedrock Geology" layer from OGSEarth, the bedrock consists of the Beekmantown Group (dolostone and sandstone) of the Phanerozoic, Paleozoic, Ordovician, Lower Ordovician eras. Based on previous sampling undertaken at the Site, the depth to bedrock is anticipated to be between 1.68 to 5.27 m bgs.

2.1.3 Site Hydrogeology

Based on local soil and surface conditions, the flow of groundwater in soils in the vicinity of the Site is anticipated to the east, towards the Rideau River. Previous investigations undertaken at the Site studied the site hydrogeology. Old Slys Island is graded down towards the east, creating up to a four meter head of water from the west side of the Island to the east. As the CP rail line is present at the east side of the Island, this creates a dam-like structure, forcing groundwater to flow to the north and south, around the rail line. Analysis of shallow versus deep intakes of the groundwater wells indicated that groundwater is consistently sitting lower in the deep groundwater wells, indicating a lower hydraulic head at depth and thus a downward component of flow. Hydraulic conductivity was calculated to be between 0.11 and 0.73 m/day, consistent with fine sands and silts, which was consistent with the types of materials encountered during drilling. It was concluded that the fill material was not impermeable, and is able to transmit groundwater. The values in general, were lower at those wells with deeper intakes (MW-1 and

MW-3D), indicating the landfill materials may be less permeable at depth, with greater compaction.

Groundwater flow at the north side of the Site is likely influenced by the operation of the lock system at the north side of the Site. Operational from May to October, the locks are opened and closed, reportedly causing groundwater fluctuations on the island of between 1.5 m near the lock, and 0.4 m away from the lock. This operation effectively "flushes" water into the landfill when the locks are filled, and allows groundwater to seep out when the locks are emptied.

During the 2017 investigation, a leak was visible from the upper lock, onto the Island, when the upper lock was full. Once the lock was emptied, the flow of water ceased. The flow of water was traced to a lower lying area, just west of the rail tracks, to an area of ponded water. This general area had approximately 0.15 to 0.20 m of ponded water, with high amounts of orange precipitate present. The well-established presence of high moisture plants, such as cattails, indicated that this ponded area has been present for some time.

2.2 Past Investigations

AEL was provided with the following reports for review:

- "Environmental Site Assessment at Old Sly's Landfill Site Along the Rideau Canal", prepared by Green Plan Environmental Corp. (GPEC), dated 3 February 1994 (herein referred to as the GPEC February 1994 Environmental Site Assessment Report).
- "Environmental Site Assessment Old Sly's Lockstation/Lower Reach Park, Smiths Falls, Ontario", prepared by Jacques Whitford Environment Ltd. (JEWL), dated 21 February 1996 (herein referred to as the JEWL February 1996 Environmental Site Assessment Report).
- "Screening Level Ecological Risk Assessment at Lower Reach Park, smiths Falls, Ontario", prepared by Bonnell Environmental Consulting (BEC), dated 18 October 1996 (herein referred to as the BEC October 1996 Screening Level Ecological Risk Assessment Report).
- "Chemical Monitoring Study at Old Slys and Lower Reach Park, Summer 1999", prepared by Bonnell Environmental Consulting (BEC), dated 15 October 1999 (herein referred to as the BEC October 1999 Summer Sampling Report).
- "Chemical Monitoring Study at Old Slys and Lower Reach Park, Summer and Fall 2000", prepared by Bonnell Environmental Consulting (BEC), dated 31 December 2000 (herein referred to as the BEC December 2000 Summer and Fall Sampling Report).
- "Groundwater, Surface Water and Sediment Sampling at Lower Reach and Old Slys at the Rideau Canal National Historic Site of Canada, Smiths Falls,

Ontario", prepared by Aqua Terre Solutions Inc. (Aqua Terre), dated 7 December 2006 (herein referred to as the Aqua Terre December 2006 Sampling Report).

- "Groundwater, Surface Water and Sediment Sampling at Lower Reach Park and Old Slys Lockstation at the Rideau Canal National Historic Site of Canada Smiths Falls, Ontario", prepared by Golder Associates Ltd. (Golder), dated September 2011 (herein referred to as the Golder September 2011 Sampling Report).

Based on AEL's review of the reports, the following information was noted.

2.2.1 GPEC February 1994 Environmental Site Assessment Report

- Landfilling activities were restricted at the Site to between 1965 and 1966.
- Between 1959 and 1976, three separate sites were used as landfill sites for the Town of Smiths Falls. The largest Site was located at Lower Reach Park, located just southwest of Old Sly Island. A second, smaller, landfill site was located to the south of Old Sly Island, and the third occupied a portion of Old Sly Island (the Site). In addition, records indicated that fill of an unknown quality was placed on lands to the south of Old Sly Island, south of the Old Sly Weir, to the north of Old Sly Island, near the lockstation, and to the east of the rail line.
- The landfill area is a largely flat-bottomed basin of approximately 100 m from north to south, and 80 m from east to west. Fill material extends up to Old Slys Road to the west, to the lock walls to the north, to the CP rail line to the east, and to within approximately 30 m of the southern shoreline of the island.
- Stratigraphy generally consisted of between 0.61 to 0.91 m of topsoil, overlying fill. Fill was comprised of liquid black silt and "garbage" (clothing, plastic, wire). Stratigraphy encountered off-site to the south and southwest consisted of sand and gravel fill.
- The depth of fill ranged from a maximum of 5 m in the centre of the landfill area, to 3 m near the rail line. Assuming an average depth of 4 m, the calculated volume of fill was 32,000 m^3.
- A sampling program was employed, and included sampling soil, surface water, groundwater and sediment. Six (6) monitoring wells were installed. Groundwater samples were also obtained from gas vent pipes, previously installed in 1984, as well as from the newly installed monitoring wells.
- The sampling program identified both inorganic and organic contaminants above CCME Interim Remediation Generic Criteria or the Ontario Ministry of Environment and Energy (MOEE) in the landfill, and demonstrated potential for these contaminants to leach from the landfill to Rideau River. Parameters above criteria included Boron and Tin in surface soil; Boron, Tin, Zinc and PAHs in subsurface

soil; Aluminium, Cobalt, Copper, Iron, Manganese, Bis(2-ethylhexyl)phthalate (DEHP), PCBs, 1,3-Dichlorobenzene and Ethyl Benzene in groundwater; Iron and Mercury in surface water; and lead in sediment.

- There is continual recharge to the landfill by leakage through the stone-key arch dam and by infiltration of precipitation (largely due to the absence of a clay cap or liner over the landfill).
- When the canal locks are full, the locks provide a significant source of recharge to the landfill by leakage through the lock walls, enhancing the production of leachate which then discharges into the Rideau River. It was surmised that a significant portion of the flow from the upper lock is held in bank storage and diverted down the outside of the lock walls without fully penetrating the landfill; the landfill was not able to dissipate the rapidly imposed head of the filled lock quickly enough and various pressure relief mechanisms, such as discharge and pooling on the landfill, were witnessed.
- Groundwater discharge from the landfill is around the ends of the CP Rail line.
- Calculated hydraulic conductivity within the fill was calculated to range from 0.11 m/day to 0.73 m/day.
- Lead levels in sediment at one location (at the southeast corner of the Site, just east of the rail line) were found to be in excess of the Severe Effect Level of the MOEE Aquatic Sediment Quality Guidelines, indicating that the material is considered to be highly contaminated, and a management decision is required at the site.
- Based on analytical testing, and on exposure scenarios modelled in a Site Specific Risk Assessment (SSRA), there is no appreciable risk to human health associated with Old Slys Island or lock station operations.
- Accumulation of metals in the river sediments, particularly lead, represents a potential environmental concern, with potential toxicity to bottom dwelling benthic organisms, but does not pose a risk to human health.
- An orange coating was present on the river bottom at leachate discharge points at the southeast side of the island, on the eastern side of the rail line. This is a result of the precipitation of ferric hydroxide gels and floc particles, which may adversely affect the sediment dwelling benthic community, but does not represent a human health risk.
- PCB testing was undertaken, however results from two separate sampling events returned contradictory results, and were thus considered inconclusive. However, modelling undertaken on the highest levels obtained demonstrated that the levels were below the human health risk.

- The proposed management strategy for the site is based on mitigating the recharge to the landfill by grouting the lock walls, and continuing to monitor contaminant emissions
- Sediment bioassays were recommended at and downstream of the discharge areas, to assess whether the sediment is acutely toxic.

2.2.2 JEWL February 1996 Environmental Site Assessment Report

- The report outlined a sampling and analysis program undertaken at the Site, as well as at Lower Reach Park, which is located southwest of the Site, and was also historically a landfill site in the 1960's. The review focussed on activities undertaken at, and results as they pertain to the Old Sly Site only.
- It was noted that between 1994, when the previous site assessment activities were undertaken, and 1996, when the JEWL site assessment activities took place, the lock walls had been repaired with grout to limit the amount of leakage from the lock to the landfill, and vice versa. Hydrogeological testing undertaken by JWEL at Old Slys Island indicates that discharge rates through the landfill were significantly reduced as a result of the repair of the south facing lock chamber wall.
- Surface water samples were collected up and down stream of Old Slys Island, and one monitoring well was sampled (MW-2, at the northeast corner of the Island, adjacent to the lower lock).
- Results were compared to 1994 Ontario PWQOs. As groundwater at the Site is discharged to the Rideau River, it was determined that the PWQO values were applicable to groundwater as well as surface water.
- Parameters above criteria included Iron, Ammonia, Total Phenols, Turbidity and Hydrogen sulphide in groundwater; and Iron, Turbidity, Chromium, Copper, Lead and Zinc in surface water.
- It was noted that the exceedances of Chromium, Copper, Lead and Zinc were only present in the upstream background surface water sample, but were not present downstream.
- The Iron exceedance in surface water was obtained from beneath the rail bridge, in an area of orange Iron hydroxide precipitate on the shoreline. Although this was an exceedance of PWQO criteria, it was determined that the exceedance was due to the Iron precipitate, and was not indicative of the overall Site.
- Exceedances in groundwater were not present downstream, and as such it was concluded that, although there is some impairment of the

groundwater within the landfill, it is not adversely impacting downstream water.

- It was concluded that the Old Sly landfill leachate was not producing negative environmental impacts downstream.
- It was recommended that surface water and groundwater sampling continue three times per year (during the spring thaw, summer and at the close of the navigation season).

2.2.3 BEC October 1996 Screening Level Ecological Risk Assessment Report

- The objective of the Screening Level Ecological Risk Assessment (SLERA) was to assess the potential risks to non-human receptors of heavy metals contamination in soil and groundwater at Lower Reach Park. The study focussed only on Lower Reach Park, located southwest of the Old Sly landfill. It was concluded that aquatic receptors are not at risk from the, then, current levels of metals in waters in the nearshore area of Lower Reach Park.
- It was noted in the report that elevated concentrations of Lead and Aluminium were noted in some surface water samples, including the background surface water sampling location, above CCME guidelines, and it was surmised that the levels may be elevated due to natural or anthropogenic sources into the Rideau River.

2.2.4 BEC October 1999 Summer Sampling Report

- The report outlined a sampling and analysis program undertaken at the Site, as well as at Lower Reach Park. The review focussed on activities undertaken at, and results as they pertain to the Old Sly Site only.
- Testing for inorganics, VOCs and PCBs in groundwater, and inorganics in sediments/precipitate was undertaken at the Site in August 1999. Parameters were selected based on previous testing undertaken by GPEC in 1994 and JEWL in 1996, where levels of analytes were measured above non-detect.
- Groundwater sampling was undertaken at six (6) previously installed monitoring wells. Sediment sampling was undertaken in locations where orange precipitate was observed (below the lower lock and below the train bridge in the weir channel), and where groundwater precipitate was observed to be leaking from areas of degraded grout along the retaining wall below the lower lock.
- Results were compared to 1994 Ontario PWQOs. As groundwater at the Site is discharged to the Rideau River, it was determined that the PWQO values were applicable to groundwater as well as surface water.

- Parameters above criteria included Chlorobenzene, Aluminium, Arsenic, Chromium, Cobalt, Copper, Iron, Lead and Zinc in groundwater; and Iron and Lead in sediment. Detectable levels of PCBs were noted in three (3) monitoring wells, however these levels were not above criteria.
- Results indicated that there was a general increase of metals concentrations in the groundwater at the Site, but only Aluminium and Iron were present in concentrations above the applicable criteria in the leachate being released through degrading grout in the retaining wall below the lower lock.
- Although previous assessments had determined that the toxicity of sediment/precipitate samples at the Site had no adverse effect on benthic organisms, the levels of metals were comparable to those of previous samples taken from Lower Reach Park, which did conclude that the levels were toxic to benthic organisms. It was concluded that, as concentrations of metals in sediment were observed to be increasing, it should be assumed that the sediment zones below the rail bridges at the northeast and southeast corners of the Island (SED1 and SED3) are toxic to benthic organisms. It was recommended that the size of the precipitate plumes be monitored to determine if the plume is increasing in size, and thus having a greater impact on the river.
- As PCBs were detected in groundwater at the Site, it was recommended that sediment/precipitate sampling be undertaken at groundwater high and low flow periods from discharge areas, to monitor the relative load to the river at these times, and determine if PCBs are reaching the river.

2.2.5 BEC December 2000 Summer and Fall Sampling Report

- The report outlined a sampling and analysis program undertaken at the Site, as well as at Lower Reach Park. The review focussed on activities undertaken at, and results as they pertain to the Old Sly Site only.
- Testing for inorganics, VOCs and PCBs in groundwater, and inorganics and PCBs in sediments/precipitate was undertaken at the Site in June and September 2000. Parameters were selected based on previous testing undertaken by GPEC and JEWL, as well as previous sampling undertaken by BEC in 1999 (see section 2.2.4).
- Visual observations indicated the level of orange precipitate was to a much lower degree as was observed in 1999, possibly due to higher water levels.

- Groundwater sampling was undertaken at six (6) previously installed monitoring wells. Sediment sampling was undertaken in locations where orange precipitate was observed (below the lower lock and below the train bridge in the weir channel), and where groundwater precipitate was observed to be leaking from areas of degraded grout along the retaining wall below the lower lock.
- Results were compared to 1994 Ontario PWQOs. As groundwater at the Site is discharged to the Rideau River, it was determined that the PWQO values were applicable to groundwater as well as surface water.
- Parameters above criteria included Aluminium, Arsenic, Chromium, Cobalt, Copper, Iron, Silver, Selenium and Zinc in groundwater; and Iron, Lead, Arsenic and Cadmium in sediment.
- Detectable levels of PCBs were noted in three (3) monitoring wells, however these levels were not above criteria. Compared to previous sampling, PCB levels are variable, suggesting PCBs are fluctuating with water levels, due to high rainfall rates and infiltration into the landfill. Sediment/precipitate results suggests the PCBs were not entering the river.
- In general, results indicated that the levels of metals in groundwater and leachate are higher in fall than in summer, suggesting a dilution effect from higher rainfall rate.
- Results indicated that Aluminium, Chromium, Selenium and Silver were present in concentrations above the applicable criteria in the leachate being released through degrading grout in the retaining wall below the lower lock.
- It was recommended that monitoring of inorganics, VOCs and PCBs continue in groundwater, groundwater leachate and sediment/precipitate, in early summer and fall, to high and low rainfall events.

2.2.6 Aqua Terre December 2006 Sampling Report

- The report outlined a sampling and analysis program undertaken at the Site, as well as at Lower Reach Park. The review focussed on activities undertaken at, and results as they pertain to the Old Sly Site only.
- Sampling was undertaken in July and August 2006. A Seepage sample was obtained from one (1) location on-site where groundwater precipitate was observed to be leaking from areas of degraded grout along the retaining wall below the lower lock, collection of two (2) sediment samples in locations where orange

precipitate was observed (below the lower lock and below the train bridge in the weir channel) and collection of six (6) groundwater samples from previously installed monitoring wells.

- Results were compared to federal (CCME 1999) and provincial (MOE 2004 Table 3 and Ontario PWQO) standards.
- Parameters above criteria included Iron (federal) and Iron and Toluene (provincial) in surface water seepage; and Iron and Mercury (federal) and Zinc, PCBs, Mercury, Cobalt and Xylenes (provincial) in groundwater. No exceedances in sediment were noted.
- It was noted that although there is variability in groundwater concentrations, there was no significant temporal increasing or decreasing trends.
- As there was the potential for impacts to surface water from the Site, it was recommended that immediate measures be taken to evaluate and implement a management approach. It was recommended that, due to a lack of consistent temporal data, a gap analysis be conducted, and supplemental investigations be undertaken for any gaps identified. Site management options could then be developed and implemented at the Site.

2.2.7 Golder September 2011 Sampling Report

- The report outlined a sampling and analysis program undertaken at the Site, as well as at Lower Reach Park. The review focussed on activities undertaken at, and results as they pertain to the Old Sly Site only.
- Sampling was undertaken between April and August 2011.
- Results were compared to federal (CCME 2001 and Guidance Document on Federal Interim Groundwater Quality Guidelines (IGQG) for Federal Contaminated Sites 2010) and provincial (MOECC 2011 Table 9 and Ontario PWQO) standards.
- Surface water samples were collected up- and downstream of the locks, as well as within the locks. Five monitoring wells were sampled; it was noted that one well (MW5, located at the east side of the Island) was dry at the time of sampling, and one well (MW3B and MW3C, located at the west side of the Island) were blocked at the time of sampling. One seepage sample was collected where groundwater precipitate was observed to be leaking from areas of degraded grout along the retaining wall below the lower lock.
- The report noted that Parks Canada staff had noted the presence of a viscous black substance along the lock wall, but this substance was not observed during the field visits.

- Parameters above criteria included Iron (federal and provincial) in surface water seepage; Lead, Mercury, Cadmium, Copper and Zinc (federal and provincial) and Chromium and Silver (provincial) in sediment; and Iron, Cadmium, Arsenic and Zinc (federal) and Cobalt, PCBs (provincial) in groundwater. No exceedances in surface water were noted.
- It was noted that iron concentrations at the seepage sampling location have been increasing since the summer of 2002.
- Iron concentrations in groundwater were noted to be within the same range as those concentrations historically reported, since 1994.
- It was recommended that monitoring well deficiencies (such as missing well caps and blockages in wells) be addressed, and an elevation survey be completed for all monitoring wells, in order to calculate groundwater elevations and gradients.

2.2.8 Areas of Potential Environmental Concern (APEC)

Based on the reviewed information, APECs at the Site include the entire Site over which fill/buried waste was placed.

Table 2-1 outlines the APECs and how they were investigated at the Site. Figure 1 outlines the Phase II Site and APEC, as outlined below.

Table 2-1 Investigation of Areas of Potential Concern			
Area of Potential Environmental Concern	Potentially Contaminating Activity	Reason	How The Concern Was Investigated
1. Across the Site	Importation of fill and buried wastes of an unknown quality	Historical records indicate the Old Sly Lock was built in the mid-1800's. Construction activities caused the formation of an Island south of the Lock. Infill of the Island likely took place from the creation of the Island onwards, but the Site also acted as a landfill for the town between 1965 and 1966.	Soil samples collected and analyzed for PHCs, VOCs, metals and inorganics, PAHs and PCBs. Groundwater samples collected and analyzed for PHCs, VOCs, metals and inorganics, PAHs and PCBs. Sediment samples collected and analyzed for PHCs, VOCs, metals and inorganics, PAHs and PCBs. Surface water samples collected and analyzed for VOCs and metals and inorganics.

2.2.9 Potential Contaminants of Concern (COCs)

Based on the reviewed information, five (5) main groups of potential COCs were identified at the Site:

- PHCs F1 to F4 where fill and buried wastes may have been placed;
- VOCs (including BTEX) where fill and buried wastes may have been placed;
- Metals and inorganics where fill and buried wastes may have been placed;
- PAHs where fill and buried wastes may have been placed; and
- PCBs where fill and buried wastes may have been placed.

3. Scope of Investigation

3.1 Overview of Site Investigation

According to the scope of work provided by the client the objectives of the investigation were to review existing information with regards to previous work completed at the Site, assess groundwater, soil, surface water and sediment quality at the Site in regards to applicable federal guidelines and criteria, conduct a Detailed Quantitative Human Health and Ecological Risk Assessment (DQ HHERA) to determine human health and ecological risks at the site, specifically taking into account upcoming select construction activities to be undertaken on the lock, and produce a report documenting the data, methods, results and recommendations of the risk assessment and environmental monitoring program.

The following scope of work was undertaken to address the above objectives:

- Review of previous environmental investigations;
- Advance boreholes to a maximum depth of up to 4.57 m (15′) to characterize soil lithology and to collect soil samples;
- Advance five (5) monitoring wells to a maximum depth of 4.57 m (15′) to characterize groundwater flow direction and quality and to collect groundwater samples;
- Purge and sample up to six (6) existing monitoring wells.
- Collect surface water samples from up to twelve (12) locations.
- Collect sediment samples from up to ten (10) locations.
- Submit selected samples to a certified CALA laboratory for testing.
- Compare the analytical testing results of the samples tested the applicable guidelines and criteria, as set out in section 1.4.
- Prepare a Phase II ESA report to outline the findings and provide engineering opinions based on the information available to the date received in AEL offices.
- Prepare a DQ HHERA report based on available data and provide engineering opinions based on the information available to the date received in AEL offices.

All matters not listed in the terms of reference or general conditions were specifically excluded from AEL responsibilities and reporting

3.2 Media Investigated

3.2.1 Soil

Soil testing was conducted on the Site soils for the presence of metals and inorganics, PHCs F1/BTEX – F4, PAHs, PCBs and VOCs, due to history of the Site as a landfill. Previous testing by other consultants included testing for pesticides, however as Parks Canada does not currently use pesticides, it was assumed that a current measurement was not warranted as the current levels of pesticides on Site would be lower than previously measured.

3.2.2 Groundwater

Eight (8) monitoring wells were investigated on-Site, and one (1) monitoring well was investigated off-Site to the southwest. Groundwater testing was conducted for the presence of metals and inorganics, PHCs F1/BTEX – F4, PAHs, PCBs and VOCs, due to history of the Site as a landfill. Groundwater level measurements were recorded to aid in the determination of groundwater flow direction.

3.2.3 Sediment

Sediment testing was conducted on-Site and nearby off-Site up- and down-stream locations for the presence of metals and inorganics, PHCs F1/BTEX – F4, PAHs, PCBs and VOCs, due to history of the Site as a landfill.

3.2.4 Surface Water

Surface water testing was conducted on Site and nearby off-Site up- and down-stream locations for the presence of metals and inorganics and VOCs, due to history of the Site as a landfill.

3.3 Deviations from Sampling and Analysis Plan

The original generic Sampling and Analysis Plan called for the drilling of eight (8) boreholes, five (5) of which were to be developed into monitoring wells for groundwater sampling. Ten (10) sediment samples, eleven (11) surface water samples and one (1) seepage sample from the lock wall were also to be collected.

During the Phase II investigation, water was viewed by field staff as flowing through the upper lock onto Old Sly island; a sample of the seep was collected. An additional soil sample was obtained from an area where the seepage water from the upper lock was collecting and ponding, at the east side of the Site. Several sediment and surface water sampling locations were moved or not accessed, due to unsafe conditions at the time of sampling. Groundwater samples were obtained from existing groundwater wells MW-1, MW-3S, MW-3D and MW-6; groundwater was not present in MW-5, and could not be sampled. Existing monitoring wells MW-2 and MW-4 could not be located, and thus were not sampled. See Appendix 1 for the sampling and analysis plan.

3.4 Impediments

Due to a high water level at the time of the Phase II investigation, some sediment and surface water sampling locations were unsafe, and samples could not be obtained (further discussions regarding this are found in sections 3.3, 5.9 and 5.9.1).

4. Investigation Methodology

4.1 General

The field investigation was undertaken between August 28th and September 1st, 2017. These methods included drilling using a Geoprobe 7822DT Direct Push Drill for soil sampling and monitoring well installation, field screening methods, surface water and sediment collection and monitoring well development and sampling.

4.1.1 Drilling and Excavating

AEL used a Geoprobe 7822DT Direct Push Drill, supplied by Strata Drilling Group, for sampling eight (8) borehole locations.

4.1.2 Soil: Sampling

AEL conducted sampling in areas of potential concern based on information obtained prior to the Phase II work. Sample locations were recorded in relation to a common benchmark. Locations were input into AEL's data management software. The borehole locations are shown in the borehole location plan (Figure 2).

Overburden was comprised of a layer of topsoil overlying sandy fill materials to the maximum depth investigated in all areas identified as the former landfill. Native materials at one location, MW9/17, consisted of a layer of topsoil overlying sand and gravel to the depth investigated, approximately 4.11 m bgs.

Drill refusal was encountered at five (5) locations across the Site, likely due to the presence of bedrock, at depths of between 3.66 and 4.27 m bgs.

Soil sampling down to a maximum depth of 4.57 m at each location was performed using a Geoprobe 7822DT Direct Push Drill. The 7822 machine provides a 0.61 m long, 2.54 cm diameter soil core in a single use plastic (PVC) liner. The samples were then field tested, and transferred into lab prepared sample jars. Soil sampling was continuous and samples were collected across the entire interval and examined using visual, olfactory and field screening methods.

The following sampling protocol was applied to reduce the risk of cross contamination:

- Only new, clean, 0.61 m long PVC liners are used for direct push drill cores;
- Only new clean jars for were used for each sample sent to laboratory;
- Only new clean latex sample gloves are used when handling all samples or sample containers. In cases where the liners are used, the

gloves may be redundant, so that gloves may not be needed. The AEL protocol is to always require new gloves for each sample;

- Each sample is marked and labelled with a unique barcode identification label.

Sample or project information reliability and security are one of the most important features of a Phase II ESA sampling program. Out of sequence or erroneous logging of samples can significantly affect the cost of site cleanups or the understanding of a site.

Sample identification information is supplied in multiples to be applied to borehole logs, sample containers, and chain of custody information. This minimizes the potential for sample mislabelling and facilitates tracking as each sample is provided with a unique identifier, regardless of related location or project information.

4.1.3 Field Screening Measurements

4.1.3.1 RKI Eagle 2 Gas Detector

On-Site field screening involved screening soil cores with a pre-cleaned and calibrated RKI Eagle 2 gas detector to measure VOCs and Hydrocarbons (HCs). The Eagle 2 is capable of 0-2000 ppm VOC detection and 0 – 50,000 ppm HC detection with an accuracy of ± 25 ppm or ± 5%. It was calibrated prior to use by Pine Environmental.

After the soil sample was removed from the ground, a sample of soil was placed in a Ziploc bag and sealed. After a period of five minutes, the gas detector was inserted into the bag, and a headspace reading was taken to determine if any VOCs and/or HCs were present. The summarized results from the field screening can be found in Table 25.

4.1.3.1 X-Ray Fluorescence

On-Site field screening also involved screening soil cores with a high-resolution X-Ray Fluorescence (XRF) analyzer in the detection and quantification of metals in soil, manufactured by Innovx. After 105 seconds, these elements can be detected from 0.1 ppm (depending on the element) in sand, with longer readings giving lower detection limits and more precise results.

The instrument is calibrated with an internal reference before any testing is done. The Calibration of the instrument was checked once daily with the NIST reference standard Blank, #2711a (low) and #2710a (high) before and at regular intervals after samples are tested. If at any time these checks fall outside the acceptable limits of the instrument, all samples tested after the last accepted check were either retested or marked as inaccurate, and the instrument recalibrated.

XRF testing in soil followed protocols established by EPA Method 6200 - Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. All sampling results are stored electronically. Field data sets were downloaded electronically into AEL's data management system. XRF testing in soil was completed on soil samples from all boreholes, and assisted in determining which samples were submitted for further laboratory analysis. The summarized results from the field screening can be found in Table 26.

4.2 Ground Water: Monitoring Well Installation

AEL used a Geoprobe 7822DT Direct Push Drill, supplied by Strata Drilling Group, of Carleton Place, Ontario, for installation of monitoring wells using a 203.2 mm diameter hollow stem auger. Monitoring wells were constructed of 50 mm inside diameter PVC riser pipe fitted with 50 mm inside diameter threaded PVC well screen (No. 10 slot). The annular space of the borehole around the screen was backfilled with clean silica sand to approximately 30.48 cm above the top of the screen. The annular space above the sand pack was grouted with a bentonite seal to ground surface. The entire top was outfitted with a flushmount or monument lockable metal protective casing.

All wells were equipped with sealed caps to prevent surface water infiltration.

AEL developed the wells over 24 hours after installation by purging no less than three well volumes or until the measurements of groundwater temperature, pH, turbidity and conductivity were stable as measured on a Horiba Water Quality Instrument. In cases where the wells went dry, they were purged once and allowed to recover fully. Please see Table 8 for identification of remaining on site wells.

4.3 Ground Water: Sampling

AEL developed monitoring wells by purging at least three well volumes or until the measurements of groundwater temperature, turbidity, pH and conductivity were stable as measured on the Horiba Water Quality Instrument. Purge water was collected on-site and removed for disposal in accordance with appropriate regulations. Groundwater samples were collected after purging. Water levels were measured prior to purging and the collection of samples. The wells were sampled using an inertial or peristaltic pump directly into the bottles provided by the CALA laboratory, with filtering where necessary. Each sample was labelled with a unique identifying label and placed immediately into a cooler packed with ice.

4.4 Surface Water/Seepage: Sampling

All surface water samples were collected close to shoreline, obtained by hand or using a swing sampler, where necessary, directly into the bottles provided by the CALA laboratory, with filtering where necessary. AEL took field measurements of pH and temperature prior to collection of samples. Each sample was labelled with a unique identifying label and placed immediately into a cooler packed with ice.

Two (2) seepage samples were collected from active seeps along the lock wall, at the north side of the site. One (1) sample was collected from the upper lock, flowing from a crack in the lock wall onto the island, when the lock was full; and one (1) sample was collected from the lower lock, flowing from a crack in the lock wall from the island to the lock, when the lock was empty. Samples were obtained by hand or using a swing sampler, where necessary, directly into the bottles provided by the CALA laboratory, with filtering where necessary. AEL took field measurements of pH and temperature prior to collection of samples. Each sample was labelled with a unique identifying label and placed immediately into a cooler packed with ice.

4.5 Sediment: Sampling

All sediment samples were collected close to shoreline. The base of the Rideau River in the area of the Site was largely rock, with some coarse sand and gravel sediment. As there was little sediment to sample, samples were obtained using a stainless-steel trowel where possible, or by hand, directly into the bottles provided by the CALA laboratory. Each sample was labelled with a unique identifying label and placed immediately into a cooler packed with ice.

4.6 Analytical Testing

Twenty-four (24) soil samples with two (2) duplicate samples, nine (9) groundwater samples plus one (1) trip blank and one (1) duplicate, six (6) sediment samples plus one (1) duplicate, and nine (9) surface water samples plus two (2) duplicates, were sent to Maxxam Analytics (32 Colonnade Rd, Unit #1000, Nepean, ON) for the analysis of selected metals and inorganics, PHC, VOCs, PAH and PCB analysis.

4.7 Residue Management Procedures

All drill cuttings, direct push samples not used for analysis, purge well water and fluids from equipment cleaning were placed in drums on site. These residues were removed daily, as per Park's Canada's instructions. Residues were removed and disposed of in accordance with appropriate regulations.

4.8 Elevation Surveying

AEL completed a topographic survey of the new wells. Elevations were acquired using a Trimble® R10 RTK GPS at an average accuracy of approximately 10 mm horizontal and 15 mm vertical. This sampling generated a sufficiently dense point cloud to create a Digital Elevation Model using topographic modelling in ArcGIS.

4.9 Quality Assurance and Quality Control Measures

AEL maintains a Quality Assurance/Quality Control (QA/QC) procedure in accordance with CSA requirements. AEL's QA/QC sampling protocol is as outlined below and includes:

- Adequate samples to provide for quality assurance and control of the sample results.
- Laboratory QA/QC procedures as required by applicable guidelines or regulations. In some instances where elevated test results are found that do not match sampling trends observed at a site, AEL may require samples be re-tested, or additional samples tested nearby. Furthermore, in some cases duplicate samples are tested.

The AEL QA/QC protocol is directed towards eliminating the potential for cross-contamination of samples and maintaining control and knowledge of the sample and sample results from the field through to reporting of the result. As a result, true field duplicates for soil samples are not generally obtained in the field during a Phase II ESA investigation owing to the variability of soils. Split field duplicates are obtained in completion of remedial work where composite samples are generally used to monitor field progress.

4.9.1 Sampling QA/QC

4.9.1.1 Background

To reduce the risk of cross-contamination of soil the following steps are implemented on AEL projects. AEL ensures and uses:

- Only new, clean, 0.61 m long PVC liners for direct push drill cores;
- Non-disposable sampling equipment is cleaned with residue free cleaners and rinsed with distilled water before and/or after each sample is taken;
- Only new clean jars for were used for each sample sent to laboratory;
- Only new clean latex sample gloves are used when handling all samples or sample containers. In cases where the liners are used, the gloves may be redundant, so that gloves may not be needed. The AEL protocol is to always require new gloves for each sample.

4.9.1.2 AEL Samples and Containers

The AEL approach produces samples in new laboratory-prepared sample containers specific to the parameter of interest, so that sample filtration and preservation are as dictated by analytical needs.

5. Results and Discussion

5.1 Geology

Overburden was comprised of a layer of topsoil overlying sandy fill materials to the maximum depth investigated in all areas identified as the former landfill. Native materials at one location, MW9/17, consisted of a layer of topsoil overlying sand and gravel to the depth investigated, approximately 4.11 m bgs.

Drill refusal was encountered at five (5) locations across the Site, likely due to the presence of bedrock, at depths of between 3.66 and 4.27 m bgs.

5.2 Ground Water: Elevations and Flow Direction

Monitoring well locations were chosen to cover the Site in a non-linear configuration. Screened intervals of monitoring wells used for interpretations of ground water flow direction were chosen to intercept the anticipated groundwater flow levels on Site.

Field measurements, taken using a water level indicator during water level measurements, have been kept for review as necessary.

No free product was present in monitoring wells.

Telephone, water, sewer and gas services are not currently provided to the Site, therefore no effect on potential contaminant migration is anticipated associated with these utilities.

At the time of water sampling groundwater was encountered between 0.96 m and 3.43 m bgs at the Site. The elevations of each monitoring well can be found on the Borehole Logs in Appendix 2. Based on flow of surface water surrounding the Site, groundwater flows in an easterly direction from the Site. See Figure 3 for inferred groundwater direction.

5.3 Ground Water: Hydraulic Gradients

Based on water levels from the current investigation, the horizontal gradient was calculated to be between 0.00015 m/m and 0.062 m/m on the Site, and confirmed an easterly groundwater flow. The vertical gradient, calculated between MW-3S and MW-3D, indicated a downwards vertical hydraulic gradient of 0.28. Previous investigations calculated the hydraulic conductivity to be between 1.3 x 10^{-4} cm/sec to 8.4 x 10^{-4} cm/sec, which is consistent with the soil/fill encountered at the Site, and indicates moderate permeability which would allow transmission of groundwater contaminants.

5.4 Coarse Grained Soil Texture

Based on visual evidence collected during soil sampling, coarse grained soil was determined to be the soil classification for comparison and as such this texture will be used in determining the applicable standards.

5.5 Soil: Field Screening

Soil samples were screened for VOCs, hydrocarbons and metals in the field using an RKI Eagle 2 Gas Detector and an XRF. All field screened samples returned low or non-detect levels of VOCs and hydrocarbons. Results from the field screening can be seen in Table 25.

Select soil samples were also screened for metals in the field using an InnovX XRF analyser. Several samples returned levels of metals above the values established by AEL as the screening levels for meeting MOECC Table 9 criteria. Results from the field screening can be seen in Table 26.

5.6 Site Characterization: Background Conditions

AEL collected background samples for soil, groundwater, surface water and sediment.

5.6.1 Soil and Groundwater Background Conditions

Previous investigations used MW-6 as a background sampling location for soil and groundwater. Although this location is up-gradient of the Site, it is down-gradient of Lower Reach Park, which was historically a landfill site at the same time as the Site, in the mid-1960's. Historic sampling completed at MW-6 indicate this well is likely being impacted to some degree by the Lower Reach Park historic landfill, and may not be appropriate as a background monitoring location, or as a monitoring location for the Site. As such, AEL installed a new monitoring well, which was off the landfill portion of Old Sly Island, and most likely to be unaffected by the landfill. This location was identified as MW9/17. AEL obtained soil and groundwater samples from this location, for laboratory analysis of PHCs, VOCs, PAHs and PCBs. All results were below the applicable guideline values, with the exception of Cadmium and Chloride, which exceeded the CCME residential/parkland property use guidelines for groundwater. There is the potential for the exceedances of Cadmium and Chloride to be related to the landfill, however, as the landfill is trans-gradient to MW9/17, and no landfill materials were present during soil sampling, it is more likely related to an off-site source. Overall, it appears that the background sampling location may be measuring off-site sources, but is generally useful in determining if off-site sources may be contributing to impacts on-site.

5.6.2 Surface Water Background Conditions

AEL obtained two (2) samples up-stream (SW1 and RR2) and one sample down-stream (SW8), plus one (1) duplicate sample, of the Site, in order to obtain background concentrations of metals and VOCs.

The sample from up-stream of the lock (SW1), did not meet the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater or the MOECC PWQOs for Cyanide. As Cyanide has not been sampled for historically, there is no historical data available for comparison. Concentrations of Cyanide at all other sampled locations, including up-stream, on-site and down-stream, were below the detection limit for Cyanide, indicating this may be a localized impact, and not related to the landfill.

Surface water down-stream of the Site, at SW8, showed elevated levels of total un-ionized ammonia above the MOECC PWQOs. As total un-ionized ammonia has not been sampled for historically in surface water, there is no historical data available. When compared to the surrounding sampling locations, concentrations of total un-ionized ammonia were also above the guideline at the seepage sample (SW3), taken from the lock wall just up-stream of RR3, but had decreased to below the guideline further down-stream, at SW7, the closest up-stream sampling location to SW8. This indicates that seepage may be having an impact immediately downstream of the lock, but impacts do not extend past SW7, and thus levels of total un-ionized ammonia at SW8 are not likely related to the Site, and there are likely other contributing sources.

Exceedances of the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater were noted for Acrolein, Mercury, Cadmium and Selenium. The results for Acrolein, Mercury, Cadmium and Selenium in all samples were inconclusive as the reported detection limit (RDL) was above the applicable guideline value. As VOCs have not been sampled for historically, there is no historical data available for comparison. Acrolein is most commonly used as a biocide in the control of floating weeds and algae in irrigation canals. Current laboratory methods are not capable of detection limits as low as the current guideline value, therefore AEL cannot confirm if there are exceedances of Acrolein in the background samples.

Overall, it appears that background sampling locations are measuring off-site sources, but are generally useful in determining if off-site sources may be contributing to impacts on-site. The down-stream background sampling location for surface water shows impacts which are not all likely related to the Site, indicating that the background sampling location may be too far down-stream to reflect impacts, if any, from the Site. Additional work is recommended to clarify the down-stream condition and potential contributors.

5.6.3 Sediment Background Conditions

AEL obtained one (1) sample up-stream (SED2) and one sample down-stream (SED10), plus one (1) duplicate sample, of the Site, in order to obtain background concentrations of PHCs, VOCs, metals and inorganics, PAHs and PCBs. Historically, an additional sample was collected up-stream of the lock (SED4), however due to the absence of sediment at this location at the time of the investigation, AEL could not collect a sample for analysis.

Sediment concentrations up-stream of the Site showed elevated levels of Mercury, Benzo(a)anthracene, Benzo(a)pyrene, Phenanthrene and Pyrene above the CCME Freshwater ISQGs, but not above the CCME PELs. Sediment concentrations downstream of the Site showed elevated levels of Arsenic above the CCME Freshwater PEL, and Cobalt, Nickel and Cyanide all above the MOECC Table 9 guidelines. Historical sediment sampling did not test for PAHs. As PAHs were identified up-stream of the Site, but not at the most down-stream location sampled (SED10), the presence of PAHs indicates that there is likely a source up-stream of the Site, possibly related to the Lower Reach Park landfill, and the Site may be acting as a contributing source to impacts down-stream. The low concentrations of PAHs seen at SED10, combined with the concentrations of metals indicates that SED10 is not related to the Site, and there are likely other contributing sources. The exceedance of Arsenic of the CCME PEL at the down-stream location (SED10) are not likely to be related to the landfill as exceedances of Arsenic were not present up-stream, and other levels of metals, specifically lead, have decreased as compared to up-stream concentrations.

Overall, it appears that background sampling locations are measuring off-site sources, but are generally useful in determining if off-site source may be contributing to impacts on-site. The down-stream background sampling location for sediment shows impacts which are not all likely related to the Site, indicating that the background sampling location may be too far down-stream to reflect impacts, if any, from the Site.

5.7 Site Characterization: Soil Quality

The results did not indicate the presence of light or dense non-aqueous phase liquids (LNAPLs or DNAPLs).

A total of eight (8) boreholes were advanced on the Site. Borehole and well locations are shown on Figure 2. Soil samples were taken from 0.0 to 4.57 m bgs. Based on visual, olfactory and other on-site examinations, soil samples were collected from all eight (8) boreholes for further laboratory investigation. Fourteen (14) samples, plus one (1) duplicate sample, were investigated for PHCs F1/BTEX – F4; fourteen (14) samples, plus one (1) duplicate sample, for metals and inorganics; fourteen (14) samples, plus one (1) duplicate samples, for VOCs; eight (8) samples for PAHs; and eight (8) samples for PCBs.

5.7.1 PHC/BTEX Analysis

A total of fourteen (14) samples, along with one (1) duplicate, were selected for laboratory analysis. Results indicated two (2) locations, MW7/17 and MW10/17, in the northeast corner of the Site which exhibited surface soil exceedances for one or more of Ethylbenzene, PHCs F3 and F4 Gravimetric. Five (5) locations, MW7/17, MW10/17, BH11/17, BH12/17 and BH13/17, at the north side of the Site, and one (1) location, MW8/17, at the west side of the

Site, exhibited subsurface soil exceedances for one or more of Ethylbenzene, Toluene and Total Xylenes, and PHCs F2, F3, F4 and F4 Gravimetric.

Historical soil sampling completed by GPEC in 1995 identified concentrations of Xylenes above the current MOECC 2011 Table 9 standard, but not above the current CCME residential/parkland property use guideline. PHCs were not analysed for at this time. Exceedances in soil, both historically and currently, were distributed across the northern portion of the Site, but were only present within the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the vertical distribution of soil impacts which are limited to the fill layer. Due to the proximity of the exceedances on the north and west sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 1. See Figure 4a for lateral distribution of soil PHC and BTEX contaminants. See Figures 9a, b – d for vertical distribution of soil PHC and BTEX contaminants and stratigraphy of the Site.

5.7.2 VOC Analysis

A total of fourteen (14) samples, along with one (1) duplicate, were selected for laboratory analysis. Results indicated one (1) location, MW10/17, in the northeast corner of the Site which exhibited surface soil exceedances for Ethylbenzene. Three (3) locations, MW10/17, BH11/17 and BH12/17, at the north side of the Site, and one (1) location, MW8/17, at the west side of the Site, exhibited subsurface soil exceedances for one or more of Ethylbenzene, Trichloroethylene, Toluene and Total Xylenes.

Historical soil sampling completed by GPEC in 1995 identified concentrations of Chlorobenzene, Dichlorobenzene and Xylenes above the current MOECC 2011 Table 9 standards, but no exceedances of the current CCME residential/parkland property use guidelines were noted. Exceedances in soil, both historically and currently, were distributed across the Site, but were only present within the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the vertical distribution of soil impacts which are limited to the fill layer. Due to the proximity of the exceedances on the north and west sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 2. See Figure 4b for lateral distribution of soil VOC contaminants. See Figures 9a, e – g for vertical distribution of soil VOC contaminants and stratigraphy of the Site.

5.7.3 Metals and Inorganics Analysis

A total of fourteen (14) samples, along with one (1) duplicate, were selected for laboratory analysis. Results indicated one (1) location, MW7/17, at the northeast corner of the Site, which exhibited surface soil exceedances for Copper. AEL identified one (1) location, MW7/17, at the south side of the Site, one (1) location, MW8/17, at the west side of the Site, and one (1) location, MW5/17, at the southeast portion of the Site, which exhibited subsurface soil exceedances for metals (including Antimony, Arsenic, Cadmium, Copper, Lead, Nickel, Tin and Zinc) within the fill.

Historical soil sampling completed by GPEC in 1995 identified concentrations of Lead and Zinc above the current CCME residential/parkland property use guidelines and concentrations of Lead, Zinc and Silver above the current MOECC 2011 Table 9 standards. Exceedances in soil, both historically and currently, were distributed across the Site, but were only present within the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the vertical distribution of soil impacts which are limited to the fill layer. Due to the proximity of the exceedances on the north and west sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 3. See Figure 4c for lateral distribution of metals and inorganics contaminants. See Figures 9a, h – j for vertical distribution of soil metals and inorganics contaminants and stratigraphy of the Site.

5.7.4 PAH Analysis

A total of eight (8) samples were selected for laboratory analysis. Results indicated one (1) location, MW10/17, at the northeast corner of the Site, and one (1) location, MW8/17, at the west side of the Site, which exhibited surface soil exceedances for one or more of Methylnaphthalene, 2-(1-), Naphthalene and Phenanthrene. Previous investigations, completed in 1995, identified one (1) location, MW-5, at the southeast portion of the Site, which exhibited subsurface soil exceedances for Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene and Phenanthrene, within the fill.

Historical soil sampling completed by GPEC in 1995 identified concentrations of Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene and Phenanthrene above the current CCME residential/parkland property use guidelines and concentrations of Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Fluoranthene, Phenanthrene and Pyrene above the current MOECC 2011 Table 9 standards. Exceedances in soil, both historically and currently, were distributed across the Site, but were only present within the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the vertical distribution of soil impacts which are limited to the fill layer. Due to the proximity of the exceedances on the west and southeast sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 4. See Figure 4d for lateral distribution of soil PAH contaminants. See Figures 9a, k – m for vertical distribution of soil PAH contaminants and stratigraphy of the Site.

5.7.5 PCB Analysis

A total of eight (8) samples were selected for laboratory analysis. All samples were below the applicable federal and provincial guidelines.

Previous investigations, completed in 1995, identified two (2) locations, MW-1 and MW-5, at the north and east sides of the Site, which exhibited subsurface soil exceedances for total DDD and Methoxychlor within the fill. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the vertical distribution of soil impacts which are limited to the fill layer. Due to the proximity of the exceedances on the north and east sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 5. See Figure 4e for lateral distribution of soil PCB contaminants.

5.8 Site Characterization: Ground Water Quality

AEL tested four (4) existing groundwater monitoring wells and five (5) newly installed groundwater monitoring wells installed across the property. One monitoring well, MW-5, did not have groundwater present, therefore a sample could not be obtained. Two monitoring wells, MW-2 and MW-4 could not be located, therefore a sample could not be obtained.

Eight (8) samples, along with one (1) duplicate and one (1) trip blank, were collected for the analyses of PHCs (F1 – F4) and VOCs (including BTEX); eight (8) samples, plus one (1) duplicate, were collected for analysis of metals and inorganics; and four (4) samples were collected for the analysis of PAHs and PCBs. The samples for metals analysis were field filtered.

5.8.1 PHC/BTEX Analysis

A total of eight (8) samples, along with one (1) duplicate, were selected for laboratory analysis. All samples returned concentrations below the FCSAP IGQGs for BTEX and PHC F1 and F2, however no guideline values exist for PHC F3 and F4. Four (4) samples (MW5/17, MW7/17, MW8/17 and MW10/17), plus the duplicate sample, did not meet the MOECC Table 9 guidelines for one or more of PHC F3, F4 and F4 gravimetric. Concentrations of PHCs F1 and F2 were also present in MW-1, MW-3S MW5/17, MW8/17 and MW10/17, although these were below the guideline.

The previous groundwater sampling event, undertaken by Golder in 2011, BTEX concentrations were non-detect in all wells, with the exception of MW-4, which returned low concentrations of Xylenes. Xylenes have been noted historically at MW-4, although have not exceeded federal guidelines. PHCs have not been sampled historically.

Exceedances in groundwater were distributed across the Site, but are likely related to the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the horizontal distribution of groundwater impacts which are limited to the wells within the fill area, and are not present in the background well (MW9/17). Due to the proximity of the exceedances on the north and west sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 8. See Figure 5a for lateral distribution of soil PHC and BTEX contaminants. See Figures 9a, n – p for vertical distribution of groundwater PHC and BTEX contaminants and stratigraphy of the Site.

5.8.2 VOC Analysis

A total of eight (8) samples, along with one (1) duplicate, were selected for laboratory analysis. Two (2) samples (MW5/17 and MW10/17), exceeded the FCSAP IGQGs for Chlorobenzene, and one (1) sample (MW-1) exceeded the MOECC Table 9 standard for Chlorobenzene. Concentrations of Chlorobenzene were also present in MW-3D and MW7/17, although these were below the guideline. Other VOCs were present across the Site in groundwater, including Acetone, Benzene, 1,4-Dichlorobenzene, Ethylbenzene, Toluene and Xylenes, although the concentrations were not above the FCSAP IGQGs.

Historically, concentrations of Chlorobenzene have exceeded the current FCSAP IGQGs at MW-2, MW-3, MW-4 and MW-5 in 1994 and at MW-2 and MW-5 in 1999. VOCs were not sampled in 2000, 2006 or 2011. The current results are within the range of historical Chlorobenzene concentrations, since 1994.

Other VOCs present in groundwater, but below the FCSAP IGQGs, included Acetone, Benzene, 1,4-Dichlorobenzene, Ethylbenzene, Toluene and Xylenes. All of these current results are within the range of historical concentrations, since 1994.

Exceedances in groundwater were distributed across the Site, but are likely related to the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the horizontal distribution of groundwater impacts which are limited to the wells within the fill area, and are not present in the background well (MW9/17). Due to the proximity of the exceedances on the north, west and southeast sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 9. See Figure 5b for lateral distribution of soil VOC contaminants. See Figures 9a, q – s for vertical distribution of groundwater VOC contaminants and stratigraphy of the Site.

5.8.3 Metals and Inorganics Analysis

A total of eight (8) samples, plus one (1) duplicate sample, were collected for analysis of metals and inorganics. Six (6) samples (MW-3D, MW-3S, MW5/17, MW-6, MW8/17 and MW10/17), plus the duplicate sample, exceeded the FCSAP IGQGs for one or more of Arsenic, Barium, Cadmium, Iron, Chloride and Cyanide; and two (2) samples (MW-1 and MW7/17) exceeded the MOECC Table 9 guidelines for Iron; and MW7/17 also exceeded the MOECC Table 9 standard for Cyanide.

In general, Iron concentrations across the Site have remained consistent since the previous groundwater sampling event, undertaken by Golder in 2011. Iron concentrations have historically exceeded the applicable criteria, and the current results are within the range of historical iron concentrations, since 1994.

In general, Arsenic concentrations have been variable since sampling for Arsenic began in 1999, but exceedances of the applicable standards have only been noted at one location, MW-3. The concentration of Arsenic at MW-3 has decreased since the previous groundwater sampling event, undertaken by Golder in 2011, and concentrations were non-detect at all other wells sampled.

It was noted by Golder in 2011 that the concentration of Cobalt at MW-3 was the highest to date in 2011, although the concentration did not exceed the FCSAP IGQGs. The concentration has decreased significantly, and is currently within range of historical Cobalt concentrations, since 1994.

Historically Zinc concentrations have been variable across the Site, exceeding the FCSAP IGQGs at MW-1, MW-2, MW-4 and MW-5 at various sampling events since 1994. No exceedances of Zinc were noted in the current sampling event, with all concentrations below the detection limit, which are within the range of historical Zinc concentrations, since 1994.

Chloride has not been sampled historically. The highest concentration of chloride was noted in the background well (MW9/17), and concentrations decreased with distance from this well. It is likely that there are naturally elevated levels of chloride present in the groundwater.

Cyanide has not been sampled historically. Cyanide exceeded the MOECC Table 9 standards at one location (MW7/17), and exceeded the FCSAP IGQGs at one location (MW5/17). It is likely the variability is related to the nature of the fill materials present in the landfill.

Exceedances in groundwater were distributed across the Site, but are likely related to the fill which was historically placed on-Site. The variable distribution of impacts suggests they are associated with the nature of fill materials used for infilling, and this source is reflected in the horizontal distribution of groundwater impacts which are limited to the wells within the fill area, and are not present in the background well (MW9/17), with the exception of Chloride, which is likely naturally occurring. Due to the proximity of the exceedances on the north, east and west sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 10. See Figure 5c for lateral distribution of soil metals and inorganics contaminants. See Figures 9a, t – v for vertical distribution of groundwater metals and inorganics contaminants and stratigraphy of the Site.

5.8.4 PAH Analysis

A total of four (4) samples were selected for laboratory analysis. Three (3) samples (MW-1, MW5/17 and MW10/17), exceeded the FCSAP IGQGs for one or more of Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Fluoranthene, Naphthalene, Phenanthrene and Pyrene. Other PAHs were present across the Site in groundwater, including Acenaphthene, Acenaphthylene, Benzo(b/j)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluorene, Indeno(1,2,3-cd)pyrene and Methylnaphthalene, 2-(1-), although the concentrations were not above the FCSAP IGQGs or the MOECC Table 9 standards.

PAHs have not been sampled historically. Several PAHs exceeded the FCSAP IGQGs at three locations (MW-1, MW5/17 and MW10/17), and PAHs are generally present across the Site, but were below the guideline. It is likely the variability is related to the nature of the fill materials present in the landfill, and this source is reflected in the horizontal distribution of groundwater impacts which are limited to the wells within the fill area, and are not present in the background well (MW9/17). Due to the proximity of the exceedances on the north and southeast sides of the Site boundary, impacts are delineated horizontally by the Site boundary at these locations.

A tabular representation of this analysis can be found in Table 11. See Figure 5d for lateral distribution of groundwater PAH contaminants. See Figures 9a, w – y for vertical distribution of groundwater PAH contaminants and stratigraphy of the Site.

5.8.5 PCB Analysis

A total of four (4) samples were selected for laboratory analysis. PCBs were present in groundwater at MW-1, MW5/17 and MW10/17, but concentrations were below the MOECC Table 9 standard.

Previous testing by Golder in 2011 returned an exceedance of PCBs at one location, MW-3. Current results of this well are inconclusive, as the detection limit was above the MOECC 2011 Table 9 standard. Historical exceedances were also noted at MW-1, in 2000. Concentrations of total PCBs was present in the current sampling event, but did not exceed the Table 9 standard. In general, PCB concentrations are lower than the previous sampling event in 2011, and all concentrations are within the range of historical PCB concentrations, since 1994. The distribution of PCB impacts suggests impacts are likely associated with the nature of fill materials used for infilling, and this source is reflected in the horizontal distribution of groundwater impacts which are limited to a localized area of the Site where infilling occurred. Due to the proximity of the exceedances on the north sides of the Site boundary, impacts are delineated horizontally by the Site boundary at this location.

A tabular representation of this analysis can be found in Table 12. See Figure 5e for lateral distribution of groundwater PCB contaminants.

5.9 Site Characterization: Sediment Quality

AEL obtained samples from one (1) location previously sampled and three (3) new locations not previously sampled. Sampling locations were chosen to represent on-site, as well as up- and down-stream conditions. Due to high water levels, a sample could not be obtained from one previously sampled location (SED1).

Four (4) samples were investigated for PHCs F1/BTEX – F4, metals and inorganics, VOCs, PAHs, and PCBs.

5.9.1 PHC/BTEX Analysis

A total of four (4) samples were selected for laboratory analysis. No guidelines currently exist for the presence of BTEX or PHCs in sediment, therefore no exceedances could be noted. All results were below the detection limit, with the exception of PHC F3 at SED6, and Toluene at SED6 and in the duplicate sample.

At the time of the Phase II investigation, water levels were very high, and thus water flow through the Old Sly dam was higher than normal. The location of SED6 was at the northeast side of a bay-like formation between the island and peninsula to the east of the rail tracks. Due to the high water flow and the bay formation, impacts at SED6 may be the result of deposition of contaminants carried into the bay and deposited in the sediment.

Historical sediment sampling did not test for BTEX or PHCs. PHCs and Toluene were identified both up- and down-stream of the Site. The presence of PHCs and Toluene indicate that there is likely a source up-stream of the Site, possibly related to the Lower Reach Park landfill, and impacts down-stream are not likely related to the Site.

A tabular representation of this analysis can be found in Table 14.

5.9.2 VOC Analysis

A total of four (4) samples were selected for laboratory analysis. No guidelines currently exist for the presence of VOCs in sediment, therefore no exceedances could be noted. All results were below the detection limit, with the exception of Acetone at SED6 and Toluene at SED6 and in the duplicate sample.

At the time of the Phase II investigation, water levels were very high, and thus water flow through the Old Sly dam was higher than normal. The location of SED6 was at the northeast side of a bay-like formation between the island and peninsula to the east of the rail tracks. Due to the high water flow and the bay formation, impacts at SED6 may be the result of deposition of contaminants carried into the bay and deposited in the sediment.

Historical sediment sampling did not test for VOCs. VOCs were identified both up- and down-stream of the Site. The presence of Acetone and Toluene indicate that there is likely a source up-stream of the Site, possibly related to the Lower Reach Park landfill, and impacts down-stream are not likely related to the Site.

A tabular representation of this analysis can be found in Table 15.

5.9.3 Metals and Inorganics Analysis

A total of four (4) samples were selected for laboratory analysis. Two (2) samples (SED5 and SED6) did not meet the CCME Freshwater PELs or the MOECC Table 9 guidelines for Lead and SED6 also exceeded the guidelines for Cyanide. One (1) sample (SED3) did not meet the CCME Freshwater ISQGs for Lead, but this sample did not exceed the CCME PEL.

Lead concentrations have increased slightly since the last sampling event in 2011 at SED3, but remain within the lower range of historical lead concentrations, since 1994.

The Lead concentration at SED5 is higher than the up-stream concentration at SED3. The Lead concentration at SED6 is also higher than SED3, and is similar to that of SED5. Although located on opposite sides of the peninsula, it is possible that the landfill is contributing a source of lead to the sediment. The location of these samples also may indicate a contributing source from the rail line, as they are all down-stream of the rail line.

Concentrations of Cadmium, Chromium, Lead, Mercury and Zinc have all decreased significantly at SED2 since the previous sampling event undertaken in 2011. Currently only Mercury is exceeding the CCME ISQG, but not the CCME PEL. Concentrations at this location were measured in 1994, 2011 and 2017. Concentrations increased significantly between 1994 and 2011, and then dropped down from 2011 to 2017, although levels still remain above the concentrations measured in 1994.

Exceedances noted at SED1 historically, and at SED6 currently, indicate that the rail line may be a contributing source to impacted sediment down-stream, as no exceedances were noted at SED7, which is down-stream of the island, but up-stream of the rail line, and concentrations of all parameters in general are lower than those at SED1 or SED6.

The variable distribution of metals and inorganics impacts suggests impacts are associated with the Site, and specifically from surface runoff of contaminated surface soil, groundwater seepage of contaminated groundwater and/or leaching from buried infill materials. These sources are reflected in the horizontal distribution of sediment impacts, which are highest immediately around the Site, and decrease down-stream.

A tabular representation of this analysis can be found in Table 16. See Figure 6a for lateral distribution of sediment metals and inorganics contaminants.

5.9.4 PAH Analysis

A total of four (4) samples were selected for laboratory analysis. Three (6) samples, plus the duplicate sample, did not meet the CCME Freshwater ISQGs for one or more of Acenaphthene, Acenaphthylene, Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Methylnaphthalene, 2-(1-), Phenanthrene and Pyrene, but these samples did not exceed the CCME PELs or the MOECC Table 9 guidelines.

Historical sediment sampling did not test for PAHs. PAHs were identified both up- and down-stream of the Site, but not at the most down-stream location sampled (SED10). The presence of PAHs indicates that there is likely a source up-stream of the Site, and the landfill may be acting as a contributing source to impacts down-stream, and specifically from surface runoff of contaminated surface soil, groundwater seepage of contaminated groundwater and/or leaching from buried infill materials.

A tabular representation of this analysis can be found in Table 17. See Figure 6b for lateral distribution of sediment PAH contaminants.

5.9.5 PCB Analysis

A total of four (4) samples were selected for laboratory analysis. One (1) sample did not meet the CCME Freshwater ISQG for Total PCBs, but this sample did not exceed the CCME PEL.

Current results of SED6 are inconclusive, as the detection limit was above the CCME Freshwater ISQG. As this location has never been sampled previously, there is no historical data available for comparison. Historical concentrations from SED1, and current concentration from SED7, both up-stream of SED6, were slightly lower than SED6, although SED6 is within the range of historical PCB concentrations measured at SED1, since 2000. The presence of PCBs indicates that the landfill may be acting as a contributing source to impacts down-stream, and specifically from surface runoff of contaminated surface soil, groundwater seepage of contaminated groundwater and/or leaching from buried infill materials.

A tabular representation of this analysis can be found in Table 18. See Figure 6c for lateral distribution of sediment PCB contaminants.

5.10 Site Characterization: Seepage Quality

AEL obtained samples from flowing seeps at two (2) locations. Two (2) seepage samples were collected from active seeps along the lock wall, at the north side of the site. One (1) sample (LOCK1) was collected from the upper lock, flowing from a crack in the lock wall onto the island, when the lock was full; and one (1) sample (SW3) was collected from the lower lock, flowing from a crack in the lock wall from the island to the lock, when the lock was empty. AEL did not note the presence of any black viscous substance, as described by Parks Canada Lock Staff, seeping from the lower lock wall, thus a sample was not collected. AEL also did not note any seepage in the area of OW-1 (formerly SED 3W), previously noted and sampled in 2011 and 2006, therefore a sample could not be obtained from this location.

Two (2) samples, plus one (1) duplicate sample, were investigated for VOCs and metals and inorganics.

5.10.1 VOC Analysis

A total of two (2) samples, along with one (1) duplicate, were selected for laboratory analysis. No exceedances of the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater or the MOECC PWQOs were noted, with the exception of Acrolein. The results for Acrolein in both samples were inconclusive as the RDL was above the applicable guideline value. As these locations have never been sampled previously, and VOCs have not been sampled for historically, there is no historical data available for comparison.

Acrolein is most commonly used as a biocide in the control of floating weeds and algae in irrigation canals. Current laboratory methods are not capable of detection limits as low as the current guideline value, therefore AEL cannot confirm if there are exceedances of Acrolein in the seepage samples.

Testing completed in 2006 indicated an exceedance of the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater for Toluene, but was below the detection limit when re-sampled in 2011. Although this seep could not be re-sampled in the current investigation, the seep sampled from the lower lock (SW3) had detectable low levels of Toluene, but did not exceeded the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater.

A tabular representation of this analysis can be found in Table 20. See Figure 7a for the location of these exceedances.

5.10.2 Metals and Inorganics Analysis

A total of two (2) samples, along with one (1) duplicate, were selected for laboratory analysis. One (1) sample, from SW3, did not meet the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater or the MOECC PWQOs for total un-ionized ammonia, dissolved Oxygen and Iron. The results for Mercury, total Cadmium and total Selenium in both samples were inconclusive as the RDLs were above the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater, but were below the MOECC PWQOs.

As SW3 has never been sampled previously, there is no historical data available. Historical concentrations of Iron at OW-1 (formerly SED 3W), located below the lower lock, were higher than the concentration of Iron at SW3 in 2011, but lower in 2006. In general, Iron concentrations are thus within the range of historical Iron concentrations, since 2006. Dissolved Oxygen has not historically been sampled for, although given that the sample was obtained from a seep in the lock wall, the concentration of dissolved would expected to be lower than compared to a surface water sample. This is corroborated by field measurements taken of groundwater during purging of the groundwater wells, and of surface water during sample collection, which indicated the dissolved oxygen concentration of SW3 was slightly higher than groundwater, but lower than surface water.

A tabular representation of this analysis can be found in Table 21. See Figure 7b for the location of these exceedances.

5.11 Site Characterization: Surface Water Quality

AEL obtained samples from one (1) location previously sampled and three (3) new locations not previously sampled. Sampling locations were chosen to represent on-site as well as up- and down-stream conditions. Due to high water levels, a sample could not be obtained from two previously sampled locations (RR1 and SW5/RR5).

Four (4) samples were investigated for VOCs and metals and inorganics.

5.11.1 VOC Analysis

A total of four (4) samples were selected for laboratory analysis. No exceedances of the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater or the MOECC PWQOs were noted, with the exception of Acrolein. The results for Acrolein in both samples were inconclusive as the RDL was above the applicable guideline value. As these locations have never been sampled previously, and VOCs have not been sampled for historically, there is no historical data available.

Acrolein is most commonly used as a biocide in the control of floating weeds and algae in irrigation canals. Current laboratory methods are not capable of detection limits as low as the current guideline value, therefore AEL cannot confirm if there are exceedances of Acrolein in the seepage samples.

A tabular representation of this analysis can be found in Table 22.

5.11.2 Metals and Inorganics Analysis

A total of four (4) samples were selected for laboratory analysis. One (1) sample, from RR3, did not meet the MOECC PWQO for total un-ionized ammonia. The results for Mercury, total Cadmium and total Selenium in all samples were inconclusive as the RDLs were above the CCME Water Quality Guidelines for the Protection of Aquatic Life in Freshwater, but were below the MOECC PWQOs.

Previous investigations, conducted from 1995 to 2011, also identified exceedances of Iron and Mercury at one (1) additional location, RR1.

As total un-ionized ammonia has not been sampled for historically in surface water, there is no historical data available for comparison. When compared to the surrounding sampling locations, concentrations of total un-ionized ammonia were also above the guideline at the seepage sample (SW3), taken from the lock wall just up-stream of RR3, but had decreased to below the guideline further down-stream, at SW7. This indicates that seepage may be having an impact immediately downstream of the lock, but impacts do not extend past SW7. The locations of exceedances would suggest that the Site may be a contributing source of un-ionized ammonia, but these impacts are localized, and an additional source is likely present downstream.

The variable distribution of metals and inorganics impacts suggests impacts are associated with the Site, and specifically from surface runoff of contaminated surface soil, groundwater seepage of contaminated groundwater and/or leaching from buried infill materials. These sources are reflected in the horizontal distribution of sediment impacts, which are highest immediately around the Site, and decrease down-stream.

A tabular representation of this analysis can be found in Table 23. See Figure 8 for lateral distribution of surface water metals and inorganics contaminants.

5.12 Quality Assurance and Quality Control Results

All certificates of analysis or analytical reports received comply with the applicable regulation and/or guideline. Certificates of analysis have been received for each sample submitted for analysis and all certificates of analysis received are included in full, in Appendix 3.

5.12.1 Soil Sample QA/QC

5.12.1.1 Soil RPD

As part of the field investigation 10% QA/QC field duplicate soil samples were collected and analyzed. Two (2) soil duplicates (A0233 and A0257, duplicates of A0230 and A0256, respectively) were submitted.

Analytical results for the QA/QC field duplicate samples in soil are presented in Appendix 3. Relative percent differences (RPDs) were calculated only where detected concentrations in both samples were greater than the five (5) times the laboratory reportable detection limit (RDL). All RPDs were within industry acceptance limits confirming that sample handling and analytical protocols were acceptable and the results were reproducible.

5.12.1.2 Analytical Laboratory QA/QC

The analytical laboratory performed matrix spikes, spiked blanks, method blanks as well as performing their own RPD calculations and percent recovery calculations, where indicated (see Appendix 3).

Sodium was not detected in samples A0215 (MW7/17), A0219 (MW10/17), A0228 (BH11/17), A0224 (BH12/17), A0225 (BH12/17), A0232 (BH13/17), A0256 (Pond), A0216 (MW7/17), A0220 (MW10/17), A0231 (BH13/17), A0241 (MW5/17), A0254 (MW9/17) and A0251 (MW9/17), as well as the duplicate sample. To report the SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio. All results were below criteria.

For sample A0225 (BH12/17), it was reported that due to the sample matrix, dilution was required for PAH analysis, and detection limits were adjusted accordingly. All adjusted detection limits remained below the applicable guideline values.

For sample A0256 (Pond), it was reported that due to a high moisture content, detection limits were adjusted for PAH and PCB analysis. All adjusted detection limits remained below the applicable guideline values.

For sample A0254 (MW9/17), it was reported that due to the sample matrix, dilution was required for metals analysis, and detection limits were adjusted accordingly. All adjusted detection limits remained below the applicable guideline values.

For QC batch 5152238 it was reported that the matrix spike recovery for Chromium VI (CrVI) was below the Lab's lower control limits and was attributed to the reducing environment of the sample. Since the environment is the same as our sample, any CrVI released at these sample points on the Site would have been reduced to become less toxic, although an overall increase in total Chromium would be seen. Total Chromium did not exceed the allowable limits for the samples and thus is not of a concern.

5.12.2 Groundwater Sample QA/QC

5.12.2.1 Groundwater RPD

As part of the field investigation 10% QA/QC field duplicate groundwater samples were collected and analyzed. One (1) groundwater duplicate (A0247, duplicate of A0246) was submitted.

Analytical results for the QA/QC field duplicate samples in groundwater are presented in Appendix 3. Relative percent differences (RPDs) were calculated only where detected concentrations in both samples were greater than the five (5) times the laboratory reportable detection limit (RDL).

The RPD for MW8/17 (A0246 and A0247) for PHC F3 was calculated to be outside the acceptability limits. This confidence was then evaluated in relation to the MOECC Table 9 parkland standard that is being used for the Sample. An increase in the value of the PHC F3 was calculated by adding the difference between the duplicate sample and the parent sample. As both samples were already well above the stated Table 9 standard, the apparent confidence in the value is not a concern to the Site.

All other RPDs were within industry acceptance limits confirming that sample handling and analytical protocols were acceptable and the results were reproducible.

5.12.2.2 Analytical Laboratory QA/QC

The analytical laboratory performed matrix spikes, spiked blanks, method blanks as well as performing their own RPD calculations and percent recovery calculations, where indicated (see Appendix 3).

For all VOC, PHC, PAH, Chromium VI, Cyanide and Chloride samples for analysis, some bottles had visible sediment which was included in the analysis. This may represent a high bias in some results for these specific analytes.

For sample A0262 (MW9/17), it was reported that due to matrix interferences, dilution was required for PCB analysis, and detection limits were adjusted accordingly. All adjusted detection limits remained below the applicable guideline values.

For sample A0193 (MW-3D), a smaller portion of the sample was extracted for PCB analysis, due to the nature of the sample matrix. Detection limits were adjusted accordingly, which resulted in the RDL being greater than the applicable standard (see Table 5-1 below). Although this analyte is not necessarily considered a contaminant of concern, this is viewed as an exceedance since it exceeds the MOECC Table 9 standard.

Samples A0193 (MW-3D), A0194 (MW-3S) and A0191 (MW-6) had a RDL which exceeded FCSAP IGQGs (see Table 5-1 below). Although these analytes are not all considered contaminants of concern, they are viewed as exceedances since they exceed the Table 2 FCSAP IGQGs.

Table 5-1 Groundwater Exceedances Due to Sample Dilution and Adjusted RDL		
Location	Sample ID	Soil Exceedance
MW-3D	A0193	Cadmium, Selenium, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Fluoranthene, Pyrene, Total PCBs
MW-3S	A0194	Cadmium, Selenium
MW-6	A0191	Cadmium, Selenium

5.12.3 Sediment Sample QA/QC

5.12.3.1 Sediment RPD

As part of the field investigation 10% QA/QC field duplicate soil samples were collected and analyzed. One (1) soil duplicate (A0213, duplicate of A0197) was submitted.

Analytical results for the QA/QC field duplicate samples in soil are presented in Appendix 3. Relative percent differences (RPDs) were calculated only where detected concentrations in both samples were greater than the five (5) times the laboratory reportable detection limit (RDL).

The RPD for SED2 (A0197 and A0213) for Indeno(1,2,3-cd)pyrene was calculated to be outside the acceptability limits. This confidence was then evaluated in relation to the MOECC Table 9 parkland guideline standard that is being used for the Sample. An increase in the value of the Indeno(1,2,3-cd) pyrene was calculated by adding the difference between the duplicate sample and the parent sample. This increase did not result in an exceedance of the Table 9 standard, and thus the apparent confidence in the value is not a concern to the Site.

All other RPDs were within industry acceptance limits confirming that sample handling and analytical protocols were acceptable and the results were reproducible.

5.12.3.2 Analytical Laboratory QA/QC

The analytical laboratory performed matrix spikes, spiked blanks, method blanks as well as performing their own RPD calculations and percent recovery calculations, where indicated (see Appendix 3).

Sodium was not detected in samples A0198 (SED7), A0204 (SED5) and A0206 (SED3). To report the SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio. All results were below criteria.

For samples A0197 (SED2), A0200 (SED10), A0202 (SED6) and the duplicate sample, it was reported that due to a high moisture content, detection limits were adjusted for F24FID, PAH and PCB analysis. This resulted in some RDLs being greater than the applicable guideline or standard (see Table 5-2 below). Although these analytes are not all considered contaminants of concern, they are viewed as exceedances since they exceed the CCME Freshwater PELs or the MOECC Table 9 guidelines.

Table 5-2 Sediment Exceedances Due to Sample Dilution and Adjusted RDL

Location	Sample ID	Sediment Exceedance
SED2	A0197 A0213, Duplicate of A0197	Acenaphthylene, Dibenz(a,h)anthracene
SED10	A0200	Dibenz(a,h)anthracene
SED6	A0202	Acenaphthylene, Dibenz(a,h)anthracene, Total PCBs

For samples A0200 (SED10) and A0202 (SED6), it was reported that due to a high moisture content, detection limits were adjusted for VOC and PHC F1 analysis. All adjusted detection limits remained below the applicable guideline values.

For QC batch 5146206 it was reported that the matrix spike recovery for Chromium VI (CrVI) was below the Lab's lower control limits and was attributed to the reducing environment of the sample. Since the environment is the same as our sample, any CrVI released at these sample points on the Site would have been reduced to become less toxic, although an overall increase in total Chromium would be seen. Total Chromium did not exceed the allowable limits for the samples and thus is not of a concern.

For QC batch 5168391 it was reported that the recovery Matrix Spike for Antimony was outside control limits, but the overall quality control for this analysis met acceptability criteria.

5.12.4 Surface Water/Seepage Sample QA/QC

5.12.4.1 Surface Water/Seepage RPD

As part of the field investigation 10% QA/QC field duplicate soil samples were collected and analyzed. Two (2) surface water/seepage duplicates (A0210 and A0249, duplicates of A0196 and A0239, respectively) were submitted.

Analytical results for the QA/QC field duplicate samples in soil are presented in Appendix 3. Relative percent differences (RPDs) were calculated only where detected concentrations in both samples were greater than the five (5) times the laboratory reportable detection limit (RDL). All RPDs were within industry acceptance limits confirming that sample handling and analytical protocols were acceptable and the results were reproducible.

5.12.4.2 Analytical Laboratory QA/QC

The analytical laboratory performed matrix spikes, spiked blanks, method blanks as well as performing their own RPD calculations and percent recovery calculations, where indicated (see Appendix 3).

5.13 Benthic Invertebrate Assessment

Based on the results of sediment monitoring, a study of benthic communities was undertaken in an effort to assess impacts from sediment quality on certain ecological receptors. This study was carried out by EcoMetrix Inc., under the direction of AEL, in November 2017. The study followed the Canadian Aquatic Biomonitoring Network (CABIN) protocol, and examined communities on-site, in comparison to communities up- and down-stream.

Sampling locations were selected based on sediment sampling undertaken during the Phase II ESA, to target communities in the area of sediment exceedances, as outlined in Section 5.9. Five (5) sampling locations were selected, representing three (3) different area types:

- SED4 – upstream control, lentic ecosystem;
- SED3 and SED5 – on-site, exposed canal;
- SED6 and SED7 – on-site, exposed lotic ecosystem.

SED4, SED3 and SED5 were all located in similar habitats (lentic ecosystems), while SED6 and SED7 were located in similar habitats (lotic ecosystems). The location of SED10 was originally chosen to be sampled, as a downstream control; however, this location was found to be frozen over at the time of sampling, so SED7 was selected for sampling instead, as flow was typical of that sampled in CABIN reference datasets.

Benthic communities were evaluated through calculated summary metrics of mean invertebrate abundance, mean taxon richness, Simpson's Diversity, and Evenness. Hilsenhoff's biotic index (BI) was also calculated at the genus level, and used to infer potential community impairments. The BI calculated indicates the overall tolerance of a benthic community, based on genus specific tolerance values for organic pollutants.

It was noted that field measurements of temperature and conductivity were found to be higher at SED3 and SED5, as compared to SED4. This was attributed to groundwater/solute inputs at SED3 and SED5, which may be related to the leaks noted in the lock wall.

Evaluation of biotic endpoints indicated that the up-stream and canal locations have benthic invertebrate communities which are representative of good to fair water quality conditions (see appendix 4 Figure 3-3 page 3.5 for bar graph). The community structure of lentic environments is comprised of fewer EPT taxa relative to that of lotic systems (Merritt et al., 2008). Therefore, it is not surprising that %EPT is lower at the upstream location as this station occurs at the lake shoreline (see Appendix 4, Figure 1-1, page 1-1). It was noted that in general, the upstream and canal locations are similar in community richness, abundance, diversity measures and Functional Feeding Groups, however a slight difference was noted in community structure, attributed to the fact that the canal locations experience flow only during the summer months when the canal is active, whereas the upstream location is representative of a true lentic ecosystem. The very low numbers of EPT taxa in upstream location is due to the community structure difference between lentic and lotic environments (see Appendix 4, Tables 2-1 and 3-2 , appendix pages 2.3 and 3.6, respectively).

Evaluation of biotic endpoints at one location, SED7, indicated that the benthic invertebrate community may experience anthropogenic impacts, having fairly poor water quality. When compared to SED6, this location showed no appreciable anthropogenic impacts, having good water quality.

It was concluded that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the Old Sly Lock area, and impacts at SED7 may not be due to the historic landfill as many anthropogenic disturbances likely affect this area.

6. Human Health Risk Assessment

6.1 Introduction

6.1.1 Background and Objectives

The Site is an island, located within the Rideau River, and is used as parkland. The Site historically operated as a landfill in the mid-1960's, and potential environmental concerns at the Site were identified due to the presence of buried landfill materials. COCs identified in soil and/or groundwater at the Site include PHCs, VOCs, PAHs, and inorganic parameters. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water.

The objective of the human health risk assessment (HHRA) is to evaluate human exposure to users of the Site, including members of the public and workers, to the COCs in soil, groundwater, sediment, and surface water and to identify the need for any risk management measures. In addition, construction activities are planned for the Site and the HHRA is to evaluate the risks associated with those activities.

6.1.2 Site Description

The Site consists of an island, approximately 11,700 m^2 (1.17 Ha) in size, located within the Rideau River and is used as parkland. The Rideau River is present to the east and west of the Site, and the Old Slys Lockstation and associated weir are present to the north and south of the Site. Surrounding land uses include parkland and residential to the northeast.

There are no buildings or structures on-Site. The entire Site is covered with grasses and trees/shrubs. A gated vehicle access point is located at the southwest corner of the Site. The Site is publicly accessible and access is not restricted. No change in land use is proposed. The Site is not serviced by utilities; however, the surrounding properties are serviced by the municipality for water and sewage.

In the 1960's, the Site was used as a landfill by the Town of Smiths Falls. There is no liner for the landfill and it is not capped. There is a thin layer of topsoil overlying fill or sand/gravel and the Site is vegetated with grass and trees. Groundwater at the Site is very shallow (0.64 m bgs). Old Slys Island is graded down towards the east, creating up to a 4 m head of water from the west side of the Island to the east. As the CP rail line is present at the east side of the Island, this creates a dam-like structure, forcing groundwater to flow to the north and south, around the rail line. Groundwater flow at the north side of the Site is likely influenced by the operation of the lock system at the north side of the Site. Operational from May to October, the locks are opened and closed, reportedly causing vertical groundwater fluctuations on the island of between 1.5 m near the lock, and 0.4 m away from the lock. This operation effectively "flushes" water into the landfill when the locks are filled, and allows groundwater to seep out when the locks are emptied.

As discussed in Section 2.2, several ESAs have been completed at the Site, from 1994 to 2017. The ESAs have included collection and laboratory analysis of samples of soil, groundwater, sediment, and surface water for a broad range of parameters. Consistent with the source of the COCs being a landfill, the COCs are heterogeneously distributed, both laterally and vertically. These ESAs have identified the following parameters as COCs:

Soil: Ethylbenzene, toluene, xylenes, PHCs (F2 to F4 fractions); trichloroethylene; anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor, DDD; antimony, arsenic, cadmium, copper, lead, nickel, tin, and zinc were measured in excess of soil guidelines.

Groundwater: PHCs (F3 and F4 fractions); chlorobenzene; anthracene, benzo[a]anthracene, benzo[a]pyrene, fluoranthene, naphthalene, phenanthrene, pyrene; arsenic, chloride, cyanide (free), and iron were measured in excess of guidelines. Cadmium and selenium were not detected; however, the detection limits of 0.10 and 2.0 ug/L, respectively, exceeded groundwater guidelines.

Sediment: Arsenic and lead were measured in excess of CCME Probable Effect Levels (PELs). Acenaphthene, acenaphthylene, benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluoranthene, methylnaphthalene, phenanthrene, pyrene, and mercury were measured in excess of ISQGs. Cobalt, cyanide (free), nickel, and silver were measured in excess of MOECC standards (no CCME guidelines are available). Acetone, toluene, benzo[b/j]fluoranthene, antimony, barium, beryllium, boron, molybdenum, selenium, thallium, uranium, vanadium were detected; however no sediment guidelines are available. PCBs were not detected; however, the detection limit exceeded the ISQG, but was below the PEL.

Surface water: Cyanide (free) and un-ionized ammonia were measured in excess of surface water guidelines. Acrolein, cadmium, mercury, and selenium were not detected; however, the detection limits exceeded guidelines, but were below PWQO. Detection limits (DL) for Acrolein were three orders of magnitude greater than PWQO , however, acrolein parameter was only included in the general list of analytes by the lab, but there is no background supporting information or reason to believe that it is a contaminant of potential concern, therefore, it was not carried forward in the RA.

6.1.3 Scope of Human Health Risk Assessment

The HHRA uses a combination of qualitative and quantitative approaches. The COCs in soil, groundwater, sediment, and surface water are identified, as described above, based on comparison with applicable guidelines. The components considered in derivation of the guidelines are then examined for their relevance to human health and to the exposure pathways present at the Site (e.g. soil guideline components for protection of inhalation of vapours indoors are not applicable to the Site). This process qualitatively eliminates many of the COCs as a concern for human exposure at the Site. Exposures to the COCs remaining following this screening process are then quantified. Tables 27 to 30 present comparative criteria for the COCs for soil, groundwater, sediment, and surface water, respectively, used to screen the COCs for exposure pathways relevant to the Site. The results of this comparison are discussed in Section 6.2.

6.2 Problem Formulation

Problem formulation is the first step in the human health risk assessment process. It comprises the identification of COCs at the Site and the receptors that may be exposed to those contaminants. The conceptual site model is developed during the problem formulation stage. The conceptual site model and risk assessment included the site specific construction activities proposed for the Site: construction of upstream and downstream cofferdams; de-watering of work areas; removal of algae, debris and zebra mussels; saw-cutting and raking mortar joints; removal of deteriorated stones/materials; potential for excavation behind lock/approach walls; masonry/grouting; and, landscaping, site reinstatement to previous condition.

6.2.1 Site Characterization

The results of ESAs completed at the Site have identified PHCs, VOCs, PAHs, and inorganic parameters as COCs in soil and/or groundwater. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water. Tables 6, 7, 13, 19, and 24 summarize the maximum measured concentrations of all parameters analyzed in samples of surface soil, subsurface soil, groundwater, sediment, and surface water, respectively, and identifies those parameters that exceed guidelines. The locations of the exceedances are presented on Figures 4 to 8. Figures 9a to 9y present the exceedances in soil and groundwater as cross-sections.

6.2.2 Hazard Identification

The maximum measured concentrations of the COCs are presented in Tables 27 to 30 for soil, groundwater, sediment, and surface water, respectively, along with comparative criteria used to screen the COCs for exposure pathways relevant to the Site. Note that for soil and groundwater, the maximum concentrations are presented separately for locations within 10 m of surface water and more than 10 m from surface water as the CCME guidelines are not applicable within 10 m of surface water. As discussed in Section 1.4, MOECC standards developed for sites adjacent to water bodies are applied within 10 m of surface water. Note, also, that for this initial screening, the soil evaluation does not distinguish between COCs identified in surface soil and subsurface soil; all soil COCs are considered accessible. The results of the screening are as follows:

Soil: The CCME soil quality guidelines are based on consideration of multiple human health components, as shown in Table 27. There are no buildings on the Site and groundwater is not used for drinking water and, therefore, those components do not need to be considered (i.e., the components identified as indoor air, drinking water check, and produce, meat, dairy check in Table 27 are not relevant to the Site). For the current and future use of the Site, the relevant components are those protective of soil ingestion, dermal contact with soil, and inhalation of particulate matter, and the COCs measured in excess of applicable guidelines for one or more of these components are: anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor; antimony, arsenic, lead, nickel, tin, and zinc. These are the COCs carried forward for further evaluation of human exposure.

Groundwater: As for soil, the groundwater guidelines are based on consideration of multiple human components, as shown in Table 28. There are no buildings on the Site and groundwater is not used for drinking water; however, because groundwater is so shallow, there is a potential for direct contact and incidental ingestion of groundwater by human receptors. Therefore, the maximum measured concentrations are conservatively compared with the Guidelines for Canadian Drinking Water Quality (GCDWQ) or, in the absence of a GCDWQ, the drinking water component of the MOECC Site Condition Standards. As shown in Table 28, the following COCs are identified as requiring further evaluation of human exposure through dermal contact and incidental groundwater ingestion: PHCs (F3 and F4 fractions), benzo[a]pyrene, fluoranthene, and arsenic.

Sediment: VOCs, PAHs, PCBs, and inorganic parameters have been identified as COCs in sediment based on comparison with guidelines protective of ecological receptors. Sediment guidelines based on human exposure are not available. For the Site, members of the public use the surface water for swimming and construction workers will be required to enter the water to complete some of the proposed construction activities. Human exposure to sediment is considered incomplete as there would not be any opportunity for direct contact with sediment (this differs from a lake, where swimmers may have contact with sediment when wading). Construction workers/divers contacting sediment during repairs would be wearing thermal protection (wet suit/dry suit) and would not have direct contact with the sediment. Some sediment may become suspended in the water column, in particular during the proposed construction activities. Exposure to suspended sediment particles is generally considered nominal as USEPA (2004) notes that suspended sediment particles are much less available for dermal absorption due to inefficient adsorption of suspended particles onto the skin surface and a slower rate of absorption into the skin. Therefore, human exposure to the COCs in sediment is not evaluated further.

Surface water: As shown in Table 30, the maximum measured concentrations of the unfiltered surface water COCs are compared with guidelines relevant to aquatic receptors (CCME FAL, MOECC PWQO, and MOECC aquatic protection values). Due to the potential for a human receptor to incidentally ingest surface water, the maximum measured concentrations and detection limits are conservatively compared with the GCDWQ in Table 30. The maximum measured concentration of cyanide (free) and the detection limits for cadmium, mercury, and selenium are much less than their respective GCDWQs and human exposure to these COCs does not require further evaluation. GCDWQs are not available for acrolein or un-ionized ammonia. Acrolein has not been detected; however, the detection limit exceeded the MOECC PWQO. Acrolein as a parameter was only included in the general list of analytes by the lab, but there is no background supporting information nor reason to believe that it is a contaminant of potential concern, therefore, it was not carried forward in the RA and therefore, potential human exposure to acrolein in surface water is not considered further. Health Canada (2013) completed a review of ammonia in drinking water and determined that it was not necessary to establish a GCDWQ due to the low toxicity of ammonia. Potential human exposure to ammonia in surface water is not evaluated further.

6.2.3 Receptor Identification

The human receptors potentially exposed to the COCs at the Site are members of the public of all ages using the park or the Lockstation, including for fishing and swimming; long-term and short-term workers operating the Lockstation or completing routine maintenance of the Site; and construction workers completing the proposed construction activities.

6.2.4 Exposure Pathway Identification

COCs at the Site are believed to be due to the presence of buried landfill materials. The soil COCs identified as requiring further human evaluation include PAHs, semi-VOCs, and inorganic parameters and the groundwater COCs requiring further evaluation are PHCs (F3 and F4 fractions), benzo[a]pyrene, fluoranthene, and arsenic. The COCs may be adsorbed to soil particles and leach from soil to groundwater due to infiltration of precipitation. Operation of the Lockstation causes vertical movement of groundwater in addition to flushing COCs into and out of surface water. In addition, dewatering during maintenance and construction activities may draw groundwater to the dewatered area. As discussed in Section 6.2.2, human exposure to sediment at the Site is considered incomplete and no surface water COCs were identified as requiring further evaluation of human exposure due to incidental ingestion of surface water.

There are three receptor types identified for the Site: Site visitors, Long-term workers, and Construction workers. The exposure pathways for all three receptor types are the same; however, the frequency and duration of exposure will differ. For the soil COCs, the exposure pathways are incidental ingestion of soil, dermal contact with soil, and inhalation of particulate matter. None of the soil COCs are sufficiently volatile for inhalation of vapours outdoors to be a concern. For the groundwater COCs, the exposure pathways are incidental ingestion of groundwater and dermal contact with groundwater. As for soil, the groundwater COCs are not sufficiently volatile for inhalation of vapours outdoors to be a concern. Roots of vegetation will contact the soil and groundwater and may uptake the COCs; however, ingestion of vegetation is not typically considered complete for human receptors at a site used for parkland as it would not provide a substantial source of food. Old Slys Lockstation surface vegetation such as occasional berry bushes, do not operate as a significant food source for visitors or on site workers.

6.2.5 Site Conceptual Model

The Site is an island, located within the Rideau River, and is used as parkland. The Site historically operated as a landfill in the mid-1960's, and potential environmental concerns at the Site were identified due to the presence of buried landfill materials. The results of ESAs completed at the Site have identified PHCs, VOCs, PAHs, and inorganic parameters as COCs in soil and/or groundwater. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water.

The objective of the HHRA is to evaluate human exposure to users of the Site, including members of the public and workers, to the COCs in soil, groundwater, sediment, and surface water and to identify the need for any risk management measures. In addition, construction activities are planned for the Site and the HHRA is to evaluate the risks associated with those activities.

There are no buildings or structures on-Site. The entire Site is covered with grasses and trees/shrubs. The Site is publicly accessible and access is not restricted. No change in land use is proposed. The Site is not serviced by utilities; however, the surrounding properties are serviced by the municipality for water and sewage. Groundwater at the Site is very shallow.

The human receptors potentially exposed to the COCs at the Site are members of the public of all ages using the park or the Lockstation, including for fishing and swimming; long-term and short-term workers operating the Lockstation or completing routine maintenance of the Site; and construction workers completing the proposed construction activities. The exposure pathways for all three receptor types are the same; however, the frequency and duration of exposure will differ. For the soil COCs, the exposure pathways are incidental ingestion of soil, dermal contact with soil, and inhalation of particulate matter. None of the soil COCs are sufficiently volatile for inhalation of vapours outdoors to be a concern. For the groundwater COCs, the exposure pathways are incidental ingestion of groundwater and dermal contact with groundwater. As for soil, the groundwater COCs are not sufficiently volatile for inhalation of vapours outdoors to be a concern. Roots of vegetation will contact the soil and groundwater and may uptake the COCs; however, ingestion of vegetation is not typically considered complete for human receptors at a site used for parkland.

Comparative criteria are used to screen the COCs for exposure pathways relevant to the Site. The results of the screening identified the following soil COCs as requiring further evaluation of human exposure to contaminated soil: anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor; antimony, arsenic, lead, nickel, tin, and zinc. The following groundwater COCs require further evaluation of human exposure to contaminated groundwater: PHCs (F3 and F4 fractions), benzo[a]pyrene, fluoranthene, and arsenic. Human exposure to sediment is considered incomplete and no surface water COCs were identified as requiring further evaluation of human exposure to surface water contaminants.

The human health conceptual site model is shown on Figure 10a.

6.3 Exposure Assessment

The exposure assessment consists of the following steps: characterization of the potentially exposed receptors, identification of the pathways of exposure, and estimation of exposure of the receptors to the COCs.

6.3.1 Characterization of Contaminant Concentrations

PHCs, PAHs, methoxychlor, and inorganic parameters have been measured in samples of soil and/or groundwater collected from the Site at concentrations requiring further evaluation for human exposure. The maximum measured concentrations in soil and groundwater are summarized in Tables 27 and 28, respectively. The maximum measured concentrations are used for all calculations and, as described in Section 6.5.1, for COCs for which the predicted risk exceeds the target level, risks are also calculated using average concentrations (described in more detail in Section 6.5.1).

6.3.2 Characterization of Parameters Governing Contaminant Fate and Transport

Soil and groundwater are the relevant media evaluated for human exposure and concentrations of the COCs in these media have been determined.

Chemical-specific information is required in order to evaluate dermal exposure to soil and groundwater and it is summarized in Table 31.

6.3.3 Fate and Transport Modelling

Fate and transport modelling was not required as the media of concern, soil and groundwater, have been characterized. None of the COCs are volatile, which would require modelling of air concentrations. As mentioned in Section 6.3.1, the maximum measured concentrations of each COC in soil and groundwater are initially used in the exposure calculations. For COCs for which the predicted risk exceeds the target level, risks are also calculated using average concentrations.

6.3.4 Receptor Characterization

As discussed in Section 6.2.5, there are three types of receptors to be evaluated: Site visitors (all ages), Long-term outdoor workers, and Construction workers.

In accordance with the protocol for conducting human health risk assessments established by the CCME (2006), toddlers (age 7 months to 4 years of age) are the selected receptors for evaluation of exposure to threshold chemicals (i.e., non-carcinogenic effects). Children in this age group generally have the highest inhalation and ingestion rates, per unit of body weight, compared with other age groups, resulting in a higher potential for exposure to chemicals in the environment. Also, the behavioural characteristics of toddlers (e.g. increased hand to mouth activity) enhance the exposure of children to chemicals in soil or dust. For evaluation of exposure to non-threshold chemicals (carcinogens), the weighted average chronic daily intake (CDI) is calculated by summing the exposures for each of the five life stages (adult, teen, child, toddler, and infant). As indicated in Table 34, the toxicological reference value for nickel is based on developmental effects and, therefore, exposure to nickel is not pro-rated, i.e., the receptors are assumed to be on the Site for 365 days per year.

The assumed receptor characteristics for each receptor are summarized in Table 32 and are discussed below. Inputs for physical characteristics such as body weight, soil ingestion rate, skin surface area, and inhalation rate are average values obtained from Health Canada (2010a). The rationale for selection of the other receptor characteristics is described below.

Site visitor: The Site visitor is assumed to be outdoors for 1.5 hours per day (Health Canada, 2010a) and to spend this entire period at the Site, which is very conservative. Due to snow cover and the protective effect of clothing in the cooler months, outdoor exposure is assumed to occur for 26 weeks per year. The adult, toddler, and infant visitors are assumed to visit the Site five days per week, while the teen and child are assumed to visit on weekends only (two days per week). The toddler is assumed to wade in groundwater pooled at the ground surface once per week for 0.25 hours (as described in Section 6.3.5, only toddler exposure to groundwater is quantified). The Virginia

Department of Environmental Quality (VDEQ, 2016) recommends a water ingestion rate of 5 mL per hour for wading in surface water, which corresponds to 10% of the USEPA value for ingestion of surface water when swimming. Lifetime exposure is conservatively assumed and the exposure duration is set equal to the duration of the life stage (60 y for adult, 8 y for teen, 7 y for child, 4.5 y for toddler, and 0.5 y for infant).

Long-term workers: The Long-term worker is quantitatively evaluated for routine, daily exposure to soil and groundwater. Approximately every 15 to 20 years, the Long-term worker may assist with clearing material from the lock chamber. Occasional, short-term activities not quantitatively evaluated for the Long-term worker in the HHRA and it is recommended that, if these activities result in direct contact with sediment, then measures to limit dermal contact with sediment be employed (i.e., wearing of long pants, sleeves, and gloves). The Long-term worker is assumed to be present ten hours per day, five days per week, 26 weeks of the year (the locks are operational from May to October). The exposure duration of the worker is assumed to be 35 years, consistent with Health Canada (2010a) for a worker. The Long-term worker is assumed to have occasional contact with groundwater (once per day for 0.5 h). The rate of incidental ingestion of groundwater is assumed to be 0.02 L/d based on guidance provided by the State of Virginia (VDEQ, 2016) for construction workers, due to splashing and hand-to-mouth contact.

Construction workers: The following construction activities are proposed for the Site: construction of upstream and downstream cofferdams; de-watering of work areas; removal of algae, debris and zebra mussels; saw-cutting and raking mortar joints; removal of deteriorated stones/materials; potential for excavation behind lock/approach walls; masonry/grouting; and, landscaping, site reinstatement to previous condition. The receptor characteristics of the Construction worker are similar to those of the Long-term worker; however, longer contact with groundwater is assumed for the Construction worker. The Construction worker is assumed to be present ten hours per day, five days per week, 26 weeks per year for two years. The Construction worker is assumed to have contact with groundwater once per day for 2.0 h. The rate of incidental ingestion of groundwater is assumed to be 0.02 L/d, the same as for the Long-term worker (VDEQ, 2016).

6.3.5 Exposure Estimation

The exposure pathways to be evaluated are:

- Incidental ingestion of soil,
- Dermal contact with soil,
- Inhalation of particulate matter,
- Incidental ingestion of groundwater, and
- Dermal contact with groundwater.

The COCs were screened for evaluation of human exposure by comparing the maximum measured concentrations to components of the guidelines, as shown in Tables 27 and 28. As a result of this screening, exposure of the following soil COCs will be quantified: anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene, methoxychlor, antimony, arsenic, lead, nickel, tin, and zinc. The following groundwater COCs were identified as requiring further evaluation: PHCs (F3 and F4 fractions), benzo[a]pyrene, fluoranthene, and arsenic. The receptor characterization described in Section 6.3.4 is used to further reduce the list of groundwater COCs requiring evaluation. Groundwater is not used for potable purposes and the assumed incidental ingestion rate of groundwater (from VDEQ, 2016) is approximately 1% of the total drinking water ingestion rate of 1.5 L/d for adults and 0.6 L/d for toddlers in Health Canada (2010a). As shown in Table 28, the maximum measured concentrations of benzo[a]pyrene, fluoranthene, and arsenic are less than ten times their respective drinking water guidelines and, therefore, incidental ingestion and dermal contact are not quantified for these COCs. PHCs (F3 and F4 fractions) are the only groundwater COCs requiring quantification.

The equations used to calculate the dose of each COC, to each receptor, are presented in Appendix 5. The maximum measured concentrations in soil and groundwater, summarized in Tables 27 and 28, respectively, are used in the calculations. The composition of the PHCs in groundwater is not known and, therefore, the assumptions employed in CCME (2008a) were used to estimate the relative proportion of aliphatics and aromatics: 80% aliphatics and 20% aromatics for both the F3 and F4 fractions. The receptor characteristics are summarized in Table 32 and the relative absorption factors used in the calculations are listed in Table 31. The estimated doses for each COC and each receptor are presented in Table 33.

6.3.6 Summary of Exposure Assessment

Exposure to the soil COCs was quantified for the pathways of incidental soil ingestion, dermal contact with soil, and inhalation of particulate matter. The maximum measured concentration of each COC was assumed to be present across the Site and at the ground surface. For ingestion of groundwater and dermal contact with groundwater, contact with the highest measured concentrations in groundwater was assumed. These assumptions will overestimate exposures. The concentrations of all COCs are assumed not to change with time. Reasonable maximum values were used for the exposure frequency and exposure duration for all pathways and will also overestimate exposure. The estimated doses are presented in Table 33 and are used in combination with the toxicity assessment to characterize the risk of exposure, as described in Section 6.5.

6.4 Toxicity Assessment

The toxicity assessment is typically conducted in two stages: the hazard assessment and the dose response assessment. In the hazard assessment, the potential adverse human health effects due to exposure to the COCs are described. In the dose response assessment, quantitative information, which establishes a relationship between the magnitude of exposure and the potential for adverse health effects, is reviewed in order to select toxicological reference values (TRVs). For this HHRA, the rationale for selection of the TRVs was based on the following order of preference: Health Canada's preferred values for contaminated sites (Health Canada, 2010a), Health Canada drinking water supporting documents, CCME soil quality guideline supporting documents, USEPA Integrated Risk Information System (IRIS), and the Agency for Toxic Substances and Disease Registry (ATSDR).

6.4.1 Threshold Contaminants (by contaminant)

Threshold chemicals are chemicals for which a safe level of exposure (one which does not produce adverse health effects when exposed daily over a lifetime) can be defined. Exposure to chemicals via ingestion is usually evaluated using a reference dose (RfD), while exposure via inhalation is evaluated using a reference concentration (RfC). The reference dose may be derived from a no observed adverse effect level (NOAEL), lowest observed adverse effect level (LOAEL), or a benchmark dose, with uncertainty factors generally applied to reflect limitations of the data used. The following COCs are evaluated as threshold chemicals: PHCs (F3 and F4 fractions), anthracene, 1- and 2-methylnaphthalene, naphthalene, methoxychlor, antimony, lead, nickel, tin, and zinc. The RfDs and RfCs, for each of the COCs, along with the critical health effects, are summarised in Table 34. As indicated in Table 34, the oral TRV for nickel is based on a developmental effect.

6.4.2 Non-threshold Contaminants (by contaminant)

Non-threshold chemicals are believed to present a risk of adverse health effects at any dose. In Canada, this class of chemicals is currently restricted to mutagens and genotoxic carcinogens. For chemicals considered carcinogenic, any dose is believed to present some risk and a slope factor, which represents the risk per unit dose of chemical, is derived by regulatory agencies. The relationship between the risk of adverse health effects and dose is termed an inhalation unit risk factor or, for ingestion, a slope factor. The following COCs are evaluated as non-threshold chemicals: anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, phenanthrene, arsenic, and nickel. The slope factors and unit risk factors, for each of the COCs, are summarised in Table 34. In addition, lead is considered a non-threshold toxicant for exposure to children; exposure is evaluated by comparison with the background soil concentration.

6.4.3 Evaluation of Potential Toxic Interactions

The potential adverse human health effects for each COC, including the potential carcinogenicity, are identified in Table 34. Some groups of chemicals may produce similar toxic effects; however, in general, there is not sufficient information in the literature to determine whether the result of exposure to mixtures of these chemicals may result in additive, synergistic, or antagonistic effects. Exposure to the carcinogenic PAHs is summed and exposure to aliphatic and aromatic sub-fractions comprising PHC F3 or PHC F4 are considered to result in additive effects.

6.5 Risk Characterization

Risk characterization combines the results of the exposure assessment and the toxicity assessment to evaluate the potential human health effects associated with exposure to the COCs in soil and groundwater.

6.5.1 Threshold Contaminants (by contaminant)

For chemicals with threshold effects, the hazard due to ingestion of soil and dermal contact with soil is evaluated by calculating a hazard quotient from the following equation:

$$HQ = (Dose_{Ing} + Dose_{Derm\ Soil})/RfD$$

where:
HQ = Hazard quotient (unitless)
RfD = Reference dose (mg/kg/d)

The hazard due to inhalation of particulate matter is calculated from the following equation:

$$HQ = (Dose_{Inh\ PM})/RfC \times BW/INH$$

where:
RfC = Reference concentration (mg/m^3)

To evaluate the hazard due to dermal contact with groundwater and incidental ingestion of groundwater the hazard quotient is calculated from the following equation:

$$HQ = (Dose_{Derm\ W} + Dose_{Ing\ W})/RfD$$

The estimated doses for each COC and each receptor are presented in Table 33 using the equations presented in Appendix 5. The calculated hazard quotients are shown in Table 35. As shown, the estimated hazard quotient exceeds the values considered acceptable by Health Canada (0.5 for PHCs or 0.2 for COCs other than PHCs) for the following COCs and receptors/pathways:

- PHCs F3 (aromatic), PHCs F4 (aromatic) and total PHCs for incidental groundwater ingestion and dermal contact with groundwater by the toddler and the long-term worker.
- PHCs F3 (aliphatic and aromatic), PHCs F4 (aromatic) and total PHCs for incidental groundwater ingestion and dermal contact with groundwater by the construction worker.
- Nickel for incidental ingestion of soil and dermal contact with soil by the toddler.

All doses and HQs were calculated using the maximum measured concentrations in soil or groundwater, which is very conservative. For the COCs resulting in HQs greater than the allowable levels, the doses and HQs were re-calculated using average concentrations, as follows:

PHCs: PHCs were analysed in groundwater samples collected in 2017 only; no historical information is available. The maximum measured concentrations of the F3 and F4 fractions were 19,000 and 9,700 ug/L, respectively. These concentrations were measured in a sample collected from MW8/17; however, the duplicate sample had much lower concentrations: 4,100 and 7,300 ug/L, for F3 and F4, respectively. The laboratory noted that there was sediment present in all the bottles, which was included in the analysis.

Average Site-wide concentrations are more representative of actual exposures. The average PHC concentrations, from all nine locations tested (ten samples including the duplicate at MW8/17), are 3,062 and 2,283 ug/L for F3 and F4, respectively. The HQs were re-calculated using these average concentrations and the results are shown in parentheses in Table 35. As shown, the HQ for total PHCs is less than 0.5 for the toddler. The HQ for total PHCs is slightly larger than 0.5 for the long-term worker (0.68). The HQ for total PHCs for the construction worker is 1.4.

Nickel: Nickel was analysed in soil samples collected from the Site historically and in 2017. Figure 4c presents the exceedances of the CCME guideline of 45 µg/g. As shown, nickel was measured in excess of the guideline in only one sample (at MW7/17 at a depth of 1.52 to 3.05 m; nickel was measured at a concentration of 17 ug/g in the shallow sample at this location). The average concentration of nickel is 50 µg/g, which was used to re-calculate the HQ. As shown in Table 35, the HQ for the toddler was 0.024, which is less than the allowable level. Average concentrations are considered more representative of exposure.

Lead: Lead was analysed in soil samples collected from the Site historically and in 2017. Figure 4c presents the exceedances of the CCME guideline of 140 µg/g. As shown, lead was measured in excess of the guideline in seven samples. The average concentration of lead in surface soil (upper 1.5 m) was 105 µg/g and the average concentration in subsurface soil (below 1.5 m) was 126 ug/g. Average concentrations are considered more representative of exposure than maxima. When compared with the background concentration of lead in Ontario soil of 120 ug/g (MOE, 2011c), the average concentration of lead in surface soil is less than the background concentration and the average concentration in subsurface soil is only slightly larger than background..

6.5.2 Non-Threshold Contaminants (by contaminant)

For non-threshold chemicals, incremental lifetime cancer risks (ILCRs) due to soil ingestion and dermal contact with soil are calculated using the following equation:

$$ILCR = (\mathrm{Dose}_{\mathrm{Ing}} + \mathrm{Dose}_{\mathrm{Derm\ Soil}})\ x\ SF$$

where:
ILCR = Incremental lifetime cancer risk (dimensionless)
SF = Slope factor $(mg/kg/d)^{-1}$

The risk due to inhalation of particulate matter is calculated from:

$$\mathrm{ILCR} = (\mathrm{Dose}_{\mathrm{Inh\ air}}) \times \mathrm{IUR} \times 70\ \mathrm{kg} / 20\ \mathrm{m}^3/\mathrm{d}$$

where:
IUR = Inhalation unit risk $(mg/m^3)^{-1}$

The estimated doses for each COC and each receptor are presented in Table 33 using the equations presented in Appendix 5. The calculated ILCRs are compared to Health Canada's target of 1 x 10^{-5} (Health Canada, 2010b). If the calculated ILCR is below the target, then the risk is considered essentially negligible. As shown in Table 36, the ILCRs for all COCs and receptors are less than the essentially negligible level.

6.5.3 Uncertainties

The types of uncertainties in the foregoing analyses are identified below, along with a discussion of the influence on the results.

Site Characterization: A comprehensive Site investigation program was completed in 2017, which used information obtained in previous Site investigations to select sample locations and included testing of soil, groundwater, sediment, and surface water for a wide range of parameters. The maximum measured concentrations of the COCs were used in the calculations and these concentrations were assumed to be homogeneously distributed across all areas of the Site and to be at the ground surface. These concentrations were assumed to remain constant with time. The use of maximum measured concentrations is very conservative and, for PHCs, nickel and lead, average concentrations were also used to characterize the risk of exposure.

Exposure assessment: Where available, the receptor characteristics used in this HHRA are the values selected by Health Canada (2010a). For parameters such as body weight and inhalation rate, these values are representative of the average for the Canadian population. There is variation in these parameters among the population; however, the influence on the calculated doses will not be large. Reasonable maximum values were used for the exposure frequency and exposure duration. The rationale for these assumptions is to avoid underestimating exposures for certain individuals who may have higher than average exposure frequencies or durations; however, it is likely that these assumptions overestimate exposure. For example, for the Site visitor, the exposure frequency is two to five days per week (depending upon the age class), for an entire lifetime.

The skin surface area in contact with soil or groundwater is assumed to be the hands and arms for adults, teens, Long-term workers, and Construction workers (i.e., no account is taken of the effect of protective covering of gloves or sleeves likely worn by the workers). For the child, toddler, and infants, exposure of legs to soil or groundwater is assumed in addition to arms and hands. Guidance from the State of Virginia (VDEQ, 2016) was used for the rate of incidental ingestion of groundwater.

Standard equations were used for estimating the dose of each COC to the receptors. These equations contain parameters to estimate the relative absorption of the COC from that medium. These absorption factors are uncertain as they are based on limited experimental data or extrapolated from other chemicals. Also, there is individual variability in the fraction of chemical absorbed.

Toxicity assessment: The TRVs are derived by regulatory agencies, on the basis of mammalian and/or human studies, and incorporate uncertainty, safety or modifying factors. They are intended to be conservative and protective of the general population. Uncertainty in the TRVs may overestimate or underestimate actual risks; however, the selected TRVs are typical of the values used to derive generic standards for contaminated sites. The TRVs have been selected from those derived by regulatory agencies, with preference given to the values selected by Health Canada and are considered to represent the most toxicologically defensible TRVs for each compound. As such, the TRVs utilized in this HHRA are considered to represent the best available or current science. Inhalation TRVs are lacking for many of the COCs; however, none of the COCs are volatile and inhalation of particulate matter is generally a minor exposure pathway compared with incidental ingestion of soil and dermal contact with soil.

In general, there is not sufficient information in the literature to determine whether the result of exposure to mixtures of chemicals may result in additive, synergistic, or antagonistic effects. In this HHRA, the effects are assumed to be additive and the hazard quotients are summed for the PHCs and the ILCRs are summed for the carcinogenic PAHs.

Major factors influencing uncertainty: The most important parameters influencing the uncertainty in the risk estimates are the concentrations of the COCs, the exposure frequency and duration, and the absorption factors for soil and groundwater.

6.5.4 Discussion

The use of maximum measured concentrations resulted in the calculation of hazard quotients higher than the allowable level for PHCs for all receptors via incidental ingestion of groundwater and dermal contact with groundwater and for nickel for the toddler via incidental ingestion of soil and dermal contact with soil. These calculations are very conservative, especially considering the assumptions related to exposure frequency and duration. Using average concentrations, the hazard quotients for PHCs and nickel were less than the allowable level for the toddler. There was one anomalous measurement of PHCs (F3 fraction); if this result were omitted from the average concentration calculation and only the duplicate sample result was included, the hazard quotient is less than the allowable level for the Long-term worker, but not for the Construction worker. For the non-threshold chemicals, the calculated ILCRs were essentially negligible for all COCs and receptors.

6.5.5 Summary of Risk Characterization

Exposure to three types of receptors, Site visitors, Long-term workers, and Construction workers, was evaluated for the pathways of incidental soil ingestion, dermal contact with soil, inhalation of particulate matter, incidental ingestion of groundwater and dermal contact with groundwater. For chemicals having threshold effects, the estimated hazard quotients using the maximum measured concentrations were less than the allowable level for all COCs and receptors/pathways, with the exception of incidental ingestion of groundwater and dermal contact with groundwater containing PHCs for all receptors and incidental ingestion of soil and dermal contact with soil containing nickel for the toddler. Use of average concentrations in the calculations results in hazard quotients less than the allowable level, except for exposure of the Long-term worker and the Construction worker to groundwater. These calculations are considered very conservative because of the high frequency and duration of exposure and, for PHCs, they incorporate an anomalous measurement in one sample); if this result were omitted from the average concentration calculation and only the duplicate sample result was included, the hazard quotient is less than the allowable level for the Long-term worker, but not the Construction worker. For lead, the average concentration in surface soil is less than the background concentration and the average concentration in subsurface soil is only slightly larger than background. For chemicals having non-threshold effects, the calculated incremental lifetime cancer risks are less than the allowable level for all COCs and receptors/pathways.

6.6 Recommendations

6.6.1 Additional Data Collection Requirements

As PHCs were analysed in groundwater samples collected in 2017 only; no historical information was available for comparison. Concentrations measured in a duplicate sample collected from MW8/17 varied from it's base sample. During future sampling events for PHCs on site, another duplicate sample should be obtained for comparison from MW8/17.

6.6.2 Recommended Risk Management Measures

The results of the HHRA indicate that risk management measures are not required for the protection of site visitors or Long-term workers due to exposure to the identified COCs in soil, groundwater, surface water, or sediment. The estimated hazard to Construction workers, due to dermal contact with groundwater containing PHCs, exceeds allowable levels and typical Health and Safety measures (i.e., the wearing of pants, long sleeves, and gloves) are recommended to limit dermal contact with groundwater; no risk management measures are required for the other COCs/exposure pathways. In the evaluation of the potential for exposure of construction workers to sediment, it was assumed that the workers would be wearing thermal protection, which would also limit contact with sediment; this is considered a risk management measure.

7. Ecological Risk Assessment

7.1 Introduction

7.1.1 Background and Objectives

The Site is an island, located within the Rideau River, and is used as parkland. The Site historically operated as a landfill in the mid-1960's, and potential environmental concerns at the Site were identified due to the presence of buried landfill materials. COCs identified in soil and/or groundwater at the Site include PHCs, VOCs, PAHs, and inorganic parameters. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water.

The objective of the ecological risk assessment (ERA) is to evaluate potential risks to terrestrial and aquatic ecological receptors (the valued ecosystem components, or VECs) due to exposure to the COCs in soil, groundwater, sediment, and surface water and to identify the need for any risk management measures. In addition, the potential impact on the VECs of the proposed construction activities is evaluated.

7.1.2 Site Description

The Site consists of an island, approximately 11,700 m^2 (1.17 Ha) in size, located within the Rideau River. The Site is used as parkland and is part of the Old Slys Lockstation grounds. The Rideau River is present to the east and west of the Site, and the Old Slys Lockstation and associated weir are present to the north and south of the Site. Surrounding land uses include parkland and residential to the northeast.

The entire Site is covered with grasses and trees/shrubs. A gated vehicle access point is located at the southwest corner of the Site and access is not restricted. No change in land use is proposed.

In the 1960's, the Site was used as a landfill by the Town of Smiths Falls. There is no liner for the landfill and it is not capped. There is a thin layer of topsoil overlying fill or sand/gravel and the Site is vegetated with grass and trees. Groundwater at the Site is very shallow (0.64 m bgs). Old Slys Island is graded down towards the east, creating up to a 4 m head of water from the west side of the Island to the east. As the CP rail line is present at the east side of the Island, this creates a dam-like structure, forcing groundwater to flow to the north and south, around the rail line. Groundwater flow at the north side of the Site is likely influenced by the operation of the lock system at the north side of the Site. Operational from May to October, the locks are opened and closed, reportedly causing vertical groundwater fluctuations on the island of between 1.5 m near the lock, and 0.4 m away from the lock. This operation effectively "flushes" water into the landfill when the locks are filled, and allows groundwater to seep out when the locks are emptied.

As discussed in Section 2.2, several ESAs have been completed at the Site, from 1994 to 2017. The ESAs have included collection and laboratory analysis of samples of soil, groundwater, sediment, and surface water for a broad range of parameters. Consistent with the source of the COCs being a landfill, the COCs are heterogeneously distributed, both laterally and vertically. These ESAs have identified the following parameters as COCs:

Soil: Ethylbenzene, toluene, xylenes, PHCs (F2 to F4 fractions); trichloroethylene; anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor, DDD; antimony, arsenic, cadmium, copper, lead, nickel, tin, and zinc were measured in excess of the applicable soil guidelines.

Groundwater: PHCs (F3 and F4 fractions); chlorobenzene; anthracene, benzo[a]anthracene, benzo[a]pyrene, fluoranthene, naphthalene, phenanthrene, pyrene; arsenic, chloride, cyanide (free), and iron were measured in excess of the applicable guidelines. Cadmium and selenium were not detected; however, the detection limits exceeded guidelines.

Sediment: Arsenic and lead were measured in excess of CCME Probable Effect Levels (PELs). Acenaphthene, acenaphthylene, benzo[a]anthracene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, fluoranthene, methylnaphthalene, phenanthrene, pyrene, and mercury were measured in excess of ISQGs. Sediment concentrations of cobalt, cyanide (free), nickel, and silver were measured in excess of MOECC sediment standards (no CCME guidelines are available). Acetone, toluene, benzo[b/j]fluoranthene, antimony, barium, beryllium, boron, molybdenum, selenium, thallium, uranium, vanadium were detected in analysed samples; however no sediment guidelines are available. PCBs were not detected; however, the detection limit exceeded the ISQG.

Surface water: Cyanide (free) and un-ionized ammonia were measured in excess of surface water guidelines. Acrolein, cadmium, mercury, and selenium were not detected; however, the detection limits exceeded guidelines.

7.1.3 Scope of Ecological Risk Assessment

The ERA uses a combination of qualitative and quantitative approaches. The COCs in soil, groundwater, sediment, and surface water are identified, as described above, based on comparison with applicable guidelines. The components considered in derivation of the guidelines are then examined for their relevance to the VECs. This process qualitatively eliminates many of the COCs as a concern for ecological exposure at the Site. Exposures to the COCs remaining following this screening process are then quantified. Tables 27 to 30 present comparative criteria for the COCs for soil, groundwater, sediment, and surface water, respectively, used to screen the COCs for receptors and exposure pathways relevant to the Site. The results of this comparison are discussed in Section 7.2.

7.2 Problem Formulation

Problem formulation comprises the identification of COCs at the Site, the VECs that may be exposed to those contaminants, the Site-specific exposure pathways, and how the contaminants move through the environment. The conceptual risk model is developed during the problem formulation stage.

7.2.1 Site Characterization

The results of ESAs completed at the Site have identified PHCs, VOCs, PAHs, and inorganic parameters as COCs in soil and/or groundwater. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water. Tables 6, 7, 13, 19, and 24 summarize the maximum measured concentrations of all parameters analysed in samples of surface soil, subsurface soil, groundwater, sediment, and surface water, respectively, and identifies those parameters that exceed guidelines. The locations of the exceedances are presented on Figures 4 to 8. Figures 9a to 9y present the exceedances in soil and groundwater as cross-sections.

7.2.2 Hazard Identification

The maximum measured concentrations of the COCs are presented in Tables 27 to 30 for soil, groundwater, sediment, and surface water, respectively, along with comparative criteria used to screen the COCs for receptors and exposure pathways relevant to the Site. Note that for soil and groundwater, the maximum concentrations are presented separately for locations within 10 m of surface water and more than 10 m from surface water as the CCME guidelines are not applicable within 10 m of surface water. As discussed in Section 1.4, MOECC standards developed for sites adjacent to water bodies are applied within 10 m of surface water. Note, also, that for this initial screening, the soil evaluation does not distinguish between COCs identified in surface soil and subsurface soil; all soil COCs are considered accessible. The results of the screening are as follows:

Soil: The CCME soil quality guidelines for the protection of environmental health are based on consideration of multiple ecological exposure pathways as shown in Table 27. For the current and future use of the Site, the relevant exposure pathways for evaluating exposure to terrestrial VECs are soil contact, soil and food ingestion, and soil nutrient and energy cycling, and the COCs measured in excess of one or more of these components are: PHCs (F3 fraction), anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor; antimony, cadmium, copper, lead, nickel, tin, and zinc. These are the soil COCs carried forward for further evaluation of exposure to terrestrial VECs. The following COCs exceed the aquatic life check components and are evaluated for exposure to aquatic VECs: toluene, xylenes, PHCs (F2 fraction), trichloroethylene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor, DDD; antimony, arsenic, cadmium, copper, lead, nickel, tin, and zinc.

Groundwater: As for soil, the applicable groundwater guidelines are based on consideration of multiple ecological exposure pathways, as shown in Table 28. The following COCs are identified as exceeding guideline values protective of aquatic receptors and require further exposure evaluation: PHCs (F3 and F4 fractions), anthracene, chloride, and iron.

Sediment: VOCs, PAHs, PCBs, and inorganic parameters have been identified as COCs in sediment based on comparison with CCME or MOECC guidelines protective of ecological receptors. Two of the COCs, arsenic and lead, have been measured in excess of the PELs. As a second line of evidence of potential impacts to the aquatic community, AEL undertook a benthic invertebrate survey to determine the health of benthic communities on-site, as well as up-stream. Due to conditions at the time of the survey, a down-stream location could not be surveyed. The results of the survey indicated that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the area of the Old Sly Locks. There is some indication that the area of SED7 is experiencing anthropogenic impacts which are likely unrelated to the presence of the historic landfill.

Surface water: As shown in Table 30, the maximum measured concentrations of the surface water COCs are compared with guidelines relevant to aquatic receptors (CCME FAL, MOECC PWQO, and MOECC aquatic protection values). The maximum measured concentrations of free cyanide and un-ionized ammonia exceed values protective of aquatic receptors and are carried forward for evaluation. Cadmium, mercury, and selenium were not detected and, although the detection limits exceeded the CCME FAL guidelines, they are less than the MOECC aquatic protection values and are not evaluated further. As noted in Section 5.6.2, if acrolein is present (it has not been detected), it is not likely associated with the Site and, therefore, potential exposure to acrolein in surface water is not considered further.

7.2.3 Receptor Identification

Potential terrestrial ecological receptors on the Site include plants, soil invertebrates, mammals and avian species. Aquatic receptors include invertebrates, plants, fish, and turtles.

A Species at Risk (SAR) evaluation for the vicinity of the Old Slys Lockstation Site was completed and is presented in Appendix 6. Sources used were the Ministry of Natural Resources and Forestry Natural Heritage Information Centre (NHIC) interactive mapping site, which shows species that are provincially tracked, and the Department of Fisheries and Oceans SAR mapping website.

Provincially Tracked Species on NHIC Database and Additional Species Considered

Provincially tracked species that have been recorded within approximately 1 km of the Site are listed below. Two of these, Butternut and Gray Ratsnake, are considered federal Species at Risk. Habitat for all these species occurs within the study area. Although habitat for all these species is present on the Site, given the main objective for the ERA is to evaluate potential risks to terrestrial and aquatic ecological receptors due to exposure to the COCs during the proposed construction activities, habitat would be considered for the area of the lock and which would be within the immediate downstream pathway, where disturbed soil or sediment could migrate. Given this objective, habitat would not be present.

Table 7-1 Potential Species at Risk and Provincially Rare Species on the Site

Common Name	Scientific Name	Federal Status	Habitat Elements on Site
Butternut	*Juglans cinerea*	END, Schedule 1	Open woodlands, though rarely in manicured parks; no Butternut noted in site investigations.
Little Brown Myotis	*Myotis lucifugus*	END, Schedule 1	Roosts in buildings and tree cavities.
Northern Myotis	*Myotis septentrionalis*	END, Schedule 1	Roosts in tree cavities.
Western Chorus Frog (Great Lakes-St. Lawrence Population) and other amphibians	*Pseudacris triseriata*	THR, Schedule 1 (Western Chorus Frog); no other amphibian Species at Risk in this area	Western Chorus Frogs have specific habitat preferences for breeding, generally areas with shallow water in flooded shrubby fields and shallow wetlands with abundant emergent vegetation. There is no suitable habitat for this species near the site. Green Frog (not a Species at Risk) would likely be present in the shallow bay east of the site, as they are highly adaptable and are found in most vegetated aquatic

Table 7-1 Potential Species at Risk and Provincially Rare Species on the Site			
Common Name	Scientific Name	Federal Status	Habitat Elements on Site
			environments with permanent water. This area is over 500 m east of the site and around a bend in the river, and it is unlikely that it would be affected by sediment during construction
Gray Ratsnake (Frontenac Axis population)	*Pantherophis spiloides pop. 1*	THR, Schedule 1	Mosaic of forest and open habitat (fields; bedrock outcrops) with a high amount of edge; potential to hibernate in building foundations. The potential for rock wall foundations to support this SAR was examined. These areas are flooded for boat traffic on the inside and due to seepage, were flooded on the land side above surface as well, not offering hospitable environments for snake habitat.
Eastern Musk Turtle	*Sternotherus odoratus*	SC, Schedule 1	It is not likely that Eastern Musk Turtle would inhabit the Rideau River within the range of sediment deposition. The river is fast-flowing near the site, with almost no floating vegetation. Eastern Musk Turtles prefer shallow, slow-moving streams and rivers with muddy bottoms and dense aquatic vegetation. They burrow into pond substrates during overwintering, so they would be exposed to sediment in that case, but they will only overwinter in areas where sediment is sufficient to provide cover for them, and they need oxygen in the

Table 7-1 Potential Species at Risk and Provincially Rare Species on the Site			
Common Name	Scientific Name	Federal Status	Habitat Elements on Site
			water/sediment. They forage on freshwater mussels, snails, crayfish, aquatic insects, worms, small fish, tadpoles, carrion, and aquatic vegetation. These would be likely only found in areas where the water was very slow moving. The aquatic habitat in the Rideau River near the site is appropriate for Eastern Musk Turtle only in the shallow bay downstream of the site (to the east), over 500 m from the site, and around a bend in the river. It appears unlikely that sediment released by the construction would migrate to this area. This species is rare and highly aquatic so there would likely be no information on effect levels available, and no similar species to provide a model
Northern Map Turtle	*Graptemys geographica*	SC, Schedule 1	It is not likely that this species would inhabit the river near the site. The river near the site is fast-flowing. Northern Map Turtle are turtles of slow water. Their overwintering sites are typically deep, oxygen-rich lake or river bottoms that are sheltered from ice, with sand or gravel substrate and varied bottom features, such as exposed ledges, boulders, and tree trunks. They often overwinter in areas of groundwater discharge. This species feeds

Table 7-1 Potential Species at Risk and Provincially Rare Species on the Site			
Common Name	Scientific Name	Federal Status	Habitat Elements on Site
			primarily on molluscs (bivalves, snails); insects and crayfish are also important food sources for the species. The habitat in the vicinity of the construction is not suitable for Map Turtles. This species has not been reported in the Ontario Herpetofaunal Summary in this area. It would be difficult to suggest a species as a surrogate for risk assessment. As a comparison Snapping Turtles (for which there might be more information on effects of contaminants) are omnivores while Northern Map Turtles are carnivores. Snapping Turtles overwinter in pond sediments – but they do not require much oxygen, unlike Northern Map Turtle. Painted Turtles are herbivores so would not be a good surrogate. It is possible that Northern Map Turtles would be somewhere in the Rideau system but the aquatic habitat near the site is appropriate for this species only in one area – the shallow bay downstream of the site (to the east), over 500 m from the site, and around a bend in the river. It is unlikely that sediment released by the construction would migrate to this area.
Barn Swallow	*Hirundo rustica*	THR, Schedule 1	Nests on human buildings and bridges.

Table 7-1 Potential Species at Risk and Provincially Rare Species on the Site			
Common Name	Scientific Name	Federal Status	Habitat Elements on Site
Eastern Whip-poor-will	*Antrostomus vociferus*	THR, Schedule 1	Semi-open or patchy forests, with clearings.
Bridle Shiner	*Notropis bifrenatus*	SC, Schedule 1	Quiet areas of streams and occasionally in lakes. It is usually found where there is an abundance of aquatic vegetation, where it feeds and spawns.
Grass Pickerel	*Esox americanus vermiculatus*	SC, Schedule 1	Warm, slow moving streams, isolated pools of such streams, and shallow bays of lakes.
Eastern Wood-pewee	*Contopus virens*	SC, Schedule 1	Nests in trees in a variety of woodland habitats.

Aquatic Species at Risk mapping

Aquatic Species at Risk mapping indicates two aquatic (fish) Species at Risk, with a status of Special Concern, in the Rideau River upstream and downstream of the Site. However, neither of these species is known to occur within the Site.

7.2.4 Exposure Pathway Identification

COCs at the Site are believed to be due to the presence of buried landfill materials. The soil COCs identified as requiring further evaluation include VOCs, PHCs, PAHs, semi-VOCs, and inorganic parameters and the groundwater COCs requiring further evaluation are PHCs (F3 and F4 fractions), anthracene, chloride, and iron. The COCs may be adsorbed to soil particles and leach from soil to groundwater due to infiltration of precipitation. Operation of the Lockstation causes vertical movement of groundwater in addition to flushing COCs into and out of surface water. VOCs, PAHs, PCBs, and inorganic parameters have been identified as COCs in sediment based on comparison with guidelines protective of ecological receptors and free cyanide and un-ionized ammonia have been identified as COCs in surface water.

Mammals and avian species may be exposed to COCs in soil through incidental soil ingestion and ingestion of impacted food items. Soil invertebrates may be exposed to soil COCs through direct contact, including ingestion. Terrestrial plants may be exposed to soil COCs through direct root contact and root uptake. The COCs in groundwater are identified on the basis of their potential to affect aquatic receptors. Although the roots of vegetation may contact the shallow groundwater at the Site, chemical-specific information to quantify this exposure pathway is generally lacking. Also, mammals and birds may ingest water that occasionally pools at the ground surface. Exposure pathways of aquatic receptors include contact with surface water and sediment by invertebrates, root uptake from surface water and sediment by plants, gill uptake and food ingestion by fish.

7.2.5 Site Conceptual Model

The Site is an island, located within the Rideau River, and is used as parkland. The Site historically operated as a landfill in the mid-1960's, and potential environmental concerns at the Site were identified due to the presence of buried landfill materials. The results of ESAs completed at the Site have identified PHCs, VOCs, PAHs, and inorganic parameters as COCs in soil and/or groundwater. PAHs and inorganic parameters have been identified as COCs in sediment and inorganic parameters have been identified as COCs in surface water.

The objective of the ERA is to evaluate potential risks from exposure of terrestrial and aquatic ecological receptors to the COCs in soil, groundwater, sediment, and surface water and to identify the need for any risk management measures. In addition, the potential impact on the VECs of the proposed construction activities is evaluated.

The entire Site is covered with grasses and trees/shrubs. A gated vehicle access point is located at the southwest corner of the Site and access is not restricted. No change in land use is proposed. Groundwater at the Site is very shallow.

Potential terrestrial ecological receptors on the Site include plants, soil invertebrates, mammals and avian species such as a diversity of trees, shrubs and grasses, earthworms, Meadow Vole; American Robin and Song Sparrow; all of which would be potentially exposed to COCs, at least at certain times of the year. Aquatic receptors include invertebrates, plants, and fish such as Largemouth Bass, Smallmouth Bass, Northern Pike, Lake Trout, Yellow Perch, Black Crappie, Muskellunge, and Walleye. A SAR evaluation identified eight potential SAR and Provincially Rare Species on the Site. However, there is a very low potential for SAR to be exposed to contaminants in soil or groundwater. The one tree species, Butternut, was not noted on the Site. Two bat species and two birds (Barn Swallow and Eastern Wood-pewee), which feed on aerial insects, would likely have a low probability of exposure. The SAR also included one snake species: Gray Ratsnake. The probability that this species is present in areas where soils will be excavated is very low: the soils on the landward side of the lock walls, the only area of potential habitat in areas of contamination, are generally saturated, which makes them unsuitable as snake habitat. In addition, critical habitat is mapped by Environment

Canada only to the south of the Site, though the Ontario Ministry of Natural Resources has records for the 1 km square surrounding the Site. Two aquatic SAR, with a status of Special Concern, were identified in the Rideau River upstream and downstream of the Site; however, neither of these species is known to occur within the Site.

Mammalian and avian species may be exposed to COCs in soil through incidental soil ingestion and ingestion of impacted food items.

Soil invertebrates may be exposed to soil COCs through direct contact, including ingestion. Terrestrial plants may be exposed to soil COCs through direct root contact and root uptake. The COCs in groundwater are identified on the basis of their potential to affect aquatic receptors. Although the roots of vegetation may contact the shallow groundwater at the Site, chemical-specific information to quantify this exposure pathway is generally lacking. Mammalian and avian species may also ingest water that occasionally pools at the ground surface; however, this exposure pathway is likely minor compared with ingestion of food and soil. Exposure pathways of aquatic receptors include contact with surface water and sediment by invertebrates, root uptake from surface water and sediment by plants, gill uptake and food ingestion by fish.

Comparative criteria are used to screen the COCs for exposure pathways relevant to the Site. The results of the screening identified the following soil COCs as requiring further evaluation for terrestrial ecological exposure: PHCs (F3 fraction), anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor; antimony, cadmium, copper, lead, nickel, tin, and zinc. The following soil COCs exceed the aquatic life check components and are evaluated for exposure to aquatic receptors: toluene, xylenes, PHCs (F2 fraction), trichloroethylene, methylnaphthalene, naphthalene, phenanthrene; methoxychlor, DDD; antimony, arsenic, cadmium, copper, lead, nickel, tin, and zinc. The following groundwater COCs are identified as exceeding guideline values protective of aquatic receptors and require further exposure evaluation: PHCs (F3 and F4 fractions), anthracene, chloride, and iron. VOCs, PAHs, PCBs, and inorganic parameters have been identified as COCs in sediment based on comparison with guidelines protective of ecological receptors; two of the COCs (arsenic and lead) have been measured in excess of the PELs. In surface water, free cyanide and un-ionized ammonia exceed values protective of aquatic receptors and are carried forward for evaluation.

The ecological conceptual site model is shown on Figure 10b.

7.3 Receptor Characterization

VECs are resources or environmental features that exhibit one or more of the following attributes: they are important to human populations; have economic and/or social significance; have intrinsic ecological significance; and/or serve as a baseline from which the impacts of development can be evaluated, including changes in management or regulatory policies (CCME, 2006).

A SAR evaluation identified eight potential SAR and Provincially Rare Species on the Site. However, there is a very low potential for SAR to be exposed to contaminants in soil or groundwater. The one tree species, Butternut, was not noted on the Site. Two bat species and two birds (Barn Swallow and Eastern Wood-pewee), which feed on aerial insects, would likely have a low probability of exposure. The SAR also included one snake species: Gray Ratsnake; the critical habitat is mapped by Environment Canada only to the south of the Site, though the Ontario Ministry of Natural Resources has records for the 1 km square surrounding the Site. Two aquatic SAR, with a status of Special Concern, were identified in the Rideau River upstream and downstream of the Site; however, neither of these species is known to occur within the Site.

VECs in the Terrestrial Environment: The Site is used as parkland and terrestrial VECs that are likely to be at the Site include trees, shrubs, grasses, soil invertebrates, mammals, and avian species. Consistent with the approaches of CCME (2006) and MOE (2011c), plants and soil organisms will be protected to preserve their principal ecological functions. Relevant effects-based endpoints used to evaluate whether ecological functions have been affected include reduced plant growth, yield, seed germination or productivity, and reduced growth or fecundity in soil invertebrates.

Mammals and birds selected as VECs in the ERA are consistent with those recommended by the MOE (2011c) for sites used as parkland and are summarized below.

The following typical or common receptors are considered to be present at the Site:

Soil Invertebrates - Earthworms are common soil invertebrates. They are in direct contact with soil and ingest soil.

Mammalian Insectivore – A short-tailed shrew (*Blarina brevicauda*) is an example of a common species, which feeds on soil invertebrates.

Mammalian Herbivore (small) – A meadow vole (*Microtus pennsylvanicus*) is an example of a common, small mammalian herbivore. They live in grassy fields, woodlands and marshes. They consume large amounts of vegetation and are prey to larger mammals (e.g. fox).

Mammalian Carnivore – A red fox (*Vulpes vulpes*) is an example of a larger mammalian carnivore. The fox preys on field voles, invertebrates, amphibians, reptiles, fish, and bird's eggs.

Avian Insectivore – An American woodcock (*Scolopax minor*) is an example of a sensitive avian ground insectivore. It consumes soil invertebrates and has a high ingestion rate of soil.

Avian Herbivore – A red-winged blackbird (*Agelarius phoeniceus*) is an example of a common herbivorous bird. It consumes grains and seeds.

Avian Carnivore – A red-tailed hawk (*Buteo jamaicensis*) is an example of a larger avian carnivore. It consumes small mammals.

Terrestrial vegetation –trees, ornamental shrubs, grasses.

Exposure parameters for the avian and mammalian species evaluated in the ERA, including body weight, food and soil ingestion rates, are summarized in Table 37.

VECs in the Aquatic Environment: Aquatic receptors include invertebrates, plants, and fish and are assumed to be exposed to COCs in surface water via direct contact and ingestion of food and water.

7.4 Exposure Assessment

The exposure assessment includes an analysis of the pathways through which VECs may be exposed to COCs and an estimate of the levels to which they are exposed.

7.4.1 Pathway Analysis

Ecological receptors may be exposed to the COCs via ingestion, inhalation and dermal contact. The exposure pathways evaluated are described below for terrestrial plants, soil invertebrates, birds, mammals, and aquatic VECs.

Terrestrial plants: Vegetation may be exposed to the soil COCs primarily via uptake through the roots. Roots of sod and ground vegetation do not usually penetrate much more than 150 mm (Craul, 1992). Most roots of trees occur within the upper 1 m of soil. Himelick (1986) reports that as much as 90% of roots of urban trees less than 3 mm in diameter grow in the top 150 mm of soil and most tree species will have 80% of their roots in the upper 300 mm of soil. Contact of roots of vegetation with subsurface soil (more than 1.5 m bgs) is, therefore, considered incomplete. Plants may also be exposed to the soil COCs through deposition of particulate matter on the foliage; however, at most locations, the impacted soil is covered by topsoil and this pathway is likely negligible compared with root uptake. Deposition of particulate matter would typically only be evaluated for a constant long-term source. Effects (if any) from construction activities would be short-term/transient and negligible. Impacted soils should be removed from the Site during construction activities and disposed of as a registered landfill. Groundwater at the Site is shallow (0.64 m bgs) and, therefore, roots of vegetation may also be in contact with impacted groundwater; however, quantitative information with which to evaluate chemical uptake from groundwater is generally lacking. Exposure and risks to terrestrial plants are predicted by comparing COC concentrations in soil with concentrations determined to be acceptable for growing plants. The direct contact component values protective of terrestrial plants and soil invertebrates from CCME Soil Quality Guidelines or MOE (2011c) were used as the screening benchmark.

Soil Invertebrates: Earthworms are often selected as suitable representative species due to their feeding and burrowing behaviour. They move through the soil, providing aeration necessary for the healthy development of plants, and absorb nutrients and contaminants through the skin from direct contact with the soil. Earthworms are important in promoting soil fertility (Efroymson et al., 1997). Through their feeding and burrowing, they break down organic matter and release nutrients. They also improve aeration, drainage, and aggregation of soil and are important in the diet of many higher-level organisms (Efroymson et al., 1997). Earthworms turn over soil from below the surface by expelling their castings at the surface. Large volumes of subsoil can be overturned by this activity. Earthworms typically feed on decaying organic matter and are found mainly within the upper 10 cm to 15 cm of soil. During winter and dry periods, earthworms may burrow to greater depths; however, the fill beneath the topsoil will have less organic matter and will not be used for feeding by earthworms. Earthworms would not likely have contact with the impacted groundwater at the Site. Soil invertebrates may be exposed to soil COCs through direct contact and ingestion; none of the soil COCs are volatile. To assess exposure and risk to soil invertebrates, soil concentrations were compared to concentrations determined to be acceptable for soil invertebrate populations. The direct contact component values protective of terrestrial plants and soil invertebrates from CCME Soil Quality Guidelines or MOE (2011c) were used as the screening benchmark.

Terrestrial Wildlife: Wildlife may be exposed to soil COCs via ingestion of soil and food, inhalation, and dermal contact. None of the soil COCs are volatile and inhalation of particulate matter is likely negligible compared with the ingestion pathways as the Site is mainly covered with topsoil. Also, inhalation toxicity data for mammalian and avian wildlife are limited. Therefore, the inhalation exposure pathway is not considered for terrestrial wildlife. Dermal exposure is generally assumed to be negligible for birds and mammals because feathers on birds and fur on mammals reduce dermal exposure by limiting the contact of skin with chemicals in soil (Sample et al., 1997). Therefore, ingestion of food and soil are the only exposure pathways considered in this ERA for mammalian and avian receptors. Groundwater at the Site is a minimum of 0.64 m bgs and, therefore, contact of mammals or avian species with COCs in groundwater is possible; however, this is considered to be minor compared with ingestion of soil and food.

Aquatic VECs: Aquatic VECs may be exposed to the COCs via direct contact with surface water and ingestion of water and food as a result of leaching of COCs from soil to groundwater and transport of groundwater to surface water. Exposure and risks to aquatic VECs are evaluated by comparison with aquatic protection values. In order to assess potential pathways, a study of the benthic communities was undertaken, to address the health of the benthic invertebrate communities on-site, as compared to those up- and down-stream of the Site. Due to conditions at the time of the survey, a down-stream location could not be surveyed. The results of the survey indicated that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the area of the Old Sly Locks. This suggests that there are limited potential effects on the exposure of Aquatic VECs to COCs. There is some indication that the area of SED7 is experiencing anthropogenic impacts which are likely unrelated to the presence of the historic landfill.

7.4.2 Exposure Estimates

<u>Soil</u>

The soil COCs were screened for evaluation of ecological exposure by comparing the maximum measured concentrations to components of the guidelines, as shown in Table 27. A secondary screening, using relevant components of the CCME soil quality guidelines as well as the MOECC Site Condition Standards was conducted as shown in Table 38. Maximum concentrations in surface soil (the upper 1.5 m) were used for this screening as exposure to soil at greater depths is considered incomplete for all the ecological receptors. For most of the PAHs, the maximum concentrations were measured in a sample collected from a depth of 0 to 3.0 m in 1994; these PAHs are retained for the analysis. As a result of this screening, exposure of the following soil COCs will be further evaluated for plants and soil organisms: PHCs F3 fraction, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, methylnaphthalene, naphthalene, methoxychlor, and zinc. Exposure to mammals and birds will be further evaluated for PHCs F3 fraction, methylnaphthalene, methoxychlor, lead, and zinc.

Terrestrial Wildlife

Exposure of mammalian and avian wildlife to the soil COCs is calculated using the following equation:

$$E_{total} = E_{food} + E_{soil\ ingestion}$$

where:

E_{total}	=	Total exposure (mg/kg/d)
E_{food}	=	Exposure from food consumption (mg/kg/d)
$E_{soil\ ingestion}$	=	Exposure from soil ingestion (mg/kg/d)

Exposure from food consumption is calculated by the following equation:

$$E_{food} = C_{food} \times IR_{food} / BW$$

where:

C_{food}	=	Concentration of COC in food (mg/kg)
IR_{food}	=	Food ingestion rate (kg/d)

BW = Body weight (kg)

Exposure from soil ingestion is calculated by the following equation:

$$E_{\text{soil ingestion}} = C_{soil} \times IR_{soil} / BW$$

where:

C_{soil} = Concentration of COC in soil (mg/kg)

IR_{soil} = Soil ingestion rate (kg/d)

The COC concentrations in food (vegetation, earthworms, and small mammals) were estimated using the equations in USEPA (2007) as shown in Table 39. The water content of the food items was assumed to be: 85% for vegetation, 84% for earthworms, 68% for small mammals (USEPA, 2007). The exposure parameters for the avian and mammalian receptors are presented in Table 37. Maximum measured concentrations in surface soil were used in the calculations and, although birds and mammals are mobile, 100% of their diet was assumed to be obtained from the Site. The estimated exposures of each soil COC are summarized in Table 40.

Groundwater

The groundwater COCs were screened for evaluation of ecological exposure by comparing the maximum measured concentrations to aquatic protection values, as shown in Table 28. The following groundwater COCs were identified as requiring further evaluation: PHCs (F3 and F4 fractions), anthracene, chloride, and iron.

Sediment

As shown in Table 29, VOCs, PAHs, PCBs, and inorganic parameters have been identified as COCs in sediment based on comparison with guidelines protective of ecological receptors; two of the COCs (arsenic and lead) have been measured in excess of the PELs. A study of the benthic communities was undertaken in November 2017, to address the health of the benthic communities on-Site, as compared to those up- and down-stream of the Site. The study concluded that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the Old Sly Lock area.

Surface Water

As shown in Table 30, free cyanide and un-ionized ammonia were measured in surface water in excess of values protective of aquatic receptors and are carried forward for evaluation.

7.5 Hazard Assessment

Assessment endpoints selected for evaluation are survival, growth, and reproduction. Benchmark concentrations and TRVs selected for use in this ERA for the terrestrial receptors are presented in Table 41.

Plants and Soil Invertebrates: The benchmark concentrations for terrestrial plants and soil invertebrates are the component values protective of plants and soil invertebrates from MOE (2011c).

Avian and Mammalian Wildlife: The TRVs developed in MOE (2011c) were used. For both lead and zinc, the TRVs for the Short-Tailed Shrew, Meadow Vole, and Red Fox are based on laboratory studies of rats and represent chronic lowest observed effect levels (LOELs) for reproduction. For lead, the TRVs for the American Woodcock and Red-Winged Blackbird are based on studies of chickens with a reproduction endpoint and, for the Red-Tailed Hawk, the TRV is based on a no observed effect level (NOEL) for survival and reduced body weight for the American Kestrel. For zinc, the TRVs for the American Woodcock, Red-Winged Blackbird, and Red-Tailed Hawk are based on studies of chickens with a reproduction endpoint.

Aquatic Receptors: The Aquatic Protection Values (APVs) presented in MOE (2011c) were selected as the benchmark concentrations for groundwater, protective of aquatic receptors. Because surface water is adjacent to the Site, no dilution of groundwater was assumed in this calculation, which is very conservative. The APVs represent the lowest toxicity effects-based values for freshwater organisms and are listed in Table 28. APVs are not available for PHCs (F3 and F4 fractions) because MOE (2011c) considers these fractions to be sufficiently insoluble that movement via dissolution in groundwater is not likely to be an operable exposure pathway to aquatic receptors. APVs were also used to evaluate the surface water COCs (Table 30).

7.6 Risk Characterization

Ecological risks are characterized by a dimensionless hazard quotient (HQ) calculated as follows:

Plants and Soil Invertebrates:

$$HQ = C_S / C_B$$

where:

C_S = Concentration in soil (ug/g)

C_B = Benchmark Concentration (ug/g)

Avian or Mammalian Receptors:

$$HQ = E_{total} / TRV$$

where:

E_{total} = Total estimated exposure (mg/kg/d)
TRV = Toxicological reference value (mg/kg/d)

Aquatic Receptors:

$$HQ = C_{GW} / APV \quad \text{or} \quad HQ = C_{SW} / APV$$

where:
C_{GW} = Concentration in groundwater (ug/L)
C_{SW} = Concentration in surface water (ug/L)
APV = Aquatic protection value (ug/L)

Terrestrial Receptors

The hazard quotients for the terrestrial receptors are presented in Table 42. As shown, the hazard quotient exceeds 1 (the value considered acceptable) for the following receptors and COCs:

- Plants and soil invertebrates: PHCs F3, anthracene, benzo[a]anthracene, naphthalene, and zinc.
- American Woodcock: lead.
- Red-Winged Blackbird: lead and zinc.

Maximum measured concentrations in surface soil were used for these calculations. For anthracene, benzo[a]anthracene, lead, and zinc, the concentrations were determined in 1994 and were measured in a sample collected over a depth of 0 to 3.0 m bgs. Neither anthracene nor benzo[a]anthracene was measured in excess of the applicable guidelines at any other location and, in particular, not in the 2017 ESA. Lead and zinc were each measured in excess of guidelines at six locations. The average concentration of lead in surface soil is 94 ug/g (versus the maximum of 239 ug/g obtained in 1994) and is less than the applicable CCME soil guideline. The average concentration of zinc in surface soil is 330 ug/g and the maximum value measured in the 2017 ESA is 310 ug/g. Using the 2017 maximum for zinc, the HQs for plants and invertebrates are less than 1 and the HQ for the Red-winged blackbird slightly exceeds 1 (value of 1.3).

As shown in Table 42, benchmark concentrations were not available for plants and invertebrates, to evaluate risk to benzo[b]fluoranthene, methylnaphthalene, and methoxychlor. TRVs and/or information to estimate concentrations in food were not available to evaluate risk to avian or mammalian receptors for PHCs F3, methylnaphthalene, and methoxychlor. In the development of the Canada Wide Standards for PHCs, CCME (2008b) notes that a guideline for exposure of livestock and wildlife to PHCs through ingestion of contaminated soil and via food chain-mediated exposure was not calculated due to insufficient available data and the assumption that the bioconcentration/biomagnification of PHCs into livestock and wildlife food items was unlikely to be significant. CCME (2008b) states that it is unlikely this exposure pathway would control risk management decisions at PHC contaminated sites.

Aquatic Receptors:

The hazard quotients for the aquatic receptors are presented in Table 43. As shown, the HQs marginally exceed 1 for anthracene and chloride, but only when based on groundwater samples obtained more than 10 m from surface water. The HQs for groundwater within 10 m of surface water are less than 1, indicating the concentrations of these substances do not present an unacceptable risk to aquatic receptors. The HQ for iron is much greater than 1 (value of 31 for groundwater within 10 m of surface water), suggesting possible adverse effects on aquatic receptors; however, iron was not identified as a surface water COC. The HQs for free cyanide and un-ionized ammonia, based on the maximum measured surface water concentrations marginally exceed 1 (values of 1.2 and 1.8, respectively). Cyanide was measured in surface water at only one location in excess of the applicable guideline (at SW1); this location is upstream of the Site suggesting that the Site is not the source, and work undertaken at the Site does not present an unacceptable risk to aquatic receptors. Un-ionized ammonia was measured at several locations in excess of the guideline, both upstream and downstream of the Site. The locations of exceedances of un-ionized ammonia would suggest that the Site may be a contributing source of un-ionized ammonia, but these impacts are localized, and an additional source is present downstream.

7.6.1 Summary of Risk Characterization

Exposure to the terrestrial VECs, plants, soil invertebrates, mammals and avian species, was evaluated for the pathways of soil contact, root uptake, and ingestion of soil and food. The estimated HQs, using the maximum measured concentrations in surface soil, were less than the allowable value of 1 for all receptors and COCs except: plants and soil invertebrates (PHCs F3, anthracene, benzo[a]anthracene, naphthalene, and zinc); American Woodcock (lead); and Red-Winged Blackbird (lead and zinc). For anthracene, benzo[a]anthracene, lead, and zinc, these maximum concentrations were determined in 1994 and were measured in a sample collected over a depth greater than would be contacted by terrestrial VECs (0 to 3.0 m bgs). Neither anthracene nor benzo[a]anthracene was measured in excess of the applicable guidelines at any other location and, in particular, not in the 2017 ESA. Lead and zinc were each measured in excess of applicable guidelines at six locations. The average concentration of lead in surface soil is less than the applicable CCME soil guideline. For zinc, the 2017 maximum measured surface soil concentration results in HQs for plants and invertebrates less than 1 and, for the Red-winged blackbird, a HQ slightly larger than 1 (value of 1.3). These calculations are considered very conservative as they employ a maximum measured concentration to evaluate exposure to a mobile VEC, who would have a home range beyond the confines of the Site.

Aquatic VECs, including invertebrates, plants, and fish, may be exposed to the COCs via direct contact with surface water and ingestion of water and food. With the exception of iron, HQs for COCs in groundwater within 10 m of surface water are less than 1, indicating the concentrations of these substances do not present an unacceptable risk to aquatic receptors. The HQ for iron in groundwater within 10 m of surface water is much greater than 1 suggesting possible adverse effects on aquatic receptors; however, iron was not identified as a surface water COC. The HQs for free cyanide and un-ionized ammonia, based on the maximum measured surface water concentrations marginally exceeded 1. Cyanide was measured in surface water at only one location in excess of the applicable guideline; this location is upstream of the Site suggesting that the Site is not the source. Un-ionized ammonia was measured at several locations in excess of the guideline, both upstream and downstream of the Site. The locations of exceedances of un-ionized ammonia would suggest that the Site may be a contributing source of un-ionized ammonia, but these impacts are localized, and an additional source is present downstream.

7.6.2 Uncertainties

The types of uncertainties in the foregoing analyses are identified below, along with a discussion of the influence on the results.

Site Characterization: A comprehensive Site investigation program was completed in 2017, which used information obtained in previous Site investigations to select sample locations and included testing of soil, groundwater, sediment, and surface water for a wide range of parameters. The maximum measured concentrations of the COCs in surface soil (the upper 1.5 m where available) were used in the calculations and these concentrations were assumed to be homogeneously distributed across all areas. The maxima for many of the soil COCs were based on the results of the 1994 ESA; these concentrations were assumed to remain constant with time. The use of maximum measured concentrations is very conservative and, for lead and zinc, average concentrations were also used to characterize the risk of exposure.

Exposure Assessment: Equations from the scientific literature were used to predict COC concentrations in food items. These predictions may over- or under-estimate actual concentrations. Equations to predict concentrations of PHCs F3 fraction, methylnaphthalene, and methoxychlor were not identified. It was assumed that all COCs in soil were 100% bioavailable and it was assumed that the mammalian and avian wildlife would only consume food items living and growing on-Site; whereas, it is likely that they would forage throughout a larger area.

1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367 Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

Hazard Assessment: Screening benchmarks, derived by regulatory agencies, were employed for soil invertebrates and plants. These benchmarks are intended to be conservative and are used to identify the potential for adverse effects. Benchmark concentrations were not available for benzo[b]fluoranthene, methylnaphthalene, or methoxychlor. The TRVs for mammalian and avian wildlife are based on limited available data and are derived based on species-to-species extrapolation. These TRVs may over- or under-estimate risk. TRVs were lacking for PHCs F3 fraction and methylnaphthalene.

Risk Characterization: Risks predicted in this ERA apply to individual organisms, whereas the assessment endpoint for the ERA is the protection of populations and communities of wildlife, plants and invertebrates.

7.7 Recommendations

7.7.1 Additional Data Collection Requirements

As part of the benthic invertebrate study, the location of SED10 was originally chosen to be sampled, as a downstream control; however, this location was found to be frozen over at the time of sampling, so SED7 was selected for sampling instead, as flow was typical of that sampled in CABIN reference datasets. If a future benthic invertebrate study is undertaken, a down-stream control should be included, and sampling be undertaken at a time when freezing conditions are not occurring.

7.7.2 Recommended Risk Management Measures

The results of the ERA suggest the possibility of some adverse effects on plants and soil invertebrates in the vicinity of MW10/17, due to the presence of naphthalene in surface soil. The results of the ERA do not indicate that risk management measures are required for the protection of terrestrial VECs due to exposure to the remaining identified COCs in soil. It is recommended that the surface soils in the vicinity of MW10/17 be excavated as part of the construction activities on-site, and closure samples from the sidewalls and floor of the excavation taken to confirm the concentration of naphthalene in surface soil meets the CCME Soil Quality Guidelines applicable to the Site. Soil that is removed during construction should be transported off site to a registered landfill.

The results of the benthic invertebrate survey indicated that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the area of the Old Sly Locks, and as such risk management measures are not required for the protection of aquatic VECs due to exposure to identified COCs in surface water and sediment. There is some indication that the area of SED7 is experiencing anthropogenic impacts which are likely unrelated to the presence of the historic landfill.

8. Conclusions and Recommendations

Based on the analysis undertaken at the Site, impacts in soil, groundwater, sediment and surface water at the Site likely occurred, at least in part, due to the historical placement of fill. Historical records indicate the Old Sly Lock was built in the mid-1800's. Construction activities caused the formation of an Island south of the Lock. Infill of the Island likely took place from the creation of the Island onwards, but the Site also acted as a landfill for the town between 1965 and 1966. Due to the absence of a competent cap material over the landfill portion of the Site, and the deteriorating condition of the lock, precipitation and water seeping through the lock onto the Site are contributing to ongoing impacts in groundwater, surface water and sediment on-Site, and are likely impacting off-Site media down-stream.

Groundwater, surface water and sediment sampling undertaken both on- and off-Site indicate that off-Site sources up-stream of the Site (to the west) may be a contributing factor to on-Site impacts. Historical records indicate that Lower Reach Park, located to the southwest of the Site, was also historically used as a landfill site, at the same time as the Site, in the mid-1960's, and the Site may be impacted to some degree by the Lower Reach Park historic landfill.

The conclusions and recommendations of the DQ HHERA are based upon the following assumptions:

- The current and future use of the Site is for parkland purposes and there are no buildings on the Site.
- The Site is an island, surrounded by surface water.
- The Site is located in a non-potable groundwater area.
- The human receptors potentially exposed to the COCs at the Site are members of the public of all ages using the park or the Lockstation; long-term and short-term workers operating the Lockstation or completing routine maintenance of the Site; and construction workers completing the proposed construction activities.
- The exposure pathways for the human receptors are incidental ingestion of soil, dermal contact with soil, inhalation of particulate matter, incidental ingestion of groundwater, and dermal contact with groundwater.
- Terrestrial VECs include plants, soil invertebrates, mammals and avian species. Aquatic VECs include invertebrates, plants, and fish.
- The primary exposure pathways for terrestrial VECs are contact with soil, root uptake, and ingestion of soil and food. Aquatic VECs may be exposed to the COCs via direct contact with surface water and ingestion of water and food.

The conclusions of the HHRA are that, for chemicals having threshold effects, the estimated HQs using the maximum measured concentrations were less than the allowable level for all COCs and receptors/pathways, with the exception of incidental ingestion of groundwater and dermal contact with groundwater containing PHCs for all receptors and incidental ingestion of soil and dermal contact with soil containing lead for the toddler. Use of average concentrations in the calculations results in HQs less than the allowable level, except for exposure of the Long-term worker and the Construction worker to PHCs in groundwater. These calculations are considered very conservative because of the high frequency and duration of exposure assumed and, for PHCs, they incorporate an anomalous measurement in one sample; if this anomalous result were omitted from the average concentration calculation and only the duplicate sample result was included, the HQ is less than the allowable level for the Long-term worker. For the Construction worker, the estimated HQ due to contact with groundwater containing PHCs exceeds the allowable level and Health and Safety measures to limit contact are recommended (i.e., wearing of pants, long sleeves, and gloves). For chemicals having non-threshold effects, the calculated incremental lifetime cancer risks are less than the allowable level for all COCs and receptors/pathways.

The conclusions of the ERA are that the estimated HQs, using the maximum measured concentrations in surface soil, were less than the allowable value for all receptors and COCs except: plants and soil invertebrates (PHCs F3, anthracene, benzo[a]anthracene, naphthalene, and zinc); American Woodcock (lead); and Red-Winged Blackbird (lead and zinc). For anthracene, benzo[a]anthracene, lead, and zinc, these maximum concentrations were determined in 1994 and were measured in a sample collected over a depth greater than would be contacted by terrestrial VECs. Neither anthracene nor benzo[a]anthracene was measured in excess of the applicable guidelines at any other location and, in particular, not in the 2017 ESA. Lead and zinc were each measured in excess of applicable guidelines at six locations. The average concentration of lead in surface soil is less than the applicable CCME soil guideline. For zinc, the 2017 maximum measured surface soil concentration results in HQs for plants and invertebrates less than 1 and, for the Red-winged blackbird, a HQ slightly larger than 1. These calculations are considered very conservative as they employ a maximum measured concentration to evaluate exposure to a mobile VEC, who would have a home range beyond the confines of the Site.

For the aquatic VECs, with the exception of iron, the HQs for COCs in groundwater within 10 m of surface water are less than the allowable level, indicating the concentrations of these substances do not present an unacceptable risk to aquatic receptors. The HQ for iron in groundwater within 10 m of surface water is much greater than 1 suggesting possible adverse effects on aquatic receptors; however, iron was not identified as a surface water COC. The HQs for free cyanide and un-ionized ammonia, based on the maximum measured surface water concentrations marginally exceeded the allowable level. Cyanide was measured in surface water at only one location in excess of the applicable guideline; this location is upstream of the Site suggesting that the Site is not the source. Un-ionized ammonia was measured at several locations in excess of the guideline, both upstream and downstream of the Site.

The results of the HHRA indicate that risk management measures are not required for the protection of site visitors or Long-term workers due to exposure to the identified COCs in soil, groundwater, surface water, or sediment. For Construction workers, typical Health and Safety measures (i.e., the wearing of pants, long sleeves, and gloves) are recommended to limit dermal contact with groundwater containing PHCs; no risk management measures are required for the other COCs/exposure pathways.

Personal Protective Equipment (PPE), above the ministry of labour mandated construction site PPE, should be worn by the following workers on site:

- Construction workers who come into contact with subsurface groundwater should wear gloves, long pants, and sleeves to minimize dermal contact with groundwater in areas containing PHCs.
- Construction workers acting as divers contacting sediment during repairs should wear a wet suit while submerged in the lock water body to minimize dermal contact with sediment.

The results of the ERA suggest the possibility of some adverse effects on plants and soil invertebrates in the vicinity of MW10/17, due to the presence of naphthalene in surface soil. The results of the ERA do not indicate that risk management measures are required for the protection of terrestrial VECs due to exposure to the remaining identified COCs in soil. It is recommended that the surface soils in the vicinity of MW10/17 be excavated as part of the construction activities on-site, disposed of at a registered disposal site, and closure samples from the sidewalls and floor of the excavation be taken to confirm the concentration of naphthalene in surface soil meets the CCME Soil Quality Guidelines applicable to the Site.

The results of the benthic invertebrate survey indicated that it is unlikely that the historical landfill has impacted the benthic invertebrate community in the area of the Old Sly Locks, and as such risk management measures are not required for the protection of aquatic VECs due to exposure to identified COCs in surface water and sediment. There is some indication that the area of SED7 is experiencing anthropogenic impacts which are likely unrelated to the presence of the historic landfill.

9. Site Closure Tool Evaluation

The Site Closure Tool (SCT) was completed for the Site. Results can be viewed in Appendix 7. The Site status remains active, due to the need for a Remedial/Risk Management Plan and Remedial Action.

10. Signatures

10.1 Closure

AEL are of the opinion the work and report above, as implemented by AEL with the assistance of the client, meets the applicable requirements for a Phase II ESA, to the extent deemed reasonable and applicable in our sole engineering judgment and met the sampling plan requirements. AEL notes that the work represents a fulfillment of the requirements. Areas of the Site not sampled or explored between the test holes may vary significantly and may contain important issues not identified by the work to date. None of the work completed by AEL shall be taken to mean the Site is or is not suitable for any purpose. AEL will not be responsible for loss or gain of value of the Site due to the findings or opinions expressed in the report, those losses or gains belonging solely to the owner or to others.

10.2 Limitations

The present work is for the sole use of AEL and the client. Others with an interest in the Site such as owners, contractors, purchasers, etc., must undertake their own investigations respecting the Site, and are advised that the work is to the terms of reference only. Neither AEL nor the client warrant or represent the report has found, detected or reported on all site conditions or site environmental conditions. The limitations (Appendix 8) shall apply.

AELenvironment
A division of Aeon Egmond Ltd.

Charna Kozole, P. Eng.

Senior Engineer

Paul Wilson, P. Eng., Project Manager

Principal

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Table 1 - BTEX and PHC in Soil

Location			MW5/17		MW7/17		MW8/17	MW9/17		MW10/17		CCME Residential/ Parkland Property Use Surface Soil	CCME Residential/ Parkland Property Use Subsurface Soil	MOECC Table 9*
Sample ID			A0241	A0244	A0215	A0217	A0235	A0252	A0255	A219	A0221			
Sample Date			2017-08-31	2017-08-31	2017-08-30	2017-08-30	2017-08-30	2017-08-31	2017-08-31	2017-08-30	2017-08-30			
Sample Time			8:26:00 AM	8:34:00 AM	9:40:00 AM	9:54:00 AM	2:38:00 PM	10:00:00 AM	10:15:00 AM	11:04:00 AM	11:12:00 AM			
Depth (m)		From	0.00	3.05	0.76	3.05	1.52	0.76	3.05	0.76	3.05			
		To	0.76	3.35	1.52	3.81	3.05	1.52	4.11	1.22	3.81			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08			
Benzene	µg/g	0.006	<0.006	0.014	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.03	0.03	0.02
Ethylbenzene	µg/g	0.01	<0.01	0.034	<0.01	<0.01	0.048	<0.01	<0.01	0.44	0.24	0.082	0.082	0.05
Toluene	µg/g	0.02	<0.02	0.045	<0.02	<0.02	0.72	<0.02	<0.02	0.024	<0.02	0.37	0.37	0.2
o-Xylene	µg/g	0.02	<0.02	0.058	<0.02	<0.02	0.053	<0.02	<0.02	2.3	1.2	11	11	0.05
p+m-Xylene	µg/g	0.02	0.022	1.2	<0.02	<0.02	0.48	<0.02	<0.02	2.7	1.6			
Xylene (Total)	µg/g	0.02	0.022	1.3	<0.02	<0.02	0.53	<0.02	<0.02	5	2.8			
F1 (C6-C10)	µg/g	10	<10	<10	<10	<10	<10	<10	<10	20	12	30	30	25
F1 (C6-C10) - BTEX	µg/g	10	<10	<10	<10	<10	<10	<10	<10	15	<10			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	-	-	
F2 (C10-C16 Hydrocarbons)	µg/g	10	<10	79	<10	<10	110	<10	<10	130	74	150	150	10
F3 (C16-C34 Hydrocarbons)	µg/g	50	<50	1400	140	130	1400	<50	<50	520	170	300	2500	240
F4 (C34-C50 Hydrocarbons)	µg/g	50	<50	1700	95	190	530	<50	<50	190	110	2800	10000	120
Reached Baseline at C50		-	Yes	No	No	No	No	Yes	Yes	No	No	-	-	
Analysis Date			-	2017-09-09	2017-09-09	2017-09-09	2017-09-09	-	-	2017-09-09	2017-09-09	-	-	
F4G-sg (Grav. Heavy Hydrocarbons)	µg/g	100	-	7300	390	560	1500	-	-	440	240	2800	10000	120
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-	
Moisture	%	1.0	15	29	21	17	32	6	17	27	25	-	-	

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes

*MOECC Table 9 used within 10m of surface water

PHC - Petroleum Hydrocarbons

RDL - Result Detection Limit

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Table 1 - BTEX and PHC in Soil, cont

Location			BH11/17		BH12/17		BH13/17			POND	CCME Residential/ Parkland Property Use Surface Soil	CCME Residential/ Parkland Property Use Subsurface Soil	MOECC Table 9*
Sample ID			A0228	A0229	A0223	A0224	A0230	A0232	A233 DUP of A0230	A0256			
Sample Date			2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-31			
Sample Time			1:36:00 PM	1:48:00 PM	1:08:00 PM	1:19:00 PM	2:10:00 PM	2:25:00 PM	2:12:00 PM	8:00:00 AM			
Depth (m)		From	1.52	3.05	0.76	1.52	0.00	3.05	0.00	0.00			
		To	3.05	4.57	1.52	3.05	1.52	4.57	1.52	0.20			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08			
Benzene	µg/g	0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.03	0.03	0.02
Ethylbenzene	µg/g	0.01	0.01	0.011	<0.01	<0.01	<0.01	0.015	<0.01	<0.01	0.082	0.082	0.05
Toluene	µg/g	0.02	0.03	0.024	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.37	0.37	0.2
o-Xylene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
p+m-Xylene	µg/g	0.02	0.08	0.07	0.026	0.11	<0.02	0.048	<0.02	<0.02	11	11	0.05
Xylene (Total)	µg/g	0.02	0.08	0.07	0.026	0.11	<0.02	0.048	<0.02	<0.02			
F1 (C6-C10)	µg/g	10	<10	<10	<10	<10	<10	<10	<10	<10	30	30	25
F1 (C6-C10) - BTEX	µg/g	10	<10	<10	<10	<10	<10	<10	<10	<10			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	-	-	
F2 (C10-C16 Hydrocarbons)	µg/g	10	<10	32	<10	<10	<10	11	<10	13	150	150	10
F3 (C16-C34 Hydrocarbons)	µg/g	50	100	620	150	210	<50	410	<50	76	300	2500	240
F4 (C34-C50 Hydrocarbons)	µg/g	50	65	370	68	68	<50	78	<50	<50	2800	10000	120
Reached Baseline at C50		-	No	No	No	No	Yes	No	Yes	Yes	-	-	
Analysis Date			2017-09-09	2017-09-09	2017-09-09	2017-09-09	-	2017-09-09	-	-	-	-	
F4G-sg (Grav. Heavy Hydrocarbons)	µg/g	100	340	1000	<100	170	-	<100	-	-	2800	10000	120
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-	
Moisture	%	1.0	24	25	18	20	19	24	27	41	-	-	

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes

*MOECC Table 9 used within 10m of surface water

PHC - Petroleum Hydrocarbons

RDL - Result Detection Limit

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Table 2 - VOCs In Soil

Location			MW5/17		MW7/17		MW8/17	MW9/17		MW10/17		CCME Residential/ Parkland Property Use Surface Soil	CCME Residential/ Parkland Property Use Subsurface Soil	MOECC Table 9*
Sample ID			A0241	A0244	A0215	A0217	A0235	A0252	A0255	A219	A0221			
Sample Date			2017-08-31	2017-08-31	2017-08-30	2017-08-30	2017-08-30	2017-08-31	2017-08-31	2017-08-30	2017-08-30			
Sample Time			8:26:00 AM	8:34:00 AM	9:40:00 AM	9:54:00 AM	2:38:00 PM	10:00:00 AM	10:15:00 AM	11:04:00 AM	11:12:00 AM			
Depth (m)		From	0.00	3.05	0.76	3.05	1.52	0.76	3.05	0.76	3.05			
		To	0.76	3.35	1.52	3.81	3.05	1.52	4.11	1.22	3.81			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08			
Acetone (2-Propanone)	µg/g	0.5	<0.5	0.54	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	16¹	NV	0.5
Benzene	µg/g	0.006	<0.006	0.014	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.03	0.03	0.02
Bromodichloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Bromoform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Bromomethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Carbon Tetrachloride	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Chlorobenzene	µg/g	0.05	<0.05	0.35	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
Chloroform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Dibromochloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,2-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
1,3-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
1,4-Dichlorobenzene	µg/g	0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
Dichlorodifluoromethane (FREON 12)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,2-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,1-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
cis-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
trans-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,2-Dichloropropane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
cis-1,3-Dichloropropene	µg/g	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	5	5	0.05
trans-1,3-Dichloropropene	µg/g	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			
Ethylbenzene	µg/g	0.01	<0.01	0.034	<0.01	<0.01	0.048	<0.01	<0.01	0.44	0.24	0.082	0.082	0.05
Ethylene Dibromide	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Hexane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.49	0.49	0.05
Methyl Ethyl Ketone (2-Butanone)	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NV	NV	0.5
Methyl Isobutyl Ketone	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NV	NV	0.5
Methyl t-butyl ether (MTBE)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Methylene Chloride(Dichloromethane)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Styrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,1,1,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1,2,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Tetrachloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	0.2	0.05
Toluene	µg/g	0.02	<0.02	0.045	<0.02	<0.02	0.72	<0.02	<0.02	0.024	<0.02	0.37	0.37	0.2
1,1,1-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1,2-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Trichloroethylene	µg/g	0.01	<0.01	0.047	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.05
Trichlorofluoromethane (FREON 11)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.25
Vinyl Chloride	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NV	NV	0.02
o-Xylene	µg/g	0.02	<0.02	0.058	<0.02	<0.02	0.053	<0.02	<0.02	2.3	1.2	11	11	0.05
p+m-Xylene	µg/g	0.02	0.022	1.2	<0.02	<0.02	0.48	<0.02	<0.02	2.7	1.6			
Xylene (Total)	µg/g	0.02	0.022	1.3	<0.02	<0.02	0.53	<0.02	<0.02	5	2.8			
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-	-
Moisture	%		15	29	21	17	32	6	17	27	25	-	-	-

VOC - Volatile Organic Compounds

RDL - Result Detection Limit

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines fort he Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

*MOECC Table 9 used within 10m of surface water

¹MOECC Table 3 used due to CCME NV

Results above applicable Standard or Guideline

Table 2 - VOCs In Soil, cont

Location			BH11/17		BH12/17		BH13/17			POND	CCME Residential/ Parkland Property Use Surface Soil	CCME Residential/ Parkland Property Use Subsurface Soil	MOECC Table 9*
Sample ID			A0228	A0229	A0223	A0224	A0230	A0232	A233 DUP of A0230	A0256			
Sample Date			2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-31			
Sample Time			1:36:00 PM	1:48:00 PM	1:08:00 PM	1:19:00 PM	2:10:00 PM	2:25:00 PM	2:12:00 PM	8:00:00 AM			
Depth (m)		From	1.52	3.05	0.76	1.52	0.00	3.05	0.00	0.00			
		To	3.05	4.57	1.52	3.05	1.52	4.57	1.52	0.20			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08			
Acetone (2-Propanone)	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.57	16[1]	NV	0.5
Benzene	µg/g	0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.03	0.03	0.02
Bromodichloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Bromoform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Bromomethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Carbon Tetrachloride	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Chlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
Chloroform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Dibromochloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,2-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
1,3-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
1,4-Dichlorobenzene	µg/g	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1	1	0.05
Dichlorodifluoromethane (FREON 12)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,2-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,1-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
cis-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
trans-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,2-Dichloropropane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
cis-1,3-Dichloropropene	µg/g	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	5	5	0.05
trans-1,3-Dichloropropene	µg/g	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			
Ethylbenzene	µg/g	0.01	0.01	0.011	<0.01	<0.01	<0.01	0.015	<0.01	<0.01	0.082	0.082	0.05
Ethylene Dibromide	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Hexane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.49	0.49	0.05
Methyl Ethyl Ketone (2-Butanone)	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NV	NV	0.5
Methyl Isobutyl Ketone	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NV	NV	0.5
Methyl t-butyl ether (MTBE)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
Methylene Chloride(Dichloromethane)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Styrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
1,1,1,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1,2,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Tetrachloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	0.2	0.05
Toluene	µg/g	0.02	0.03	0.024	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.37	0.37	0.2
1,1,1-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.05
1,1,2-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	5	0.05
Trichloroethylene	µg/g	0.01	<0.01	0.48	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.05
Trichlorofluoromethane (FREON 11)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NV	NV	0.25
Vinyl Chloride	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NV	NV	0.02
o-Xylene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	11	11	0.05
p+m-Xylene	µg/g	0.02	0.08	0.07	0.026	0.11	<0.02	0.048	<0.02	<0.02			
Xylene (Total)	µg/g	0.02	0.08	0.07	0.026	0.11	<0.02	0.048	<0.02	<0.02			
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-	-
Moisture	%		24	25	18	20	19	24	27	41	-	-	-

VOC - Volatile Organic Compounds

*MOECC Table 9 used within 10m of surface water

RDL - Result Detection Limit

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines fort he Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Table 3 - Metals and Inorganics in Soil

Location			MH5/17		MW7/17			MW8/17	MW9/17		CCME Residential/ Parkland Property Use	MOECC Table 9*
Sample ID			A0241	A0245	A0215	A0216	A0217	A0234	A0254	A0251		
Sample Date			2017-08-31	2017-08-31	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-31	2017-08-31		
Sample Time			8:26:00 AM	8:34:00 AM	9:40:00 AM	9:48:00 AM	9:54:00 AM	2:30:00 PM	10:10:00 AM	10:00:00 AM		
Depth (m)		From	0.00	3.35	0.76	1.52	3.05	1.52	2.29	0.00		
		To	0.76	3.66	1.52	3.05	3.81	3.05	3.05	0.76		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08		
Acid Extractable Antimony (Sb)	µg/g	0.2	0.29	<0.20	0.58	5.9	0.42	1.3	<0.20	0.36	20	1.3
Acid Extractable Arsenic (As)	µg/g	1	2.6	13	3.5	17	7.7	3.2	3.2	4.5	12	18
Acid Extractable Barium (Ba)	µg/g	0.5	67	35	130	100	37	210	96	110	500	220
Acid Extractable Beryllium (Be)	µg/g	0.2	0.26	<0.20	0.53	0.37	<0.20	0.37	0.31	0.44	4	2.5
Acid Extractable Cadmium (Cd)	µg/g	0.1	0.18	<0.10	0.4	3.4	0.21	1.9	0.11	0.15	10	1.2
Acid Extractable Chromium (Cr)	µg/g	1	13	9.9	24	42	9.8	39	11	17	64	70
Acid Extractable Cobalt (Co)	µg/g	0.1	4.2	4.5	7.9	8.6	2.6	6.8	4.9	6.2	50	22
Acid Extractable Copper (Cu)	µg/g	0.5	16	18	66	110	320	47	7.4	22	63	92
Acid Extractable Lead (Pb)	µg/g	1	20	33	35	350	27	210	8.7	32	140	120
Acid Extractable Sulphur (S)	µg/g	50	720	4800	320	1700	1900	910	-	270	ND	NV
	µg/g	100	-	-	-	-	-	-	110	-		
Acid Extractable Mercury (Hg)	µg/g	0.05	<0.05	<0.05	0.12	0.64	<0.05	0.4	<0.05	0.085	6.6	0.27
Acid Extractable Molybdenum (Mo)	µg/g	0.5	1.7	3.4	1.5	4.1	2.6	3.4	1.4	1.4	10	2
Acid Extractable Nickel (Ni)	µg/g	0.5	8.6	18	17	-	13	21	7.8	13	45	82
	µg/g	2.5	-	-	-	550	-	-	-	-		
Acid Extractable Selenium (Se)	µg/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	1.5
Acid Extractable Silver (Ag)	µg/g	0.2	<0.20	<0.20	<0.20	0.36	<0.20	0.38	<0.20	0.4	20	0.5
Acid Extractable Thallium (Tl)	µg/g	0.05	0.14	0.13	0.14	0.19	0.11	0.14	0.14	0.24	1	1
Acid Extractable Tin (Sn)	µg/g	1	5.8	16	15	230	8.6	77	<1.0	1.9	50	NV
Acid Extractable Uranium (U)	µg/g	0.05	0.53	0.69	0.66	0.65	0.19	0.52	0.32	0.46	23	2.5
Acid Extractable Vanadium (V)	µg/g	5	18	8	35	27	6.9	46	21	25	130	86
Acid Extractable Zinc (Zn)	µg/g	5	32	37	82	590	53	310	13	54	200	290
Analysis Date			2017-09-08	2017-09-07	2017-09-07	2017-09-08	2017-09-07	2017-09-08	2017-09-07	2017-09-07	-	-
Hot Water Ext. Boron (B)	µg/g	0.050	0.3	0.12	0.17	0.32	0.12	0.38	0.17	0.22	ND	1.5
Analysis Date			2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	-	-
Sodium Adsorption Ratio	-	-	0.19	0.31	0.21	0.12	0.29	0.15	0.27	0.23	5	-
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	-	-
Free Cyanide	µg/g	0.01	0.04	<0.01	0.18	0.26	0.05	0.06	<0.01	<0.01	0.9	0.051
Conductivity	mS/cm	0.002	0.28	0.24	0.19	0.68	0.33	0.47	0.13	0.15	2	0.7
Chromium (VI)	µg/g	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.66
Flouride (F-)	dS/m	5	<5	<5	<5	<5	<5	<5	<5	<5	400	NV
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-
Available (CaCl2) pH	s.u.	-	7.52	7.61	6.8	7.27	7.37	7.55	7.83	7.5	6 to 8	-
Analysis Date			2017-09-06	2017-09-06	2017-09-07	2017-09-06	2017-09-07	2017-09-07	2017-09-06	2017-09-06	-	-
Moisture	%	1.0	15	11	21	31	17	20	13	12	-	-

RDL - Result Detection Limit

*MOECC Table 9 used within 10m of surface water

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Results above CCME Guideline (<10m to water)

Table 3 - Metals and Inorganics in Soil, cont

Location			MW10/17		BH11/17	BH12/17		BH13/17		POND		CCME Residential/ Parkland Property Use	MOECC Table 9*
Sample ID			A0219	A0220	A0228	A0224	A0225	A0231	A0232	A0256	A0257 DUP of A0256		
Sample Date			2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-31	2017-08-31	2017-08-30		
Sample Time			11:04:00 AM	11:09:00 AM	1:36:00 PM	1:19:00 PM	1:22:00 PM	2:18:00 PM	2:25:00 PM	8:00:00 AM	8:02:00 AM		
Depth (m)		From	0.76	1.52	1.52	1.52	3.05	1.52	3.05	0.00	0.00		
		To	1.22	3.05	3.05	3.05	4.57	3.05	4.57	0.20	0.20		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08		
Acid Extractable Antimony (Sb)	µg/g	0.2	1.4	9.8	4.7	0.42	1.4	0.73	3.5	0.46	0.3	20	1.3
Acid Extractable Arsenic (As)	µg/g	1	3.4	12	7.6	2.3	4	3	4.4	2.4	2.1	12	18
Acid Extractable Barium (Ba)	µg/g	0.5	130	280	160	69	140	120	87	120	100	500	220
Acid Extractable Beryllium (Be)	µg/g	0.2	0.39	0.38	0.47	0.21	<0.20	0.39	0.3	0.31	0.25	4	2.5
Acid Extractable Cadmium (Cd)	µg/g	0.1	1.7	1.7	13	0.38	4.3	0.49	0.86	0.29	0.25	10	1.2
Acid Extractable Chromium (Cr)	µg/g	1	38	51	39	14	20	25	23	15	13	64	70
Acid Extractable Cobalt (Co)	µg/g	0.1	7.1	9.5	7	2.9	4.1	5.8	4.9	5.2	4.7	50	22
Acid Extractable Copper (Cu)	µg/g	0.5	62	210	62	23	51	30	710	17	14	63	92
Acid Extractable Lead (Pb)	µg/g	1	190	530	200	73	330	110	90	47	40	140	120
Acid Extractable Sulphur (S)	µg/g	50	1400	1800	1700	570	1800	890	4100	530	470	ND	NV
	µg/g	100	-	-	-	-	-	-	-	-	-		
Acid Extractable Mercury (Hg)	µg/g	0.05	0.23	0.27	0.21	0.087	0.16	0.15	0.12	0.071	0.052	6.6	0.27
Acid Extractable Molybdenum (Mo)	µg/g	0.5	3.4	6.7	2.3	1.4	3.2	1.9	3.1	1.2	1	10	2
Acid Extractable Nickel (Ni)	µg/g	0.5	17	43	20	9.5	18	14	13	13	11	45	82
	µg/g	2.5	-	-	-	-	-	-	-	-	-		
Acid Extractable Selenium (Se)	µg/g	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	1.5
Acid Extractable Silver (Ag)	µg/g	0.2	0.38	0.99	0.3	<0.20	<0.20	<0.20	0.84	0.24	0.23	20	0.5
Acid Extractable Thallium (Tl)	µg/g	0.05	0.18	0.21	0.24	0.097	0.16	0.13	0.19	0.2	0.18	1	1
Acid Extractable Tin (Sn)	µg/g	1	16	210	130	50	150	57	15	11	1.4	50	NV
Acid Extractable Uranium (U)	µg/g	0.05	0.44	0.66	0.63	0.64	0.35	0.53	0.71	0.33	0.33	23	2.5
Acid Extractable Vanadium (V)	µg/g	5	29	23	31	19	13	32	21	19	19	130	86
Acid Extractable Zinc (Zn)	µg/g	5	310	880	150	180	4500	230	340	61	50	200	290
Analysis Date			2017-09-08	2017-09-07	2017-09-08	2017-09-07	2017-09-08	2017-09-08	2017-09-07	2017-09-07	2017-09-07	-	-
Hot Water Ext. Boron (B)	µg/g	0.050	0.24	0.61	0.3	0.11	0.21	0.3	0.36	1.2	1.1	ND	1.5
Analysis Date			2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	2017-09-11	-	-
Sodium Adsorption Ratio	-	-	0.15	0.17	0.1	0.18	0.14	0.19	0.14	0.25	0.26	5	-
Analysis Date			2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	2017-09-08	-	-
Free Cyanide	µg/g	0.01	0.13	0.2	0.03	0.1	0.06	0.13	0.1	0.09	0.09	0.9	0.051
Conductivity	mS/cm	0.002	0.47	0.38	0.84	0.34	0.51	0.31	0.49	0.2	0.17	2	0.7
Chromium (VI)	µg/g	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.66
Flouride (F-)	dS/m	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	400	NV
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-
Available (CaCl2) pH	s.u.	-	7.19	6.82	11.6	7.48	7.32	7.29	8.9	5.78	5.99	6 to 8	5 to 9
Analysis Date			2017-09-07	2017-09-06	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-06	2017-09-06	-	-
Moisture	%	1.0	27	38	24	20	26	36	24	41	42	-	-

RDL - Result Detection Limit

*MOECC Table 9 used within 10m of surface water

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline | Results above CCME Guideline (<10m to water)

Table 4 - PAH In Soils

Location			MW5/17		MW7/17		MW8/17	MW9/17	MW10/17	BH11/17		BH12/17		BH13/17		POND	CCME Residential/ Parkland Property Use	MOECC Table 9*
Sample ID			A0245		A0217		A0234	A0254	A0219	A0227		A0225		A0230		A0256		
Sample Date			2017-08-31		2017-08-30		2017-08-30	2017-08-31	2017-08-30	2017-08-30		2017-08-30		2017-08-30		2017-08-31		
Sample Time			8:34:00 AM		9:54:00 AM		2:30:00 PM	10:10:00 AM	11:04:00 AM	1:30:00 PM		1:22:00 PM		2:10:00 PM		8:00:00 AM		
Depth (m)		From	3.35		3.05		0.00	2.29	0.76	0.76		3.05		0.00		0.00		
		To	3.66		3.81		1.52	3.05	1.22	1.52		4.57		1.52		0.20		
Chemicals	Units	RDL	Results		Results		Results	Results	Results	Results		Results		Results		Results		
Analysis Date			2017-09-08	RDL-->	2017-09-08	RDL-->	2017-09-08	2017-09-08	2017-09-08	2017-09-08	RDL-->	2017-09-08	RDL-->	2017-09-08	RDL-->	2017-09-08		
Acenaphthene	µg/g	0.0050	0.0058	0.0050	<0.005	0.0050	0.013	<0.005	0.099	<0.005	0.050	<0.05	0.0050	<0.005	0.010	<0.01	0.28	0.072
Acenaphthylene	µg/g	0.0050	<0.005	0.0050	<0.005	0.0050	<0.005	<0.005	0.018	<0.005	0.050	<0.05	0.0050	<0.005	0.010	<0.01	320	0.093
Anthracene	µg/g	0.0050	<0.005	0.010	<0.01	0.0050	0.023	<0.005	0.015	0.011	0.050	<0.05	0.0050	0.010	0.020	<0.02	2.5	0.22
Benzo(a)anthracene	µg/g	0.0050	<0.005	0.0050	<0.005	0.0050	0.062	<0.005	0.032	0.043	0.050	<0.05	0.0050	0.039	0.010	0.035	1	0.36
Benzo(a)pyrene	µg/g	0.0050	<0.005	0.0050	0.029	0.0050	0.053	<0.005	0.029	0.043	0.050	<0.05	0.0050	0.039	0.010	0.041	20	0.3
Benzo(b/j)fluoranthene	µg/g	0.0050	<0.005	0.0050	0.017	0.0050	0.078	<0.005	0.044	0.061	0.050	<0.05	0.0050	0.053	0.010	0.059	1	0.47
Benzo(g,h,i)perylene	µg/g	0.0050	<0.005	0.0050	0.043	0.0050	0.033	<0.005	0.020	0.024	0.050	<0.05	0.0050	0.021	0.010	0.031	NV	0.68
Benzo(k)fluoranthene	µg/g	0.0050	<0.005	0.0050	<0.005	0.0050	0.024	<0.005	0.016	0.019	0.050	<0.05	0.0050	0.017	0.010	0.020	1	0.48
Chrysene	µg/g	0.0050	<0.005	0.010	<0.01	0.0050	0.052	<0.005	0.036	0.044	0.050	<0.05	0.0050	0.035	0.010	0.036	NV	2.8
Dibenz(a,h)anthracene	µg/g	0.0050	<0.005	0.0050	<0.005	0.0050	0.0077	<0.005	<0.005	0.0062	0.050	<0.05	0.0050	0.0062	0.010	<0.01	1	0.1
Fluoranthene	µg/g	0.0050	0.012	0.0050	0.0054	0.0050	0.14	<0.005	0.073	0.076	0.050	0.10	0.0050	0.069	0.010	0.077	50	0.69
Fluorene	µg/g	0.0050	0.0063	0.0050	<0.005	0.0050	0.014	<0.005	0.21	<0.005	0.050	<0.05	0.0050	<0.005	0.010	<0.01	0.25	0.19
Indeno(1,2,3-cd)pyrene	µg/g	0.0050	<0.005	0.0050	0.014	0.0050	0.034	<0.005	0.020	0.028	0.050	<0.05	0.0050	0.023	0.010	0.029	1	0.23
1-Methylnaphthalene	µg/g	0.0050	0.012	0.0050	<0.005	0.0050	0.021	<0.005	2.3	<0.005	0.050	<0.05	0.0050	0.0051	0.010	<0.01	NV	0.59
2-Methylnaphthalene	µg/g	0.020	<0.02	0.0050	<0.005	0.0050	0.036	<0.005	2.9	<0.005	0.20	<0.2	0.0050	0.0081	0.010	<0.01		
Methylnaphthalene, 2-(1-)	µg/g	0.021	<0.021	0.0071	<0.0071	0.0071	0.057	<0.0071	5.3	<0.0071	0.21	<0.21	0.0071	0.013	0.014	<0.014		
Naphthalene	µg/g	0.0050	<0.005	0.0050	<0.005	0.0050	0.054	<0.005	3.7	<0.005	0.050	<0.05	0.0050	<0.005	0.010	<0.01	0.013	0.09
Phenanthrene	µg/g	0.0050	0.018	0.0050	0.0085	0.0050	0.088	<0.005	0.055	0.042	0.050	0.073	0.0050	0.041	0.010	0.037	0.046	0.69
Pyrene	µg/g	0.0050	0.011	0.0050	0.021	0.0050	0.12	<0.005	0.076	0.065	0.050	0.10	0.0050	0.058	0.010	0.062	10	1
Benzo[a]pyrene Total Potency Equivalents	µg/g		0.012		0.039		0.081	0.012	0.046	0.065		0.121		0.059		0.066	0.6	
Analysis Date			2017-09-06		2017-09-07		2017-09-07	2017-09-06	2017-09-07	2017-09-07		2017-09-06		2017-09-07		2017-09-07	-	-
Moisture	%	1	11		17		20	13	27	16		26		19		41	-	-

PAH - Polycyclic Aromatic Hydrocarbons

*MOECC Table 9 used within 10m of surface water

RDL - Result Detection Limit

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

RDL above applicable Standard or Guideline

Table 5 - PCBs In Soil

Location			MW5/17	MW7/17	MW8/17	MW9/17	MW10/17	BH11/17	BH12/17	BH13/17	POND	CCME Residential/ Parkland Property Use	MOECC Table 9*
Sample ID			A0245	A0217	A0234	A0254	A0219	A0227	A0225	A0230	A0256		
Sample Date			2017-08-31	2017-08-30	2017-08-30	2017-08-31	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-31		
Sample Time			8:34:00 AM	9:54:00 AM	2:30:00 PM	10:10:00 AM	11:04:00 AM	1:30:00 PM	1:22:00 PM	2:10:00 PM	8:00:00 AM		
Depth (m)		From	3.35	3.05	0.00	2.29	0.76	0.76	3.05	0.00	0.00		
		To	3.66	3.81	1.52	3.05	1.22	1.52	4.57	1.52	0.20		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-08	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-08	2017-09-08	2017-09-08	2017-09-07		
Total PCBs	µg/g	0.01	<0.01	<0.01	0.027	<0.01	0.19	<0.01	0.099	<0.01	-	1.3	0.3
	µg/g	0.02	-	-	-	-	-	-	-	-	<0.02		

PCB - Polychlorinated Biphenyl

*MOECC Table 9 used within 10m of surface water

RDL - Result Detection Limit

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

CCME - Canadian Council of Ministers of the Environment, Soil Quality Guidelines for the Protection of Environmental and Human Health, 1991 - 2015

Results above Guideline

Table 6 Surface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
PHC F1 (C6-C10)	10	µg/g	15	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	30	N
	10	µg/g	<10	Not Detected On Site	< 10 m	N/A	N/A	25	N
PHC F2 (C10-C16)	10	µg/g	130	MW10/17	>10 m	2017-08-30	0.76 - 1.22 m	150	N
	10	µg/g	<10	Not Detected On Site	< 10 m	N/A	N/A	10	N
PHC F3 (C16-C34)	50	µg/g	520	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	300	Y
	50	µg/g	150	BH12/17	< 10 m	2017-08-30	0.76 - 1.52 m	240	N
PHC F4 (C34-C50)	50	µg/g	190	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	2800	N
	50	µg/g	95	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	120	N
PHC F4 (Grav. Heavy Hydrocarbons)	100	µg/g	440	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	2800	N
	100	µg/g	390	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	120	Y

Table 6 Surface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Sodium Adsorption Ratio (SAR)	N/A	N/A	0.25	Pond	>10 m	2017-08-31	0.00 - 0.20	5	N
	N/A	N/A	0.21	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	5	N
pH	N/A	s.u.	7.56	SS1	>10 m	1994-10-17	N/A	6-8	N
	N/A	s.u.	6.8	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	6-8	N
Cyanide (Free)	0.01	µg/g	0.18	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	0.9	N
	0.01	µg/g	0.13	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.051	N
Electrical Conductivity	0.002	mS/cm	0.47	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	2	N
	0.002	mS/cm	0.19	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.7	N
Fluoride	5	dS/m	<5	Not Detected On Site	< 10 m	N/A	N/A	400	N
	5	dS/m	<5	Not Detected On Site	< 10 m	N/A	N/A	NV	N
Alunimum	N/A	N/A	N/A	N/A	> 10 m	N/A	N/A	NV	N
	1	ppm	10800	SS1	>10 m	1994-10-17	Surface	NV	N
Antimony	0.2	µg/g	1.4	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	20	N
	0.2	µg/g	0.58	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	1.3	N
Arsenic	1	µg/g	4.5	MW9/17	>10 m	2017-08-31	0.00 - 0.76 m	12	N
	1	µg/g	3.5	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	18	N
Barium	0.5	µg/g	130	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	500	N
	0.5	µg/g	130	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	220	N
Beryllium	0.2	µg/g	0.44	MW9/17	>10 m	2017-08-31	0.00 - 0.76 m	4	N
	0.2	µg/g	0.53	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	2.5	N
Boron (HWS)	0.05	µg/g	1.20	Pond	>10 m	2017-08-31	0.00 - 0.20	NV	N
	0.05	µg/g	0.17	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	1.5	N
Boron (total)	0.5	µg/g	1.8	SS1	>10 m	1994-10-17	Surface	1.5	Y
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Cadmium	0.1	µg/g	1.7	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	10	N
	0.1	µg/g	0.4	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	1.2	N
Chromium (Total)	1	µg/g	38	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	64	N
	1	µg/g	24	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	70	N
Chromium (VI)	0.2	µg/g	<0.2	Not Detected On Site	> 10 m	N/A	N/A	0.4	N
	0.2	µg/g	<0.2	Not Detected On Site	< 10 m	N/A	N/A	0.66	N
Cobalt	0.1	µg/g	7.1	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	50	N
	0.1	µg/g	7.9	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	22	N
Copper	0.5	µg/g	62	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	63	N
	0.5	µg/g	66	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	92	N
Iron	0.3	ppm	14300	SS2	>10 m	1994-11-15	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Lead	1	µg/g	190	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	140	Y
	1	µg/g	35	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	120	N
Manganese	0.3	ppm	850	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Mercury	0.05	µg/g	0.23	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	6.6	N
	0.05	µg/g	0.12	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.27	N
Molybdenum	0.5	µg/g	3.4	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	10	N
	0.5	µg/g	1.5	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	2	N
Nickel	0.5	µg/g	17	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	45	N
	0.5	µg/g	17	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	82	N
Phosphorous	3.0	ppm	667	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Potassium	20	ppm	1330	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Sodium	0.5	ppm	76.2	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NA	N
Selenium	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	1.5	N
Silver	0.5	µg/g	0.6	SS1	>10 m	1994-10-17	Surface	20	N
	0.2	µg/g	<0.2	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Strontium	0.3	ppm	19	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Sulphur	50	µg/g	1400	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	NV	N
	50	µg/g	320	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	NV	N
Thallium	0.05	µg/g	0.24	MW9/17	>10 m	2017-08-31	0.00 - 0.76 m	1	N
	0.05	µg/g	0.14	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	1	N
Tin	1	µg/g	16	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	50	N
	1	µg/g	15	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	NV	N
Titanium	0.3	ppm	523	SS1	>10 m	1994-10-17	Surface	NV	N
	N/A	N/A	N/A	N/A	< 10 m	N/A	N/A	NV	N
Uranium	0.05	µg/g	0.53	MW5/17	>10 m	2017-08-31	0.00 - 0.76 m	23	N
	0.05	µg/g	0.66	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	2.5	N
Vanadium	5	µg/g	29	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	130	N
	5	µg/g	35	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	86	N
Zinc	5	µg/g	310	MW10/17	> 10 m	2017-08-31	0.76 - 1.22 m	200	Y
	5	µg/g	82	MW7/17	< 10 m	2017-08-30	0.76 - 1.52 m	290	N

Table 6 Surface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Acetone (2-Propanone)	0.5	µg/g	0.57	Pond	>10 m	2017-08-31	0.00 - 0.20	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Benzene	0.006	µg/g	<0.006	Not Detected On Site	> 10 m	N/A	N/A	0.0095	N
	0.006	µg/g	<0.006	Not Detected On Site	< 10 m	N/A	N/A	0.02	N
Bromodichloromethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Bromoform	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Bromomethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Carbon Tetrachloride	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Chlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Chloroform	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Dibromochloromethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,3-Dichlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,4-Dichlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Dichlorodifluoromethane (FREON 12)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1-Dichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
cis-1,2-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
trans-1,2-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichloropropane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
cis-1,3-Dichloropropene	0.03	µg/g	<0.03	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.03	µg/g	<0.03	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
trans-1,3-Dichloropropene	0.04	µg/g	<0.04	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.04	µg/g	<0.04	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Ethylbenzene	0.01	µg/g	0.44	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	0.082	Y
	0.01	µg/g	<0.01	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Ethylene Dibromide	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Hexane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	0.49	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Methyl Ethyl Ketone (2-Butanone)	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Methyl Isobutyl Ketone	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Methyl t-butyl ether (MTBE)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Methylene Chloride(Dichloromethane)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Styrene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,1,2-Tetrachloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,2,2-Tetrachloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Tetrachloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	0.2	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Toluene	0.02	µg/g	0.024	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	0.37	N
	0.02	µg/g	<0.02	Not Detected On Site	< 10 m	N/A	N/A	0.2	N
1,1,1-Trichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,2-Trichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Trichloroethylene	0.01	µg/g	<0.01	Not Detected On Site	> 10 m	N/A	N/A	0.01	N
	0.01	µg/g	<0.01	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Trichlorofluoromethane (FREON 11)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.25	N
Vinyl Chloride	0.02	µg/g	<0.02	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.02	µg/g	<0.02	Not Detected On Site	< 10 m	N/A	N/A	0.02	N
o-Xylene	0.02	µg/g	2.3	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	11	N
	0.02	µg/g	<0.02	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
p+m-Xylene	0.02	µg/g	2.7	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	11	N
	0.02	µg/g	0.026	BH12/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.05	N
Xylene (Total)	0.02	µg/g	5.0	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	11	N
	0.02	µg/g	0.026	BH12/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.05	N

Table 6 Surface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Acenaphthene	0.005	µg/g	0.013	MW8/17	>10 m	2017-08-30	0.00 - 1.52 m	0.28	N
	0.005	µg/g	<0.005	Not Detected On Site	< 10 m	N/A	N/A	0.072	N
Acenaphthylene	0.005	µg/g	0.018	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	320	N
	0.005	µg/g	<0.005	Not Detected On Site	< 10 m	N/A	N/A	0.093	N
Anthracene	0.1	µg/g	0.29	SS1	>10 m	1994-10-17	Surface	2.5	N
	0.005	µg/g	0.011	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.22	N
Benzo[a]anthracene	0.1	µg/g	0.3	SS1	>10 m	1994-10-17	Surface	1	N
	0.005	µg/g	0.043	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.36	N
Benzo[a]pyrene	0.1	µg/g	0.24	SS1	>10 m	1994-10-17	Surface	20	N
	0.005	µg/g	0.043	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.3	N
Benzo[b]fluoranthene	0.1	µg/g	0.22	SS1	>10 m	1994-10-17	Surface	1	N
	0.005	µg/g	0.061	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.47	N
Benzo[ghi]perylene	0.005	µg/g	0.033	MW8/17	>10 m	2017-08-30	0.00 - 1.52 m	NV	N
	0.005	µg/g	0.024	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.68	N
Benzo[k]fluoranthene	0.1	µg/g	0.25	SS1	>10 m	1994-10-17	Surface	1	N
	0.005	µg/g	0.019	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.48	N
Chrysene	0.1	µg/g	0.30	SS1	>10 m	1994-10-17	Surface	NV	N
	0.005	µg/g	0.044	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	2.8	N
Dibenz[a,h]anthracene	0.005	µg/g	0.0077	MW8/17	>10 m	2017-08-30	0.00 - 1.52 m	1	N
	0.005	µg/g	0.0062	BH11/17/BH13/17	< 10 m	2017-08-30/2017-08-30	0.76 - 1.52 m/0.00 - 1.52 m	0.1	N
Fluoranthene	0.1	µg/g	0.63	SS1	>10 m	1994-10-17	Surface	50	N
	0.005	µg/g	0.076	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.69	N
Fluorene	0.005	µg/g	0.21	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	0.25	N
	0.005	µg/g	<0.005	Not Detected On Site	< 10 m	N/A	N/A	0.19	N
Ideno[1,2,3-cd]pyrene	0.005	µg/g	0.034	MW8/17	>10 m	2017-08-30	0.00 - 1.52 m	1	N
	0.005	µg/g	0.028	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.23	N
Methylnaphthalene, 2-(1-)	0.0071	µg/g	5.3	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	NV	Y
	0.0071	µg/g	0.013	BH13/17	< 10 m	2017-08-30	0.00 - 1.52 m	0.59	N
Naphthalene	0.005	µg/g	3.7	MW10/17	>10 m	2017-08-31	0.76 - 1.22 m	0.013	Y
	0.005	µg/g	<0.005	Not Detected On Site	< 10 m	N/A	N/A	0.09	N
Phenanthrene	0.1	µg/g	0.43	SS1	>10 m	1994-10-17	Surface	0.046	Y
	0.005	µg/g	0.042	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	0.69	N
Pyrene	0.1	µg/g	0.17	SS1/SS2	>10 m	1994-10-17/1994-11-15	Surface	10	N
	0.005	µg/g	0.065	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	1	N
Benzo[a]pyrene Total Potency Equivalents	-	µg/g	0.081	MW8/17	> 10 m	2017-08-30	0.00 - 1.52 m	0.6	N
	-	µg/g	0.065	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	NV	N
Total PCBs	0.01	µg/g	0.027	MW8/17	>10 m	2017-08-30	0.00 - 1.52 m	1.3	N
	0.01	µg/g	<0.01	Not Detected On Site	< 10 m	N/A	N/A	0.3	N

N/A - Not Applicable

Table 7 Subsurface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
PHC F1 (C6-C10)	10	µg/g	<10	Not Detected On Site	>10 m	N/A	N/A	30	N
	10	µg/g	<10	Not Detected On Site	< 10 m	N/A	N/A	25	N
PHC F2 (C10-C16)	10	µg/g	110	MW8/17	>10 m	2017-08-30	1.52 - 3.05 m	150	N
	10	µg/g	32	BH11/17	< 10 m	2017-08-30	3.05 - 4.57 m	10	Y
PHC F3 (C16-C34)	50	µg/g	1400	MW5/17/MW8/17	>10 m	2017-08-31/2017-08-30	3.05 - 3.35 m/1.52 - 3.05 m	2500	N
	50	µg/g	620	BH11/17	< 10 m	2017-08-30	3.05 - 4.57 m	240	Y
PHC F4 (C34-C50)	50	µg/g	1700	MW5/17	>10 m	017-08-31	3.05 - 3.35 m	10000	N
	50	µg/g	370	BH11/17	< 10 m	2017-08-30	3.05 - 4.57 m	120	Y
PHC F4 (Grav. Heavy Hydrocarbons)	100	µg/g	7300	MW5/17	>10 m	017-08-31	3.05 - 3.35 m	10000	N
	100	µg/g	1000	BH11/17	< 10 m	2017-08-30	3.05 - 4.57 m	120	Y

Table 7 Subsurface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Sodium Adsorption Ratio (SAR)	N/A	N/A	0.31	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	5	N
	N/A	N/A	0.29	MW7/17	< 10 m	2017-08-30	3.05 - 3.81 m	5	N
pH	N/A	s.u.	7.83	MW9/17	>10 m	2017-08-31	2.29 - 3.05 m	6-8	N
	N/A	s.u.	8.9	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	6-8	N
Cyanide (Free)	0.01	µg/g	0.2	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	0.9	N
	0.01	µg/g	0.26	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	0.051	Y
Electrical Conductivity	0.002	mS/cm	0.47	MW8/17	> 10 m	2017-08-30	1.52 - 3.05 m	2	N
	0.002	mS/cm	0.68	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	0.7	N
Fluoride	5	dS/m	<5	Not Detected On Site	< 10 m	N/A	N/A	400	N
	5	dS/m	<5	Not Detected On Site	< 10 m	N/A	N/A	NV	N
Alunimum	1	ppm	13400	MW-4	> 10 m	1994-11-14	0 - 4.94 m	NV	N
	1	ppm	8290	MW-1	>10 m	1994-11-14	0 - 4.49 m	NV	N
Antimony	0.2	µg/g	9.8	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	20	N
	0.2	µg/g	5.9	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	1.3	Y
Arsenic	1	µg/g	13	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	12	Y
	1	µg/g	17	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	18	N
Barium	0.5	µg/g	280	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	500	N
	0.2	µg/g	155	MW-1	< 10 m	1994-11-14	0 - 4.49 m	220	N
Beryllium	0.2	µg/g	0.38	MW10/17	>10 m	2017-08-31	1.52 - 3.05 m	4	N
	0.2	µg/g	0.37	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	2.5	N
Boron (HWS)	0.05	µg/g	0.61	MW10/17	>10 m	2017-08-31	1.52 - 3.05 m	NV	N
	0.05	µg/g	0.36	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	1.5	N
Boron (total)	0.5	µg/g	4.7	MW-3	>10 m	1994-11-14	0 - 4.94 m	1.5	Y
	0.5	N/A	N/A	Not Detected On Site	< 10 m	N/A	N/A	NV	N
Cadmium	0.1	µg/g	1.9	MW8/17	> 10 m	2017-08-30	1.52 - 3.05 m	10	N
	0.1	µg/g	13	BH11/17	< 10 m	2017-08-30	1.52 - 3.05 m	1.2	Y
Chromium (Total)	1	µg/g	51	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	64	N
	1	µg/g	42	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	70	N
Chromium (VI)	0.2	µg/g	<0.2	Not Detected On Site	> 10 m	N/A	N/A	0.4	N
	0.2	µg/g	<0.2	Not Detected On Site	< 10 m	N/A	N/A	0.66	N
Cobalt	0.3	µg/g	11.8	MW-5	> 10 m	1994-11-14	0 - 3.0 m	50	N
	0.1	µg/g	8.6	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	22	N
Copper	0.5	µg/g	210	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	63	Y
	0.5	µg/g	710	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	92	Y
Iron	0.3	ppm	19100	MW-3	>10 m	1994-11-14	0 - 4.94 m	NV	N
	0.3	ppm	28200	MW-1	< 10 m	1994-11-14	0 - 4.49 m	NV	N
Lead	1	µg/g	530	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	140	Y
	1	µg/g	350	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	120	Y
Manganese	0.3	ppm	796	MW-3	>10 m	1994-11-14	0 - 4.94 m	NV	N
	0.3	ppm	722	MW-1	< 10 m	1994-11-14	0 - 4.49 m	NV	N
Mercury	0.05	µg/g	0.4	MW8/17	> 10 m	2017-08-30	1.52 - 3.05 m	6.6	N
	0.05	µg/g	0.64	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	0.27	Y
Molybdenum	0.5	µg/g	6.7	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	10	N
	0.5	µg/g	4.1	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	2	Y
Nickel	0.5	µg/g	43	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	45	N
	2.5	µg/g	550	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	82	Y
Selenium	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	1.5	N
Silver	0.2	µg/g	0.99	MW10/17	>10 m	2017-08-31	1.52 - 3.05 m	20	N
	0.2	µg/g	0.84	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	0.5	Y
Sulphur	50	µg/g	4800	MW5/17	> 10 m	2017-08-31	3.35 - 3.66 m	NV	N
	50	µg/g	4100	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	NV	N
Thallium	0.05	µg/g	0.21	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	1	N
	0.05	µg/g	0.19	MW7/17/BH13/17	< 10 m	2017-08-30/2017-08-31	1.52 - 3.05 m/3.05 - 4.57 m	1	N
Tin	1	µg/g	210	MW10/17	> 10 m	2017-08-31	1.52 - 3.05 m	50	Y
	1	µg/g	230	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	NV	N
Uranium	0.05	µg/g	0.69	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	23	N
	0.05	µg/g	0.71	BH13/17	< 10 m	2017-08-31	3.05 - 4.57 m	2.5	N
Vanadium	5	µg/g	46	MW8/17	> 10 m	2017-08-30	1.52 - 3.05 m	130	N
	5	µg/g	27	MW7/17	< 10 m	2017-08-30	1.52 - 3.05 m	86	N
Zinc	0.3	µg/g	1440	MW-3	> 10 m	1994-11-14	0 - 4.94 m	200	Y
	5	µg/g	4500	BH12/17	< 10 m	2017-08-30	3.05 - 4.57 m	290	Y

Table 7 Subsurface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Acetone (2-Propanone)	0.5	µg/g	0.54	MW5/17	>10 m	2017-08-31	3.05 - 3.35 m	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Benzene	0.006	µg/g	0.014	MW5/17	> 10 m	2017-08-31	3.05 - 3.35 m	0.03	N
	0.006	µg/g	<0.006	Not Detected On Site	< 10 m	N/A	N/A	0.02	N
Bromodichloromethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Bromoform	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Bromomethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Carbon Tetrachloride	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Chlorobenzene	0.05	µg/g	0.35	MW5/17	> 10 m	2017-08-31	3.05 - 3.35 m	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Chloroform	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Dibromochloromethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,3-Dichlorobenzene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,4-Dichlorobenzene	0.05	µg/g	0.12	MW5/17	> 10 m	2017-08-31	3.05 - 3.35 m	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Dichlorodifluoromethane (FREON 12)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1-Dichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
cis-1,2-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
trans-1,2-Dichloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,2-Dichloropropane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
cis-1,3-Dichloropropene	0.03	µg/g	<0.03	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.03	µg/g	<0.03	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
trans-1,3-Dichloropropene	0.04	µg/g	<0.04	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.04	µg/g	<0.04	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Ethylbenzene	0.01	µg/g	0.24	MW10/17	>10 m	2017-08-31	3.05 - 3.81 m	0.082	Y
	0.01	µg/g	0.015	BH13/17	< 10 m	2017-08-30	3.05 - 4.57 m	0.05	N
Ethylene Dibromide	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Hexane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	0.49	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Methyl Ethyl Ketone (2-Butanone)	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Methyl Isobutyl Ketone	0.5	µg/g	<0.5	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.5	µg/g	<0.5	Not Detected On Site	< 10 m	N/A	N/A	0.5	N
Methyl t-butyl ether (MTBE)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Methylene Chloride(Dichloromethane)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Styrene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,1,2-Tetrachloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,2,2-Tetrachloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Tetrachloroethylene	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	0.2	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Toluene	0.02	µg/g	0.72	MW8/17	>10 m	2017-08-30	1.52 - 3.05 m	0.37	Y
	0.02	µg/g	0.03	BH11/17	< 10 m	2017-08-30	1.52 - 3.81 m	0.2	N
1,1,1-Trichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
1,1,2-Trichloroethane	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	5	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
Trichloroethylene	0.05	µg/g	0.047	MW5/17	> 10 m	2017-08-31	3.05 - 3.35 m	0.01	Y
	0.01	µg/g	0.48	BH11/17	< 10 m	2017-08-30	3.05 - 4.57 m	0.05	Y
Trichlorofluoromethane (FREON 11)	0.05	µg/g	<0.05	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.25	N
Vinyl Chloride	0.02	µg/g	<0.02	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.02	µg/g	<0.02	Not Detected On Site	< 10 m	N/A	N/A	0.02	N
o-Xylene	0.02	µg/g	2.8	MW10/17	>10 m	2017-08-31	3.05 - 3.81	11	N
	0.02	µg/g	<0.02	Not Detected On Site	< 10 m	N/A	N/A	0.05	N
p+m-Xylene	0.02	µg/g	1.6	MW10/17	>10 m	2017-08-31	3.05 - 3.81	11	N
	0.02	µg/g	0.11	BH12/17	< 10 m	2017-08-30	1.52 - 3.05 m	0.05	Y
Xylene (Total)	0.02	µg/g	2.8	MW10/17	>10 m	2017-08-31	3.05 - 3.81	11	N
	0.02	µg/g	0.11	BH12/17	< 10 m	2017-08-30	1.52 - 3.05 m	0.05	Y

Table 7 Subsurface Soil Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Sampling Depth	Applicable Guideline/Standard Value	Exceedance
Acenaphthene	0.005	µg/g	0.0058	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	0.28	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.072	N
Acenaphthylene	0.005	µg/g	<0.005	Not Detected On Site	> 10 m	N/A	N/A	320	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.093	N
Anthracene	0.1	µg/g	2.94	MW-5	>10 m	1994-11-14	0 - 3.0 m	2.5	Y
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.22	N
Benzo[a]anthracene	0.1	µg/g	1.63	MW-5	>10 m	1994-11-14	0 - 3.0 m	1	Y
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.36	N
Benzo[a]pyrene	0.1	µg/g	1.42	MW-5	>10 m	1994-11-14	0 - 3.0 m	20	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.3	N
Benzo[b]fluoranthene	0.1	µg/g	1.16	MW-5	>10 m	1994-11-14	0 - 3.0 m	1	Y
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.47	N
Benzo[ghi]perylene	0.005	µg/g	<0.005	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.68	N
Benzo[k]fluoranthene	0.1	µg/g	1.3	MW-5	>10 m	1994-11-14	0 - 3.0 m	1	Y
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.48	N
Chrysene	0.1	µg/g	1.79	MW-5	>10 m	1994-11-14	0 - 3.0 m	NV	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	2.8	N
Dibenz[a,h]anthracene	0.005	µg/g	<0.005	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.1	N
Fluoranthene	0.1	µg/g	2.93	MW-5	>10 m	1994-11-14	0 - 3.0 m	50	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.69	N
Fluorene	0.005	µg/g	0.0063	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	0.25	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.19	N
Ideno[1,2,3-cd]pyrene	0.005	µg/g	<0.005	Not Detected On Site	> 10 m	N/A	N/A	1	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.23	N
Methylnaphthalene, 2-(1-)	0.021	µg/g	<0.021	Not Detected On Site	> 10 m	N/A	N/A	NV	N
	0.21	µg/g	<0.21	Not Detected On Site	< 10 m	N/A	N/A	0.59	N
Naphthalene	0.005	µg/g	<0.005	Not Detected On Site	> 10 m	N/A	N/A	0.013	N
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.09	N
Phenanthrene	0.1	µg/g	3.04	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	0.046	Y
	0.05	µg/g	<0.05	Not Detected On Site	< 10 m	N/A	N/A	0.69	N
Pyrene	0.1	µg/g	3.9	MW5/17	>10 m	2017-08-31	3.35 - 3.66 m	10	N
	0.005	µg/g	0.065	BH11/17	< 10 m	2017-08-30	0.76 - 1.52 m	1	N
Benzo[a]pyrene Total Potency Equivalents	-	µg/g	0.012	MW5/17/MW9/17	> 10 m	2017-08-31/2017-08-31	3.35 - 3.66 m/2.29 - 3.05 m	0.6	N
	-	µg/g	0.121	BH12/17	< 10 m	2017-08-30	3.05 - 4.57 m	NV	N
Total PCBs	0.01	µg/g	<0.01	Not Detected On Site	>10 m	N/A	N/A	1.3	N
	0.01	µg/g	0.099	BH12/17	< 10 m	2017-08-30	3.05 - 4.57 m	0.3	N
4,4-DDD	0.6	ppm	0.048	MW-3	>10 m	1994-11-14	0 - 4.94 m	NV	N
	0.6	ppm	0.062	MW-1	< 10 m	1994-11-14	0 - 4.49 m	0.05	Y
4,4-DDT	1.8	ppm	0.102	MW-5	> 10 m	1994-11-14	0 - 3.0 m	0.7	N
	1.8	ppm	<1.8	Not Detected On Site	< 10 m	N/A	N/A	1.4	N
Dieldrin	0.3	ppm	<0.3	Not Detected On Site	>10 m	N/A	N/A	NV	N
	0.3	ppm	0.013	MW-1	< 10 m	1994-11-14	0 - 4.49 m	0.05	N
Methoxychlor	2.4	ppm	1.31	MW-5	> 10 m	1994-11-14	0 - 3.0 m	NV	N
	2.4	ppm	<2.4	Not Detected On Site	< 10 m	N/A	N/A	0.05	N

N/A - Not Applicable

Table 8 - BTEX and PHC in Groundwater

Location			MW1	MW3D	MW3S	MW5/17	MW6	MW7/17	MW8/17		MW9/17	MW10/17	FCSAP Residential/ Parkland Land Use Coarse	MOECC Table 9*
Sample ID			A0192	A0193	A0194	A0261	A0191	A0240	A0246	A0247 DUP of A0246	A0262	A0248		
Sample Date			2017-08-28	2017-08-28	2017-08-28	2017-09-01	2017-08-28	2017-08-31	2017-08-31	2017-08-31	2017-09-01	2017-08-31		
Sample Time			3:00:00 PM	5:15:00 PM	5:45:00 PM	8:05:00 AM	1:40:00 PM	9:10:00 AM	11:20:00 AM	11:25:00 AM	8:40:00 AM	12:35:00 PM		
Depth (m)		From	-	-	-	2.13	-	2.13	1.22	1.22	2.59	2.29		
		To	5.2	5.75	2.39	3.66	3.17	3.66	4.27	4.27	4.11	3.81		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-02	2017-09-02	2017-09-02	2017-09-07	2017-09-02	2017-09-05	2017-09-05	2017-09-05	2017-09-07	2017-09-05		
Benzene	µg/L	0.20	<0.20	<0.20	<0.20	0.30	<0.20	<0.20	<0.20	<0.20	<0.20	0.71	140	44
Ethylbenzene	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	29	11000	1800
Toluene	µg/L	0.20	<0.20	<0.20	<0.20	0.26	<0.20	<0.20	0.27	0.30	<0.20	2.7	83	14000
o-Xylene	µg/L	0.20	<0.20	<0.20	<0.20	0.37	<0.20	<0.20	<0.20	<0.20	<0.20	170	3900	3300
p+m-Xylene	µg/L	0.20	<0.20	<0.20	<0.20	14	<0.20	0.34	<0.20	<0.20	<0.20	160		
Xylene (Total)	µg/L	0.20	<0.20	<0.20	<0.20	15	<0.20	0.34	<0.20	<0.20	<0.20	340		
F1 (C6-C10)	µg/L	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	690	810	420
F1 (C6-C10) - BTEX	µg/L	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	320		
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-08	2017-09-05	2017-09-07	2017-09-07	2017-09-07	2017-09-08	2017-09-07	-	-
F2 (C10-C16 Hydrocarbons)	µg/L	100	<100	<100	<100	390	<100	<100	270	340	<100	530	1300	150
F3 (C16-C34 Hydrocarbons)	µg/L	200	260	<200	310	2600	<200	3700	4100	19000	<200	350	NV	500
F4 (C34-C50 Hydrocarbons)	µg/L	200	<200	<200	<200	2700	<200	2100	7300	9700	<200	530	NV	500
Reached Baseline at C50		-	Yes	Yes	Yes	No	Yes	No	No	No	Yes	No	-	-
Analysis Date			-	-	-	2017-09-11	-	2017-09-08	-	2017-09-08	-	2017-09-08	-	-
F4G-sg (Grav. Heavy Hydrocarbons)	µg/L	200	-	-	-	6000	-	6400	-	30000	-	1600	NV	500

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes

*MOECC Table 9 used within 10m of surface water

PHC - Petroleum Hydrocarbons

RDL - Result Detection Limit

ND - No Data

NV - No Value

FCSAP Coarse - Federal Contaminated Sites Action Plan, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, November 2012

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard

Table 9 - VOCs In Groundwater

Location			MW1	MW3D	MW3S	MW5/17	MW6	MW7/17	MW8/17		MW9/17	MW10/17	FCSAP Residential/ Parkland Land Use Coarse	MOECC Table 9*
Sample ID			A0192	A0193	A0194	A0261	A0191	A0240	A0246	A0247 DUP of A0246	A0262	A0248		
Sample Date			2017-08-28	2017-08-28	2017-08-28	2017-09-01	2017-08-28	2017-08-31	2017-08-31	2017-08-31	2017-09-01	2017-08-31		
Sample Time			3:00:00 PM	5:15:00 PM	5:45:00 PM	8:05:00 AM	1:40:00 PM	9:10:00 AM	11:20:00 AM	11:25:00 AM	8:40:00 AM	12:35:00 PM		
Depth (m)		From	-	-	-	2.13	-	2.13	1.22	1.22	2.59	2.29		
		To	5.2	5.75	2.39	3.66	3.17	3.66	4.27	4.27	4.11	3.81		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-02	2017-09-02	2017-09-02	2017-09-07	2017-09-02	2017-09-05	2017-09-05	2017-09-05	2017-09-07	2017-09-05		
Acetone (2-Propanone)	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	13000	100000
Benzene	µg/L	0.20	<0.20	<0.20	<0.20	0.30	<0.20	<0.20	<0.20	<0.20	<0.20	0.71	140	44
Bromodichloromethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8500	67000
Bromoform	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	380	380
Bromomethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.6	5.6
Carbon Tetrachloride	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.56	0.79
Chlorobenzene	µg/L	0.20	3.1	0.73	<0.20	5.4	<0.20	0.37	<0.20	<0.20	<0.20	2.2	1.3	500
Chloroform	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.8	2.4
Dibromochloromethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1100	65000
1,2-Dichlorobenzene	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.7	4600
1,3-Dichlorobenzene	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	42	7600
1,4-Dichlorobenzene	µg/L	0.50	<0.50	<0.50	<0.50	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	26	8
Dichlorodifluoromethane (FREON 12)	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NV	3500
1,1-Dichloroethane	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	320	320
1,2-Dichloroethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	1.6
1,1-Dichloroethylene	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	39	1.6
cis-1,2-Dichloroethylene	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	1.6
trans-1,2-Dichloroethylene	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.6	1.6
1,2-Dichloropropane	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	16	16
cis-1,3-Dichloropropene	µg/L	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	5.2	5.2
trans-1,3-Dichloropropene	µg/L	0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40		
Ethylbenzene	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	29	11000	1800
Ethylene Dibromide	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.25	0.25
Hexane	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NV	51
Methyl Ethyl Ketone (2-Butanone)	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	150000	470000
Methyl Isobutyl Ketone	µg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	58000	140000
Methyl t-butyl ether (MTBE)	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	340	190
Methylene Chloride(Dichloromethane)	µg/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	98	610
Styrene	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	72	1300
1,1,1,2-Tetrachloroethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.4	3.3
1,1,2,2-Tetrachloroethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.2	3.2
Tetrachloroethylene	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	110	1.6
Toluene	µg/L	0.20	<0.20	<0.20	<0.20	0.26	<0.20	<0.20	0.27	0.30	<0.20	2.7	83	14000
1,1,1-Trichloroethane	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	640	640
1,1,2-Trichloroethane	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.7	4.7
Trichloroethylene	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	20	1.6
Trichlorofluoromethane (FREON 11)	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NV	2000
Vinyl Chloride	µg/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.1	0.5
o-Xylene	µg/L	0.20	<0.20	<0.20	<0.20	0.37	<0.20	<0.20	<0.20	<0.20	<0.20	170	3900	3300
p+m-Xylene	µg/L	0.20	<0.20	<0.20	<0.20	14	<0.20	0.34	<0.20	<0.20	<0.20	160		
Xylene (Total)	µg/L	0.20	<0.20	<0.20	<0.20	15	<0.20	0.34	<0.20	<0.20	<0.20	340		
Analysis Date			2017-09-06	2017-09-06	2017-09-06	2017-09-08	2017-09-06	2017-09-07	2017-09-07	2017-09-07	2017-09-08	2017-09-07	-	-
1,3-Dichloropropene (cis+trans)	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.2	5.2

VOC - Volatile Organic Compounds

RDL - Result Detection Limit   ND - No Data   NV - No Value   *MOECC Table 9 used within 10m of surface water

FCSAP Coarse - Federal Contaminated Sites Action Plan, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, November 2012

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline | Results above CCME Guideline (<10m to water)

Table 10 - Metals and Inorganics In Groundwater

Location			MW1	MW3D	MW3S	MW5/17	MW6	MW7/17	MW8/17		MW9/17	MW10/17	FCSAP Residential/ Parkland Land Use Coarse	MOECC Table 9*
Sample ID			A0192	A0193	A0194	A0261	A0191	A0240	A0246	A0247 DUP of A0246	A0262	A0248		
Sample Date			2017-08-28	2017-08-28	2017-08-28	2017-09-01	2017-08-28	2017-08-31	2017-08-31	2017-08-31	2017-09-01	2017-08-31		
Sample Time			3:00:00 PM	5:15:00 PM	5:45:00 PM	8:05:00 AM	1:40:00 PM	9:10:00 AM	11:20:00 AM	11:25:00 AM	8:40:00 AM	12:35:00 PM		
Depth (m)		From	-	-	-	2.13	-	2.13	1.22	1.22	2.59	2.29		
		To	5.2	5.75	2.39	3.66	3.17	3.66	4.27	4.27	4.11	3.81		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-08	2017-09-05	2017-09-07	2017-09-07	2017-09-07	2017-09-08	2017-09-07		
Dissolved Aluminum (Al)	µg/L	3.0	-	-	-	<3.0	-	8.10	6.70	7.50	6.20	6.40	NV	-
Dissolved Antimony (Sb)	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	2.63	2000	16000
Dissolved Arsenic (As)	µg/L	0.10	-	-	-	3.33	-	2.19	0.43	0.31	2.16	4.74	5	1500
		1.0	<1.0	12	<1.0	-	<1.0	-	-	-	-	-		
Dissolved Barium (Ba)	µg/L	1.0	-	-	-	399	-	182	152	149	410	581	500	23000
		2.0	120	500	150	-	110	-	-	-	-	-		
Dissolved Beryllium (Be)	µg/L	0.1	-	-	-	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	5.3	53
		0.50	<0.50	<0.50	<0.50	-	<0.50	-	-	-	-	-		
Dissolved Bismuth (Bi)	µg/L	1.0	-	-	-	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	NV	NV
Dissolved Boron (B)	µg/L	10	23	33	24	-	25	-	-	-	-	-	5000	36000
		50	-	-	-	52	-	<50	<50	<50	55	109		
Dissolved Cadmium (Cd)	µg/L	0.01	-	-	-	<0.010	-	<0.010	<0.010	<0.010	0.024	<0.010	0.017	2.1
		0.10	<0.10	<0.10	<0.10	-	<0.10	-	-	-	-	-		
Dissolved Chromium (Cr)	µg/L	1.0	-	-	-	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	8.9	640
		5.0	<5.0	<5.0	<5.0	-	<5.0	-	-	-	-	-		
Dissolved Cobalt (Co)	µg/L	0.20	-	-	-	0.81	-	1.19	<0.20	<0.20	7.78	2.15	NV	52
		0.50	<0.50	1.9	0.71	-	0.56	-	-	-	-	-		
Dissolved Copper (Cu)	µg/L	0.20	-	-	-	<0.20	-	<0.20	<0.20	<0.20	0.23	<0.20	NV	69
		1.0	<1.0	<1.0	<1.0	-	<1.0	-	-	-	-	-		
Dissolved Iron (Fe)	µg/L	5.0	-	-	-	19800	-	18700	8790	8770	138	24800	300	-
		100	9400	34000	10000	-	1700	-	-	-	-	-		
Dissolved Lead (Pb)	µg/L	0.20	-	-	-	<0.20	-	0.29	<0.20	<0.20	<0.20	0.24	NV	20
		0.50	<0.50	<0.50	<0.50	-	<0.50	-	-	-	-	-		
Dissolved Lithium (Li)	µg/L	2.0	-	-	-	3.30	-	<2.0	<2.0	<2.0	<2.0	7.60	NV	NV
Mercury (Hg)	µg/L	0.1	<0.10	<0.10	<0.10	-	<0.10	-	-	-	-	-	NV	0.29
Dissolved Manganese (Mn)	µg/L	1.0	-	-	-	666	-	1100	684	691	4930	1330	NV	NV
Dissolved Molybdenum (Mo)	µg/L	0.50	0.57	0.81	<0.50	-	0.86	-	-	-	-	-	73	7300
		1.0	-	-	-	1.1	-	1.60	<1.0	<1.0	1.8	3.30		
Dissolved Nickel (Ni)	µg/L	1.0	<1.0	<1.0	7.9	1.5	1.2	1.30	<1.0	<1.0	7.1	1.80	NV	390
Dissolved Selenium (Se)	µg/L	0.10	-	-	-	<0.10	-	<0.10	<0.10	<0.10	0.11	<0.10	1	50
		2.0	<2.0	<2.0	<2.0	-	<2.0	-	-	-	-	-		
Dissolved Silicon (Si)	µg/L	100	-	-	-	6360	-	5040	5300	5370	5650	12200	NV	NV
Dissolved Silver (Ag)	µg/L	0.02	-	-	-	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	0.1	1.2
		0.10	<0.10	<0.10	<0.10	-	<0.10	-	-	-	-	-		
Dissolved Strontium (Sr)	µg/L	1.0	-	-	-	253	-	162	168	171	259	323	NV	NV
Dissolved Sodium (Na)	µg/L	100	6700	120000	6600	-	15000	-	-	-	-	-	NV	1800000
	mg/L	0.050	-	-	-	40.4	-	10.9	89.9	89.0	141	14.1		
Dissolved Thallium (Tl)	µg/L	0.01	-	-	-	<0.01	-	<0.01	<0.01	<0.01	0.287	<0.01	0.8	400
		0.05	<0.50	<0.50	<0.50	-	<0.50	-	-	-	-	-		
Dissolved Tin (Sn)	µg/L	5.0	-	-	-	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0	NV	NV
Dissolved Titanium (Ti)	µg/L	5.0	-	-	-	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0	NV	NV
Dissolved Uranium (U)	µg/L	0.10	<0.10	<0.10	<0.10	0.16	0.31	<0.10	<0.10	<0.10	0.66	0.13	15	330
Dissolved Vanadium (V)	µg/L	0.50	<0.50	<0.50	<0.50	-	<0.50	-	-	-	-	-	NV	200
		5.0	-	-	-	<5.0	-	<5.0	<5.0	<5.0	<5.0	<5.0		
Dissolved Zinc (Zn)	µg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	10	890
Dissolved Zirconium (Zr)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	0.24	<0.10	NV	NV
Dissolved Calcium (Ca)	mg/L	0.05	-	-	-	82.5	-	58.9	67.2	65.5	148	109	NV	NV
Dissolved Magnesium (Mg)	mg/L	0.05	-	-	-	10.7	-	10.9	11.5	11.5	22.8	14.4	NV	NV
Dissolved Potassium (K)	mg/L	0.05	-	-	-	1.68	-	1.28	1.46	1.49	3.07	3.52	NV	NV
Dissolved Sulphur (S)	mg/L	3.0	-	-	-	<3.0	-	<3.0	<3.0	<3.0	7.30	<3.0	NV	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01	-	2017-09-01	-	-	-	-	-	-	-
Chloride (Cl)	mg/L	1.0	11	-	11	-	15	-	-	-	-	-	120	1800
	mg/L	3.0	-	220	-	-	-	-	-	-	-	-		
Analysis Date			2017-09-01	2017-09-01	2017-09-01	-	2017-09-01	-	-	-	-	-	-	-
Free Cyanide	µg/L	1	<1	<1	<1	-	<1	-	-	-	-	-	0.001	52
Analysis Date			2017-08-13	2017-08-13	2017-08-13	-	2017-08-13	-	-	-	-	-	-	-
Chromium (VI)	µg/L	0.5	<0.5	<0.5	<0.5	-	<0.5	-	-	-	-	-	NV	110
Analysis Date			-	-	-	2017-09-11	-	2017-09-08	2017-09-08	2017-09-08	2017-09-11	2017-09-08	-	-
Dissolved Hardness	mg/L	0.5	-	-	-	463	-	192	215	211	250	332	NV	-

RDL - Result Detection Limit

*MOECC Table 9 used within 10m of surface water

ND - No Data

NV - No Value

FCSAP Coarse - Federal Contaminated Sites Action Plan, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, November 2012

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Result above FCSAP Guideline (<10m to water)

RDL above applicable Standard or Guideline

Table 10 - Metals and Inorganics In Groundwater con't

Location			MW5/17	MW7/17	MW8/17		MW9/17	MW10/17	FCSAP Residential/ Parkland Land Use Coarse	MOECC Table 9*
Sample ID			A0261	A0240	A0246	A0247 DUP of A0246	A0262	A0248		
Sample Date			2017-09-01	2017-08-31	2017-08-31	2017-08-31	2017-09-01	2017-08-31		
Sample Time			8:05:00 AM	9:10:00 AM	11:20:00 AM	11:25:00 AM	8:40:00 AM	12:35:00 PM		
Depth (m)		From	2.13	2.13	1.22	1.22	2.59	2.29		
		To	3.66	3.66	4.27	4.27	4.11	3.81		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-08	2017-09-07	2017-09-07	2017-09-07	2017-09-08	2017-09-07		
Mercury (Hg)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NV	0.29
Analysis Date			2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	2017-09-07	-	-
Flouride (F-)	mg/L	0.1	0	0.12	<0.1	<0.1	<0.1	<0.1	0.12	-
Chromium (VI)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NV	110
Analysis Date			2017-09-07	2017-09-05	2017-09-05	2017-09-05	2017-09-07	2017-09-05	-	-
Dissolved Chloride (Cl)	mg/L	1.0	68	9.5	140	140	-	22	120	1800
	mg/L	3.0	-	-	-	-	220	-		
Analysis Date			2017-09-07	2017-09-08	2017-09-08	2017-09-08	2017-09-07	2017-09-08	-	-
Free Cyanide	µg/L	1	1.2	2.3	<1	<1	<1	<1	0.001	52
Analysis Date			2017-09-07	2017-09-06	2017-09-06	2017-09-06	2017-09-07	2017-09-06	-	-
Available (CaCl2) pH	s.u.	-	7.42	6.93	6.97	7.21	7.61	6.81	6.5 to 9	5 to 9
Dissolved Sulphate (SO4)	mg/L	1.0	1.2	6.3	6.3	6.2	22	5.2	100	-
Nitrate + Nitrite (N)	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	0.15	<0.1	13	-

RDL - Result Detection Limit

*MOECC Table 9 used within 10m of surface water

ND - No Data

NV - No Value

FCSAP Coarse - Federal Contaminated Sites Action Plan, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, November 2012

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Results above CCME Guideline (<10m to water)

RDL above applicable Standard or Guideline

Table 11 - PAH In Groundwater

Location			MW1	MW3D		MW5/17	MW9/17	MW10/17	FCSAP Residential/ Parkland Land Use Coarse	MOECC Table 9*
Sample ID			A0192	A0193		A0261	A0262	A0248		
Sample Date			2017-08-28	2017-08-28		2017-09-01	2017-09-01	2017-08-31		
Sample Time			3:00:00 PM	5:15:00 PM		8:05:00 AM	8:40:00 AM	12:35:00 PM		
Depth (m)		From	-	-		2.13	2.59	2.29		
		To	5.2	5.75		3.66	4.11	3.81		
Chemicals	Units	RDL	Results	Results		Results	Results	Results		
Analysis Date			2017-09-02	2017-09-02	RDL-->	2017-09-07	2017-09-07	2017-09-07		
Acenaphthene	µg/L	0.050	0.59	0.11	0.01	1.0	<0.01	0.46	5.8	600
Acenaphthylene	µg/L	0.050	<0.050	<0.050	0.01	0.024	<0.01	0.013	46	1.4
Anthracene	µg/L	0.050	0.085	<0.050	0.01	0.12	<0.01	0.053	0.012	1
Benzo(a)anthracene	µg/L	0.050	<0.050	<0.050	0.01	0.063	<0.01	0.060	0.018	1.8
Benzo(a)pyrene	µg/L	0.010	<0.050	<0.050	0.01	0.060	<0.01	0.055	0.01	0.81
Benzo(b/j)fluoranthene	µg/L	0.050	<0.050	<0.050	0.01	0.079	<0.01	0.055	0.48	0.75
Benzo(g,h,i)perylene	µg/L	0.050	<0.050	<0.050	0.01	0.061	<0.01	0.059	0.17	0.2
Benzo(k)fluoranthene	µg/L	0.050	<0.050	<0.050	0.01	0.032	<0.01	0.022	0.48	0.4
Chrysene	µg/L	0.050	<0.050	<0.050	0.01	0.068	<0.01	0.062	0.1	0.7
Dibenz(a,h)anthracene	µg/L	0.050	<0.050	<0.050	0.01	0.015	<0.01	<0.01	0.26	0.4
Fluoranthene	µg/L	0.050	0.11	<0.050	0.01	0.42	0.010	0.18	0.04	73
Fluorene	µg/L	0.050	0.53	<0.050	0.01	0.87	<0.01	0.45	3	290
Indeno(1,2,3-cd)pyrene	µg/L	0.050	<0.050	<0.050	0.01	0.054	<0.01	0.049	0.21	0.2
1-Methylnaphthalene	µg/L	0.050	0.26	0.23	0.01	2.1	0.012	6.0	180	1500
2-Methylnaphthalene	µg/L	0.050	<0.050	<0.050	0.01	0.19	0.015	7.8		
Naphthalene	µg/L	0.050	<0.050	<0.050	0.01	0.31	0.016	27	1.1	1400
Phenanthrene	µg/L	0.030	0.56	0.051	0.01	0.94	0.016	0.33	0.4	380
Pyrene	µg/L	0.050	0.072	<0.050	0.01	0.24	0.013	0.12	0.025	6
Analysis Date			2017-09-07	2017-09-07	-	-	-	-	-	-
Methylnaphthalene, 2-(1-)	µg/L	0.0710	0.26	0.23	0.0710	-	-	-	180	1500

PAH - Polycyclic Aromatic Hydrocarbons

*MOECC Table 9 used within 10m of surface water

RDL - Result Detection Limit

ND - No Data

NV - No Value

FCSAP Coarse - Federal Contaminated Sites Action Plan, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites, November 2012

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard or Guideline

Results above CCME Guideline (<10m to water)

RDL above applicable Standard or Guideline

Table 12 - PCBs In Groundwater

Location			MW1	MW3D	MW5/17	MW9/17	MW10/17	MOECC Table 9
Sample ID			A0192	A0193	A0261	A0262	A0248	
Sample Date			2017-08-28	2017-08-28	2017-09-01	2017-09-01	2017-08-31	
Sample Time			3:00:00 PM	5:15:00 PM	8:05:00 AM	8:40:00 AM	12:35:00 PM	
Depth (m)		From	-	-	2.13	2.59	2.29	
		To	5.2	5.75	3.66	4.11	3.81	
Chemicals	Units	RDL	Results	Results	Results	Results	Results	
Analysis Date			2017-09-01	2017-09-01	2017-09-07	2017-09-07	2017-09-06	
Total PCBs	µg/L	0.01	-	-	0.79[1]	-	0.51[1]	0.2
	µg/L	0.05	0.17	-	-	<0.05[1]	-	
	µg/L	0.5	-	<0.5[1]	-	-	-	

PCB - Polychlorinated Biphenyl

RDL - Result Detection Limit

[1]MOECC Table 3 (7.8 µg/L) used due to >10m from water

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Standard

RDL above applicable Standard

Table 13 Groundwater Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Applicable Guideline/Standard Value	Exceedance
PHC F1 (C6-C10)	25	µg/L	320	MW10/17	>10 m	2017-08-31	810	N
	25	µg/L	<25	Not Detected On Site	< 10 m	N/A	420	Y
PHC F2 (C10-C16)	100	µg/L	530	MW10/17	>10 m	2017-08-31	1300	N
	100	µg/L	<100	Not Detected On Site	< 10 m	N/A	150	Y
PHC F3 (C16-C34)	200	µg/L	19000	MW8/17	>10 m	2017-08-31	NV	N
	200	µg/L	3700	MW7/17	< 10 m	2017-08-31	500	Y
PHC F4 (C34-C50)	200	µg/L	9700	MW8/17	>10 m	2017-08-31	NV	N
	200	µg/L	2100	MW7/17	< 10 m	2017-08-31	500	Y
PHC F4 (Grav. Heavy Hydrocarbons)	200	µg/L	30000	MW8/17	>10 m	2017-08-31	NV	N
	200	µg/L	6400	MW7/17	< 10 m	2017-08-31	500	Y

Table 13 Groundwater Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Hardness	1.0	mg/L	473	MW-4	> 10 m	2006-08-02	NV	N
	0.5	mg/L	192	MW7/17	< 10 m	2017-08-31	NV	N
Dissolved Sulphate	1.0	mg/L	22	MW9/17	> 10 m	2017-09-01	100	N
	1.0	mg/L	6.3	MW7/17	< 10 m	2017-08-31	NV	N
Nitrate + Nitrite	0.1	mg/L	0.15	MW9/17	> 10 m	2017-09-01	13	N
	0.1	mg/L	<0.1	Not Detected On Site	< 10 m	N/A	NV	N
Cyanide (Free)	1.0	µg/L	1.2	MW5/17	> 10 m	2017-09-01	0.001	Y
	1.0	µg/L	2.3	MW7/17	< 10 m	2017-08-31	52	N
Fluoride	0.1	mg/L	0.12	MW5/17	> 10 m	2017-09-01	0.12	N
	0.1	mg/L	0.12	MW7/17	< 10 m	2017-08-31	NV	N
Chloride	3.0	mg/L	220	MW-3D/MW9/17	> 10 m	2017-08-28/2017-09-01	120	Y
	1.0	mg/L	11	MW-1	< 10 m	2017-08-28	1800	N
Calcium	0.5	mg/L	198	MW-3	> 10 m	2000-09-19	NV	N
	0.5	mg/L	90	MW-1	< 10 m	2000-06-28	NV	N
Alunimum	10	µg/L	850	MW-6	> 10 m	1999-08-12	NV	N
	10	µg/L	137	MW-1	< 10 m	1994-11-20	NV	N
Antimony	0.5	µg/L	70.6	MW-3	> 10 m	2000-09-19	2000	N
	0.5	µg/L	6	MW-1	< 10 m	2000-06-28	16000	N
Arsenic	0.2	µg/L	47.2	MW-3	>10 m	2011-07-19	5	Y
	0.1	µg/L	2.19	MW7/17	< 10 m	2017-08-31	1500	N
Barium	5.0	µg/L	2400	MW-3D	> 10 m	2000-06-28	500	Y
	5.0	µg/L	1640	MW-1	< 10 m	2000-06-28	23000	N
Beryllium	5.0	µg/L	<5.0	Not Detected On Site	> 10 m	N/A	5.3	N
	5.0	µg/L	<5.0	Not Detected On Site	< 10 m	N/A	53	N
Bismuth	2.0	µg/L	<2.0	Not Detected On Site	> 10 m	N/A	NV	N
	2.0	µg/L	<2.0	Not Detected On Site	< 10 m	N/A	NV	N
Boron (total)	6.0	µg/L	2870	MW-3	>10 m	2000-09-19	5000	N
	5.0	µg/L	251	MW-1	< 10 m	2000-06-28	36000	N
Cadmium	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	0.017	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	2.1	N
Chromium (Total)	5.0	µg/L	71	MW-6	> 10 m	2000-06-28	8.9	Y
	5.0	µg/L	6	MW-1	< 10 m	2000-06-28	640	N
Chromium (VI)	1.0	µg/L	<1.0	Not Detected On Site	> 10 m	N/A	NV	N
	1.0	µg/L	<1.0	Not Detected On Site	< 10 m	N/A	110	N
Cobalt	0.1	µg/L	220	MW-3	>10 m	2011-07-19	NV	N
	0.2	µg/L	1.19	MW7/17	< 10 m	2017-08-31	52	N
Copper	2.0	µg/L	100	MW-3	> 10 m	1999-08-12	NV	N
	2.0	µg/L	<2.0	Not Detected On Site	< 10 m	N/A	69	N
Iron	30.0	µg/L	72000	MW-4	>10 m	2000-09-19	300	Y
	30.0	µg/L	34750	MW-1	< 10 m	2000-06-28	NV	N
Lead	0.5	µg/L	6.3	MW-3D	> 10 m	2000-06-28	NV	N
	0.1	µg/L	9.2	MW-1	< 10 m	1999-08-12	20	N
Lithium	2.0	µg/L	7.6	MW10/17	> 10 m	2017-08-31	NV	N
	0.5	µg/L	2.1	MW-1	< 10 m	2011-07-19	NV	N
Manganese	1.0	µg/L	4930	MW9/17	>10 m	2017-09-01	NV	N
	1.0	µg/L	1100	MW7/17	< 10 m	2017-08-31	NV	N
Magnesium	0.1	mg/L	75.1	MW-3	> 10 m	2000-09-19	NV	N
	0.1	mg/L	13.4	MW-1	< 10 m	2000-06-28	NV	N
Mercury	0.1	µg/L	1.07	MW-2	> 10 m	2006-08-02	NV	N
	0.1	µg/L	<0.1	Not Detected On Site	< 10 m	N/A	0.29	N
Molybdenum	1.0	µg/L	12	MW-3	> 10 m	2000-09-19	73	N
	2.0	µg/L	10	MW-1	< 10 m	1994-11-20	7300	N
Nickel	2.0	µg/L	16	MW-3	> 10 m	1999-08-12	NV	N
	10	µg/L	<10	Not Detected On Site	< 10 m	N/A	390	N
Phosphorous	0.1	mg/L	25	MW-3	>10 m	2011-07-19	NV	N
	0.01	mg/L	1.26	MW-1	< 10 m	2006-08-02	NV	N
Potassium	100	µg/L	6800	MW-4	>10 m	2000-09-19	NV	N
	100	µg/L	12650	MW-1	< 10 m	2000-09-19	NV	N
Sodium	100	µg/L	184000	MW-3	>10 m	2000-09-19	NV	N
	100	µg/L	30700	MW-1	< 10 m	2000-06-28	1800000	N
Selenium	2.0	µg/L	<2.0	Not Detected On Site	> 10 m	N/A	1	N
	2.0	µg/L	<2.0	Not Detected On Site	< 10 m	N/A	50	N
Silicon	100	µg/L	12200	MW10/17	>10 m	2017-08-31	NV	N
	100	µg/L	5040	MW7/17	< 10 m	2017-08-31	NV	N
Silver	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	0.1	N
	0.1	µg/L	<0.1	Not Detected On Site	< 10 m	N/A	1.2	N
Strontium	1.0	µg/L	3370	MW-3	>10 m	2000-09-19	NV	N
	1.0	µg/L	459.5	MW-1	< 10 m	2000-06-28	NV	N
Sulphur	3.0	mg/L	7.3	MW9/17	> 10 m	2017-09-01	NV	N
	3.0	mg/L	<3.0	MW7/17	< 10 m	2017-08-31	NV	N
Thallium	0.1	µg/L	<0.1	Not Detected On Site	> 10 m	N/A	0.8	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	400	N
Tin	2.0	µg/L	3	MW-4	> 10 m	1999-08-12	NV	N
	5.0	µg/L	<5.0	Not Detected On Site	< 10 m	N/A	NV	N
Titanium	2.0	µg/L	26	MW-6	>10 m	1999-08-12	NV	N
	2.0	µg/L	10	MW-1	< 10 m	1999-08-12	NV	N
Tungsten	10	µg/L	<10	Not Detected On Site	> 10 m	N/A	NV	N
	10	µg/L	<10	Not Detected On Site	< 10 m	N/A	NV	N
Uranium	0.1	µg/L	1.1	MW-2	>10 m	1999-08-12	15	N
	0.1	µg/L	<0.1	Not Detected On Site	< 10 m	N/A	330	N
Vanadium	0.2	µg/L	0.7	MW-4	> 10 m	2011-07-19	NV	N
	5.0	µg/L	<5.0	Not Detected On Site	< 10 m	N/A	200	N
Zinc	5.0	µg/L	574	MW-4	> 10 m	2000-09-19	10	Y
	5.0	µg/L	388	MW-1	< 10 m	2000-06-28	890	N
Zirconium	3.0	µg/L	<3.0	Not Detected On Site	> 10 m	N/A	NV	N
	3.0	µg/L	<3.0	Not Detected On Site	< 10 m	N/A	NV	N

Table 13 Groundwater Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Acetone (2-Propanone)	10	µg/L	15	MW10/17	>10 m	2017-08-31	13000	N
	10	µg/L	<10	Not Detected On Site	< 10 m	N/A	100000	N
Benzene	1.0	µg/L	3.8	MW-3D	> 10 m	1994-11-20	140	N
	0.1	µg/L	0.9	MW-1	< 10 m	1999-08-12	44	N
Bromodichloromethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	8500	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	67000	N
Bromoform	1.0	µg/L	<1.0	Not Detected On Site	> 10 m	N/A	380	N
	1.0	µg/L	<1.0	Not Detected On Site	< 10 m	N/A	380	N
Bromomethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	5.6	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	5.6	N
Carbon Tetrachloride	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	0.56	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	0.79	N
Chlorobenzene	0.2	µg/L	13.4	MW-2	> 10 m	1994-11-20	1.3	Y
	0.2	µg/L	11.4	MW-1	< 10 m	1999-08-12	500	N
Chloroethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	NV	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	NV	N
Chloroform	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	1.8	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	2.4	N
Chloromethane	1.0	µg/L	<1.0	Not Detected On Site	> 10 m	N/A	NV	N
	1.0	µg/L	<1.0	Not Detected On Site	< 10 m	N/A	NV	N
Dibromochloromethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	1100	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	65000	N
1,2-Dichlorobenzene	0.2	µg/L	1	MW-2	> 10 m	1994-11-20	0.7	Y
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	4600	N
1,3-Dichlorobenzene	0.2	µg/L	2.9	MW-5	> 10 m	1994-11-20	42	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	7600	N
1,4-Dichlorobenzene	0.2	µg/L	2.6	MW-5	> 10 m	1994-11-20	56	N
	0.2	µg/L	0.8	MW-1	< 10 m	1999-08-12	8	N
Dichlorodifluoromethane (FREON 12)	1.0	µg/L	<1.0	Not Detected On Site	> 10 m	N/A	NV	N
	1.0	µg/L	<1.0	Not Detected On Site	< 10 m	N/A	3500	N
1,1-Dichloroethane	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	320	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	320	N
1,2-Dichloroethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	10	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	1.6	N
1,1-Dichloroethylene	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	39	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	1.6	N
cis-1,2-Dichloroethylene	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	1.6	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	1.6	N
trans-1,2-Dichloroethylene	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	1.6	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	1.6	N
1,2-Dichloropropane	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	16	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	16	N
cis-1,3-Dichloropropene	0.3	µg/L	<0.3	Not Detected On Site	> 10 m	N/A	5.2	N
	0.3	µg/L	<0.3	Not Detected On Site	< 10 m	N/A	5.2	N
trans-1,3-Dichloropropene	0.4	µg/L	<0.4	Not Detected On Site	> 10 m	N/A	5.2	N
	0.4	µg/L	<0.4	Not Detected On Site	< 10 m	N/A	5.2	N
1,3-Dichloropropene (cis+trans)	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	5.2	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	5.2	N
Ethylbenzene	0.2	µg/L	29	MW10/17	>10 m	2017-08-31	11000	N
	1.0	µg/L	18.4	MW-1	< 10 m	1994-11-20	1800	N
Ethylene Dibromide	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	0.25	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	0.25	N
Hexane	1.0	µg/L	<1.0	Not Detected On Site	> 10 m	N/A	NV	N
	1.0	µg/L	<1.0	Not Detected On Site	< 10 m	N/A	51	N
2-Hexanone	5.0	µg/L	<5.0	Not Detected On Site	> 10 m	N/A	NV	N
	5.0	µg/L	<5.0	Not Detected On Site	< 10 m	N/A	NV	N
Methyl Ethyl Ketone (2-Butanone)	10	µg/L	<10	Not Detected On Site	> 10 m	N/A	150000	N
	10	µg/L	<10	Not Detected On Site	< 10 m	N/A	470000	N
Methyl Isobutyl Ketone	5.0	µg/L	<5.0	Not Detected On Site	> 10 m	N/A	58000	N
	5.0	µg/L	<5.0	Not Detected On Site	< 10 m	N/A	140000	N
Methyl t-butyl ether (MTBE)	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	340	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	190	N
Methylene Chloride(Dichloromethane)	2.0	µg/L	<2.0	Not Detected On Site	> 10 m	N/A	98	N
	2.0	µg/L	<2.0	Not Detected On Site	< 10 m	N/A	610	N
Styrene	0.6	µg/L	<0.6	Not Detected On Site	> 10 m	N/A	72	N
	0.6	µg/L	<0.6	Not Detected On Site	< 10 m	N/A	1300	N
1,1,1,2-Tetrachloroethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	3.4	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	3.3	N
1,1,2,2-Tetrachloroethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	3.2	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	3.2	N
Tetrachloroethylene	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	110	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	1.6	N
Toluene	0.2	µg/L	2.7	MW10/17	>10 m	2017-08-31	83	N
	0.2	µg/L	<0.20	Not Detected On Site	< 10 m	N/A	14000	N
1,1,1-Trichloroethane	0.2	µg/L	<0.2	Not Detected On Site	> 10 m	N/A	640	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	640	N
1,1,2-Trichloroethane	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	4.7	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	4.7	N
Trichloroethylene	0.2	µg/L	3.3	MW-2	> 10 m	1994-11-20	20	N
	0.2	µg/L	<0.2	Not Detected On Site	< 10 m	N/A	1.6	N
Trichlorofluoromethane (FREON 11)	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	NV	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	2000	N
Vinyl Chloride	0.5	µg/L	<0.5	Not Detected On Site	> 10 m	N/A	1.1	N
	0.5	µg/L	<0.5	Not Detected On Site	< 10 m	N/A	0.5	N
o-Xylene	0.2	µg/L	170	MW10/17	>10 m	2017-08-31	NV	N
	1.0	µg/L	38.7	MW-1	< 10 m	1994-11-20	NV	N
p+m-Xylene	0.2	µg/L	338	MW-4	>10 m	1999-08-12	NV	N
	1.0	µg/L	133	MW-1	< 10 m	1994-11-20	NV	N
Xylene (Total)	0.2	µg/L	340	MW10/17	>10 m	2017-08-31	3900	N
	0.2	µg/L	0.34	MW7/17	< 10 m	2017-08-31	3300	N

Table 13 Groundwater Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Distance from Surface Water	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Acenaphthene	0.01	µg/L	1.0	MW5/17	>10 m	2017-09-01	5.8	N
	0.05	µg/L	0.59	MW-1	< 10 m	2017-09-02	600	N
Acenaphthylene	0.01	µg/L	1.0	MW5/17	>10 m	2017-09-01	46	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	1.4	N
Anthracene	0.01	µg/L	0.12	MW5/17	>10 m	2017-09-01	0.012	Y
	0.05	µg/L	0.085	MW-1	< 10 m	2017-09-02	1.0	N
Benzo[a]anthracene	0.01	µg/L	0.063	MW5/17	>10 m	2017-09-01	0.018	Y
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	1.8	N
Benzo[a]pyrene	0.01	µg/L	0.06	MW5/17	>10 m	2017-09-01	0.01	Y
	0.01	µg/L	<0.01	Not Detected On Site	< 10 m	N/A	0.81	N
Benzo[b]fluoranthene	0.01	µg/L	0.079	MW5/17	>10 m	2017-09-01	0.48	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.75	N
Benzo[ghi]perylene	0.01	µg/L	0.061	MW5/17	>10 m	2017-09-01	0.17	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.2	N
Benzo[k]fluoranthene	0.01	µg/L	0.032	MW5/17	>10 m	2017-09-01	0.48	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.4	N
Chrysene	0.01	µg/L	0.07	MW5/17	>10 m	2017-09-01	0.1	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.7	N
Dibenz[a,h]anthracene	0.01	µg/L	0.015	MW5/17	>10 m	2017-09-01	0.26	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.4	N
Fluoranthene	0.01	µg/L	0.42	MW5/17	>10 m	2017-09-01	0.04	Y
	0.05	µg/L	0.11	MW-1	< 10 m	2017-09-02	73	N
Fluorene	0.01	µg/L	0.87	MW5/17	>10 m	2017-09-01	3.0	N
	0.05	µg/L	0.53	MW-1	< 10 m	2017-09-02	290	N
Ideno[1,2,3-cd]pyrene	0.01	µg/L	0.054	MW5/17	>10 m	2017-09-01	0.21	N
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	0.2	N
Methylnaphthalene, 2-(1-)	0.071	µg/L	0.23	MW-3D	>10 m	2017-08-28	180	N
	0.071	µg/L	0.26	MW-1	< 10 m	2017-09-02	1500	N
Naphthalene	0.01	µg/L	27	MW10/17	>10 m	2017-08-31	1.1	Y
	0.05	µg/L	<0.05	Not Detected On Site	< 10 m	N/A	1400	N
Phenanthrene	0.01	µg/L	0.94	MW5/17	>10 m	2017-09-01	0.4	Y
	0.03	µg/L	0.56	MW-1	< 10 m	2017-09-02	380	N
Pyrene	0.01	µg/L	0.24	MW5/17	>10 m	2017-09-01	0.025	Y
	0.05	µg/L	0.072	MW-1	< 10 m	2017-09-02	6.0	N
Total PCBs	0.01	µg/L	0.79	MW5/17	>10 m	2017-09-01	NV	N
	0.05	µg/L	0.74	MW-1	< 10 m	2006-08-02	0.2	Y

N/A - Not Applicable

Table 14 - BTEX and PHC in Sediment

Location			SED2	SED2		SED3	SED5		SED6		SED7		SED10	MOECC Table 9
Sample ID			A0197	A0213 DUP of A0197		A0206	A0204		A0202		A0198		A0200	
Sample Date			2017-08-29	2017-08-29		2017-08-29	2017-08-29		2017-08-29		2017-08-29		2017-08-29	
Sample Time			9:30:00 AM	9:32:00 AM		12:20:00 PM	12:00:00 PM		11:10:00 AM		9:45:00 AM		10:40:00 AM	
Depth (m)		From	0	0		0	0		0		0		0	
		To	0.1	0.1		0.1	0.1		0.1		0.1		0.1	
Chemicals	Units	RDL	Results	Results		Results	Results		Results		Results		Results	
Analysis Date			2017-09-01	2017-09-01	RDL-->	2017-09-01	2017-09-01	RDL-->	2017-09-01	RDL-->	2017-09-01	RDL-->	2017-09-01	
Benzene	µg/g	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.06	0.02	<0.02	0.1	<0.1	NV
Ethylbenzene	µg/g	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.06	0.02	<0.02	0.1	<0.1	NV
Toluene	µg/g	0.02	<0.02	0.13	0.02	<0.02	<0.02	0.06	0.079	0.02	<0.02	0.1	<0.1	NV
o-Xylene	µg/g	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.06	0.02	<0.02	0.1	<0.1	NV
p+m-Xylene	µg/g	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.06	0.02	<0.02	0.1	<0.1	
Xylene (Total)	µg/g	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.06	<0.06	0.02	<0.02	0.1	<0.1	
F1 (C6-C10)	µg/g	10	<10	<10	10	<10	<10	30	<30	10	<10	20	<20	NV
F1 (C6-C10) - BTEX	µg/g	10	<10	<10	10	<10	<10	30	<30	10	<10	20	<20	
Analysis Date			2017-09-02	2017-09-02		2017-09-02	2017-09-02		2017-09-02		2017-09-02		2017-09-02	-
F2 (C10-C16 Hydrocarbons)	µg/g	20	<20	<20	10	<10	<10	50	<50	10	<10	20	<20	NV
F3 (C16-C34 Hydrocarbons)	µg/g	100	110	<100	50	<50	<50	250	270	50	<50	100	<100	NV
F4 (C34-C50 Hydrocarbons)	µg/g	100	<100	<100	50	<50	<50	250	<250	50	<50	100	<100	NV
Reached Baseline at C50		-	Yes	Yes	-	Yes	Yes	-	Yes	-	Yes	-	Yes	-
Analysis Date			2017-09-01	2017-09-01		2017-09-01	2017-09-01		2017-09-01		2017-09-01		2017-09-01	-
Moisture	%	1.0	47	56	1.0	21	27	1.0	80	1.0	21	1.0	59	-

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes

PHC - Petroleum Hydrocarbons

RDL - Result Detection Limit

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above Table 9 criteria

Table 15 - VOCs In Sediment

Location			SED2	SED2	SED3	SED5		SED6		SED7		SED10	CCME Freshwater ISQG	CCME Freshwater PEL	MOECC Table 9
Sample ID			A0197	A0213 DUP of A0197	A0206	A0204		A0202		A0198		A0200			
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29		2017-08-29		2017-08-29		2017-08-29			
Sample Time			9:30:00 AM	9:32:00 AM	12:20:00 PM	12:00:00 PM		11:10:00 AM		9:45:00 AM		10:40:00 AM			
Depth (m)		From	0	0	0	0		0		0		0			
		To	0.1	0.1	0.1	0.1		0.1		0.1		0.1			
Chemicals	Units	RDL	Results	Results	Results	Results	RDL	Results	RDL	Results	RDL	Results			
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	-->	2017-09-01	-->	2017-09-01	-->	2017-09-01			
Acetone (2-Propanone)	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	1.5	1.5	0.5	<0.5	1.0	<1.0	NV	NV	NV
Benzene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	ND	ND	NV
Bromodichloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Bromoform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Bromomethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Carbon Tetrachloride	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Chlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Chloroform	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Dibromochloromethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
1,2-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
1,3-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
1,4-Dichlorobenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Dichlorodifluoromethane (FREON 12)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
1,1-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
1,2-Dichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
1,1-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
cis-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
trans-1,2-Dichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
1,2-Dichloropropane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
cis-1,3-Dichloropropene	µg/g	0.03	<0.03	<0.03	<0.03	<0.03	0.090	<0.09	0.03	<0.03	0.060	<0.06	NV	NV	NV
trans-1,3-Dichloropropene	µg/g	0.04	<0.04	<0.04	<0.04	<0.04	0.12	<0.12	0.04	<0.04	0.080	<0.08	NV	NV	NV
Ethylbenzene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	ND	ND	NV
Ethylene Dibromide	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Hexane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Methyl Ethyl Ketone (2-Butanone)	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	1.5	<1.5	0.5	<0.5	1.0	<1.0	NV	NV	NV
Methyl Isobutyl Ketone	µg/g	0.5	<0.5	<0.5	<0.5	<0.5	1.5	<1.5	0.5	<0.5	1.0	<1.0	NV	NV	NV
Methyl t-butyl ether (MTBE)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Methylene Chloride(Dichloromethane)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Styrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
1,1,1,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
1,1,2,2-Tetrachloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Tetrachloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Toluene	µg/g	0.02	<0.02	0.13	<0.02	<0.02	0.060	0.079	0.02	<0.02	0.040	<0.04	ND	ND	NV
1,1,1-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
1,1,2-Trichloroethane	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	ND	ND	NV
Trichloroethylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Trichlorofluoromethane (FREON 11)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.10	<0.10	NV	NV	NV
Vinyl Chloride	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	NV	NV	NV
o-Xylene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	NV	NV	NV
p+m-Xylene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	NV	NV	NV
Xylene (Total)	µg/g	0.02	<0.02	<0.02	<0.02	<0.02	0.060	<0.06	0.02	<0.02	0.040	<0.04	NV	NV	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01		2017-09-01		2017-09-01		2017-09-01	-	-	-
Moisture	%	1.0	47	56	21	27	1.0	80	1.0	21	1.0	59	-	-	-
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05		2017-09-05		2017-09-05		2017-09-05	-	-	-
1,3-Dichloropropene (cis+trans)	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.15	0.05	<0.05	0.1	<0.1	NV	NV	NV

VOC - Volatile Organic Compounds

RDL - Result Detection Limit

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, 1998

ISQG - Interim sediment quality guidelines

PEL - Probable effect level

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Guideline (ISQG)

Results above applicable Standard or Guideline (PEL or MOECC Table 9)

Table 16 - Metals and Inorganics in Sediment

Location			SED2		SED3	SED5	SED6	SED7	SED10	CCME Freshwater ISQG	CCME Freshwater PEL	MOECC Table 9
Sample ID			A0197	A0213 DUP of A0197	A0206	A0204	A0202	A0198	A0200			
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29			
Sample Time			9:30:00 AM	9:32:00 AM	12:20:00 PM	12:00:00 PM	11:10:00 AM	9:45:00 AM	10:40:00 AM			
Depth (m)		From	0	0	0	0	0	0	0			
		To	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05			
Acid Extractable Antimony (Sb)	µg/g	0.20	0.21	0.22	0.47	0.77	0.27	0.64	0.42	NV	NV	NV
Acid Extractable Arsenic (As)	µg/g	1.0	<1.0	<1.0	1.3	2.5	1.5	1.6	82	5.9	17	-
Acid Extractable Barium (Ba)	µg/g	0.50	55	60	28	79	76	34	210	NV	NV	NV
Acid Extractable Beryllium (Be)	µg/g	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.33	ND	ND	NV
Acid Extractable Boron (B)	µg/g	5.0	<5.0	<5.0	<5.0	<5.0	5.8	<5.0	<5.0	NV	NV	NV
Acid Extractable Cadmium (Cd)	µg/g	0.10	0.18	0.17	<0.10	<0.10	0.30	<0.10	0.46	0.6	3.5	-
Soluble Calcium (Ca)	mg/L	0.50	29.6	39.4	12.7	8.4	43.0	17.6	19.8	NV	NV	NV
Acid Extractable Chromium (Cr)	µg/g	1.0	8.2	8.3	10	5.8	12	4.0	8.8	37.3	90	-
Acid Extractable Cobalt (Co)	µg/g	0.10	1.5	1.6	2.6	2.2	2.0	0.85	54	NV	NV	50
Acid Extractable Copper (Cu)	µg/g	0.50	7.8	7.5	14	6.1	20	4.5	15	35.7	197	-
Acid Extractable Lead (Pb)	µg/g	1.0	29	33	50	110	100	15	31	35	91.3	-
Soluble Magnesium (Mg)	mg/L	0.5	6.3	7.4	2.7	1.9	11.3	1.4	3.0	NV	NV	NV
Acid Extractable Mercury (Hg)	µg/g	0.05	0.19	0.11	<0.05	0.13	0.16	<0.05	0.057	0.17	0.486	-
Acid Extractable Molybdenum (Mo)	µg/g	0.50	<0.50	<0.50	<0.50	0.61	<0.50	<0.50	4.9	NV	NV	NV
Acid Extractable Nickel (Ni)	µg/g	0.50	4.0	3.9	5.2	3.7	6.1	2.6	38	NV	NV	16
Acid Extractable Selenium (Se)	µg/g	0.50	<0.50	<0.50	<0.50	<0.50	0.68	<0.50	1.1	NV	NV	NV
Acid Extractable Silver (Ag)	µg/g	0.20	<0.20	<0.20	<0.20	<0.20	0.27	<0.20	<0.20	NV	NV	0.5
Soluble Sodium (Na)	mg/L	5.0	5	7	<5.0	<5.0	8	<5.0	5	NV	NV	NV
Acid Extractable Thallium (Tl)	µg/g	0.05	0.067	0.064	<0.05	0.086	0.11	<0.05	0.95	NV	NV	NV
Acid Extractable Uranium (U)	µg/g	0.05	0.58	0.61	0.42	0.17	1.3	0.19	2.6	NV	NV	NV
Acid Extractable Vanadium (V)	µg/g	5.0	9.8	11	32	5.5	9.2	8.9	15	NV	NV	NV
Acid Extractable Zinc (Zn)	µg/g	5.0	46	37	27	35	71	7.9	52	123	315	-
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-	-
Hot Water Ext. Boron (B)	µg/g	0.050	0.37	0.13	0.16	0.22	0.32	0.11	0.67	NV	NV	NV
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-	-
Sodium Adsorption Ratio	-	-	0.22	0.25	0.33	0.40	0.28	0.31	0.28	NV	NV	NV
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-	-
Free Cyanide	µg/g	0.01	0.07	0.10	0.01	0.02	0.20	0.02	0.20	NV	NV	0.1
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-	-
Conductivity	mS/cm	0.002	0.20	0.29	0.091	0.067	0.36	0.10	0.11	NV	NV	NV
Analysis Date			2017-09-05	2017-09-01	2017-09-02	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-	-
Chromium (VI)	µg/g	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NV	NV	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-	-
Available (CaCl2) pH	s.u.	-	6.37	6.54	7.25	6.50	6.16	6.61	5.87	NV	NV	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-	-
Moisture	%	1.0	47	56	21	27	80	21	59	-	-	-

RDL - Result Detection Limit

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, 1997 - 2015

ISQG - Interim sediment quality guidelines

PEL - Probable effect level

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Guideline (ISQG)

Results above applicable Standard or Guideline (PEL or MOECC Table 9)

Table 17 - PAH In Sediment

Location			SED2		SED3	SED5	SED6	SED7	SED10	CCME Freshwater ISQG	CCME Freshwater PEL	MOECC Table 9
Sample ID			A0197	A0213 DUP of A0197	A0206	A0204	A0202	A0198	A0200			
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29			
Sample Time			9:30:00 AM	9:32:00 AM	12:20:00 PM	12:00:00 PM	11:10:00 AM	9:45:00 AM	10:40:00 AM			
Depth (m)		From	0	0	0	0	0	0	0			
		To	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results			
Analysis Date			2017-09-02	2017-09-02	2017-09-02	2017-09-02	2017-09-02	2017-09-02	2017-09-02			
Acenaphthene	µg/g	0.005	-	-	<0.005	0.0098	-	0.0078	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.00671	0.0889	-
	µg/g	0.02	-	-	-	-	<0.02	-	-			
Acenaphthylene	µg/g	0.005	-	-	<0.005	0.0086	-	<0.005	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.00587	0.128	-
	µg/g	0.02	-	-	-	-	<0.02	-	-			
Anthracene	µg/g	0.005	-	-	<0.005	0.021	-	0.0062	-			
	µg/g	0.01	0.011	<0.01	-	-	-	-	<0.01	0.0469	0.245	-
	µg/g	0.02	-	-	-	-	0.024	-	-			
Benzo(a)anthracene	µg/g	0.005	-	-	0.015	0.073	-	<0.005	-			
	µg/g	0.01	0.050	0.036	-	-	-	-	<0.01	0.0317	0.385	-
	µg/g	0.02	-	-	-	-	0.073	-	-			
Benzo(a)pyrene	µg/g	0.005	-	-	0.012	0.063	-	<0.005	-			
	µg/g	0.01	0.043	0.030	-	-	-	-	<0.01	0.0319	0.782	-
	µg/g	0.02	-	-	-	-	0.065	-	-			
Benzo(b/j)fluoranthene	µg/g	0.005	-	-	0.032	0.097	-	0.009	-			
	µg/g	0.01	0.062	0.040	-	-	-	-	0.019	NV	NV	NV
	µg/g	0.02	-	-	-	-	0.11	-	-			
Benzo(g,h,i)perylene	µg/g	0.005	-	-	0.0095	0.042	-	<0.005	-			
	µg/g	0.01	0.034	0.019	-	-	-	-	0.012	NV	NV	0.17
	µg/g	0.02	-	-	-	-	0.057	-	-			
Benzo(k)fluoranthene	µg/g	0.005	-	-	0.0078	0.036	-	<0.005	-			
	µg/g	0.01	0.024	0.016	-	-	-	-	<0.01	NV	NV	0.24
	µg/g	0.02	-	-	-	-	0.039	-	-			
Chrysene	µg/g	0.005	-	-	0.026	0.07	-	0.0062	-			
	µg/g	0.01	0.043	0.029	-	-	-	-	0.012	0.0571	0.862	-
	µg/g	0.02	-	-	-	-	0.071	-	-			
Dibenz(a,h)anthracene	µg/g	0.005	-	-	<0.005	0.011	-	<0.005	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.00622	0.135	-
	µg/g	0.02	-	-	-	-	<0.02	-	-			
Fluoranthene	µg/g	0.005	-	-	0.056	0.14	-	0.025	-			
	µg/g	0.01	0.095	0.065	-	-	-	-	0.031	0.111	2.355	-
	µg/g	0.02	-	-	-	-	0.15	-	-			
Fluorene	µg/g	0.005	-	-	<0.005	0.0094	-	0.01	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.0212	0.144	-
	µg/g	0.02	-	-	-	-	<0.02	-	-			
Indeno(1,2,3-cd)pyrene	µg/g	0.005	-	-	0.0093	0.046	-	<0.005	-			
	µg/g	0.01	0.037	0.020	-	-	-	-	0.011	NV	NV	0.2
	µg/g	0.02	-	-	-	-	0.055	-	-			
1-Methylnaphthalene	µg/g	0.005	-	-	<0.005	<0.005	-	<0.005	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01			
	µg/g	0.02	-	-	-	-	<0.02	-	-			
2-Methylnaphthalene	µg/g	0.005	-	-	0.0052	<0.005	-	<0.005	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.0202	0.201	-
	µg/g	0.02	-	-	-	-	0.028	-	-			
Methylnaphthalene, 2-(1-)	µg/g	0.0074	-	-	<0.005	<0.005	-	<0.005	-			
	µg/g	0.014	<0.014	<0.01	-	-	-	-	<0.01			
	µg/g	0.028	-	-	-	-	0.028	-	-			
Naphthalene	µg/g	0.005	-	-	<0.005	<0.005	-	<0.005	-			
	µg/g	0.01	<0.01	<0.01	-	-	-	-	<0.01	0.0346	0.391	-
	µg/g	0.02	-	-	-	-	<0.02	-	-			
Phenanthrene	µg/g	0.005	-	-	0.019	0.083	-	0.0088	-			
	µg/g	0.01	0.042	0.027	-	-	-	-	0.010	0.0419	0.515	-
	µg/g	0.02	-	-	-	-	0.053	-	-			
Pyrene	µg/g	0.005	-	-	0.042	0.11	-	0.021	-			
	µg/g	0.01	0.077	0.052	-	-	-	-	0.026	0.053	0.875	-
	µg/g	0.02	-	-	-	-	0.12	-	-			
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-	-
Moisture	%	1	47	56	21	27	80	21	59	-	-	-

PAH - Polycyclic Aromatic Hydrocarbons

ND - No Data NV - No Value RDL - Result Detection Limit

CCME - Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, 1998

ISQG - Interim sediment quality guidelines

PEL - Probable effect level

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Guideline (ISQG)

Results above applicable Standard or Guideline (PEL or MOECC Table 9)

RDL above applicable Standard or Guideline

Table 18 - PCBs In Sediment

Location			SED2	SED2	SED3	SED5	SED6	SED7	SED10	CCME Freshwater ISQG	CCME Freshwater PEL
Sample ID			A0197	A0213 DUP of A0197	A0206	A0204	A0202	A0198	A0200		
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29		
Sample Time			9:30:00 AM	9:32:00 AM	12:20:00 PM	12:00:00 PM	11:10:00 AM	9:45:00 AM	10:40:00 AM		
Depth (m)		From	0	0	0	0	0	0	0		
		To	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01		
Total PCBs	µg/g	0.01	-	-	<0.01	<0.01	-	<0.01	-	0.0341	0.277
	µg/g	0.02	<0.02	-	-	-	-	-	-		
	µg/g	0.03	-	<0.03	-	-	-	-	<0.03		
	µg/g	0.05	-	-	-	-	<0.05	-	-		

PCB - Polychlorinated Biphenyl

RDL - Result Detection Limit

ND - No Data

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, 1998

ISQG - Interim sediment quality guidelines

PEL - Probable effect level

MOECC Table 9 - Ministry of Environment and Climate Change, Soil, Ground Water And Sediment Standards For Use Under Part XV.1 of the Environmental Protection Act, Table 9 Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition, 2011

Results above applicable Guideline (ISQG)

Results above applicable Standard or Guideline (PEL or MOECC Table 9)

RDL above applicable Standard or Guideline

Table 19 Sediment Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Sodium Adsorption Ratio (SAR)	N/A	N/A	0.4	SED5	2017-08-29	NV	N
pH	N/A	s.u.	7.25	SED3	2017-08-29	NV	N
Cyanide (Free)	0.01	µg/g	0.2	SED6/SED10	2017-08-29/2017-08-29	0.1	Y
Electrical Conductivity	0.002	mS/cm	0.36	SED6	2017-08-29	NV	N
Alunimum	1.0	mg/kg	18000	SED3	1994-11-15	NV	N
Antimony	0.2	µg/g	2.2	SED4	2011-08-09	NV	N
Arsenic	1.0	µg/g	82	SED10	2017-08-29	17	Y
Barium	0.2	mg/kg	248	SED3	1994-11-15	NV	N
Beryllium	0.2	µg/g	0.50	SED2	2011-08-09	NV	N
Boron (total)	5.0	µg/g	5.8	SED6	2017-08-29	NV	N
Cadmium	0.1	mg/kg	1.2	SED2	2011-08-09	3.5	N
Chromium (Total)	0.3	mg/kg	28.8	SED3	1994-11-15	90	N
Chromium (VI)	0.2	µg/g	0.5	SED4	2011-08-09	NV	N
Cobalt	0.1	µg/g	54	SED10	2017-08-29	50	Y
Copper	0.5	mg/kg	51	SED2	2011-08-09	197	N
Iron	0.3	mg/kg	74900	SED1	1999-08-12	NV	N
Lead	1.0	mg/kg	539	SED1	1994-11-15	91.3	Y
Manganese	1.0	mg/kg	539	SED1	1994-11-15	NV	N
Magnesium	20	mg/kg	19500	SED3	2000-09-19	NV	N
Mercury	0.05	mg/kg	1.3	SED2	2011-08-09	0.486	Y
Molybdenum	0.5	µg/g	4.9	SED10	2017-08-29	NV	N
Nickel	0.5	µg/g	38	SED10	2017-08-29	16	Y
Phosphorous	20	ppm	962	SED3	1999-08-12	NV	N
Potassium	100	mg/kg	556	SED3	2000-06-28	NV	N
Sodium	50	mg/kg	103	SED3	2000-09-19	NV	N
Selenium	0.5	µg/g	1.7	SED2	2011-08-09	NV	N
Silver	0.2	µg/g	1.4	SED2	2011-08-09	0.5	Y
Strontium	0.3	mg/kg	55.7	SED3	2000-09-19	NV	N
Thallium	0.05	µg/g	0.95	SED10	2017-08-29	NV	N
Titanium	1.0	mg/kg	298	SED3	1999-08-12	NV	N
Uranium	0.05	µg/g	2.6	SED10	2017-08-29	NV	N
Vanadium	0.5	mg/kg	46	SED3	1994-11-15	NV	N
Zinc	5.0	mg/kg	250	SED2	2011-08-09	315	N

Table 19 Sediment Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Acetone (2-Propanone)	1.5	µg/g	1.5	SED6	2017-08-29	NV	N
Benzene	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
Bromodichloromethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Bromoform	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Bromomethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Carbon Tetrachloride	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Chlorobenzene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Chloroform	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Dibromochloromethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,2-Dichlorobenzene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,3-Dichlorobenzene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,4-Dichlorobenzene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Dichlorodifluoromethane (FREON 12)	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,1-Dichloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,2-Dichloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,1-Dichloroethylene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
cis-1,2-Dichloroethylene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
trans-1,2-Dichloroethylene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,2-Dichloropropane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
cis-1,3-Dichloropropene	0.09	µg/g	<0.09	Not Detected On Site	N/A	NV	N
trans-1,3-Dichloropropene	0.12	µg/g	<0.12	Not Detected On Site	N/A	NV	N
Ethylbenzene	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
Ethylene Dibromide	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Hexane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Methyl Ethyl Ketone (2-Butanone)	1.5	µg/g	<1.5	Not Detected On Site	N/A	NV	N
Methyl Isobutyl Ketone	1.5	µg/g	<1.5	Not Detected On Site	N/A	NV	N
Methyl t-butyl ether (MTBE)	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Methylene Chloride(Dichloromethane)	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Styrene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,1,1,2-Tetrachloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,1,2,2-Tetrachloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Tetrachloroethylene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Toluene	0.02	µg/g	0.13	SED2	2017-08-29	NV	N
1,1,1-Trichloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
1,1,2-Trichloroethane	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Trichloroethylene	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Trichlorofluoromethane (FREON 11)	0.15	µg/g	<0.15	Not Detected On Site	N/A	NV	N
Vinyl Chloride	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
o-Xylene	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
p+m-Xylene	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
Xylene (Total)	0.06	µg/g	<0.06	Not Detected On Site	N/A	NV	N
Acenaphthene	0.005	µg/g	0.0098	SED5	2017-08-29	0.0889	N
Acenaphthylene	0.005	µg/g	0.0086	SED5	2017-08-29	0.128	N
Anthracene	0.02	µg/g	0.024	SED6	2017-08-29	0.245	N
Benzo(a)anthracene	0.02	µg/g	0.073	SED5/SED6	2017-08-29/2017-08-29	0.385	N
Benzo(a)pyrene	0.02	µg/g	0.065	SED6	2017-08-29	0.782	N
Benzo(b/j)fluoranthene	0.02	µg/g	0.11	SED6	2017-08-29	NV	N
Benzo(g,h,i)perylene	0.02	µg/g	0.057	SED6	2017-08-29	0.17	N
Benzo(k)fluoranthene	0.02	µg/g	0.039	SED6	2017-08-29	0.24	N
Chrysene	0.02	µg/g	0.071	SED6	2017-08-29	0.862	N
Dibenz(a,h)anthracene	0.005	µg/g	0.011	SED5	2017-08-29	0.135	N
Fluoranthene	0.02	µg/g	0.15	SED6	2017-08-29	2.355	N
Fluorene	0.02	µg/g	<0.02	Not Detected On Site	N/A	0.144	N
Indeno(1,2,3-cd)pyrene	0.02	µg/g	0.055	SED6	2017-08-29	0.2	N
Methylnaphthalene, 2-(1-)	0.028	µg/g	0.028	SED6	2017-08-29	0.201	N
Naphthalene	0.02	µg/g	<0.02	Not Detected On Site	N/A	0.391	N
Phenanthrene	0.005	µg/g	0.083	SED5	2017-08-29	0.515	N
Pyrene	0.02	µg/g	0.12	SED6	2017-08-29	0.875	N
Total PCBs	0.05	µg/g	<0.05	Not Detected On Site	N/A	0.277	N

N/A - Not Applicable

Table 20 - VOCs In Seepage

Location			SW3	LOCK1		CCME Freshwater Long Term	PWQO
Sample ID			A0237	A0239	A0249 DUP of A0239		
Sample Date			2017-08-31	2017-08-31	2017-08-31		
Sample Time			7:30:00 AM	1:10:00 PM	1:12:00 PM		
Chemicals	Units	RDL	Results	Results	Results		
Analysis Date			2017-09-06	2017-09-06	2017-09-06		
Acrolein	ug/L	10	<10	<10	<10	-	0.03
Benzene	ug/L	0.10	<0.10	<0.10	<0.10	370	100
Bromodichloromethane	ug/L	0.10	<0.10	<0.10	<0.10	-	200
Bromoform	ug/L	0.20	<0.20	<0.20	<0.20	-	60
Bromomethane	ug/L	0.50	<0.50	<0.50	<0.50	-	0.9
Chlorobenzene	ug/L	0.10	<0.10	<0.10	<0.10	1.3	15
Chloromethane	ug/L	0.50	<0.50	<0.50	<0.50	-	700
Dibromochloromethane	ug/L	0.20	<0.20	<0.20	<0.20	-	NV
1,2-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	0.7	2.5
1,3-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	150	2.5
1,4-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	26	4
1,1-Dichloroethane	ug/L	0.10	<0.10	<0.10	<0.10	-	200
1,2-Dichloroethane	ug/L	0.20	<0.20	<0.20	<0.20	100	100
1,1-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	-	40
cis-1,2-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	-	200
trans-1,2-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10		
1,2-Dichloropropane	ug/L	0.10	<0.10	<0.10	<0.10	-	0.7
trans-1,3-Dichloropropene	ug/L	0.20	<0.20	<0.20	<0.20	-	7
Ethylbenzene	ug/L	0.10	<0.10	<0.10	<0.10	90	8
Ethylene Dibromide	ug/L	0.20	<0.20	<0.20	<0.20	-	5
Methyl Ethyl Ketone (2-Butanone)	ug/L	5.0	<5.0	<5.0	<5.0	-	400
Methyl t-butyl ether (MTBE)	ug/L	0.20	<0.20	<0.20	<0.20	10000	200
Methylene Chloride(Dichloromethane)	ug/L	0.50	<0.50	<0.50	<0.50	98.1	100
Styrene	ug/L	0.20	<0.20	<0.20	<0.20	72	4
1,1,1,2-Tetrachloroethane	ug/L	0.20	<0.20	<0.20	<0.20	-	20
1,1,2,2-Tetrachloroethane	ug/L	0.20	<0.20	<0.20	<0.20	-	70
Tetrachloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	-	50
Toluene	ug/L	0.20	0.30	<0.20	<0.20	2	0.8
1,1,1-Trichloroethane	ug/L	0.10	<0.10	<0.10	<0.10	-	10
1,1,2-Trichloroethane	ug/L	0.20	<0.20	<0.20	<0.20	-	800
Trichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	-	20
Vinyl Chloride	ug/L	0.20	<0.20	<0.20	<0.20	-	600
o-Xylene	ug/L	0.10	<0.10	<0.10	<0.10	-	40
p+m-Xylene	ug/L	0.10	<0.10	<0.10	<0.10	-	2

VOC - Volatile Organic Compounds
RDL - Result Detection Limit
NV - No Value
PWQO - Ontario Provincial Water Quality Objectives, February 1999
CCME - Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life
Results above applicable Standard or Guideline
RDL above applicable Standard or Guideline

Table 21 - Metals and Inorganics In Seepage

Location			SW3	LOCK1		CCME Freshwater Long Term	PWQO
Sample ID			A0237	A0239	A0249 DUP of A0239		
Sample Date			2017-08-31	2017-08-31	2017-08-31		
Sample Time			7:30:00 AM	1:10:00 PM	1:12:00 PM		
Chemicals	Units	RDL	Results	Results	Results		
Analysis Date			2017-09-07	2017-09-07	2017-09-07		
Mercury (Hg)	µg/L	0.1	<0.1	<0.1	<0.1	0.026	0.2
Analysis Date			2017-09-06	2017-09-06	2017-09-06		-
Dissolved (0.2u) Aluminum (Al)	ug/L	5.0	<5.0	7	7	100*	75
Analysis Date			2017-09-07	2017-09-07	2017-09-07		-
Chromium (VI)	ug/L	0.5	<0.5	<0.5	<0.5	1	1
Analysis Date			2017-09-07	2017-09-06	2017-09-07		-
Total Un-ionized Ammonia	ug/L	Var	46	14	<5.1	Note**	20
Analysis Date			2017-09-01	2017-09-01	2017-09-01		-
Dissolved Oxygen	mg/L		4.57	8.44	8.52	>5.5	>5
Analysis Date			2017-09-06	2017-09-06	2017-09-06		-
pH	pH		7.81	8.04	8.04	6.5 - 9.0	6.5-8.5
Analysis Date			2017-09-06	2017-09-06	2017-09-06		-
Phenols-4AAP	mg/L	0.0010	<0.001	0.0024	0.0021	4	1
Analysis Date			2017-09-05	2017-09-05	2017-09-05		-
Total Phosphorus	mg/L	0.004	0.025	0.013	0.019	-	20
Analysis Date			2017-09-02	2017-09-02	2017-09-02		-
Sulphide	mg/L	0.020	<0.02	<0.02	<0.02	-	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01		-
Turbidity	NTU	0.1	8.4	0.6	0.5	-	NV
Analysis Date			2017-09-06	2017-09-06	2017-09-06		-
WAD Cyanide (Free)	ug/L	1	<1	<1	<1	5	5
Analysis Date			2017-09-06	2017-09-06	2017-09-05		-
Alkalinity (Total as CaCO3)	mg/L	1.0	160	92	92	-	>69
Analysis Date			2017-09-06	2017-09-06	2017-09-06		-
Total Antimony (Sb)	ug/L	0.50	<0.50	<0.50	<0.50	-	20
Total Arsenic (As)	ug/L	1.0	<1.0	<1.0	<1.0	5	100
Total Beryllium (Be)	ug/L	0.50	<0.50	<0.50	<0.50	-	1100
Total Boron (B)	ug/L	10	20	13	13	1500	200
Total Cadmium (Cd)	ug/L	0.10	<0.10	<0.10	<0.10	0.09	0.2
Total Chromium (Cr)	ug/L	5.0	<5.0	<5.0	<5.0	8.9	NV
Total Cobalt (Co)	ug/L	0.50	0.51	<0.50	<0.50	-	0.9
Total Copper (Cu)	ug/L	1.0	<1.0	<1.0	<1.0	2.2 - 3.53	5
Total Iron (Fe)	ug/L	100	2800	150	140	300	300
Total Lead (Pb)	ug/L	0.50	<0.50	<0.50	<0.50	2.86 - 5.79	25
Total Molybdenum (Mo)	ug/L	0.50	<0.50	<0.50	<0.50	73	40
Total Nickel (Ni)	ug/L	1.0	1.6	<1.0	<1.0	89.71 - 136.61	25
Total Selenium (Se)	ug/L	2.0	<2.0	<2.0	<2.0	1	100
Total Silver (Ag)	ug/L	0.10	<0.10	<0.10	<0.10	0.25	0.1
Total Thallium (Tl)	ug/L	0.050	<0.05	<0.05	<0.05	0.8	0.3
Total Tungsten (W)	ug/L	1.0	<1.0	<1.0	<1.0	-	30
Total Uranium (U)	ug/L	0.10	<0.10	0.11	0.11	15	5
Total Vanadium (V)	ug/L	0.50	0.64	0.78	0.88	-	6
Total Zinc (Zn)	ug/L	5.0	5.5	<5.0	<5.0	30	30
Total Zirconium (Zr)	ug/L	1.0	<1.0	<1.0	<1.0	-	4

RDL - Result Detection Limit *100µg/L if pH > 6.5

NV - No Value

CCME - Canadian Council of Ministers of the Environment,
Water Quality Guidelines for the Protection of Aquatic Life

PWQO - Ontario Provincial Water Quality Objectives, February 1999

Results above applicable Standard or Guideline

RDL above applicable Standard or Guideline

Table 22 - VOCs In Surface Water

Location			SW1	RR2		RR3	SW7	SW8	SW9	SW10	CCME Freshwater Long Term	PWQO
Sample ID			A0211	A0196	A0210 DUP of A0196	A0207	A0205	A0201	A0203	A0199		
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29		
Sample Time			2:30:00 PM	9:00:00 AM	9:10:00 AM	12:40:00 PM	12:00:00 PM	10:40:00 AM	11:10:00 AM	10:00:00 AM		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01		
Acrolein	ug/L	10	<10	<10	<10	<10	<10	<10	<10	<10	-	0.03
Benzene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	370	100
Bromodichloromethane	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	-	200
Bromoform	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	60
Bromomethane	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	0.9
Chlorobenzene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1.3	15
Chloromethane	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	700
Dibromochloromethane	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	NV
1,2-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.7	2.5
1,3-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	150	2.5
1,4-Dichlorobenzene	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	26	4
1,1-Dichloroethane	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	200
1,2-Dichloroethane	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	100	100
1,1-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	40
cis-1,2-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	200
trans-1,2-Dichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
1,2-Dichloropropane	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	0.7
trans-1,3-Dichloropropene	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	7
Ethylbenzene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	90	8
Ethylene Dibromide	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	5
Methyl Ethyl Ketone (2-Butanone)	ug/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	-	400
Methyl t-butyl ether (MTBE)	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	10000	200
Methylene Chloride(Dichloromethane)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	98.1	100
Styrene	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	72	4
1,1,1,2-Tetrachloroethane	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	20
1,1,2,2-Tetrachloroethane	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	70
Tetrachloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	50
Toluene	ug/L	0.20	<0.20	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	2	0.8
1,1,1-Trichloroethane	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	10
1,1,2-Trichloroethane	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	800
Trichloroethylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	20
Vinyl Chloride	ug/L	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	600
o-Xylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	40
p+m-Xylene	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	2

VOC - Volatile Organic Compounds

RDL - Result Detection Limit

NV - No Value

PWQO - Ontario Provincial Water Quality Objectives, February 1999

CCME - Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life

Results above applicable Standard or Guideline

RDL above applicable Standard or Guideline

Table 23 - Metals and Inorganics In Surface Water

Location			SW1	RR2		RR3	SW7	SW8	SW9	SW10	CCME Freshwater Long Term	PWQO
Sample ID			A0211	A0196	A0210 DUP of A0196	A0207	A0205	A0201	A0203	A0199		
Sample Date			2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29	2017-08-29		
Sample Time			2:30:00 PM	9:00:00 AM	9:10:00 AM	12:40:00 PM	12:00:00 PM	10:40:00 AM	11:10:00 AM	10:00:00 AM		
Chemicals	Units	RDL	Results	Results	Results	Results	Results	Results	Results	Results		
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05		
pH (Field)	s.u.	-	8.43	7.2	7.2	8.35	8.30	8.29	8.36	8.22	-	8.5
Temperature (Field)	°C	-	22.44	21.08	21.08	21.41	21.30	21.00	21.28	21.27	-	-
Conductivity (Field)	mS/cm	-	0.22	0.225	0.225	0.231	0.243	0.269	0.228	0.228	-	-
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-
Mercury (Hg)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.026	0.2
Analysis Date			2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	2017-09-05	-	-
Dissolved (0.2u) Aluminum (Al)	ug/L	5.0	5	<5.0	6	7	5	8	7	<5.0	100*	75
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-
Chromium (VI)	ug/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01		-
Total Un-ionized Ammonia	ug/L	Var	20	2.0	3.2	30	<4.9	26	34	4.2	19	20
Total Ammonia-N	mg/L	0.05	0.15	0.25	0.38	0.28	<0.05	0.28	0.31	0.051	Note**	-
Analysis Date			2017-08-30	2017-09-01	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	2017-08-30	-	-
Dissolved Oxygen	mg/L		9.45	8.63	9.22	9.00	8.97	9.07	9.36	8.85	>5.5	>5
Analysis Date			2017-08-31	2017-08-31	2017-09-01	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	-	-
pH	pH		8.11	8.01	8.07	8.06	7.90	8.03	8.07	8.01	6.5 - 9.0	6.5-8.5
Analysis Date			2017-08-31	2017-08-31	2017-09-05	2017-09-05	2017-09-05	2017-08-31	2017-08-31	2017-08-31	-	-
Phenols-4AAP	mg/L	0.0010	0.0023	0.0025	0.0020	<0.001	<0.001	0.0022	0.0027	0.0021	4	1
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-
Total Phosphorus	mg/L	0.004	0.011	0.011	0.015	0.016	0.017	0.015	0.021	0.013	-	20
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-
Sulphide	mg/L	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	NV
Analysis Date			2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	-	-
Turbidity	NTU	0.1	0.7	0.4	0.5	1.2	0.4	0.6	1.2	0.7	-	NV
Analysis Date			2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	2017-09-01	-	-
WAD Cyanide (Free)	ug/L	1	6	<1	<1	<1	<1	<1	<1	<1	5	5
Analysis Date			2017-09-01	2017-08-31	2017-09-01	2017-09-01	2017-09-01	2017-08-31	2017-09-01	2017-08-31	-	-
Alkalinity (Total as CaCO3)	mg/L	1.0	92	92	92	92	94	100	93	93	-	>69
Analysis Date			2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	2017-08-31	-	-
Total Antimony (Sb)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	20
Total Arsenic (As)	ug/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	100
Total Beryllium (Be)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	1100
Total Boron (B)	ug/L	10	13	13	17	13	14	15	13	14	1500	200
Total Cadmium (Cd)	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.09	0.2
Total Chromium (Cr)	ug/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	8.9	NV
Total Cobalt (Co)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	0.9
Total Copper (Cu)	ug/L	1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.2 - 3.53	5
Total Iron (Fe)	ug/L	100	<100	<100	<100	<100	130	160	110	220	300	300
Total Lead (Pb)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	1.4	<0.50	2.86 - 5.79	25
Total Molybdenum (Mo)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	73	40
Total Nickel (Ni)	ug/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	89.71 - 136.61	25
Total Selenium (Se)	ug/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	1	100
Total Silver (Ag)	ug/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.25	0.1
Total Thallium (Tl)	ug/L	0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.8	0.3
Total Tungsten (W)	ug/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	30
Total Uranium (U)	ug/L	0.10	0.10	0.12	0.11	0.11	0.13	0.18	0.13	0.12	15	5
Total Vanadium (V)	ug/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	6
Total Zinc (Zn)	ug/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	30	30
Total Zirconium (Zr)	ug/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	4

RDL - Result Detection Limit

*100µg/L if pH > 6.5

Note** - Guideline value is based on Table 2 of the CCME Ammonia Water Quality Guidelines

NV - No Value

CCME - Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life

PWQO - Ontario Provincial Water Quality Objectives, February 1999

Results above applicable Standard or Guideline

RDL above applicable Guideline

Table 24 Surface Water Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Alkalinity (Total as CaCO3)	1.0	mg/L	100	SW8	2017-08-29	>69	Y
pH	N/A	pH	8.11	SW1	2017-08-29	6.5 - 9.0	N
Cyanide (Free)	1.0	ug/L	6.0	SW1	2017-08-29	5	Y
Total Un-ionized Ammonia	NA	ug/L	34	SW9	2017-08-29	19	Y
Total Ammonia-N	0.05	mg/L	0.38	RR2	2017-08-29	4.82	N
Dissolved Oxygen	N/A	mg/L	9.45	SW1	2017-08-29	>5.5	N
Turbidity	0.1	NTU	1.2	RR3/SW9	2017-08-29	NV	N
Alunimum	0.5	µg/L	12.6	SW4	2011-07-19	NV	N
Antimony	0.5	µg/L	<0.5	Not Detected On Site	N/A	20	N
Arsenic	1.0	µg/L	<1.0	Not Detected On Site	N/A	5	N
Beryllium	0.5	µg/L	<0.5	Not Detected On Site	N/A	1100	N
Boron (total)	10	µg/L	17	RR2	2017-08-29	200	N
Cadmium	0.1	µg/L	<0.1	Not Detected On Site	N/A	0.09	N
Calcium	20	µg/L	24600	SW6	2011-07-19	NV	N
Chromium (Total)	5.0	µg/L	<5.0	Not Detected On Site	N/A	8.9	N
Chromium (VI)	0.5	mg/L	<0.5	Not Detected On Site	N/A	1	N
Cobalt	0.5	µg/L	<0.5	Not Detected On Site	N/A	0.9	N
Copper	1.0	µg/L	1.4	SW1	2017-08-29	2.2 - 3.53	N
Iron	100	µg/L	220	SW10	2017-08-29	300	N
Lead	0.5	µg/L	1.5	SW7	2017-08-29	2.86 - 5.79	N
Lithium	0.5	µg/L	0.6	SW1	2011-07-19	NV	N
Manganese	0.2	µg/L	39.3	SW4	2011-07-19	NV	N
Mercury	0.1	µg/L	<0.1	Not Detected On Site	N/A	0.026	Y
Molybdenum	0.5	µg/L	<0.5	Not Detected On Site	N/A	40	N
Nickel	1.0	µg/L	<1.0	Not Detected On Site	N/A	25	N
Phenols-4AAP	0.001	mg/L	0.0027	SW9	2017-08-29	1	N
Total Phosphorous	0.004	mg/L	0.021	SW9	2017-08-29	20	N
Selenium	2.0	µg/L	<2.0	Not Detected On Site	N/A	1	N
Silver	0.1	µg/L	<0.1	Not Detected On Site	N/A	0.1	N
Sulphide	0.02	mg/L	<0.02	Not Detected On Site	N/A	NV	N
Thallium	0.05	µg/L	<0.05	Not Detected On Site	N/A	0.3	N
Tungsten	1.0	µg/L	<1.0	Not Detected On Site	N/A	30	N
Uranium	0.1	µg/L	0.18	SW8	2017-08-29	5	N
Vanadium	0.5	µg/L	<0.5	Not Detected On Site	N/A	6	N
Zinc	5.0	µg/L	<5.0	Not Detected On Site	N/A	30	N
Zirconium	1.0	µg/L	<1.0	Not Detected On Site	N/A	4	N

Table 24 Surface Water Contaminant Inventory

Contaminant	Result Detection Limit (RDL)	Units	Maximum Measured Concentration	Location Name	Sampling Date	Applicable Guideline/Standard Value	Exceedance
Acrolein	10.0	ug/L	<10	Not Detected On Site	N/A	NV	N
Benzene	0.1	ug/L	<0.10	Not Detected On Site	N/A	100	N
Bromodichloromethane	0.1	ug/L	0.12	SW8	2017-08-29	200	N
Bromoform	0.2	ug/L	<0.20	Not Detected On Site	N/A	60	N
Bromomethane	0.5	ug/L	<0.50	Not Detected On Site	N/A	0.9	N
Chlorobenzene	0.1	ug/L	<0.10	Not Detected On Site	N/A	1.3	N
Chloromethane	0.5	ug/L	<0.50	Not Detected On Site	N/A	700	N
Dibromochloromethane	0.2	ug/L	<0.20	Not Detected On Site	N/A	NV	N
1,2-Dichlorobenzene	0.2	ug/L	<0.20	Not Detected On Site	N/A	0.7	N
1,3-Dichlorobenzene	0.2	ug/L	<0.20	Not Detected On Site	N/A	150	N
1,4-Dichlorobenzene	0.2	ug/L	<0.20	Not Detected On Site	N/A	4	N
1,1-Dichloroethane	0.1	ug/L	<0.10	Not Detected On Site	N/A	200	N
1,2-Dichloroethane	0.2	ug/L	<0.20	Not Detected On Site	N/A	100	N
1,1-Dichloroethylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	40	N
cis-1,2-Dichloroethylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	200	N
trans-1,2-Dichloroethylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	200	N
1,2-Dichloropropane	0.1	ug/L	<0.10	Not Detected On Site	N/A	0.7	N
trans-1,3-Dichloropropene	0.2	ug/L	<0.20	Not Detected On Site	N/A	7	N
Ethylbenzene	0.1	ug/L	<0.10	Not Detected On Site	N/A	8	N
Ethylene Dibromide	0.2	ug/L	<0.20	Not Detected On Site	N/A	5	N
Methyl Ethyl Ketone (2-Butanone)	5.0	ug/L	<5.0	Not Detected On Site	N/A	400	N
Methyl t-butyl ether (MTBE)	0.2	ug/L	<0.20	Not Detected On Site	N/A	200	N
Methylene Chloride(Dichloromethane)	0.5	ug/L	<0.50	Not Detected On Site	N/A	98.1	N
Styrene	0.2	ug/L	<0.20	Not Detected On Site	N/A	4	N
1,1,1,2-Tetrachloroethane	0.2	ug/L	<0.20	Not Detected On Site	N/A	20	N
1,1,2,2-Tetrachloroethane	0.2	ug/L	<0.20	Not Detected On Site	N/A	70	N
Tetrachloroethylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	50	N
Toluene	0.2	ug/L	0.22	RR2	2017-08-29	0.8	N
1,1,1-Trichloroethane	0.1	ug/L	<0.10	Not Detected On Site	N/A	10	N
1,1,2-Trichloroethane	0.2	ug/L	<0.20	Not Detected On Site	N/A	800	N
Trichloroethylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	20	N
Vinyl Chloride	0.2	ug/L	<0.20	Not Detected On Site	N/A	600	N
o-Xylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	40	N
p+m-Xylene	0.1	ug/L	<0.10	Not Detected On Site	N/A	2	N
Total PCBs	0.005	µg/L	0.11	RR2	1994-10-17	0.001	Y

N/A - Not Applicable

Table 25 - PID Field Screening Measurements

Sample Location	Sample Depth (m)	HC Reading† (ppm)	VOC Reading† (ppm)
MW5/17	0-0.76	0	2
MW5/17	0.76-1.52	0	0
MW5/17	1.52-3.05	0	0
MW5/17	3.05-3.35	0	2
MW5/17	3.35-3.66	0	0
MW7/17	0-0.76	0	0
MW7/17	0.76-1.52	0	4
MW7/17	1.52-3.05	0	2
MW7/17	3.05-3.81	5	0
MW8/17	0-1.52	0	0
MW8/17	1.52-3.05	0	2
MW8/17	3.05-4.27	0	0
MW9/17	0-0.76	0	0
MW9/17	0.76-1.52	0	0
MW9/17	1.52-2.29	0	0
MW9/17	2.29-3.05	0	0
MW9/17	3.05-4.11	0	0
MW10/17	0-0.76	0	0
MW10/17	0.76-1.52	15	28
MW10/17	1.52-3.05	0	8
MW10/17	3.05-3.81	5	4
BH11/17	0-0.76	0	0
BH11/17	0.76-1.52	0	0
BH11/17	1.52-3.05	0	2
BH11/17	3.05-4.57	0	0
BH12/17	0-0.76	0	0
BH12/17	0.76-1.52	0	2
BH12/17	1.52-3.05	0	0
BH12/17	3.05-4.57	0	0
BH13/17	0-1.52	0	0
BH13/17	1.52-3.05	0	0
BH13/17	3.05-4.57	10	0

† Samples measured using a RKI Eagle 2

HC - Hydrocarbon

VOC - Volatile Organic Compounds

Table 26 - XRF Screening Results

Location	MW5/17	MW5/17	MW5/17	MW5/17	MW5/17	MW7/17	MW7/17	MW7/17	MW7/17	MW8/17	Applicable Site Condition Standard XRF Limit
Sample Date	0-0.76	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	
Sample Depth (m)	0.76-1.52	0.76-1.52	1.52-3.05	3.05-3.35	3.35-3.66	0-0.76	0.76-1.52	1.52-3.05	3.05-3.81	0-1.52	
Arsenic (ppm)	<2	N/A	13	23	N/A	<2	8.1	15.1	6.1	<2	16
Lead (ppm)	<2	N/A	164	47	N/A	<2	58	112	<2	117	80
Zinc (ppm)	6.8	N/A	606	392	N/A	12.7	86	365	14.6	183	440

Location	MW8/17	MW8/17	MW9/17	MW9/17	MW9/17	MW9/17	MW9/17	MW10/17	MW10/17	MW10/17	Applicable Site Condition Standard XRF Limit
Sample Date	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	
Sample Depth (m)	1.52-3.05	3.05-4.27	0-0.76	0.76-1.52	1.52-2.29	2.29-3.05	3.05-4.11	0-0.76	0.76-1.52	1.52-3.05	
Arsenic (ppm)	9.2	N/A	<2	<2	<2	<2	<2	<2	6.7	<2	16
Lead (ppm)	139	N/A	5.6	<2	<2	<2	<2	<2	65	900	80
Zinc (ppm)	376	N/A	14.5	<2	<2	<2	<2	6.7	705	402	440

Location	MW10/17	BH11/17	BH11/17	BH11/17	BH11/17	BH12/17	BH12/17	BH12/17	BH12/17	BH13/17	Applicable Site Condition Standard XRF Limit
Sample Date	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	31-Aug-17	
Sample Depth (m)	3.05-3.81	0-0.76	0.76-1.52	1.52-3.05	3.05-4.57	0-0.76	0.76-1.52	1.52-3.05	3.05-4.57	0-1.52	
Arsenic (ppm)	<2	<2	<2	28.8	4.1	<2	<2	<2	<2	<2	16
Lead (ppm)	37.2	<2	80	82	50.7	4.6	9.6	12.6	30.6	23.9	80
Zinc (ppm)	40.5	32.5	92	121	47	21.8	<2	22.7	685	53	440

Location	BH13/17	BH13/17	Applicable Site Condition Standard XRF Limit
Sample Date	31-Aug-17	31-Aug-17	
Sample Depth (m)	1.52-3.05	3.05-4.57	
Arsenic (ppm)	<2	7.6	16
Lead (ppm)	28.1	127	80
Zinc (ppm)	184	726	440

XRF - X-Ray fluorescence

Applicable site condition standard XRF limit determined from Innove-X accuracy studies and in-house correlations

Values that exceeded site condition standard XRF limit

TABLE 27 COMPARATIVE CRITERIA FOR SOIL

Contaminant of Concern	Distance from Surface Water	Maximum Measured Concentration [a]	CCME Guideline	Components of CCME guideline										MOECC SCS	Carried forward to RA?
				Human Health						Ecological					
				Soil Ingestion	Soil Dermal	Soil Inhalation	Indoor Air (basement / slab-on-grade)	Drinking Water check	Produce, Meat, Dairy check	Soil Contact	Soil and Food Ingestion	Nutrient and Energy Cycling	Aquatic Life check		
BTEX and PHCs															
Ethylbenzene	> 10 m	0.44	0.082	10,000	58,000	NV	88 / 55	0.082	NV	55	NV	NV	50	-	No
	< 10 m	-	NV											0.05	
Toluene	> 10 m	0.72	0.37	22,000	220,000	NV	200 / 120	0.37	NV	75	NV	NV	0.1	-	Yes - aq
	< 10 m	-	NV											0.2	
Xylenes	> 10 m	-	11	150,000	<1,000,000	NV	22 / 14	11	NV	95	NV	NV	37	-	Yes - aq
	< 10 m	0.11	NV											0.05	
PHCs F2	> 10 m	-	150	6,800		NV	190 / 150	320	NV	150	NV	NV	380	-	Yes - aq
	< 10 m	32	NV											10	
PHCs F3	> 10 m	520	300	15,000		NV	NA	NA	NV	300	NV	NV	NA	-	Yes - terr. eco
	< 10 m	620	NV											240	
PHCs F4	> 10 m	-	2800	21,000		NV	NA	NA	NV	2800	NV	NV	NA	-	No
	< 10 m	370 (1000 grav)	NV											120	
VOCs															
Trichloroethylene	> 10 m	0.047	0.01	28		NV	0.058 / 0.036	0.01	0.14	3	NV	NV	0.05	-	Yes - aq
	< 10 m	0.48	NV											0.05	
PAHs and semi-VOCs															
Anthracene	> 10 m	2.94 (in 1994)	2.5	NV	NV	NV	NV	NV	NV	2.5	61.5	NV	NA	-	Yes - HH; terr.eco
	< 10 m	-	NV											0.22	
Benzo[a]anthracene	> 10 m	1.63 (in 1994)	1	NV	NV	NV	NV	NV	NV	NV	6.2	NV	NA	-	Yes - HH; terr.eco
	< 10 m	-	NV											0.36	
Benzo[b]fluoranthene	> 10 m	1.16 (in 1994)	1	NV	NV	NV	NV	NV	NV	NV	6.2	NV	NA	-	Yes - HH; terr.eco
	< 10 m	-	NV											0.47	
Benzo[k]fluoranthene	> 10 m	1.30 (in 1994)	1	NV	NV	NV	NV	NV	NV	NV	6.2	NV	NA	-	Yes - HH; terr.eco
	< 10 m	-	NV											0.48	
Methylnaphthalene	> 10 m	5.3	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	-	Yes - HH; terr.eco; aq
	< 10 m	-	NV											-	
Naphthalene	> 10 m	3.7	0.013	NV	NV	NV	NV	NV	NV	NV	8.8	NV	0.013	-	Yes - HH; terr.eco; aq
	< 10 m	-	NV											-	
Phenanthrene	> 10 m	0.088 (3.04 in 1994)	0.046	NV	NV	NV	NV	NV	NV	NV	43	NV	0.046	-	Yes - HH; terr.eco; aq
	< 10 m	-	NV											-	
Methoxychlor	> 10 m	1.31 (in 1994)	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.13	Yes - HH; terr.eco; aq
	< 10 m	-	NV											0.05	
DDD	> 10 m	-	0.7 (sum DDT)	NV [b]	NV [b]	NV	NV	NV	NV	12 (sum DDT)	0.7 (sum DDT)	NV	0.1 (sum DDT)	-	Yes - aq
	< 10 m	0.062 (in 1994) (DDT not detected)	NV											0.05	
Inorganic Parameters															
Antimony	> 10 m	-	20	NV	NV	NV	NA	NV	NV	NV	NV	NV	NV	-	Yes - HH; terr.eco; aq
	< 10 m	5.9	NV											1.3	
Arsenic	> 10 m	13	12	12	NV	NV	NA	NV	NV	17	NV	NV	NV	-	Yes - HH; aq
	< 10 m	17	NV											18	
Cadmium	> 10 m	-	10	14	NV	NV	NA	NV	NV	10	NV	54	NV	-	Yes - terr eco; aq
	< 10 m	13	NV											1.2	
Copper	> 10 m	210	63	1,100	NV	NV	NA	NV	NV	63	NV	430	NV	-	Yes - terr eco; aq
	< 10 m	710	NV											92	
Lead	> 10 m	530	140	140	NV	NV	NA	NV	NV	300	NV	723	NV	-	Yes - HH; terr.eco; aq
	< 10 m	350	NV											120	
Nickel	> 10 m	-	45	200		10,000	NA	NV	NV	45	NV	171	NV	-	Yes - HH; terr.eco; aq
	< 10 m	550	NV											82	
Tin	> 10 m	210	50	NV	NV	NV	NA	NV	NV	NV	NV	NV	NV	-	Yes - HH; terr.eco; aq
	< 10 m	230	NV											NV	
Zinc	> 10 m	880	200	NV	NV	NV	NA	NV	NV	200	NV	NV	NV	-	Yes - HH; terr.eco; aq
	< 10 m	4500	NV											290	

All data in units of µg/g; a - Measured in 2017 unless noted otherwise; b - 3.3 ug/g in MOE (2011c)

NA- Not applicable; NV - No value; HH - Human health; terr. eco - Terrestrial ecological receptors; aq - Aquatic receptors

TABLE 28 COMPARATIVE CRITERIA FOR GROUNDWATER

Contaminant of Concern	Distance from Surface Water	Maximum Measured Concentration [a]	FCSAP Residential/ Parkland Land Use Coarse	CCME Freshwater Aquatic Life	MOECC Table 9	MOECC Aquatic Protection Value	Components of FCSAP Guideline			Guideline for Canadian Drinking Water Quality [b]	Carried forward to RA?
							Inhalation	Soil Organisms Direct Contact	Freshwater Life		
PHCs											
PHCs F3	> 10 m < 10 m	19,000 3,700	NV	NV	500	NV	NV	NV	NV	1,000 [b]	Yes (HH; aq)
PHCs F4	> 10 m < 10 m	9,700 2,100	NV	NV	500	NV	NV	NV	NV	1,100 [b]	Yes (HH; aq)
VOCs											
Chlorobenzene	> 10 m < 10 m	5.4 3.1	1.3	1.3	500	50	14	NV	1.3	30 [b]	No
PAHs											
Anthracene	> 10 m < 10 m	0.12 0.085	0.012	0.012	1	0.1	>solubility	25	0.012	890 [b]	Yes (aq)
Benzo(a)anthracene	> 10 m < 10 m	0.063 <0.05	0.018	0.018	1.8	0.18	NV	NV	0.018	1 [b]	No
Benzo(a)pyrene	> 10 m < 10 m	0.06 <0.05	0.01	0.015	0.81	0.21	NV	1.8	0.015	0.01 [b]	Yes (HH)
Fluoranthene	> 10 m < 10 m	0.42 0.11	0.04	0.04	73	7.3	>solubility	240	0.04	0.41 [b]	Yes (HH)
Naphthalene	> 10 m < 10 m	27 -	1.1	1.1	1400	620	600	NV	1.1	59 [b]	No
Phenanthrene	> 10 m < 10 m	0.94 0.56	0.4	0.4	380	38	NV	NV	0.4	1 [b]	No
Pyrene	> 10 m < 10 m	0.24 0.072	0.025	0.025	5.7	0.57	>solubility	NV	0.025	4.1 [b]	No
Inorganic Parameters											
Arsenic	> 10 m < 10 m	12 -	5	5	1500	150	NA	NA	5	10	Yes (HH)
Cadmium	> 10 m < 10 m	<0.10 <0.10	0.017	0.09	2.1	0.21	NA	NA	0.017	5	No
Chloride	> 10 m < 10 m	220,000 -	120,000	120,000	1,800,000	180,000	NA	NA	120,000	250,000	Yes (aq)
Cyanide, free	> 10 m < 10 m	1.2 2.3	1	5	52	5.2	NA	NA	5	200	No
Iron	> 10 m < 10 m	34,000 9,400	300	300	NV	NV	NA	NA	300	300 (aesthetic)	Yes (aq)
Selenium	> 10 m < 10 m	<2.0 <2.0	1	1	50	5	NA	NA	1	50	No

All data in units of µg/L
NV - No value; NA - Not applicable; HH - Human health; aq - Aquatic receptors
a - Measured in 2017
b - No GCDWQ available; value shown is MOECC drinking water component

TABLE 29 COMPARATIVE CRITERIA FOR SEDIMENT

Contaminant of Concern	Maximum Measured Concentration [a]	CCME Freshwater ISQG	CCME Freshwater PEL	MOECC Table 9	Carried forward to RA? [b]
VOCs					
Acetone	1.5	NV	NV	NV	Yes
Toluene	0.13	NV	NV	NV	Yes
PAHs					
Acenaphthene	0.0098	0.00671	0.0889	-	Yes
Acenaphthylene	0.0086 (<0.02)	0.00587	0.128	-	Yes
Benzo(a)anthracene	0.073	0.0317	0.385	-	Yes
Benzo(a)pyrene	0.065	0.0319	0.782	-	Yes
Benzo(b/j)fluoranthene	0.11	NV	NV	NV	Yes
Chrysene	0.071	0.0571	0.862	-	Yes
Dibenz(a,h)anthracene	0.011 (<0.02)	0.00622	0.135	-	Yes
Fluoranthene	0.15	0.111	2.355	-	Yes
Methylnaphthalene, 2-(1-)	0.028	0.0202	0.201	-	Yes
Phenanthrene	0.083	0.0419	0.515	-	Yes
Pyrene	0.12	0.053	0.875	-	Yes
PCBs	<0.05	0.0341	0.277	-	Yes
Inorganic Parameters					
Antimony	0.77 (2.2 in 2011)	NV	NV	NV	Yes
Arsenic	82	5.9	17	-	Yes (>PEL)
Barium	210	NV	NV	NV	Yes
Beryllium	0.33	ND	ND	NV	Yes
Boron	5.8	NV	NV	NV	Yes
Cobalt	54	NV	NV	50	Yes
Cyanide (free)	0.2	NV	NV	0.1	Yes
Lead	110 (539 in 1994)	35	91.3	-	Yes (>PEL)
Mercury	0.19 (1.3 in 2011)	0.17	0.486	-	Yes
Molybdenum	4.9	NV	NV	NV	Yes
Nickel	38	NV	NV	16	Yes
Selenium	1.1	NV	NV	NV	Yes
Silver	1.4 (in 2011)	NV	NV	0.5	Yes
Thallium	0.95	NV	NV	NV	Yes
Uranium	2.6	NV	NV	NV	Yes
Vanadium	32	NV	NV	NV	Yes

All data in units of µg/g

a - Measured in 2017 unless noted otherwise

b - Aquatic receptors only

TABLE 30 COMPARATIVE CRITERIA FOR SURFACE WATER

Contaminant of Concern	Maximum Measured Concentration [a]	CCME Freshwater Aquatic Life	MOECC PWQO	MOECC Aquatic Protection Value	Guideline for Canadian Drinking Water Quality	Carried forward to RA?
VOCs						
Acrolein	<10	NV	0.03	NV	NV	No
Inorganic Parameters						
Cadmium	<0.10	0.09	0.2	0.21	5	No
Cyanide (free)	6	5	5	5.2	200	Yes (aquatic)
Mercury	<0.1	0.026	0.2	0.77	1	No
Selenium	<2.0	1	100	5	50	No
Ammonia, unionized	34	19	20	NV	NV	Yes (aquatic)

All data in units of µg/L
NV - No value
a - Measured in 2017

TABLE 31: CHEMICAL-SPECIFIC INFORMATION

COC	Relative Absorption Factors				Lag Time per event
	Dermal AF $_S$ (no units) [a]	GI Tract AF_{git} (no units)	Fraction Absorbed from Water FA (no units)[f]	Permeability Constant PC (cm/h) [b]	(h/event) [c]
PHCs (F3)					
Aliphatics	NA	1	1	1.96	0.82
Aromatics	NA	1	1	0.308	2.69
PHCs (F4)					
Aliphatics	NA	1	1	1.96	0.82
Aromatics	NA	1	1	0.308	2.69
Anthracene	0.13 [d]	NA	NA	NA	NA
Benzo[a]anthracene	0.13 [d]	NA	NA	NA	NA
Benzo[b]fluoranthene	0.13 [d]	NA	NA	NA	NA
Benzo[k]fluoranthene	0.13 [d]	NA	NA	NA	NA
Methylnaphthalene, 1- and 2-	0.148	NA	NA	NA	NA
Naphthalene	0.148	NA	NA	NA	NA
Phenanthrene	0.13 [d]	NA	NA	NA	NA
Methoxychlor	0.1 [b]	NA	NA	NA	NA
Antimony	0.1 [d]	NA	NA	NA	NA
Arsenic	0.03	NA	NA	NA	NA
Lead	0.006 [e]	NA	NA	NA	NA
Nickel	0.091	NA	NA	NA	NA
Tin	0.1 [e]	NA	NA	NA	NA
Zinc	0.1	NA	NA	NA	NA

Notes:
a - HC (2010b) except where noted
b - RAIS (2017)
c - USEPA (2004). Values not available for PHCs and surrogate chemicals were selected as follows: decanol and benzo[a]pyrene for F3 and F4 aliphatics and aromatics.
d - MOE (2011c)
e - HC (2004)
f - assumed
NA - pathway not applicable

TABLE 32: CHARACTERISTICS OF HUMAN RECEPTORS[a]

VARIABLE	UNITS	DESCRIPTION	SITE VISITOR					LONG-TERM WORKER	CONSTRUCTION WORKER
			ADULT (20 years and older)	TEEN (12 to 19 years)	CHILD (5 to 11 years)	TODDLER (7 months to 4 years)	INFANT (0 to 6 months)		
SIR	mg/day	Soil ingestion rate	20	20	20	80	20	100	100
SSA	cm^2	Skin surface area in contact with soil or groundwater	3390 (890: hands and 2500: arms)	3030 (800: hands and 2230: arms)	5140 (590: hands, 1480: arms, 3070: legs)	3010 (430: hands, 890: arms, 1690: legs)	1780 (320: hands, 550: arms, 910: legs)	3390 (890: hands and 2500: arms)	3390 (890: hands and 2500: arms)
SA	mg/cm^2/event	Soil adherence factor	0.1 (hands); 0.01 (other); 0.034 (calculated, combined)	0.1 (hands); 0.01 (other); 0.034 (calculated, combined)	0.1 (hands); 0.01 (other); 0.02 (calculated, combined)	0.1 (hands); 0.01 (other); 0.023 (calculated, combined)	0.1 (hands); 0.01 (other); 0.026 (calculated, combined)	1 (hands); 0.1 (other); 0.34 (calculated, combined)	1 (hands); 0.1 (other); 0.34 (calculated, combined)
INH	m^3/h	Inhalation rate	16.6 m^3/d (0.7 m^3/h)	15.6 m^3/d (0.7 m^3/h)	14.5 m^3/d (0.6 m^3/h)	8.3 m^3/d (0.35 m^3/h)	2.2 m^3/d (0.09 m^3/h)	1.4	1.4
C_{PM10}	$\mu g/m^3$	Concentration of particulate matter, 10 µm or less, in air	0.76 [b]	0.76 [b]	0.76 [b]	0.76 [b]	0.76 [b]	0.76 [b]	0.76 [b]
BW	kg	Body weight	70.7	59.7	32.9	16.5	8.2	70.7	70.7
IR_{GW}	L/d	Ingestion rate of groundwater	NA	NA	NA	0.005 [c]	NA	0.02[c]	0.02[c]
EF	h/d	Exposure frequency outdoors: Hours per day	1.5	1.5	1.5	1.5	1.5	10	10
EF_1	d/w	Exposure frequency: Days per week	5 [d]	2 [d]	2 [d]	5 [d]	5 [d]	5	5
EFout	w/y	Exposure frequency outdoors: Weeks per year	26 [d]	26 [d]	26 [d]	26 [d]	26 [d]	26 [d]	26 [d]
ET	h/d	Exposure time for contact with groundwater	NA	NA	NA	0.25 [d]	NA	0.5 [d]	2 [d]
E	events/d	Number of times per day soil contacted	1	1	1	1	1	1	1
EV	events/d	Number of times per day groundwater contacted	NA	NA	NA	0.2 [d] (equals once per week)	NA	1 [d]	1 [d]
ED	y	Exposure duration	60	8	7	4.5	0.5	35	2 [d]
AT	y	Averaging time - non-threshold effects	80	80	80	80	80	80	80
		Averaging time - threshold effects	60	8	7	4.5	0.5	35	2 [d]

NOTES:

a - Health Canada (2010a) except where noted

b - Health Canada (2004)

c - VDEQ (2016)

d - Assumed - refer to text in Section 6.3.4 for explanation

NA - Not applicable

TABLE 33: ESTIMATED DOSES

COC / EXPOSURE PATHWAY	ESTIMATED DOSE (mg/kg/d)						
	SITE VISITOR*					LONG-TERM WORKER	CONSTRUCTION WORKER
	ADULT	TEEN	CHILD	TODDLER	INFANT		
PHCs (F3) aliphatic							
Incidental ingestion of groundwater				1.64E-03		1.53E-03	1.53E-03
Dermal contact with groundwater				4.84E-01		9.00E-01	1.80E+00
PHCs (F3) aromatic							
Incidental ingestion of groundwater				4.10E-04		3.83E-04	3.83E-04
Dermal contact with groundwater				3.45E-02		6.41E-02	1.28E-01
PHCs (F4) aliphatic							
Incidental ingestion of groundwater				8.38E-04		7.82E-04	7.82E-04
Dermal contact with groundwater				2.47E-01		4.60E-01	9.19E-01
PHCs (F4) aromatic							
Incidental ingestion of groundwater				2.09E-04		1.95E-04	1.95E-04
Dermal contact with groundwater				1.76E-02		3.27E-02	6.54E-02
Anthracene - non-threshold effects							
Incidental ingestion of soil	2.22E-07	1.40E-08	2.23E-08	2.86E-07	1.60E-08	6.48E-07	3.70E-08
Dermal contact with soil	1.65E-07	9.33E-09	1.51E-08	3.19E-08	4.83E-09	9.60E-07	5.49E-08
Inhalation of particulate matter	8.86E-12	5.60E-13	7.62E-13	1.42E-12	8.19E-14	6.89E-11	3.94E-12
Anthracene - threshold effects							
Incidental ingestion of soil				5.08E-06		1.48E-06	1.48E-06
Dermal contact with soil				5.68E-07		2.19E-06	2.19E-06
Inhalation of particulate matter				2.53E-11		1.58E-10	1.58E-10
Benzo[a]anthracene							
Incidental ingestion of soil	1.23E-07	7.78E-09	1.24E-08	1.58E-07	8.85E-09	3.59E-07	2.05E-08
Dermal contact with soil	9.13E-08	5.17E-09	8.39E-09	1.77E-08	2.68E-09	5.32E-07	3.04E-08
Inhalation of particulate matter	4.91E-12	3.10E-13	4.22E-13	7.90E-13	4.54E-14	3.82E-11	2.18E-12
Benzo[b]fluoranthene							
Incidental ingestion of soil	8.77E-08	5.54E-09	8.79E-09	1.13E-07	6.30E-09	2.56E-07	1.46E-08
Dermal contact with soil	6.50E-08	3.68E-09	5.97E-09	1.26E-08	1.91E-09	3.79E-07	2.17E-08
Inhalation of particulate matter	3.50E-12	2.21E-13	3.01E-13	5.62E-13	3.23E-14	2.72E-11	1.55E-12
Benzo[k]fluoranthene							
Incidental ingestion of soil	9.82E-08	6.20E-09	9.85E-09	1.26E-07	7.06E-09	2.87E-07	1.64E-08
Dermal contact with soil	7.28E-08	4.13E-09	6.69E-09	1.41E-08	2.14E-09	4.25E-07	2.43E-08
Inhalation of particulate matter	3.92E-12	2.48E-13	3.37E-13	6.30E-13	3.62E-14	3.05E-11	1.74E-12
Methylnaphthalene, 1- and 2-							
Incidental ingestion of soil				9.15E-06		2.67E-06	2.67E-06
Dermal contact with soil				1.16E-06		4.50E-06	4.50E-06
Inhalation of particulate matter				4.56E-11		2.84E-10	2.84E-10
Naphthalene							
Incidental ingestion of soil				6.39E-06		1.86E-06	1.86E-06
Dermal contact with soil				8.13E-07		3.14E-06	3.14E-06
Inhalation of particulate matter				3.19E-11		1.98E-10	1.98E-10
Phenanthrene							
Incidental ingestion of soil	2.30E-07	1.45E-08	2.30E-08	2.95E-07	1.65E-08	6.70E-07	3.83E-08
Dermal contact with soil	1.70E-07	9.65E-09	1.56E-08	3.30E-08	5.00E-09	9.93E-07	5.67E-08
Inhalation of particulate matter	9.17E-12	5.79E-13	7.88E-13	1.47E-12	8.47E-14	7.13E-11	4.07E-12
Methoxychlor							
Incidental ingestion of soil				2.26E-06		6.60E-07	6.60E-07
Dermal contact with soil				1.95E-07		7.52E-07	7.52E-07
Inhalation of particulate matter				1.13E-11		7.02E-11	7.02E-11
Antimony							
Incidental ingestion of soil				1.02E-05		2.97E-06	2.97E-06
Dermal contact with soil				8.76E-07		3.39E-06	3.39E-06
Inhalation of particulate matter				5.08E-11		3.16E-10	3.16E-10
Arsenic							
Incidental ingestion of soil	1.28E-06	8.11E-08	1.29E-07	1.65E-06	9.23E-08	3.75E-06	2.14E-07
Dermal contact with soil	2.20E-07	1.25E-08	2.02E-08	4.26E-08	6.45E-09	1.28E-06	7.32E-08
Inhalation of particulate matter	5.13E-11	3.24E-12	4.41E-12	8.24E-12	4.73E-13	3.99E-10	2.28E-11
Lead							
Incidental ingestion of soil				9.15E-04		2.67E-04	2.67E-04
Dermal contact with soil				4.72E-06		1.83E-05	1.83E-05
Inhalation of particulate matter				4.56E-09		2.84E-08	2.84E-08
Nickel							
Incidental ingestion of soil				2.67E-03		7.78E-04	7.78E-04
Dermal contact with soil				2.09E-04		8.07E-04	8.07E-04
Inhalation of particulate matter - threshold effects				1.33E-08		8.28E-08	8.28E-08
Inhalation of particulate matter - non-threshold effects	1.66E-09	1.05E-10	1.43E-10	2.66E-10	1.53E-11	1.29E-08	7.37E-10
Tin							
Incidental ingestion of soil				3.97E-04		1.16E-04	1.16E-04
Dermal contact with soil				3.42E-05		1.32E-04	1.32E-04
Inhalation of particulate matter				1.98E-09		1.23E-08	1.23E-08
Zinc							
Incidental ingestion of soil				7.77E-03		2.27E-03	2.27E-03
Dermal contact with soil				6.68E-04		2.58E-03	2.58E-03
Inhalation of particulate matter				3.88E-08		2.41E-07	2.41E-07

Note:
* - Site visitor - toddlers are considered the critical receptors for threshold chemicals; all age classes are evaluated for non-threshold chemicals.

TABLE 34: HUMAN TOXICOLOGICAL INFORMATION

COC	Route	Toxicological Reference Value		Critical	Study	Reference	Date
		Type (units)	Value	Effect			
PHCs							
F3							
Aliphatics $C_{>16}$ - C_{21}	Oral	RfD (mg/kg/d)	2	Hepatic granuloma		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA	-			
Aliphatics $C_{>21}$ - C_{34}	Oral	RfD (mg/kg/d)	2	Hepatic granuloma		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA	-			
Aromatics $C_{>16}$ - C_{21}	Oral	RfD (mg/kg/d)	0.03	Nephrotoxicity		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA				
Aromatics $C_{>21}$ - C_{34}	Oral	RfD (mg/kg/d)	0.03	Nephrotoxicity		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA				
F4							
Aliphatics $C_{>34}$	Oral	RfD (mg/kg/d)	20	Hepatic granuloma		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA	-			
Aromatics $C_{>34}$	Oral	RfD (mg/kg/d)	0.03	Nephrotoxicity		Edwards et al.	1997
	Inhalation	RfC (mg/m^3)	NA				
Anthracene	Oral	RfD (mg/kg/d)	0.3	No effects observed	US EPA, 1989	USEPA IRIS	1993
		Slope factor (mg/kg/d)$^{-1}$	0.23	Gastric tumours (mice)	Neal and Rigdon, 1967	HC [b]	2010b
	Inhalation	RfC (mg/m^3)	NA				
		Unit risk (mg/m^3)$^{-1}$	0.0031	Respiratory tract tumours (hamsters)	Thyssen *et al.* , 1981	HC [b]	2010b
Benzo[a]anthracene	Oral	Slope factor (mg/kg/d)$^{-1}$	0.23	Gastric tumours (mice)	Neal and Rigdon, 1967	HC [b]	2010b
	Inhalation	Unit risk (mg/m^3)$^{-1}$	0.0031	Respiratory tract tumours (hamsters)	Thyssen *et al.* , 1981	HC [b]	2010b
Benzo[b]fluoranthene	Oral	Slope factor (mg/kg/d)$^{-1}$	0.23	Gastric tumours (mice)	Neal and Rigdon, 1967	HC [b]	2010b
	Inhalation	Unit risk (mg/m^3)$^{-1}$	0.0031	Respiratory tract tumours (hamsters)	Thyssen *et al.* , 1981	HC [b]	2010b
Benzo[k]fluoranthene	Oral	Slope factor (mg/kg/d)$^{-1}$	0.23	Gastric tumours (mice)	Neal and Rigdon, 1967	HC [b]	2010b
	Inhalation	Unit risk (mg/m^3)$^{-1}$	0.0031	Respiratory tract tumours (hamsters)	Thyssen *et al.* , 1981	HC [b]	2010b
Methylnaphthalene, 1- and 2-	Oral	RfD (mg/kg/d)	0.004 [a]	Pulmonary alveolar proteinosis (mice)	Murata *et al.,* 1997	USEPA IRIS	2003
	Inhalation	RfC (mg/m^3)	NA				
Naphthalene	Oral	RfD (mg/kg/d)	0.02 [a]	Decreased body weight (rats)	BCL, 1980	USEPA IRIS	1998
	Inhalation	RfC (mg/m^3)	NA				
Phenanthrene	Oral	Slope factor (mg/kg/d)$^{-1}$	0.0023	Gastric tumours (mice)	Neal and Rigdon, 1967	HC [b]	2010b
	Inhalation	Unit risk (mg/m^3)$^{-1}$	3.10E-05	Respiratory tract tumours (hamsters)	Thyssen *et al.* , 1981	HC [b]	2010b
Methoxychlor	Oral	RfD (mg/kg/d)	0.1			HC	2010b
	Inhalation	RfC (mg/m^3)	NA				
Antimony	Oral	RfD (mg/kg/d)	0.06	Histological changes (rats)	Poon *et al.,* 1998	HC	1999
	Inhalation	RfC (mg/m^3)	NA				
Arsenic	Oral	RfD (mg/kg/d)	NA				
		Slope factor (mg/kg/d)$^{-1}$	1.8	Cancer: bladder, lung, liver (epidemiological)	Morales et al., 2000	HC	2010b
	Inhalation	RfC (mg/m^3)	NA				
		Unit risk (mg/m^3)$^{-1}$	6.4	Lung cancer (human - occupational)	Several studies	HC	2010b
Lead	Oral	RfD (mg/kg/d)	NA	Neurobehavioural effects in children. Considered a non-threshold toxicant; soil concentrations screened with CCME guideline of 140 ug/g and background concentration of 120 ug/g. For adults, TRV of 1.2E-03 mg/kg/d, based on increased blood pressure, used (JECFA, 2011)			
	Inhalation	RfC (mg/m^3)	NA				
Nickel	Oral	RfD (mg/kg/d)	0.011 [a]	Developmental effects (rats)	SLI (2000)	CCME	2015
	Inhalation	RfC (mg/m^3)	NA				
		Unit risk (mg/m^3)$^{-1}$	1.3 [a]	Lung cancer (human)		CCME	2015
Tin	Oral	RfD (mg/kg/d)	0.3	Reduced hemoglobin concentration (rats)	DeGroot *et al.* 1973	ATSDR	2005
	Inhalation	RfC (mg/m^3)	NA				
Zinc	Oral	RfD (mg/kg/d)	0.5 (infant to teen); 0.6 (adult)	Reduced iron and copper status; increased growth of infant	Yadrick *et al.,* 1989; Walravens and Hambidge, 1976	HC	2010b
	Inhalation	RfC (mg/m^3)	NA				

Notes:

NA - Not available.

a - Preferred value in HC, 2010b

b - Benzo[a]pyrene Potency Equivalence Factors from HC (2010a) applied to HC (2010b) slope factor and unit risk for benzo[a]pyrene.

TABLE 35: ESTIMATED HAZARD QUOTIENTS

COC / EXPOSURE PATHWAY	HAZARD QUOTIENT (HQ) [a]						
	SITE VISITOR					LONG-TERM WORKER	CONSTRUCTION WORKER
	ADULT	TEEN	CHILD	TODDLER	INFANT		
PHCs (F3) aliphatic							
Groundwater: incidental ingestion and dermal contact				0.24 (0.039)		0.45 (0.073)	**0.90** (0.15)
PHCs (F3) aromatic							
Groundwater: incidental ingestion and dermal contact				**1.2** (0.19)		**2.1** (0.35)	**4.3** **(0.69)**
PHCs (F4) aliphatic							
Groundwater: incidental ingestion and dermal contact				0.012 (0.0029)		0.023 (0.0054)	0.046 (0.011)
PHCs (F4) aromatic							
Groundwater: incidental ingestion and dermal contact				**0.59** (0.14)		**1.1** (0.26)	**2.2** **(0.51)**
Total PHCs				**2.0** (0.37)		**3.7** **(0.68)**	**7.4** **(1.4)**
Anthracene							
Soil: incidental ingestion and dermal contact				1.9E-05		1.2E-05	1.2E-05
Inhalation of particulate matter				-		-	-
Methylnaphthalene, 1- and 2-							
Soil: incidental ingestion and dermal contact				2.6E-03		1.8E-03	1.8E-03
Inhalation of particulate matter				-		-	-
Naphthalene							
Soil: incidental ingestion and dermal contact				3.6E-04		2.5E-04	2.5E-04
Inhalation of particulate matter				-		-	-
Methoxychlor							
Soil: incidental ingestion and dermal contact				2.5E-05		1.4E-05	1.4E-05
Inhalation of particulate matter				-		-	-
Antimony							
Soil: incidental ingestion and dermal contact				1.8E-04		1.1E-04	1.1E-04
Inhalation of particulate matter				-		-	-
Lead							
Soil: incidental ingestion and dermal contact				NC		NC	NC
Inhalation of particulate matter				-		-	-
Nickel							
Soil: incidental ingestion and dermal contact				**0.26** (0.024)		0.14	0.14
Inhalation of particulate matter - threshold effects				-		-	-
Tin							
Soil: incidental ingestion and dermal contact				1.4E-03		8.3E-04	8.3E-04
Inhalation of particulate matter				-		-	-
Zinc							
Soil: incidental ingestion and dermal contact				0.014		8.1E-03	8.1E-03
Inhalation of particulate matter				-		-	-

Note:

BOLD - hazard quotient exceeds allowable level of 0.2 for COCs other than PHCs or 0.5 for PHCs

a - All HQs initially calculated using maximum measured concentrations. For HQs exceeding allowable levels, HQs re-calculated using average concentrations (shown in parentheses).
NC - Not calculated

TABLE 36: ESTIMATED INCREMENTAL LIFETIME CANCER RISKS

COC / EXPOSURE PATHWAY	INCREMENTAL LIFETIME CANCER RISK (ILCR) [a]							
	SITE VISITOR						LONG-TERM WORKER	CONSTRUCTION WORKER
	ADULT	TEEN	CHILD	TODDLER	INFANT	COMPOSITE		
Anthracene								
Soil: incidental ingestion and dermal contact	8.9E-08	5.4E-09	8.6E-09	7.3E-08	4.8E-09	1.8E-07	3.7E-07	2.1E-08
Inhalation of particulate matter	9.6E-14	6.1E-15	8.3E-15	1.5E-14	8.9E-16	1.3E-13	7.5E-13	4.3E-14
Benzo[a]anthracene								
Soil: incidental ingestion and dermal contact	4.9E-08	3.0E-09	4.8E-09	4.0E-08	2.7E-09	1.0E-07	2.1E-07	1.2E-08
Inhalation of particulate matter	5.3E-14	3.4E-15	4.6E-15	8.6E-15	4.9E-16	7.0E-14	4.1E-13	2.4E-14
Benzo[b]fluoranthene								
Soil: incidental ingestion and dermal contact	3.5E-08	2.1E-09	3.4E-09	2.9E-08	1.9E-09	7.1E-08	1.5E-07	8.3E-09
Inhalation of particulate matter	3.8E-14	2.4E-15	3.3E-15	6.1E-15	3.5E-16	5.0E-14	3.0E-13	1.7E-14
Benzo[k]fluoranthene								
Soil: incidental ingestion and dermal contact	3.9E-08	2.4E-09	3.8E-09	3.2E-08	2.1E-09	8.0E-08	1.6E-07	9.3E-09
Inhalation of particulate matter	4.3E-14	2.7E-15	3.7E-15	6.8E-15	3.9E-16	5.6E-14	3.3E-13	1.9E-14
Phenanthrene								
Soil: incidental ingestion and dermal contact	9.2E-10	5.6E-11	8.9E-11	7.6E-10	4.9E-11	1.9E-09	3.8E-09	2.2E-10
Inhalation of particulate matter	9.9E-16	6.3E-17	8.5E-17	1.6E-16	9.2E-18	1.3E-15	7.7E-15	4.4E-16
Total Carcinogenic PAHs								
Soil: incidental ingestion and dermal contact	-	-	-	-	-	4.3E-07	8.9E-07	5.1E-08
Inhalation of particulate matter	-	-	-	-	-	3.0E-13	1.8E-12	1.0E-13
Arsenic								
Soil: incidental ingestion and dermal contact	2.7E-06	1.7E-07	2.7E-07	3.0E-06	1.8E-07	6.4E-06	9.1E-06	5.2E-07
Inhalation of particulate matter	1.1E-09	7.3E-11	9.9E-11	1.8E-10	1.1E-11	1.5E-09	8.9E-09	5.1E-10
Nickel								
Inhalation of particulate matter	7.5E-09	4.8E-10	6.5E-10	1.2E-09	7.0E-11	1.0E-08	5.9E-08	3.4E-09

Note:
BOLD - ILCR exceeds allowable level of 1×10^{-5}
a - All ILCRs calculated using maximum measured concentrations

TABLE 37: EXPOSURE PARAMETERS FOR AVIAN AND MAMMALIAN WILDLIFE[a]

Species	Body Weight (kg)	Food Ingestion Rate (g ww/d)	Soil Ingestion Rate (g dw/d)	Food Source
Short-Tailed Shrew	0.015	9	0.187	Invertebrates
Meadow Vole	0.044	5	0.018	Plants
Red Fox	4.5	430	3.85	Mammals
American Woodcock	0.198	150	2.5	Invertebrates
Red-Winged Blackbird	0.064	91	1.09	Plants
Red-Tailed Hawk	1.13	98.7	1.8	Mammals

Note:
a - MOE (2011c)
ww - wet weight; dw - dry weight

TABLE 38: SCREENING OF SOIL COCS FOR ECOLOGICAL RECEPTORS

COC	Maximum Measured Concentration [a]	CCME Guideline	Components of CCME guideline				MOECC		Receptors to be evaluated in ERA
			Soil Contact	Soil and Food Ingestion	Nutrient and Energy Cycling	Aquatic Life check	Plants & Soil Organisms	Mammals & Birds	
PHCs									
PHCs F3	520 (1400)	300	**<u>300</u>**	NC	NC	NA	**<u>300</u>**	NC	Plants, Soil Organisms, Mammals, Birds
PAHs and semi-VOCs									
Anthracene	2.94 [b]	2.5	**<u>2.5</u>**	61.5	NC	NA	**<u>2.5</u>**	38000	Plants, Soil Organisms
Benzo[a]anthracene	1.63 [b]	1	NC	6.2	NC	NA	**<u>0.5</u>**	NC	Plants, Soil Organisms
Benzo[b]fluoranthene	1.16 [b]	1	NC	6.2	NC	NA	NC	NC	Plants, Soil Organisms
Benzo[k]fluoranthene	1.30 [b]	1	NC	6.2	NC	NA	7.6	NC	None
Methylnaphthalene	5.3	NC	NC	NC	NC	NC	NC	NC	Plants, Soil Organisms, Mammals, Birds
Naphthalene	3.7	0.013	NC	8.8	NC	0.013	**<u>0.6</u>**	380	Plants, Soil Organisms
Phenanthrene	3.04 [b]	0.046	NC	43	NC	0.046	6.2	2700	None
Methoxychlor	1.31 [b]	NC	NC	NC	NC	NC	NC	**<u>0.13</u>**	Plants, Soil Organisms, Mammals, Birds
Inorganic Parameters									
Antimony	1.4 (5.9)	20	NC	NC	NC	NC	20	25	None
Arsenic	4.5 (17	12	17	NC	NC	NC	20	51	None
Cadmium	1.7 (13)	10	10	NC	54	NC	12	1.9	None
Copper	66 (710)	63	63	NC	430	NC	140	770	None
Lead	239 [b] (530)	140	300	NC	723	NC	250	**<u>32</u>**	Mammals, Birds
Nickel	17 (550)	45	45	NC	171	NC	100	5000	None
Tin	16 (230)	50	NC	NC	NC	NC	NC	NC	None
Zinc	1440 [b] (4500)	200	**<u>200</u>**	NC	NC	NC	**<u>400</u>**	**<u>340</u>**	Plants, Soil Organisms, Mammals, Birds

Note:
All data in units of µg/g
a - Measured in 2017 unless noted otherwise; maximum concentration in surface soil shown followed by overall maximum in parentheses if greater than concentration in surface soil
b - Samples collected over a depth of 0 to 3.0 m in 1994
NA- Not applicable; NC - Not calculated

TABLE 39: CALCULATED CONCENTRATIONS OF SOIL COCS IN WILDLIFE FOOD

COC	Concentration in soil mg/kg dw	Concentration in Plants			Concentration in Earthworms			Concentration in Small Mammals		
		Equation [a]	mg/kg dw	mg/kg ww	Equation [a]	mg/kg dw	mg/kg ww	Equation [a]	mg/kg dw	mg/kg ww
PHC F3	520	NV			NV			NV		
Methylnaphthalene	5.3	NV			NV			NV		
Methoxychlor	1.31	NV			NV			NV		
Lead	239	exp(0.561*ln(Csoil)-1.328)	5.7	0.86	exp(0.807*ln(Csoil)-0.218)	67	11	exp(0.4422*ln(Csoil)+0.0761)	12	3.9
Zinc	1440	exp(0.554*ln(Csoil)+1.575)	271	41	exp(0.328*ln(Csoil)+4.449)	929	149	exp(0.0706*ln(Csoil)+4.3632)	131	42

Note:
a - USEPA (2007)
NV - No equation available
Dry weight to wet weight conversion based on water contents: 85% for vegetation, 84% for earthworms, 68% for small mammals (USEPA, 2007)

TABLE 40: ESTIMATED EXPOSURE TO AVIAN AND MAMMALIAN WILDLIFE

COC / Receptor	E food (mg/kg/d)	E soil (mg/kg/d)	E total (mg/kg/d)
Methoxychlor			
Short-Tailed Shrew	NC	0.016	0.016
Meadow Vole	NC	0.0005	0.0005
Red Fox	NC	0.0011	0.0011
American Woodcock	NC	0.017	0.017
Red-Winged Blackbird	NC	0.022	0.022
Red-Tailed Hawk	NC	0.0021	0.0021
Lead			
Short-Tailed Shrew	6.4	3.0	9.4
Meadow Vole	0.10	0.10	0.20
Red Fox	0.37	0.20	0.58
American Woodcock	8.1	3.0	11
Red-Winged Blackbird	8.1	4.1	12
Red-Tailed Hawk	0.34	0.38	0.72
Zinc			
Short-Tailed Shrew	89	18	107
Meadow Vole	4.6	0.6	5.2
Red Fox	4.0	1.2	5.2
American Woodcock	113	18	131
Red-Winged Blackbird	386	25	411
Red-Tailed Hawk	3.7	2.3	6.0

Note:
NC - Data not available to calculate

TABLE 41: BENCHMARK CONCENTRATIONS AND TOXICOLOGICAL REFERENCE VALUES[a]

COC	Plants Benchmark (mg/kg)	Invertebrates Benchmark (mg/kg)	TRV Short-tailed Shrew, Meadow Vole, Red Fox (mg/kg/d)	TRV American Woodcock and Red-Winged Blackbird (mg/kg/d)	TRV Red-Tailed Hawk (mg/kg/d)
PHCs F3	300	300	NV	NV	NV
Anthracene	2.5	2.5	NA	NA	NA
Benzo[a]anthracene	0.5	0.5	NA	NA	NA
Benzo[b]fluoranthene	NV	NV	NA	NA	NA
Methylnaphthalene	NV	NV	NV	NV	NV
Naphthalene	0.6	0.6	NA	NA	NA
Methoxychlor	NV	NV	8	NV	NV
Lead	NA	NA	80	3.3	28
Zinc	600	600	320	131	131

Note:
a - MOE (2011c)
NA - not applicable
NV - no value available

TABLE 42: HAZARD QUOTIENTS FOR TERRESTRIAL ECOLOGICAL RECEPTORS

COC	Plants	Invertebrates	Short-tailed Shrew	Meadow Vole	Red Fox	American Woodcock	Red-Winged Blackbird	Red-Tailed Hawk
PHCs F3	**1.7**	**1.7**	NV	NV	NV	NV	NV	NV
Anthracene	**1.2**	**1.2**	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene	**3.3**	**3.3**	NA	NA	NA	NA	NA	NA
Benzo[b]fluoranthene	NV	NV	NA	NA	NA	NA	NA	NA
Methylnaphthalene	NV	NV	NV	NV	NV	NV	NV	NV
Naphthalene	**6.2**	**6.2**	NA	NA	NA	NA	NA	NA
Methoxychlor	NV	NV	0.002 [a]	0.00007 [a]	0.0001 [a]	NV	NV	NV
Lead	NA	NA	0.12	0.002	0.007	**3.4**	**3.7**	0.03
Zinc	**2.4**	**2.4**	0.33	0.016	0.016	1.0	**3.1**	0.05

Note:
NA - not applicable
NV - no value available
a - Based only on soil ingestion as information not available to calculate exposure via ingestion of food
BOLD - hazard quotient exceeds allowable level of 1

TABLE 43: HAZARD QUOTIENTS FOR AQUATIC RECEPTORS

COC	Distance from Surface Water	Maximum Measured Groundwater Concentration (ug/L)	Maximum Measured Surface Water Concentration (ug/L)	Aquatic Protection Value (ug/L)	Hazard Quotient
PHCs F3	> 10 m	19,000	-	NV	NC
	< 10 m	3,700	-		
PHCs F4	> 10 m	9,700	-	NV	NC
	< 10 m	2,100	-		
Anthracene	> 10 m	0.12	-	0.1	**1.2**
	< 10 m	0.085	-		0.85
Chloride	> 10 m	220,000	-	180,000	**1.2**
	< 10 m	11,000	-		0.1
Iron	> 10 m	34,000	-	300 [a]	**113**
	< 10 m	9,400	-		**31**
Cyanide (free)	-	-	6	5.2	**1.2**
Ammonia, unionized	-	-	34	19 [a]	**1.8**

Note:
a - No APV available; value is CCME Freshwater Aquatic Life criterion
NV - No value
NC - Not calculated
BOLD - hazard quotient exceeds allowable level of 1

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Site Investigation

Areas of Potential Environmental Concern

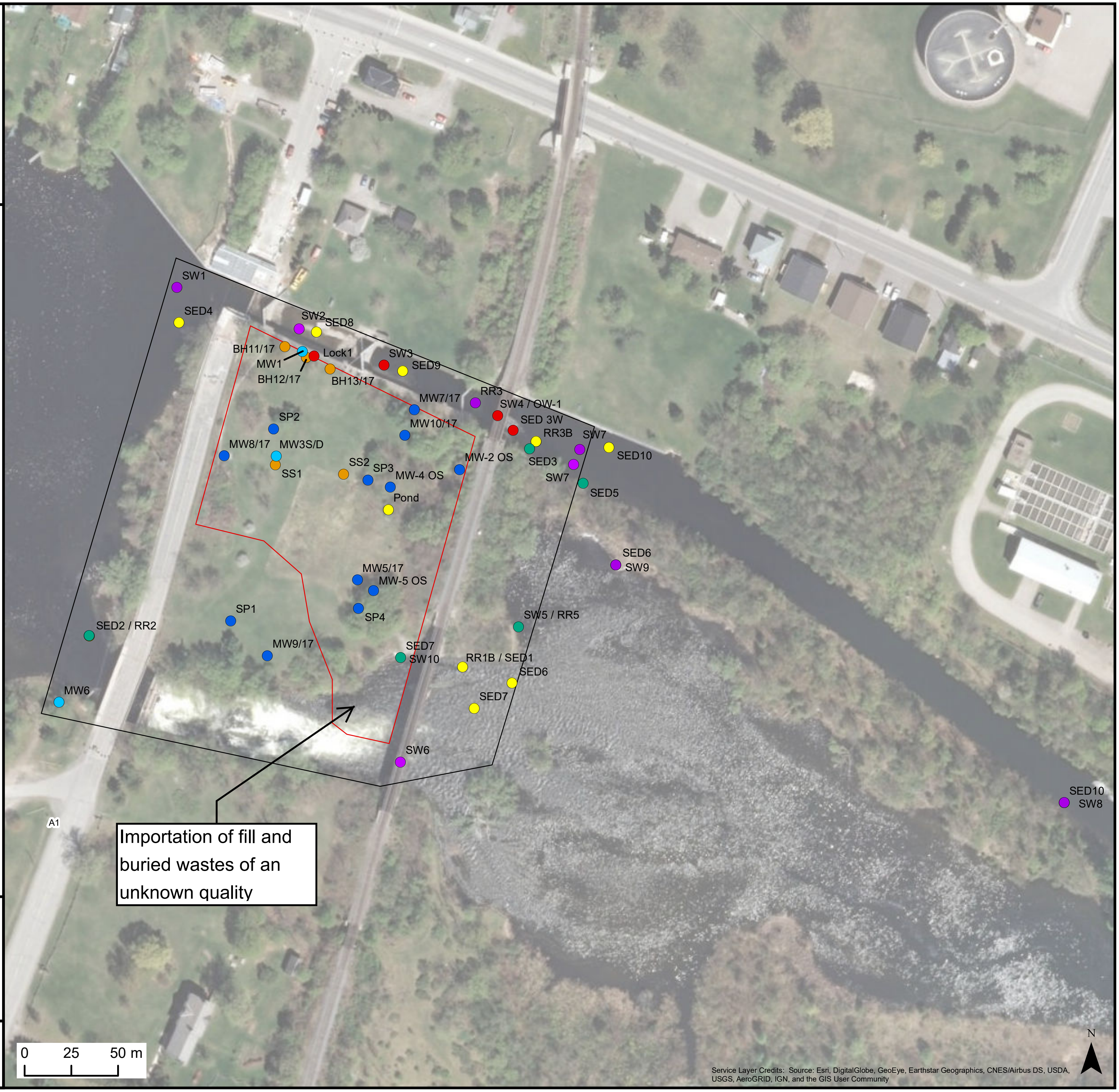
#10888 Figure 1

Legend

- Seep
- Surface Water
- Borehole
- Monitoring Well
- Monitoring Well (Historical)
- Surface Water / Sediment
- Sediment
- APEC 1
- Site Boundary

Smiths Falls, ON

Source:



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Site Investigation

August 2017 Sampling Locations

Figure 2

#10888

Legend

- Borehole
- Monitoring Well
- Monitoring Well (Historical)
- Surface Water / Sediment
- Surface Water
- Sediment

Smiths Falls, ON

Source:

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Site Investigation

Groundwater Flow

Figure 3

#10888

Legend

- Borehole
- Monitoring Well
- Monitoring Well (Historical)
- Surface Water / Sediment
- Surface Water
- Sediment

Smiths Falls, ON

Source:

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Site Investigation

Sampling Overview

Soil Exceedances - BTEX/PHC

#10888 Figure 4a

Legend

- Exceedance
- No Exceedance

MOECC Table 9 Standard
Xylene - 0.05 µg/g
PHC F2 - 10 µg/g
PHC F3 - 240 µg/g
PHC F4 - 120 µg/g

CCME Soil Quality Guidelines
Ethylbenzene - 0.082 µg/g
Toluene - 0.37 µg/g
PHC F3 (Surface) - 300 µg/g

Source:

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Site Investigation

Sampling Overview

Soil Exceedances - VOC

#10888 Figure 4b

Legend

- Exceedance (red)
- No Exceedance (green)

MOECC Table 9 Standard
Trichloroethylene - 0.05 µg/g
Xylene - 0.05 µg/g

CCME Soil Quality Guidelines
Ethylbenzene - 0.082 µg/g
Toluene - 0.37 µg/g
Trichloroethylene - 0.01 µg/g
Xylenes - 11 µg/g

Source:

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Site Investigation

Sampling Overview

Soil Exceedances - Metals

#10888 Figure 4c

Legend

- No Exceedance
- Exceedance

MOECC Table 9 Standard
Cadmium - 1.2 µg/g
Copper - 92 µg/g
Lead - 120 µg/g
Nickel - 82 µg/g
Zinc - 290 µg/g
pH - 5 to 9

CCME Soil Quality Guidelines
Arsenic - 12 µg/g
Cadmium - 10 µg/g
Copper - 63 µg/g
Lead - 140 µg/g
Nickel - 45 µg/g
Tin - 50 µg/g
Zinc - 200 µg/g
pH - 6 to 8

* - flags samples exceeding CCME, but not Table 9

Source:

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Old Sly Locks

Site Investigation

Sampling Overview

Soil Exceedances - PAH

#10888 Figure 4d

Legend

- No Exceedance
- Exceedance

MOECC Table 9 Standard
Methylnaphthalene, 2-(1-) - 0.59 µg/g

CCME Soil Quality Guidelines
Anthracene - 2.5 µg/g
Benz[a]anthracene - 1 µg/g
Benzo[a]pyrene - 20 µg/g
Benzo[b]fluoranthene - 1 µg/g
Benzo[k]fluoranthene - 1 µg/g
Naphthalene - 0.013 µg/g
Phenanthrene - 0.046 µg/g

Source:

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Site Investigation

Sampling Overview

Soil Exceedances - PCB

#10888 Figure 4e

Legend

- No Exceedance
- Exceedace

MOECC Table 9 Standard
DDD - 0.05 µg/g
Methoxyclhor - 0.05 µg/g

Source:

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Site Investigation

Sampling Overview

Groundwater Exceedances

BTEX/PHC

#10888

Figure 5a

Legend

● No Exceedance

Smiths Falls, ON

MOECC Table 9 Standard
PHC F2 - 500 µg/L
PHC F3 - 500 µg/L
PHC F4/F4 Grav. - 500 µg/L

Source:

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Old Sly Locks

Site Investigation

Sampling Overview

Groundwater Exceedances - VOC

#10888 Figure 5b

Legend

- Exceedance
- No Exceedance

Smiths Falls, ON

CCME ISQG Groundwater
Chlorobenzene - 1.3 µg/L

* - flags samples exceeding
CCME, but not Table 9

Source:

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Old Sly Locks
Site Investigation
Sampling Overview
Groundwater Exceedances
Metals

#10888
Figure 5c

Legend

- Exceedance
- No Exceedance

Smiths Falls, ON

MOECC Table 9 Standard
Cobalt - 52 µg/L
Mercury - 0.29 µg/L

CCME ISQG Groundwater
Arsenic - 5 µg/L
Barium - 500 µg/L
Iron - 300 µg/L
Cadmium - 0.017 µg/L
Chloride - 120 mg/L
Cyanide - 0.001 µg/L
Zinc - 10 µg/L

* - flags samples exceeding CCME, but not Table 9

Source:

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Old Sly Locks

Site Investigation

Sampling Overview

Groundwater Exceedances - PAH

#10888 Figure 5d

Legend

- Exceedance
- No Exceedance

Smiths Falls, ON

CCME ISQG Groundwater
Anthracene - 0.012 µg/L
Benzo(a)anthracene - 0.018 µg/L
Benzo(a)pyrene - 0.01 µg/L
Fluoranthene - 0.018 µg/L
Naphthalene - 1.1 µg/L
Phenanthrene - 0.4 µg/L
Pyrene - 0.025 µg/L

* - flags samples exceeding
CCME, but not Table 9

Source:

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Site Investigation

Sampling Overview

Groundwater Exceedances - PCB

#10888 Figure 5e

Legend

- Exceedance
- No Exceedance

Smiths Falls, ON

MOECC Table 9 Standard
Total PCB - 0.2 µg/L

Source:

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Site Investigation

Sampling Overview

Sediment Exceedances - Metals

#10888 Figure 6a

Legend

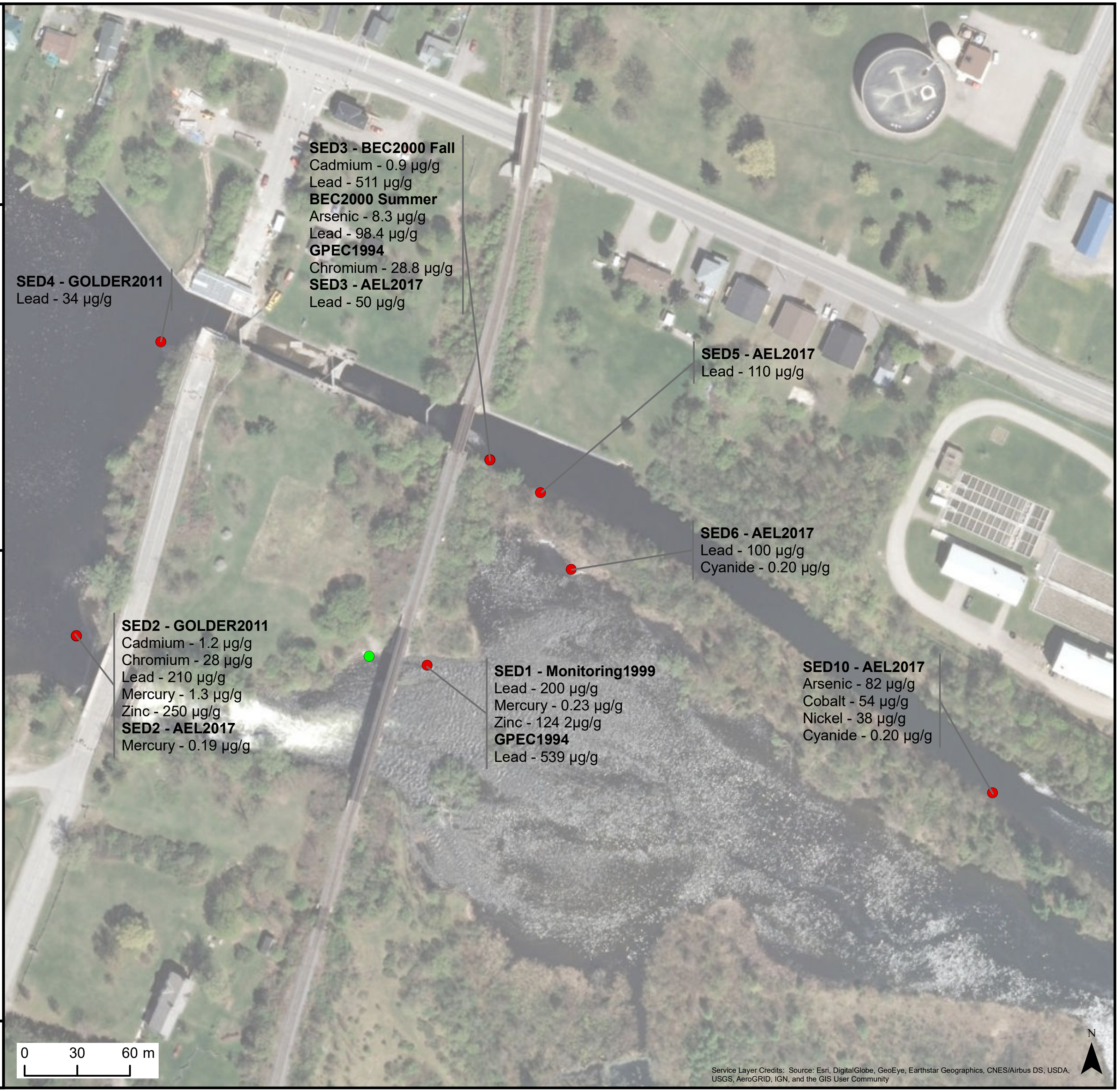
● Exceedance

Smiths Falls, ON

MOECC Table 9 Standard
Cobalt - 50 µg/g
Cyanide - 0.1 µg/g
Nickel - 16 µg/g

CCME Sediment Freshwater
Arsenic (ISQG) - 5.9 µg/g
Arsenic (PEL)- 17 µg/g
Cadmium - 0.6 µg/g
Chromium - 37.3 µg/g
Lead (ISQG) - 35 µg/g
Lead (PEL) - 91.3 µg/g
Mercury (ISQG) - 0.17 µg/g
Zinc - 123 µg/g

Source:



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Site Investigation

Sampling Overview

Sediment Exceedances - PAH

#10888 Figure 6b

Legend

- Exceedance (red point)
- No Exceedance (green point)

Smiths Falls, ON

CCME Sediment Freshwater

Acenaphthene (ISQG) - 0.00671 µg/g
Acenaphthylene (ISQG) - 0.00587 µg/g
Benzo(a)anthracene (ISQG) - 0.0317 µg/g
Benzo(a)pyrene (ISQG) - 0.0319 µg/g
Chrysene (ISQG) - 0.0571 µg/g
Dibenz(a,h)anthracene (ISQG) - 0.00622 µg/g
Fluoranthene (ISQG) - 0.111 µg/g
Methylnaphthalene, 2-(1-) (ISQG) - 0.0346 µg/g
Phenanthrene (ISQG) - 0.0419 µg/g
Pyrene (ISQG) - 0.053 µg/g

Source:

AELenvironment

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Old Sly Locks

Site Investigation

Sampling Overview

Sediment Exceedances - PCB

#10888 Figure 6c

Legend

- Exceedance (red)
- No Exceedance (green)

Smiths Falls, ON

CCME Sediment Freshwater

Total PCBs (ISQG) - 0.0341 µg/g

Source:

AEL environment

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Old Sly Locks

Site Investigation

Sampling Overview

Seep Exceedances - VOCs

#10888 Figure 7a

Legend

- No Exceedance
- Exceedance

Smiths Falls, ON

PWQO Criteria
Toluene - 0.8 µg/L

CCME Aquatic Freshwater
Toluene - 2 µg/L

Source:

AELenvironment

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Old Sly Locks

Site Investigation

Sampling Overview

Seep Exceedances - Metals

#10888 Figure 7b

Legend

- No Exceedance (green)
- Exceedance (red)

Smiths Falls, ON

PWQO Criteria
Iron - 300 µg/L
Dissolved Oxygen - >5mg/L

CCME Aquatic Freshwater
Iron - 300 µg/L

Source:

AELenvironment

A division of Aeon Egmond Ltd.

Old Sly Locks

Site Investigation

Sampling Overview

Surface Water Exceedances

#10888 *Metals Figure 8*

Legend

- No Exceedance
- Exceedance

Smiths Falls, ON

PWQO Criteria
Cyanide - 5 µg/L
Iron - 300 µg/L
Dissolved Oxygen - >5mg/L
Mercury - 0.2 µg/L
Total Un-ionized Ammonia - 20 µg/L

CCME Aquatic Freshwater
Iron - 300 µg/L
Mercury - 0.026 µg/L

Source:

![AEL environment logo]

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Old Sly Locks
Site Investigation

Cross Section Overview

Figure 9a

#10888

Legend

- Borehole
- Monitoring Well
- Monitoring Well (Historical)
- Cross Section

Smiths Falls, ON

Source:

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9b

Cross Section AA'

BTEX/PHC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

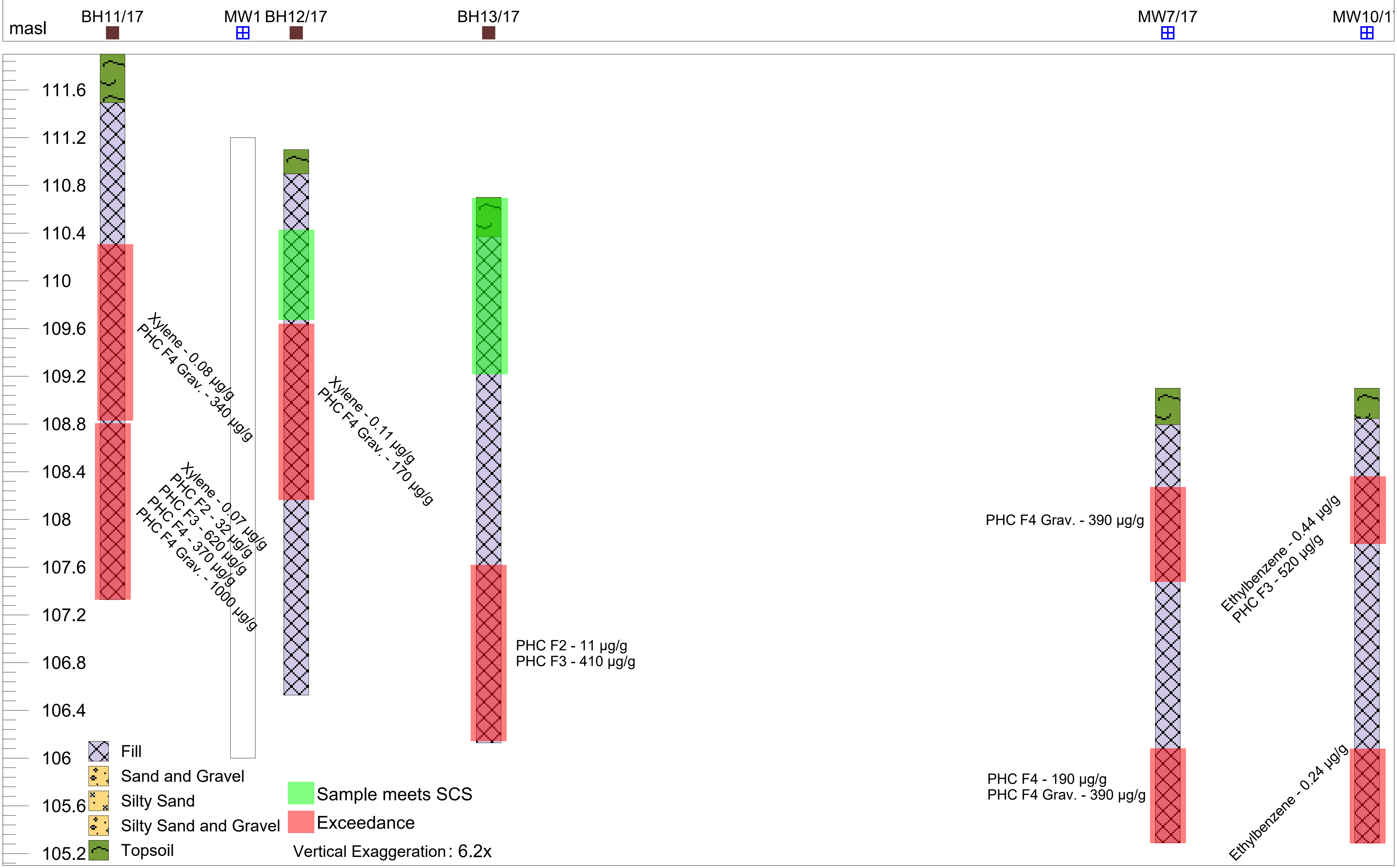
Figure 9c
Cross Section BB'
BTEX/PHC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

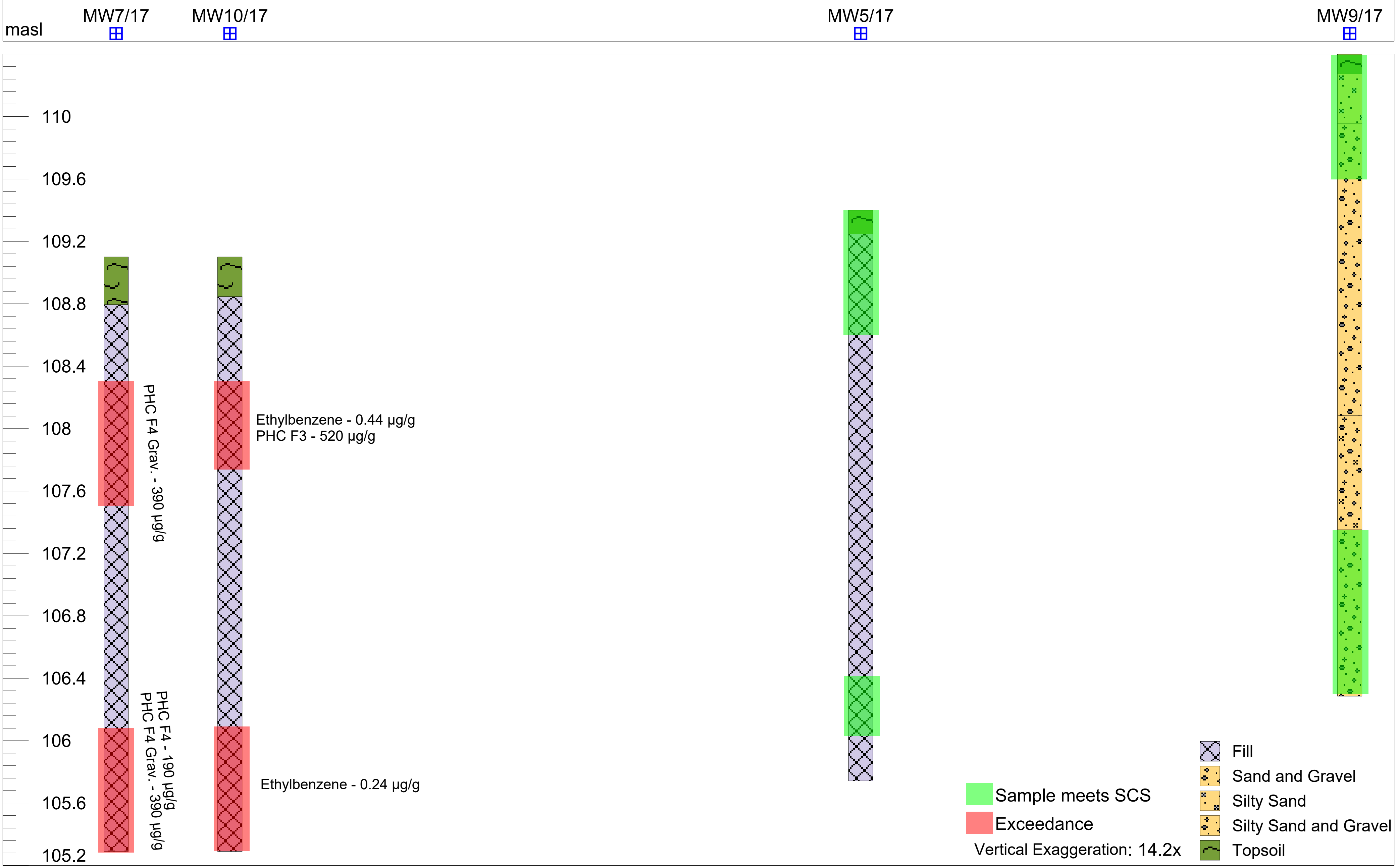
Figure 9d
Cross Section CC'
BTEX/PHC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9e
Cross Section AA'
VOC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

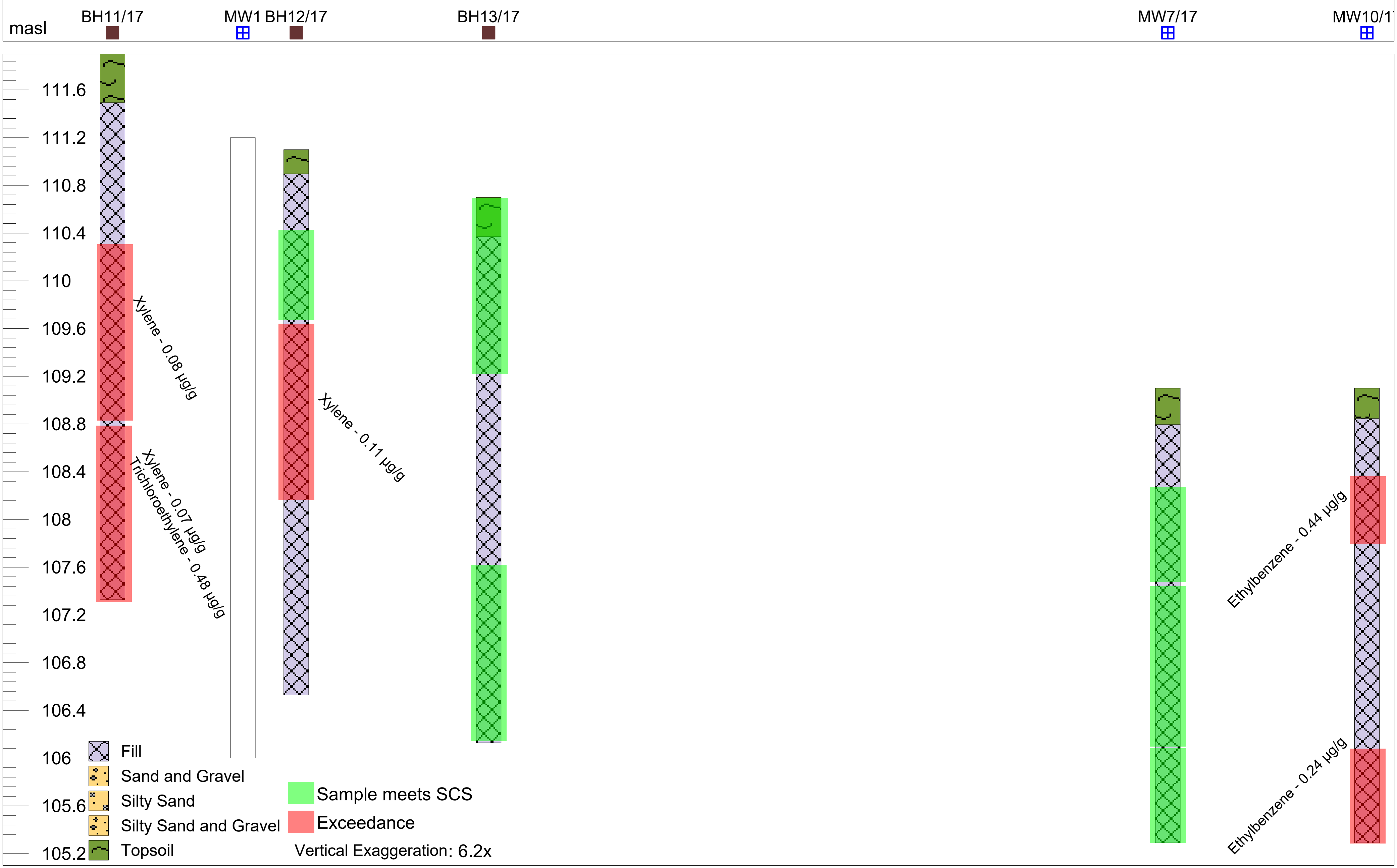
Figure 9f
Cross Section BB'
VOC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

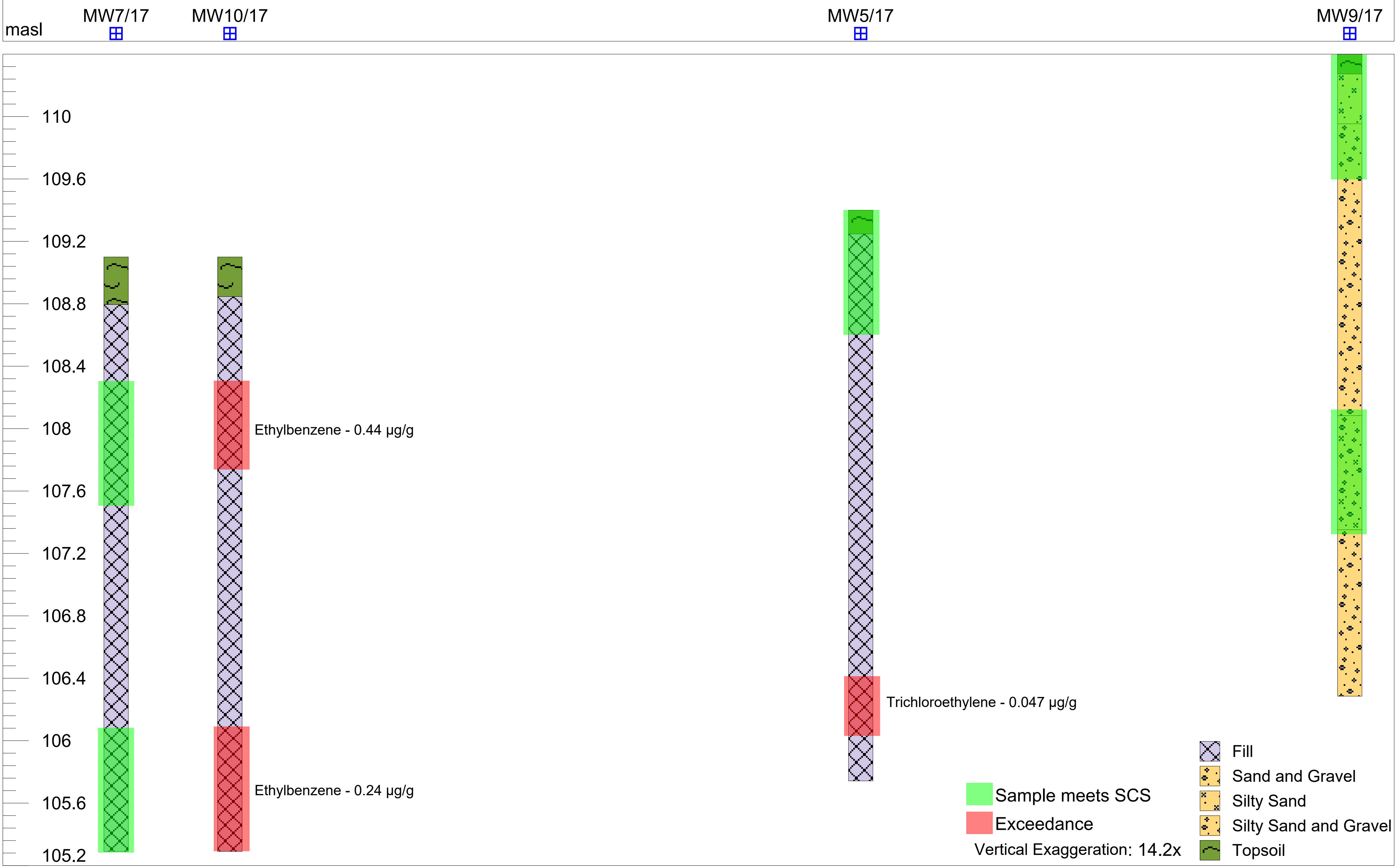
Figure 9g
Cross Section CC'
VOC Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



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Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9h
Cross Section AA'
Metal Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

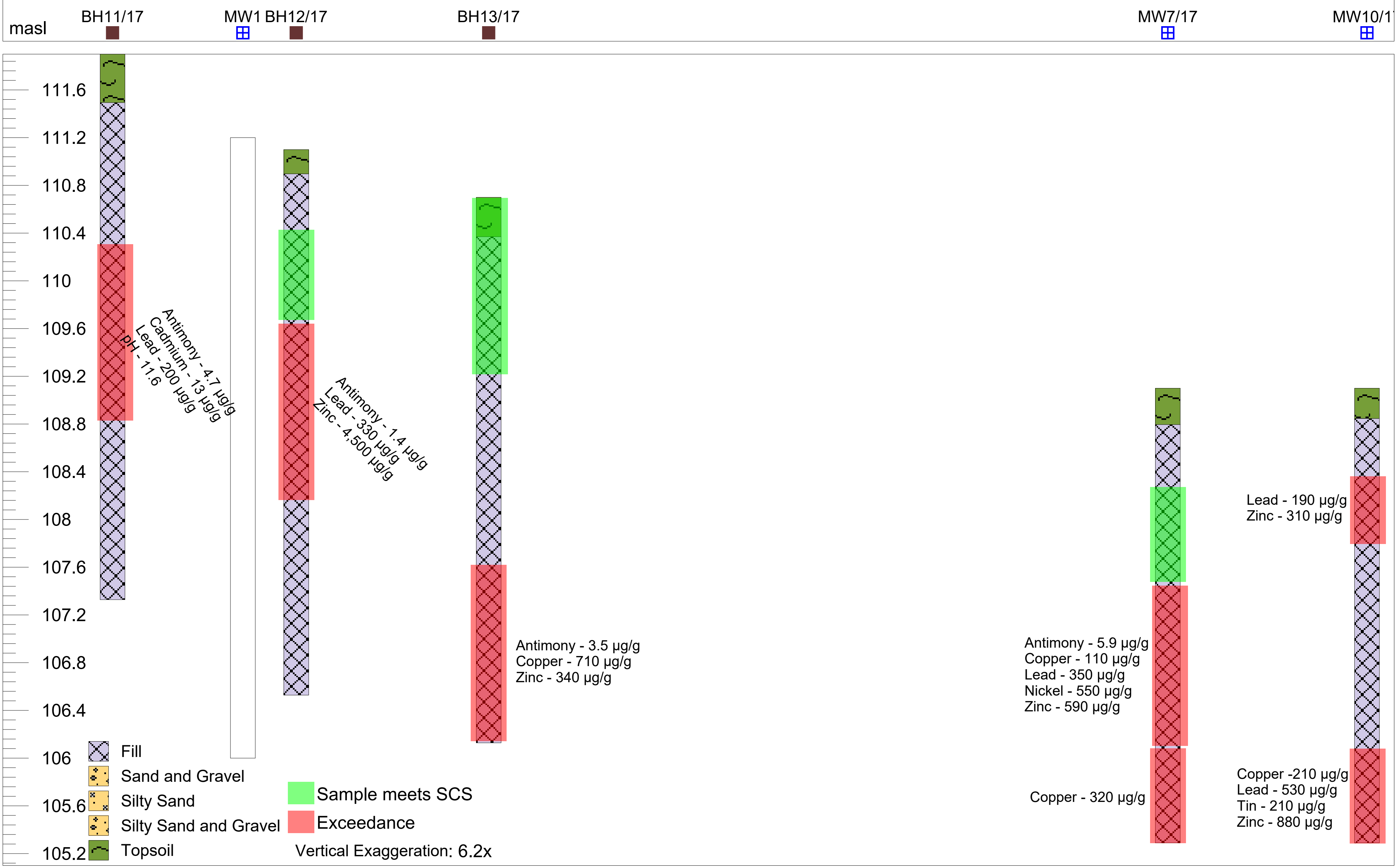
Figure 9i
Cross Section BB'
Metal Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



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Mississauga, ON, L5N 3A9
1-800-267-4797

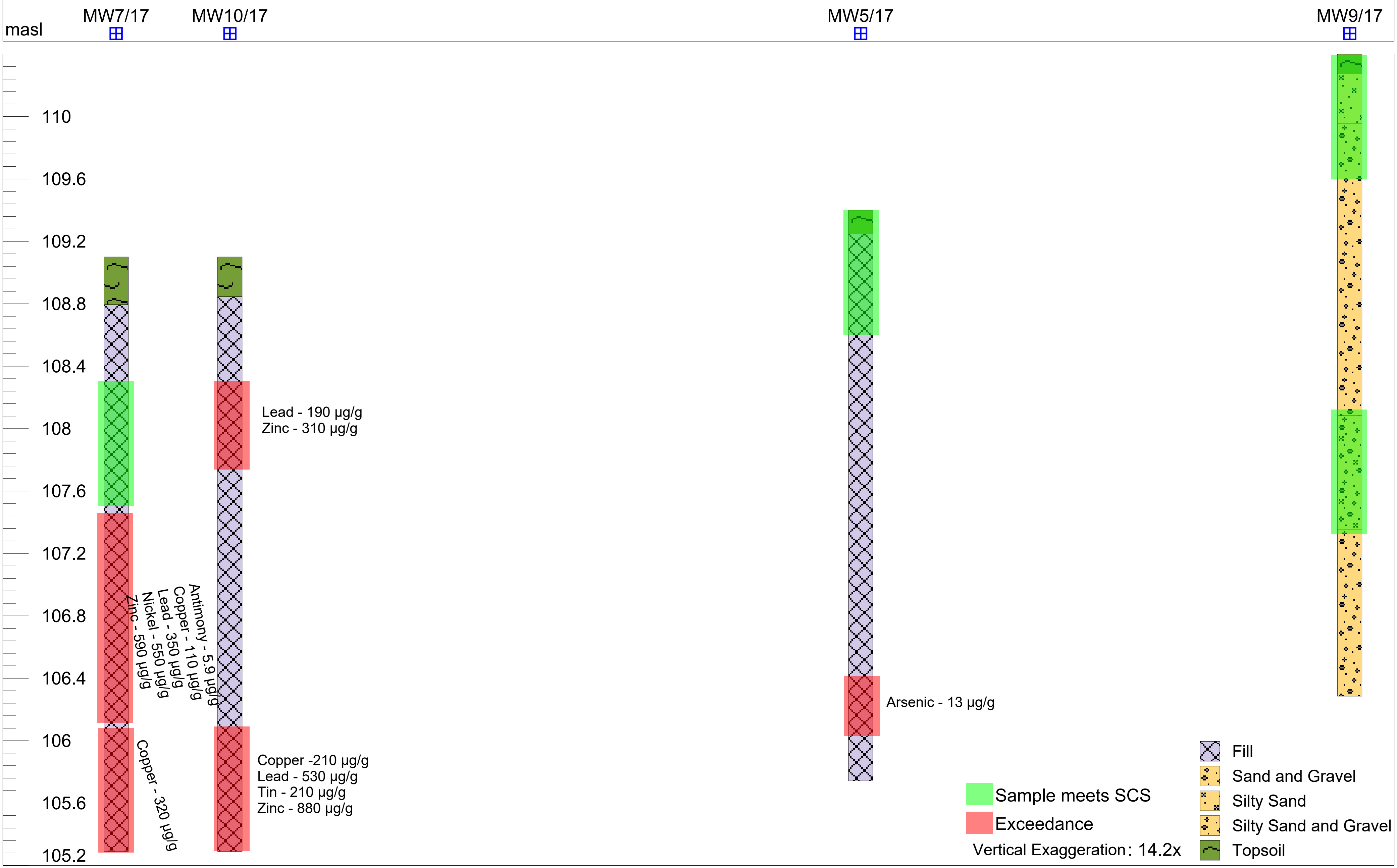
Figure 9j
Cross Section CC'
Metal Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
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Figure 9k
Cross Section AA'
PAH Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

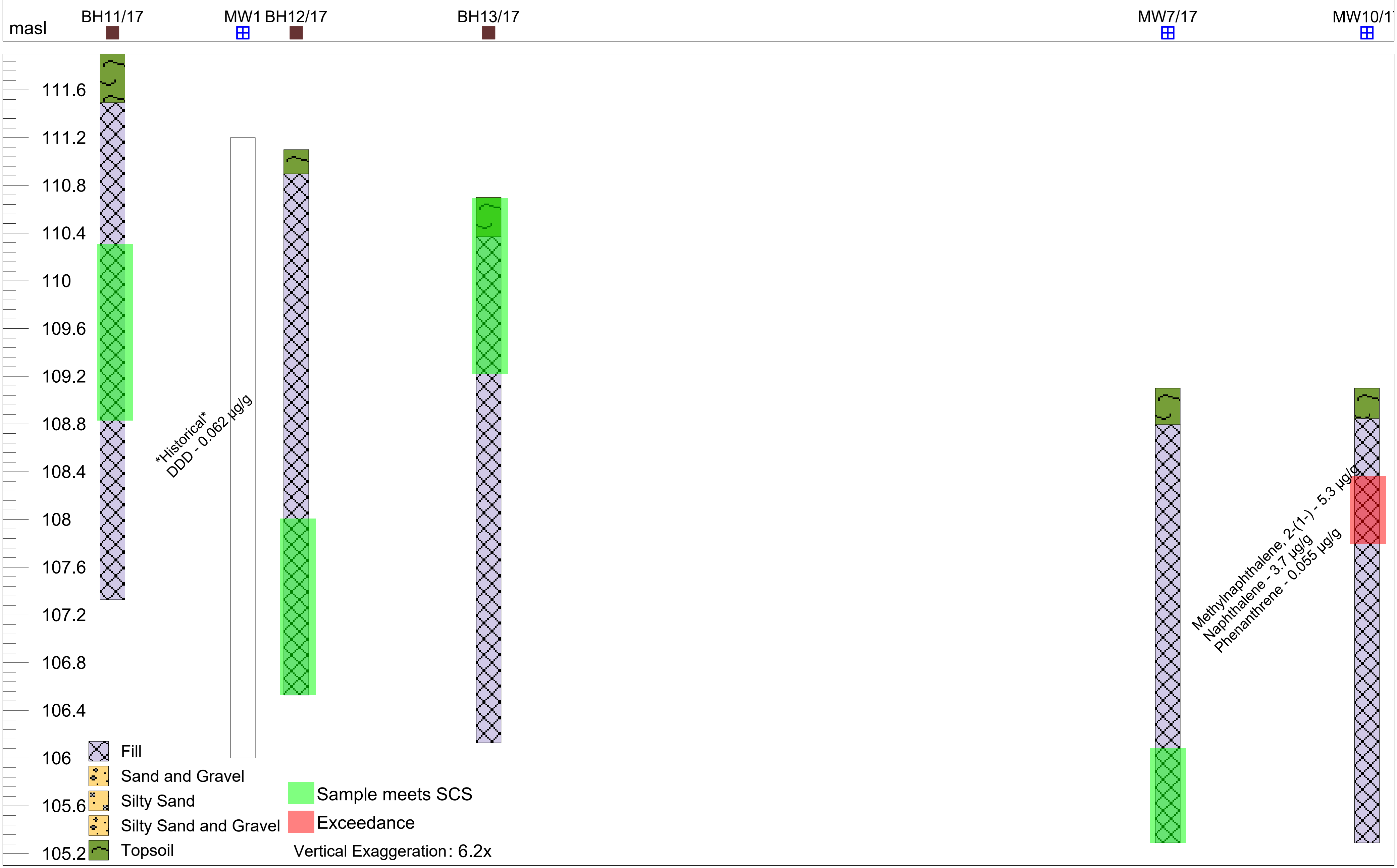
Date: October 2017

Location: Smiths Falls, ON

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9l
Cross Section BB'
PAH Exceedances - Soil

Project: Old Sly Lockstation
Project No.: 10888
Date: October 2017
Location: Smiths Falls, ON



environment

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1-800-267-4797

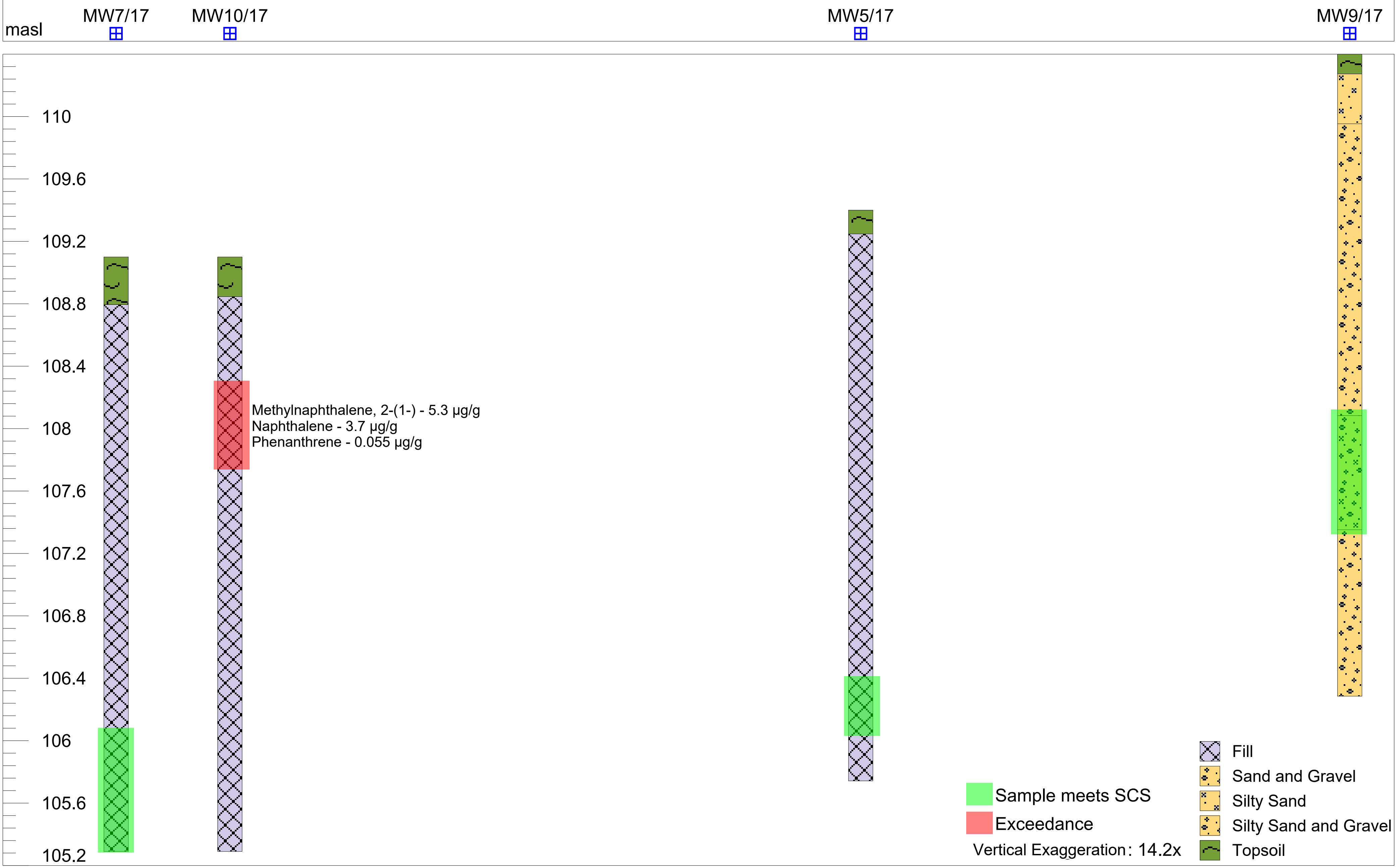
Figure 9m
Cross Section CC'
PAH Exceedances - Soil

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

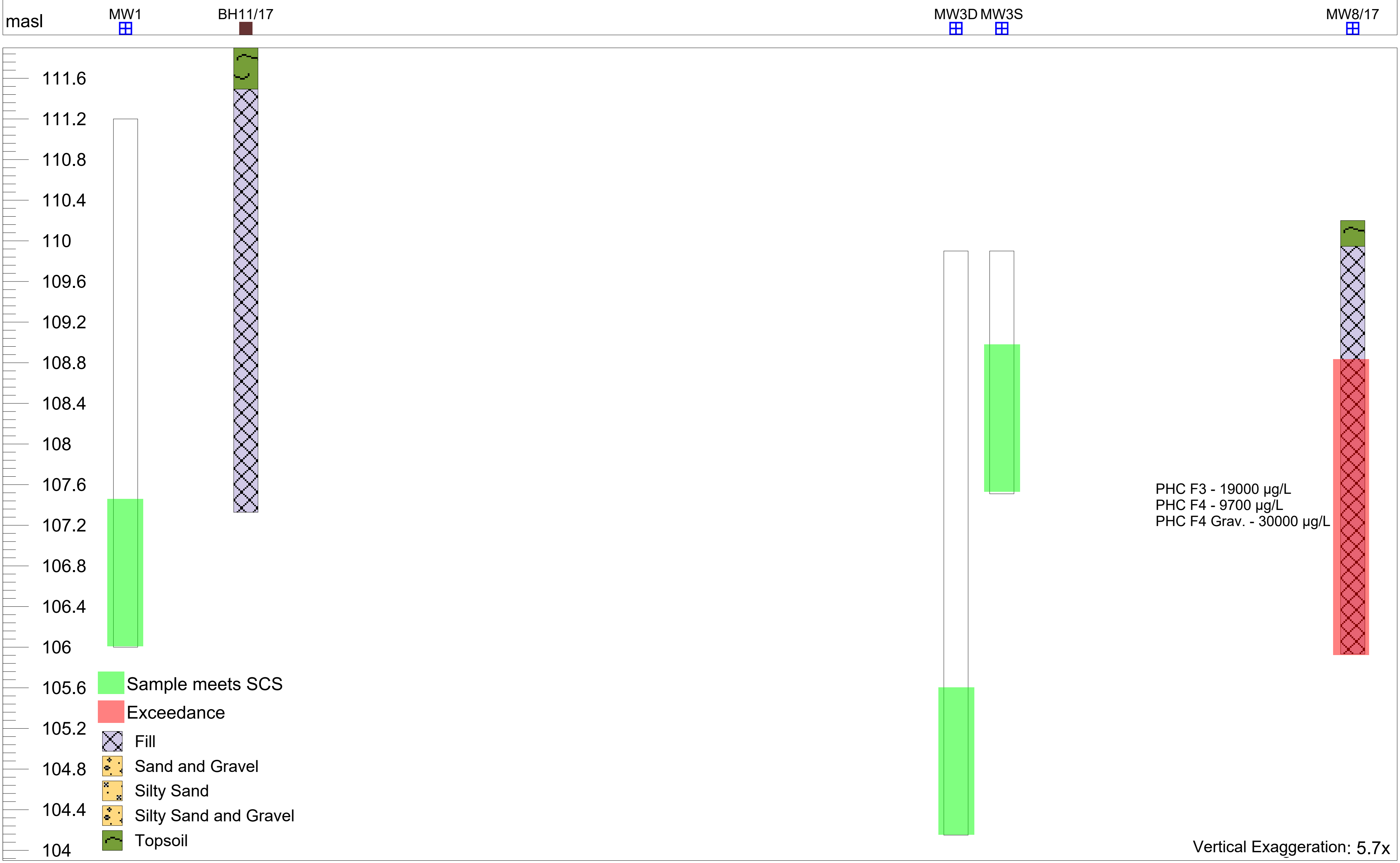
Figure 9n
Cross Section AA'
BTEX/PHC Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

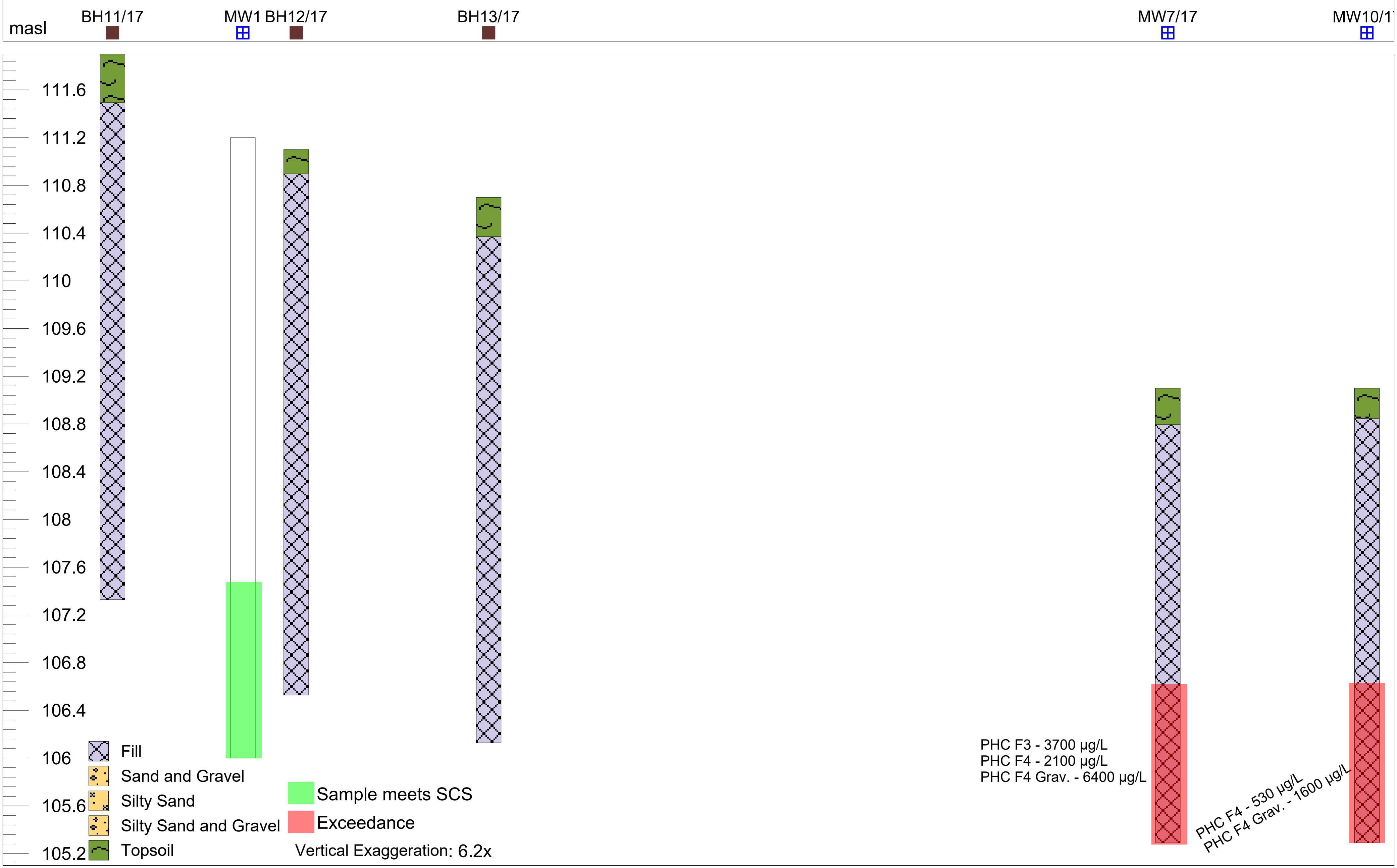
Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9o
Cross Section BB'
BTEX/PHC Exceedances - GW

Project: Old Sly Lockstation
Project No.: 10888
Date: October 2017
Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

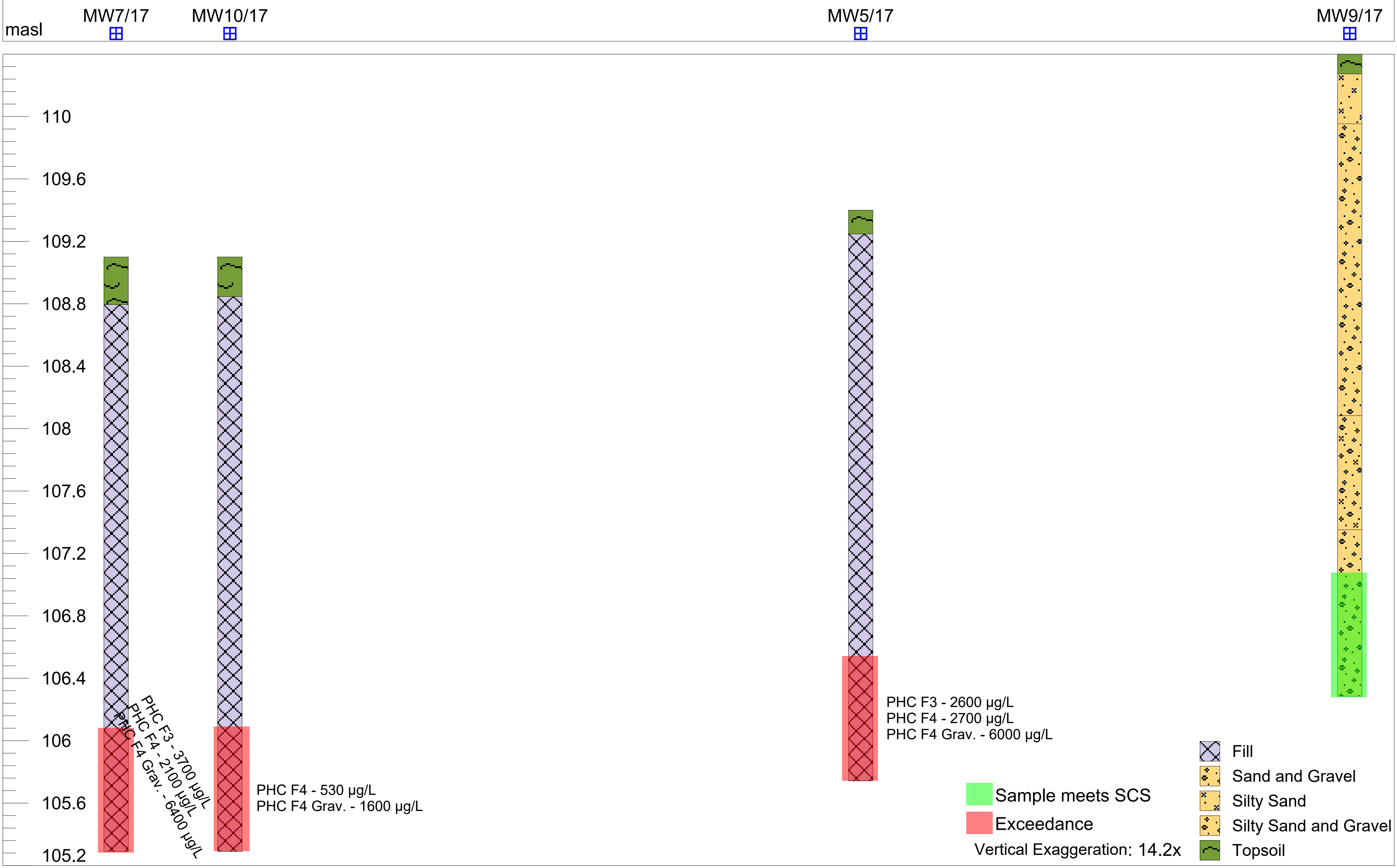
Figure 9p
Cross Section CC'
BTEX/PHC Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Figure 9q

Cross Section AA'

VOC Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

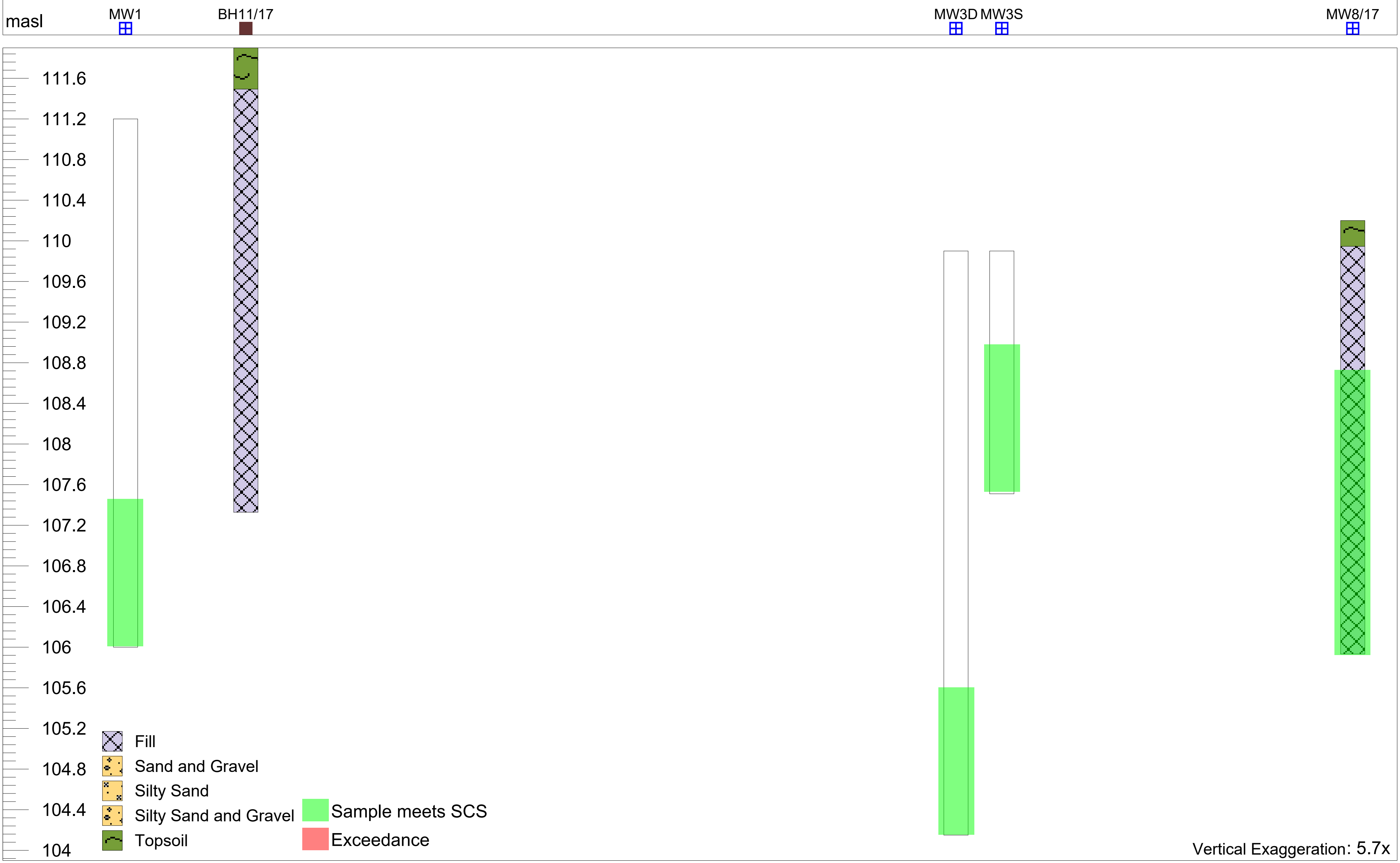


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Figure 9r
Cross Section BB'
VOC Exceedances - GW

Project: Old Sly Lockstation
Project No.: 10888
Date: October 2017
Location: Smiths Falls, ON

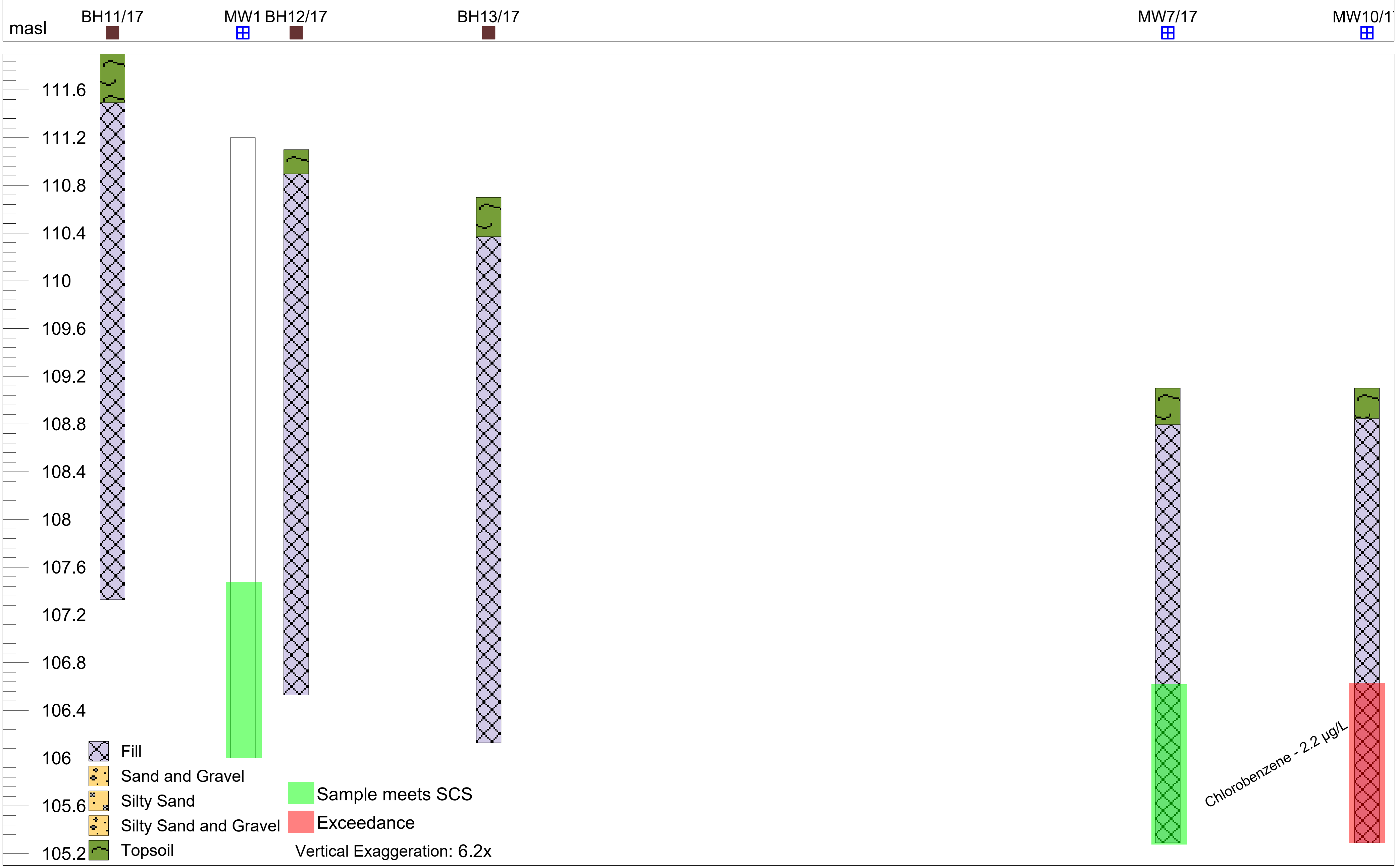

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Figure 9s
Cross Section CC'
VOC Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

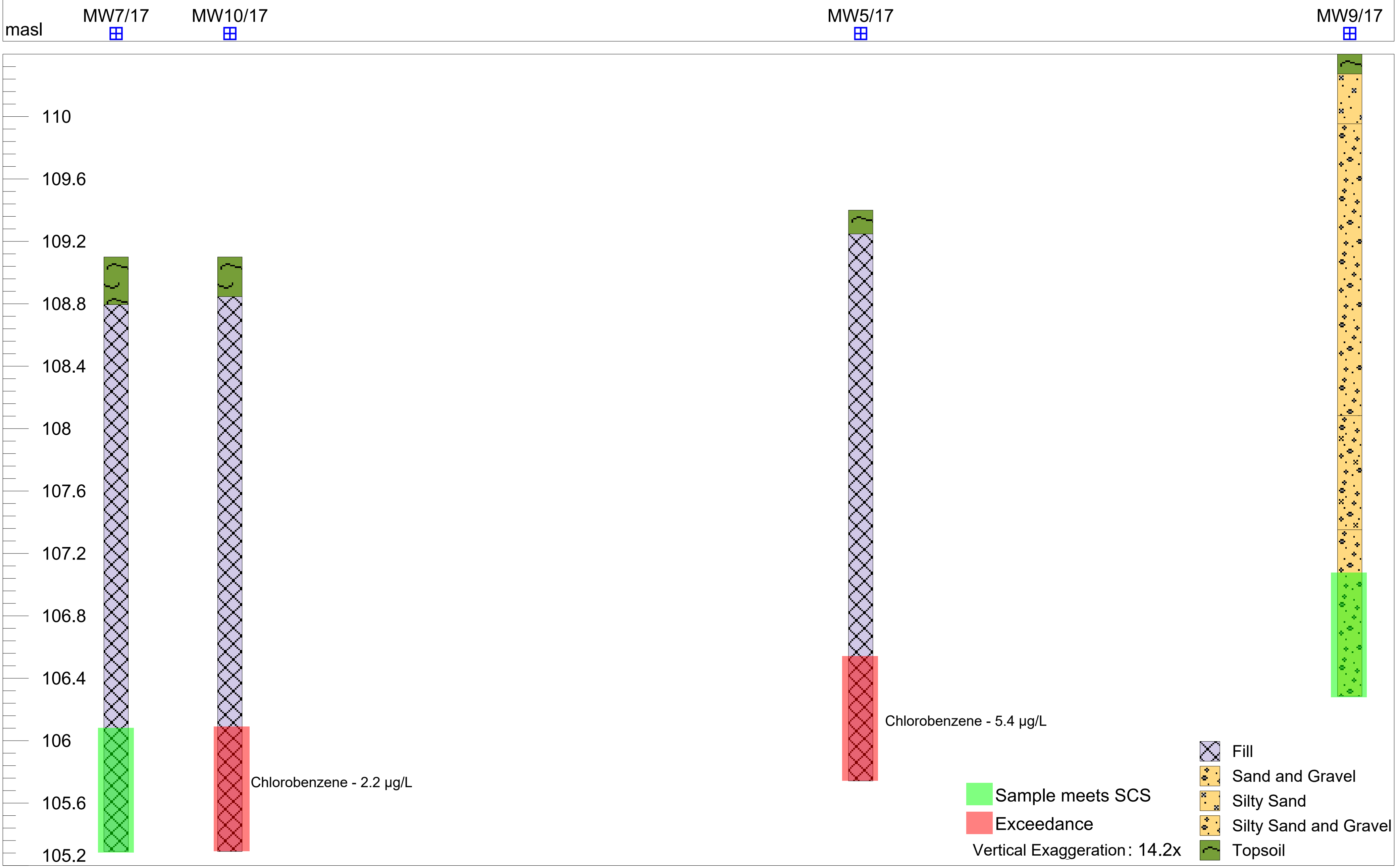

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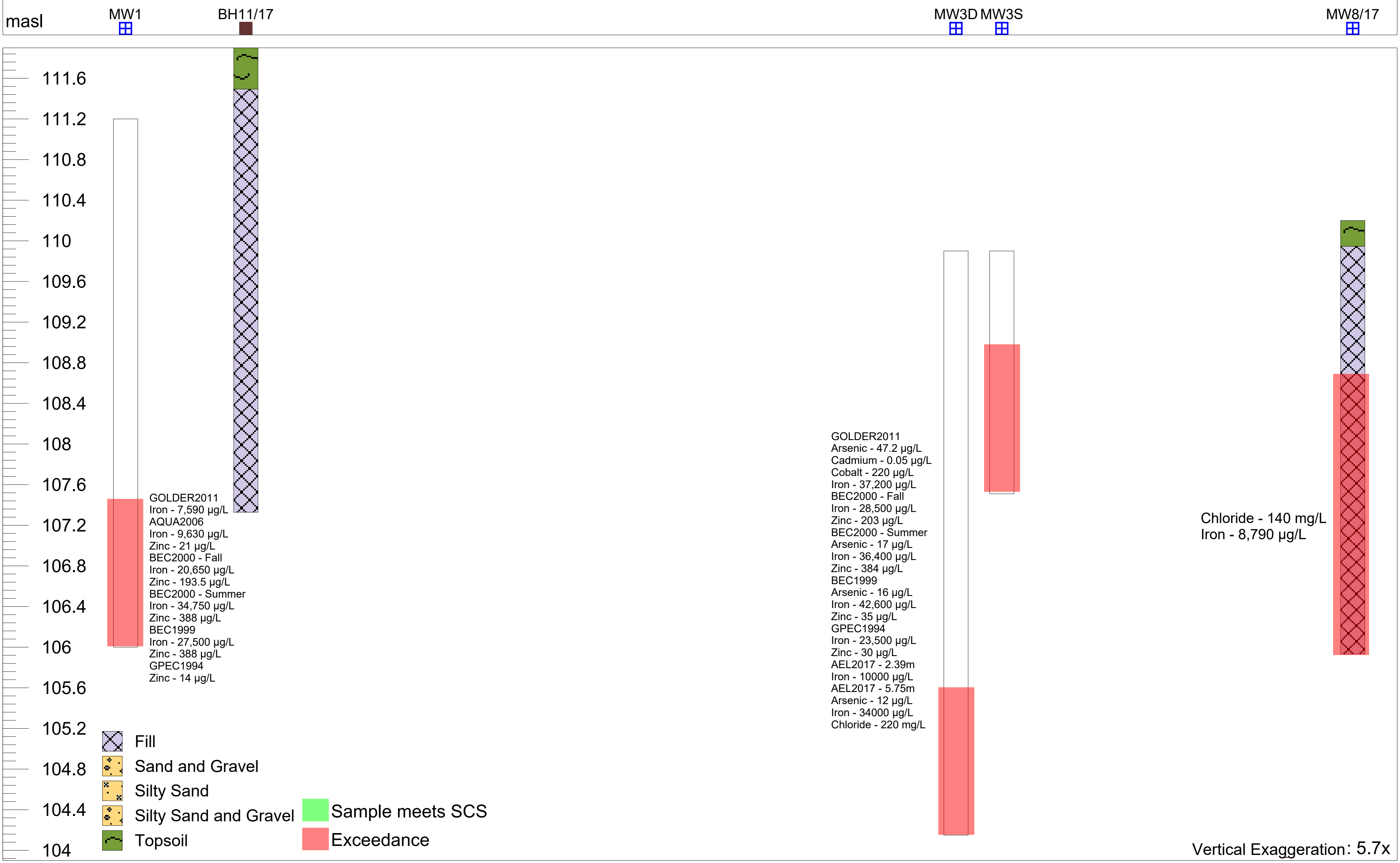
Figure 9t
Cross Section AA'
Metals Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



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Mississauga, ON, L5N 3A9
1-800-267-4797

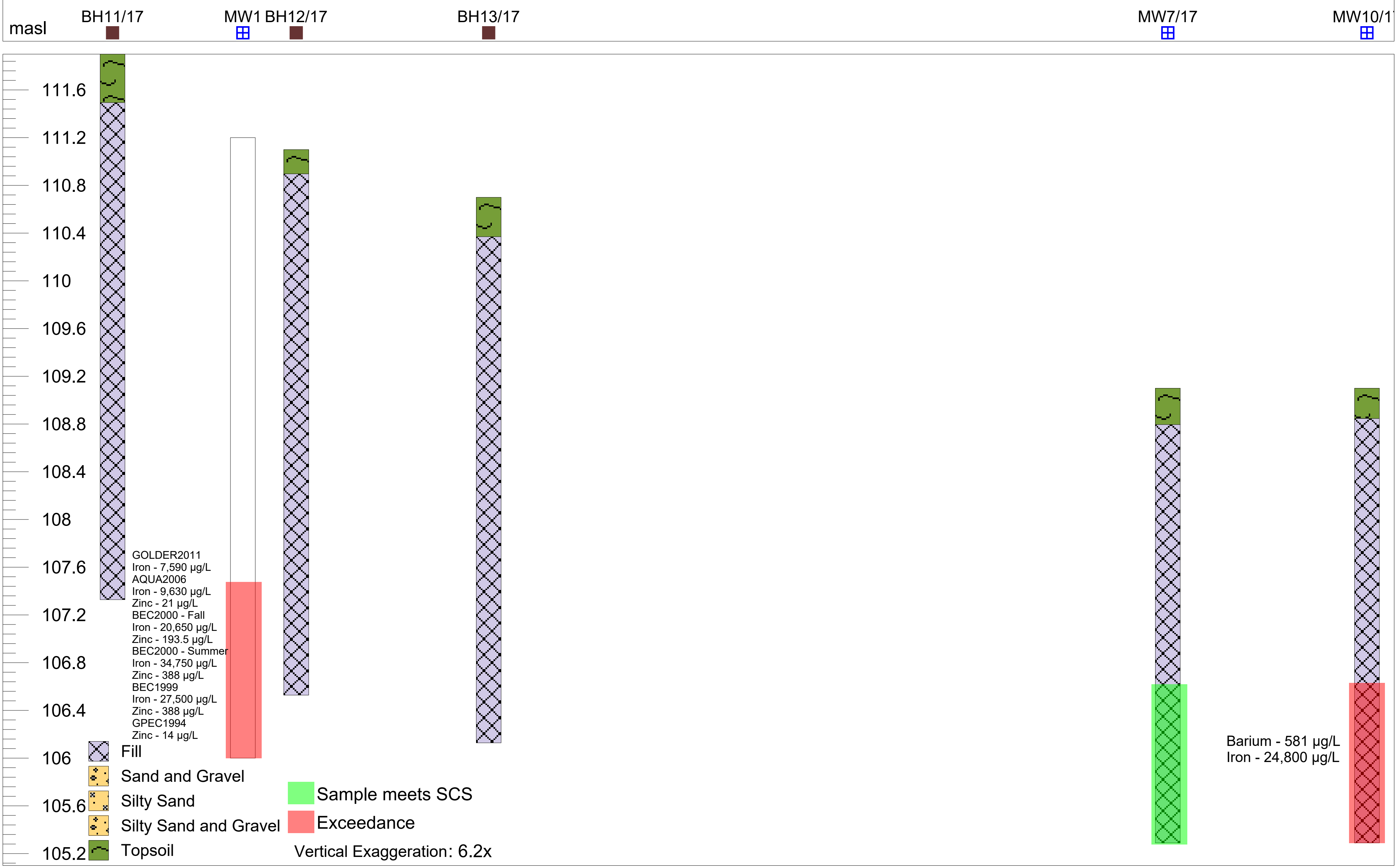
Figure 9u
Cross Section BB'
Metals Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



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Mississauga, ON, L5N 3A9
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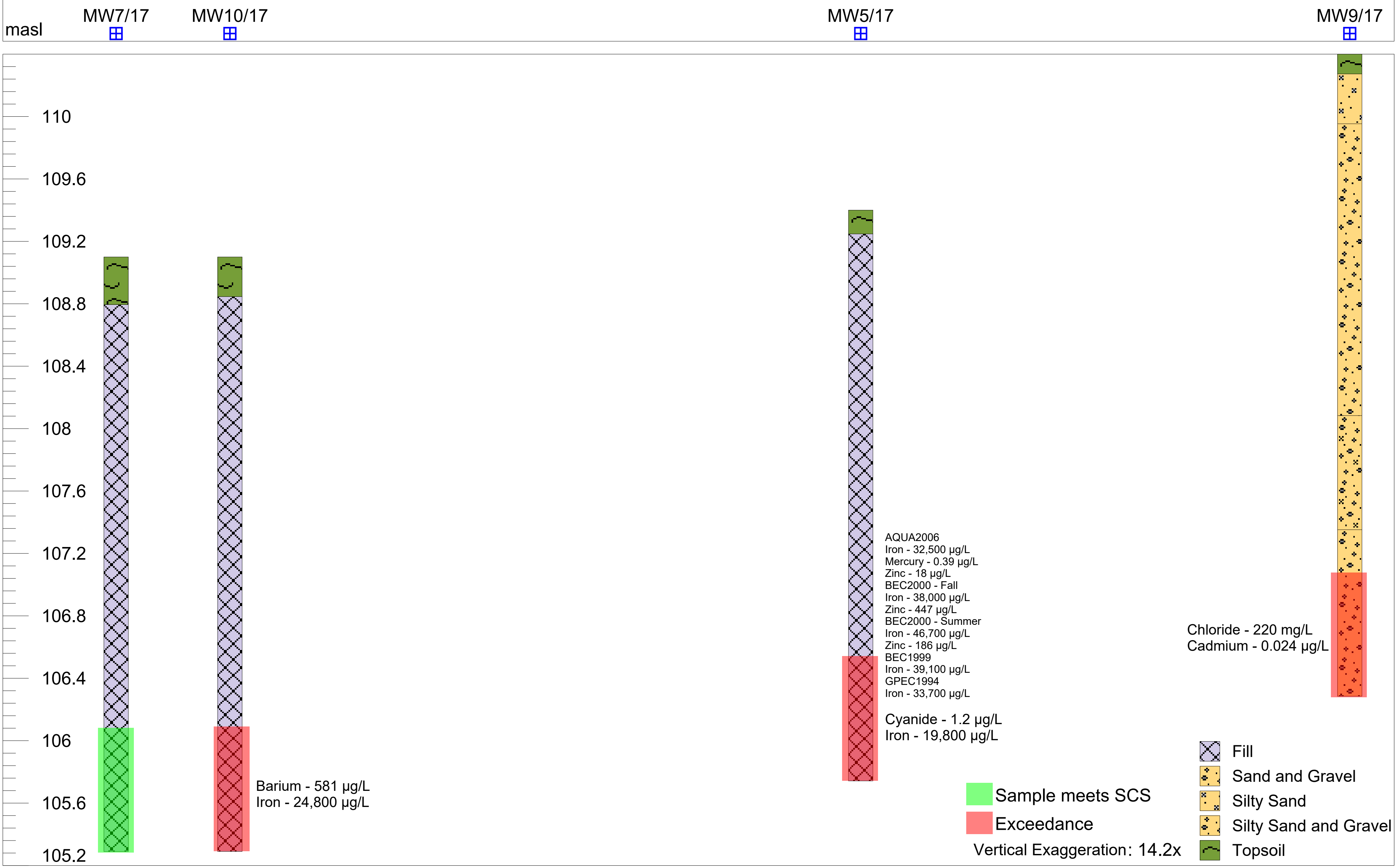
Figure 9v
Cross Section CC'
Metals Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
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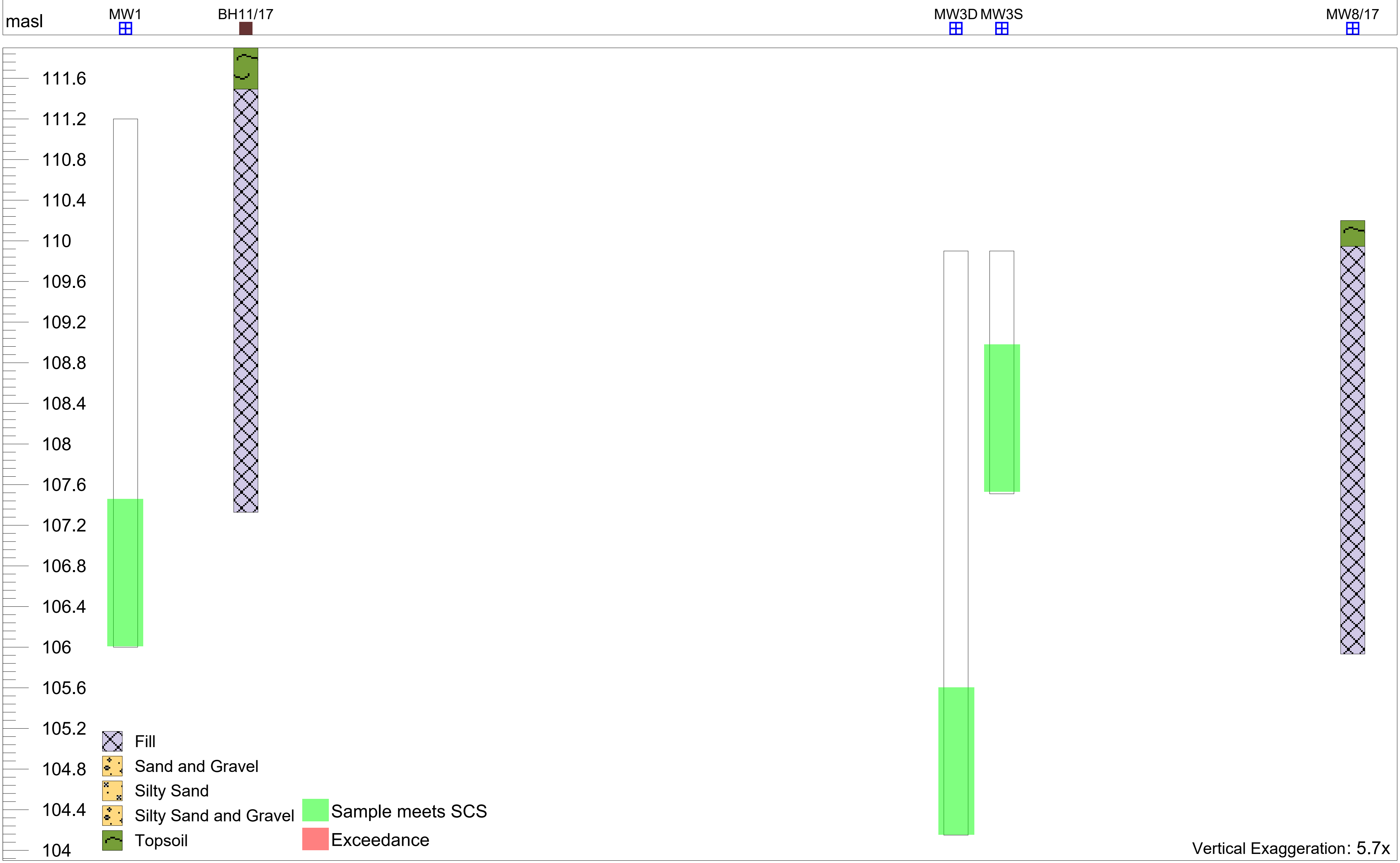
Figure 9w
Cross Section AA'
PAH Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON



1705 Argentia Road, Unit 3
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Figure 9x

Cross Section BB'

PAH Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

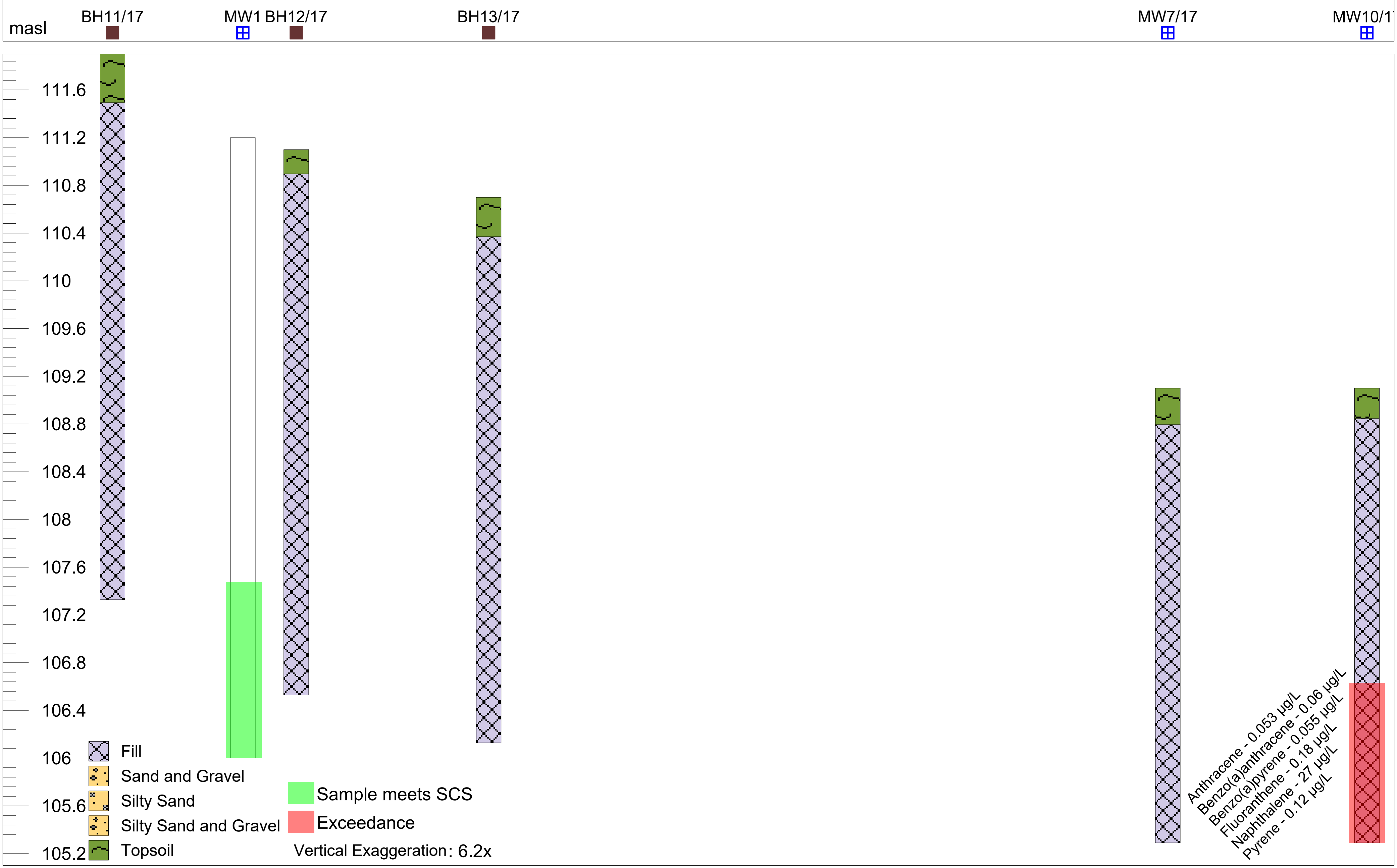

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Figure 9y
Cross Section CC'
PAH Exceedances - GW

Project: Old Sly Lockstation

Project No.: 10888

Date: October 2017

Location: Smiths Falls, ON

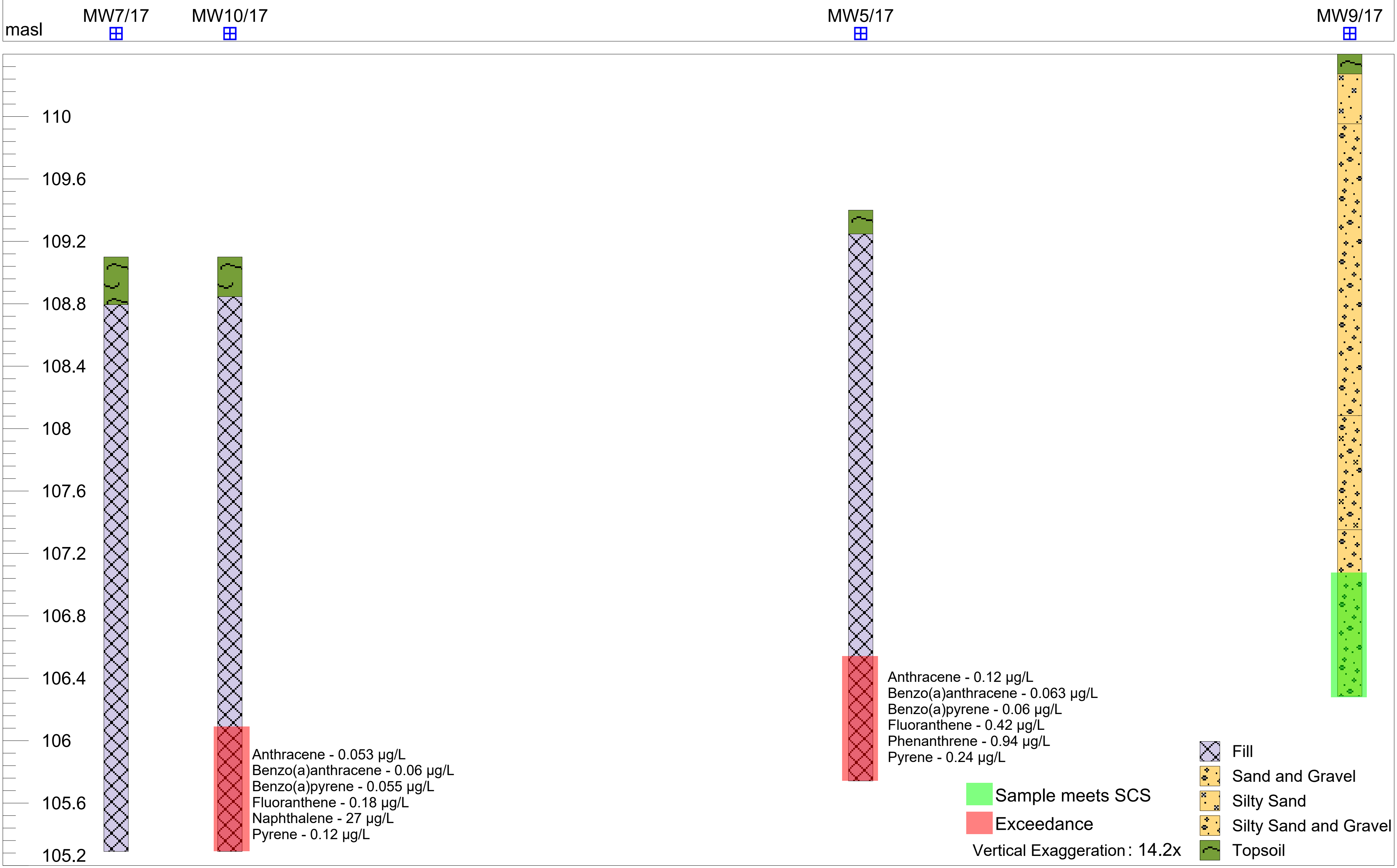
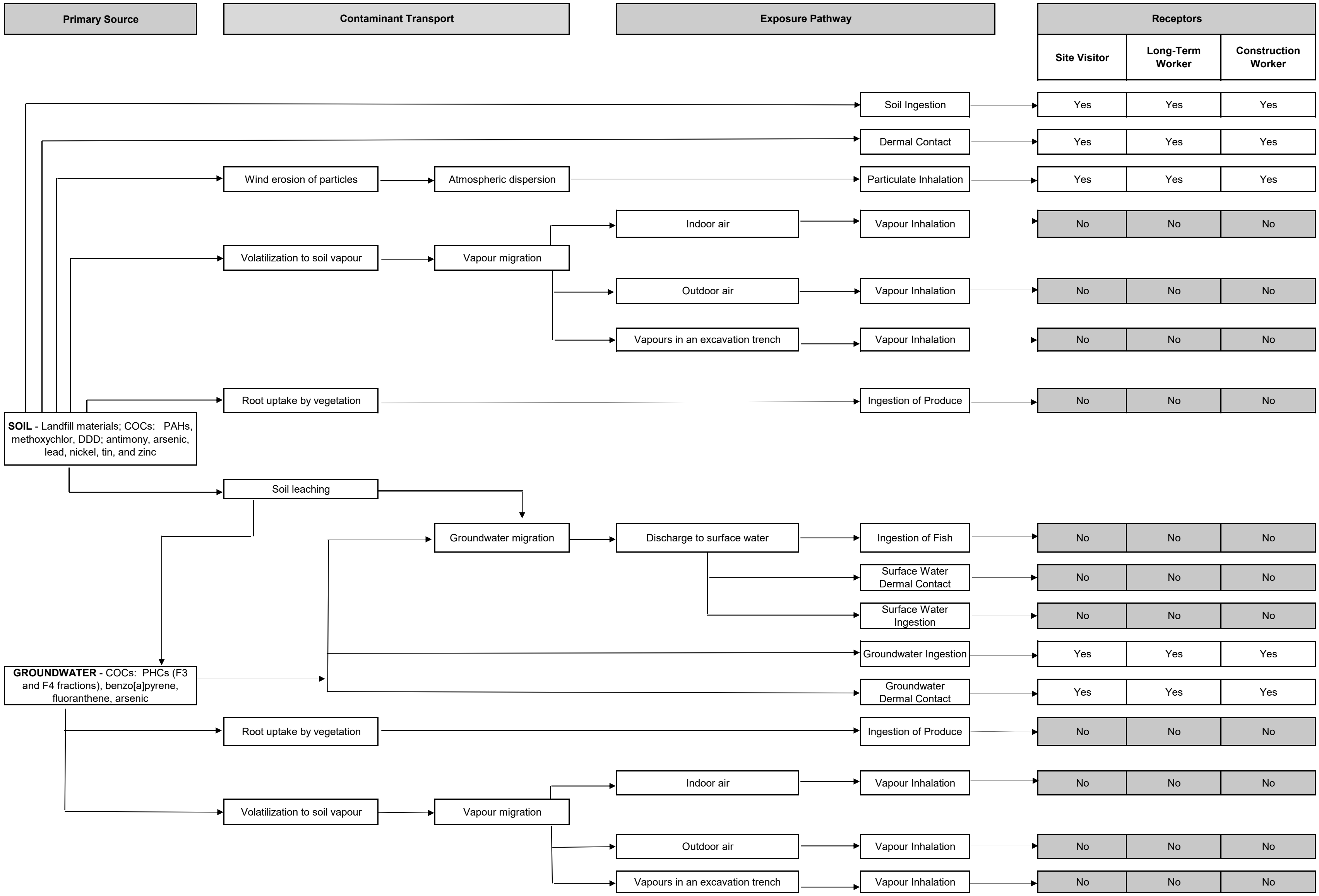
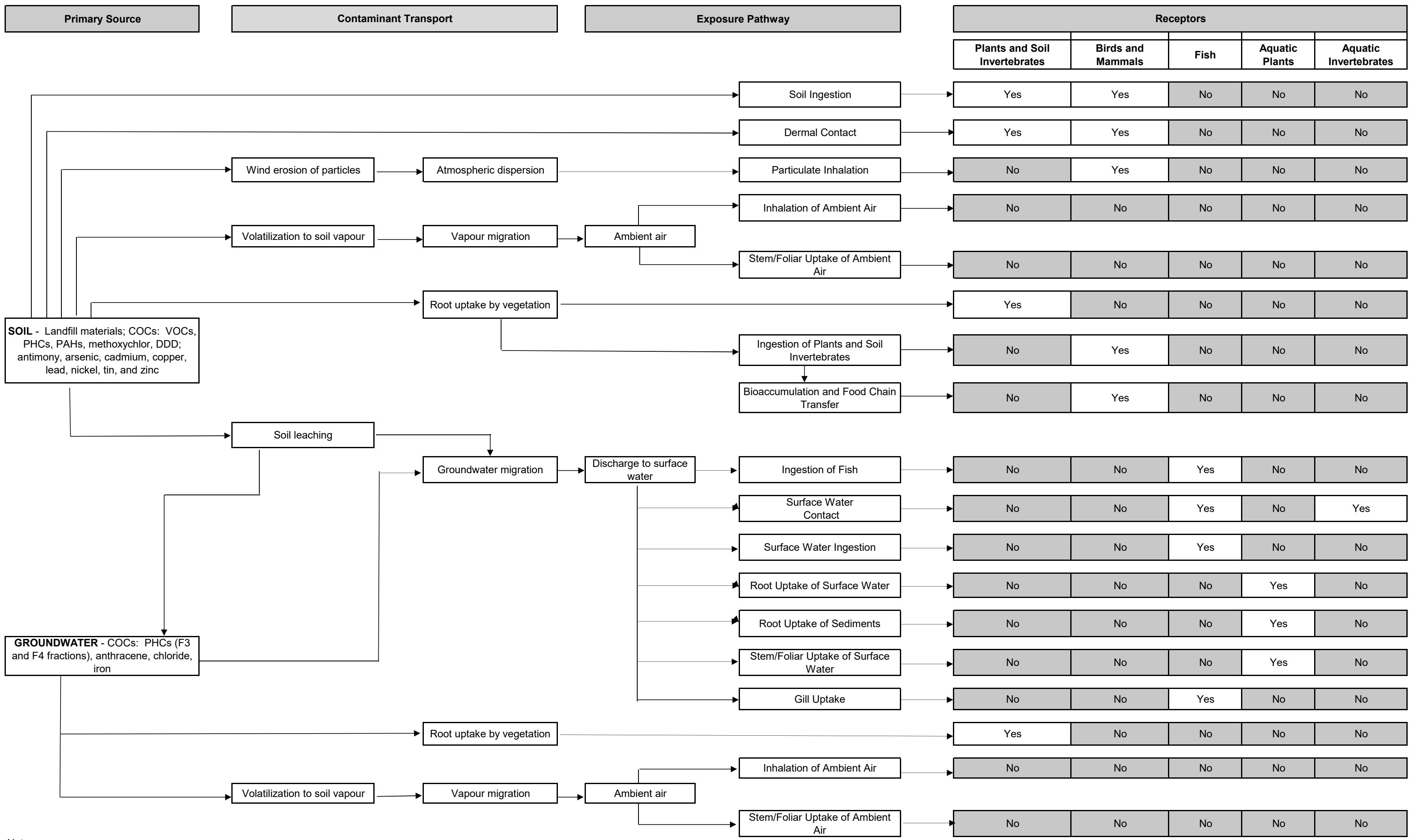


Figure 10a: Human Health Conceptual Site Model



Note:
"No" - exposure pathway incomplete
"Yes" - exposure pathway evaluated in RA

Figure 10b: Ecological Conceptual Site Model



Note:
"No" - exposure pathway incomplete
"Yes" - exposure pathway evaluated in RA

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APPENDIX 1

Sampling and Analysis Plan

AELenvironment

A division of Aeon Egmond Ltd.

Old Sly Locks

Site Investigation

Soil Sampling Plan - Borehole

#10888

Legend

- ● Historical Sampling Location
- ● New Borehole Location
- ▭ Estimated Landfill Extents

Smiths Falls, ON

Source:

Soil		
Sampling Location	**Location Description**	**Rationale**
MW-3	West central portion of Site, beside current MW-3; Replacement well to be installed if inspection determines MW-3B or MW-3C are deficient	Confirmation sampling to determine if location has exceedances of Lead, Zinc, Dichlorobenzene, Chlorobenzene and Xylenes
MW-5	South central portion of Site, in the area of current MW-5; Replacement well to be installed if inspection determines MW-5A or MW-5B are deficient	Confirmation sampling to determine if location has exceedances of PAHs
MW7/17	North central portion of Site	New monitoring well location for vertical delineation; down gradient of MW-1, which has historically had exceedances of Zinc
MW8/17	East central portion of Site	New monitoring well location for vertical delineation; up gradient of MW-3, which has historically had exceedances of Lead, Zinc, Xylenes and PAHs
MW9/17	South central portion of Site	New monitoring well location for vertical delineation; trans gradient to all known exceedances, and located outside of landfill extents
SS1 to SS20	North side of Site, in 10 x 10 m grid sections	New surface sampling locations; Area could be a potential staging area for work to be completed on locks. Sampling needs and locations will be confirmed by the client, and will only be completed if confirmed.

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Old Sly Locks

Site Investigation

Groundwater Sampling Plan

#10888

Legend

- Resample
- Historical Sampling Location
- New Monitoring Well Location
- Estimated Landfill Extents

Smiths Falls, ON

Source:

Groundwater		
Sampling Location	**Location Description**	**Rationale**
SP3	Central portion of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals and PCBs
MW-1	Northwest side of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW-2	Northeast side of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW-3A	West central portion of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals and PCBs
MW-3B	West central portion of Site; AEL to confirm if well is still viable before sampling	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals and PCBs
MW-3C	West central portion of Site; AEL to confirm if well is still viable before sampling	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals and PCBs
MW-4	East central portion of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW-5A	South central portion of Site; AEL to confirm if well is still viable before sampling	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW-5B	South central portion of Site; AEL to confirm if well is still viable before sampling	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW-6	Southeast corner of Site	Existing monitoring location; confirmation sampling to determine if location still has exceedances of Metals
MW7/17	North central portion of Site	New monitoring well location for vertical delineation; down gradient of MW-1, which has historically had exceedances of Metals
MW8/17	East central portion of Site	New monitoring well location for vertical delineation; up gradient of MW-3, which has historically had exceedances of Metals and PCBs
MW9/17	South central portion of Site	New monitoring well location for horizontal and vertical delineation; trans gradient to all known exceedances, and located outside of landfill extents

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Old Sly Locks

Site Investigation

Sediment Sampling Plan

#10888

Legend

- Resample
- New Sampling Location
- Estimated Landfill Extents

Smiths Falls, ON

New locations dependant on conditions at time of sampling

Source:

Sediment		
Sampling Location	**Location Description**	**Rationale**
SED1	Southeast side of Site, east of rail tracks	Previous sampling location; confirmation sampling to determine if location still has exceedances of Lead, Mercury and Zinc
SED2	Southwest side of Site, west of Old Sly Rd.	Previous sampling location; confirmation sampling to determine if location still has exceedances of Cadmium, Chromium, Lead, Mercury and Zinc
SED3	Northeast side of Site, east of rail tracks	Previous sampling location; confirmation sampling to determine if location still has exceedances of Cadmium and Lead
SED4	Northwest side of Site, west of Old Sly Rd.	Previous sampling location; confirmation sampling to determine if location still has exceedances of Cadmium, Chromium, Lead, Mercury and Zinc
SED5	Northeast side of Site, east of rail tracks	New sampling location for delineation; downstream of SED3, which has historically had exceedances of Cadmium and Lead
SED6	East side of Site, central, east of rail tracks	New sampling location for delineation; downstream of SED1, which has historically had exceedances of Lead, Mercury and Zinc
SED7	Southeast side of Site, east of rail tracks	New sampling location for delineation; downstream of SED1, which has historically had exceedances of Lead, Mercury and Zinc

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Old Sly Locks

Site Investigation

Surface Water Sampling Plan

#10888

Legend

- Resample
- Historical Sampling Location
- New Sampling Location
- Site Investigation Area

Smiths Falls, ON

New locations dependant on conditions at time of sampling

Source:

Sampling Locations and Rationale

Surface Water/Seepage		
Sampling Location	**Location Description**	**Rationale**
RR3	North side of Site, west of rail tracks	Previous sampling location; confirmation that location still has no exceedances, as downstream location (SEDW3) had exceedances of Iron and Toluene
OW-1	Historical seep at north side of Site by rail tracks	Previous sampling location; AEL to confirm if seep is still present during Site walk over, and re-sample if still present
SEDW3	North side of Site, east of rail tracks	Previous sampling location; confirmation sampling to determine if location still has exceedances of Iron and Toluene
SW5/RR5	East side of Site, central	Previous sampling location; confirmation that location still has no exceedances, as locations to the north (SEDW3) and south (RR1) had exceedances of Iron and Toluene or Mercury
RR1	East side of Site, east of rail tracks	Previous sampling location; confirmation sampling to determine if location still has exceedances of Iron and Mercury
SW6	Southeast corner of Site	Previous sampling location; confirmation that location still has no exceedances to confirm delineation
SW7	Northeast corner of Site, downstream of SEDW3	New sampling location for delineation; downstream of SEDW3, which has historically had exceedances for Iron and Toluene
SW8	East side of Site, central, downstream of RR1	New sampling location for delineation; downstream of RR1, which has historically had exceedances for Iron and Mercury

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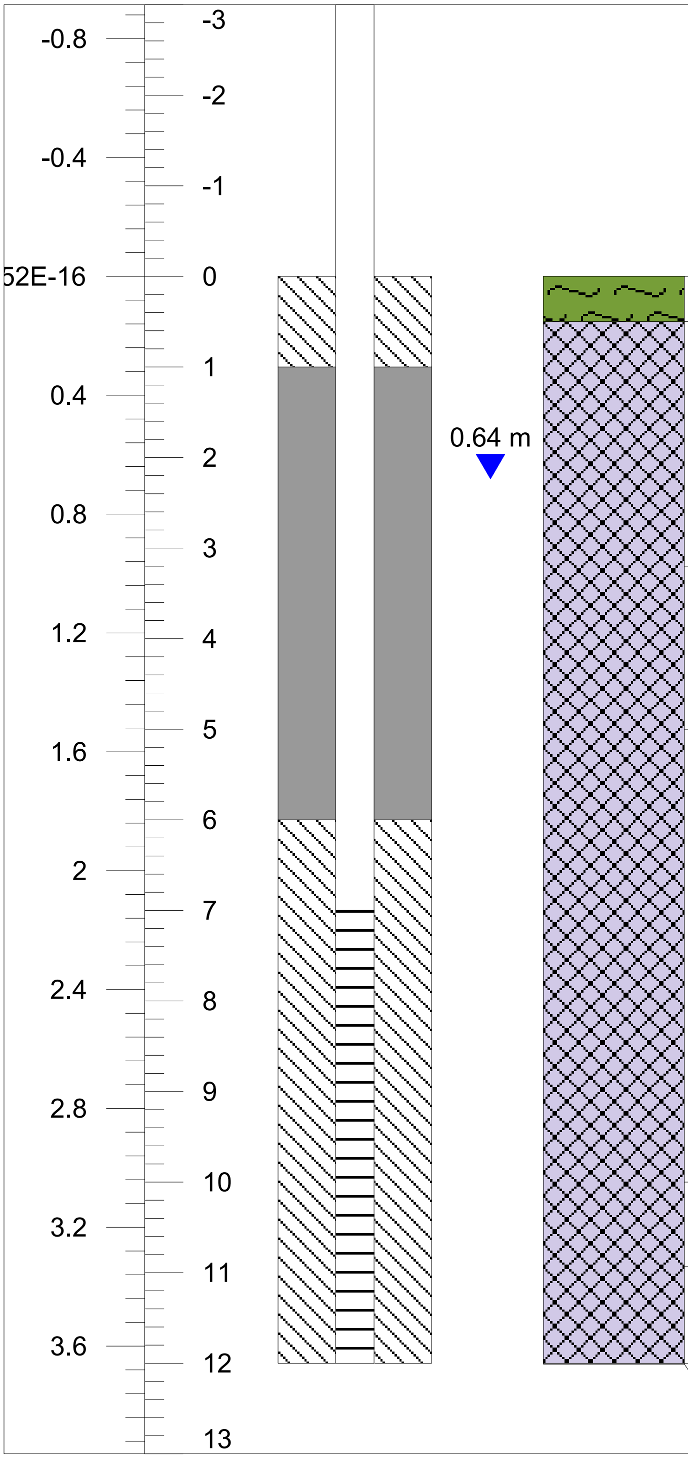
APPENDIX 2

Finalized Field Logs

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	Log of Test Hole:	MW5/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
Location:	Old Slys Road Smiths Falls, Ontario	Northing:	
		Elevation:	

Depth (m/ft)	Well Construction	Lithology	Description		Sample ID



Topsoil	Grass	A0241
Fill	Coarse sand with gravel	
Fill	Brown to black, silty sand with plastic, moist, slight hydrocarbon odour	A0242
Fill	Cbrown, coarse sand, large wood chunks, saturated	A0243
Fill	Black, medium to coarse sand with gravel, slight hydrocarbon odour, wet	A0244
Fill	Grey, coarse sand, wet	A0245
Refusal		

Drill Method:	Direct Push / Auger	Hole Depth (m):	3.66 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

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Mississauga, ON, L5N 3A9
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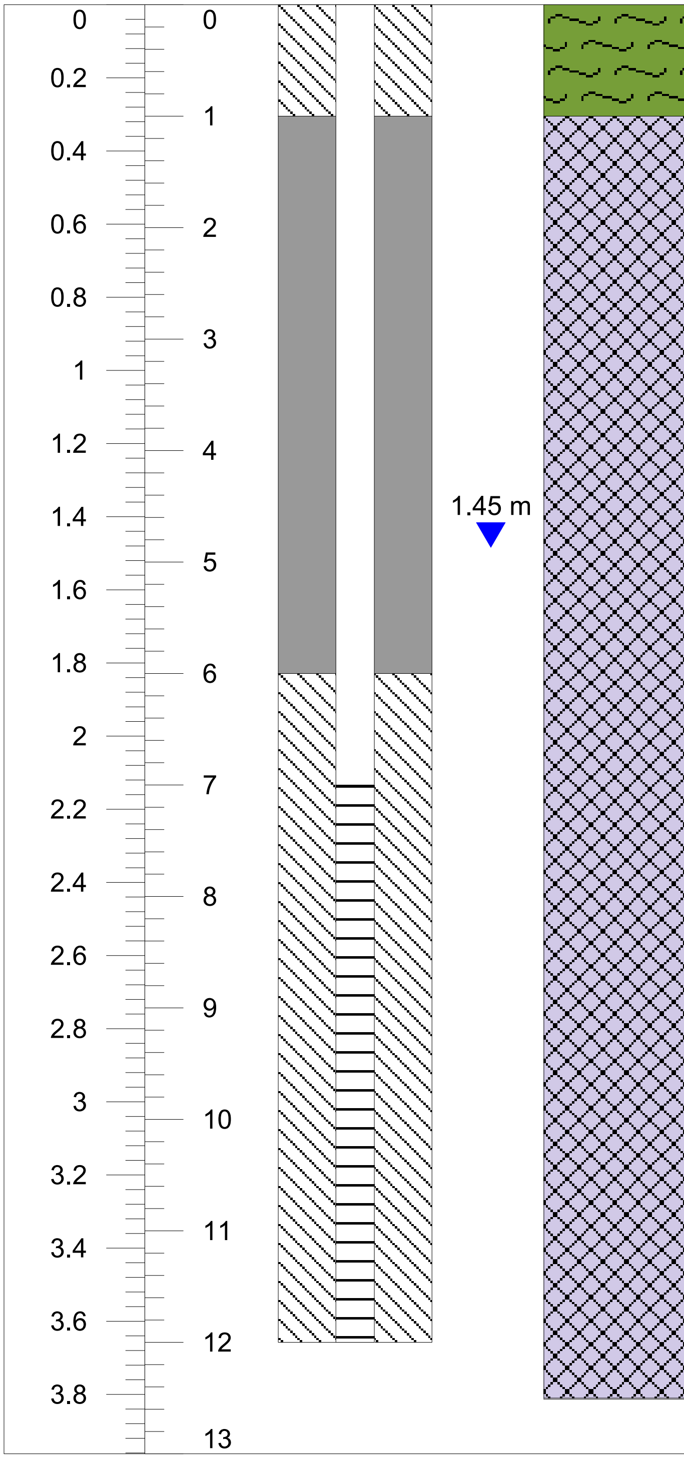
Project No.:	10888	**Log of Test Hole:**	MW7/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
		Easting:	
Client:	Parks Canada	Northing:	
Location:	Old Slys Road Smiths Falls, Ontario	Elevation:	



Lithology	Description	Sample ID
Topsoil	Brown, moist	A0214
Fill	White/grey, gravel	A0214
Fill	Brown, sandy, dry	A0215
Fill	Dark brown/black, silty sand, wet, slight hydrocarbon odour	A0216
Fill	Brown, silty sand, wet	A0216
Fill	Brown, coarse sand with gravel, saturated, slight hydrocarbon odour	A0217

Refusal

Drill Method:	Direct Push / Auger	Hole Depth (m):	3.81 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

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1-800-267-4797

Project No.: 10888

Project: Old Slys Lockstation

Client: Parks Canada

Location: Old Slys Road Smiths Falls, Ontario

Log of Test Hole: MW8/17

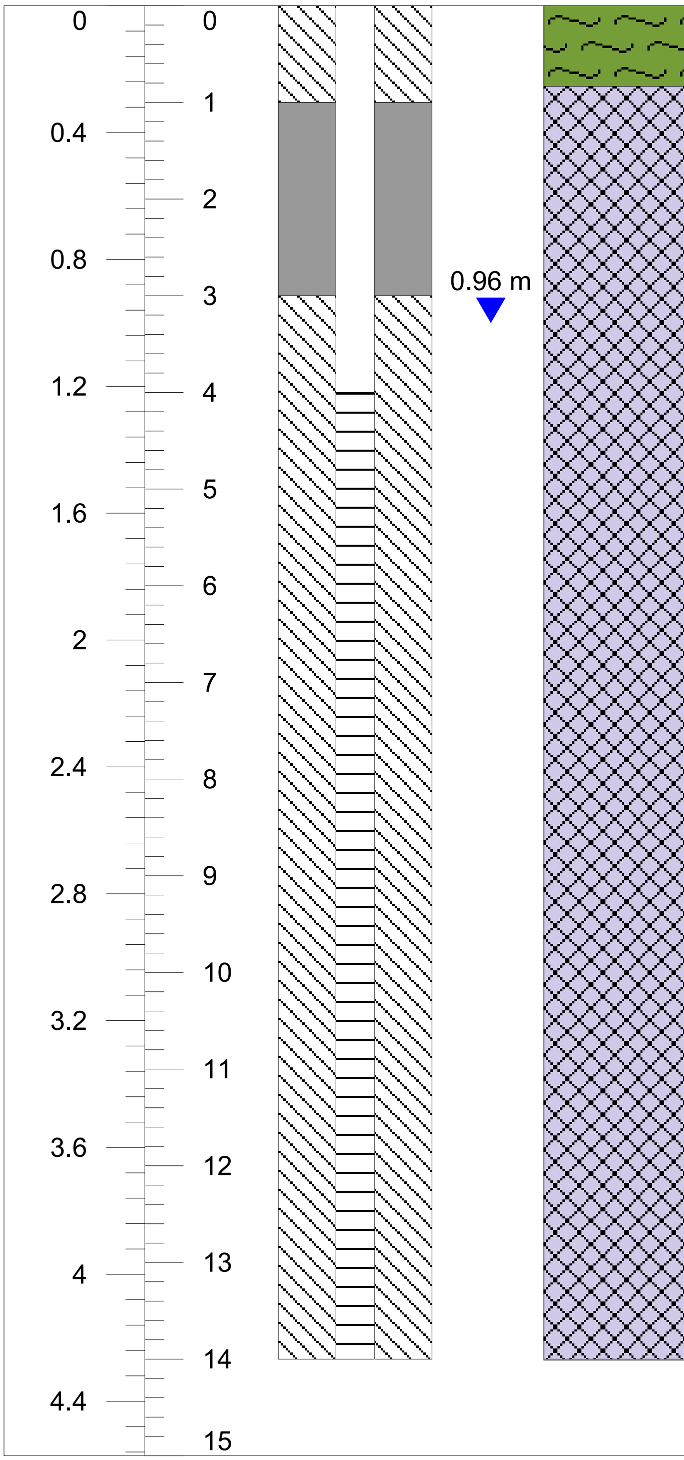
Project Manager: Paul Wilson

Easting:

Northing:

Elevation:

Depth (m/ft)	Well Construction	Lithology	Description		Sample ID
			Topsoil	Grass	A0234
			Fill	Coarse sand with gravel	A0234
			Fill	Coarse sand, plastic and glass	A0234
			Fill	Brown, coarse sand with glass and plastic, wet	A0235
			Fill	Brown, coarse sand, wet	A0235
			Fill	Coarse sand, glass, saturated	A0236



Refusal

Drill Method: Direct Push / Auger

Drill Date: 30-Aug-17

Hole Diameter: 3.8cm

Hole Depth (m): 4.27 m

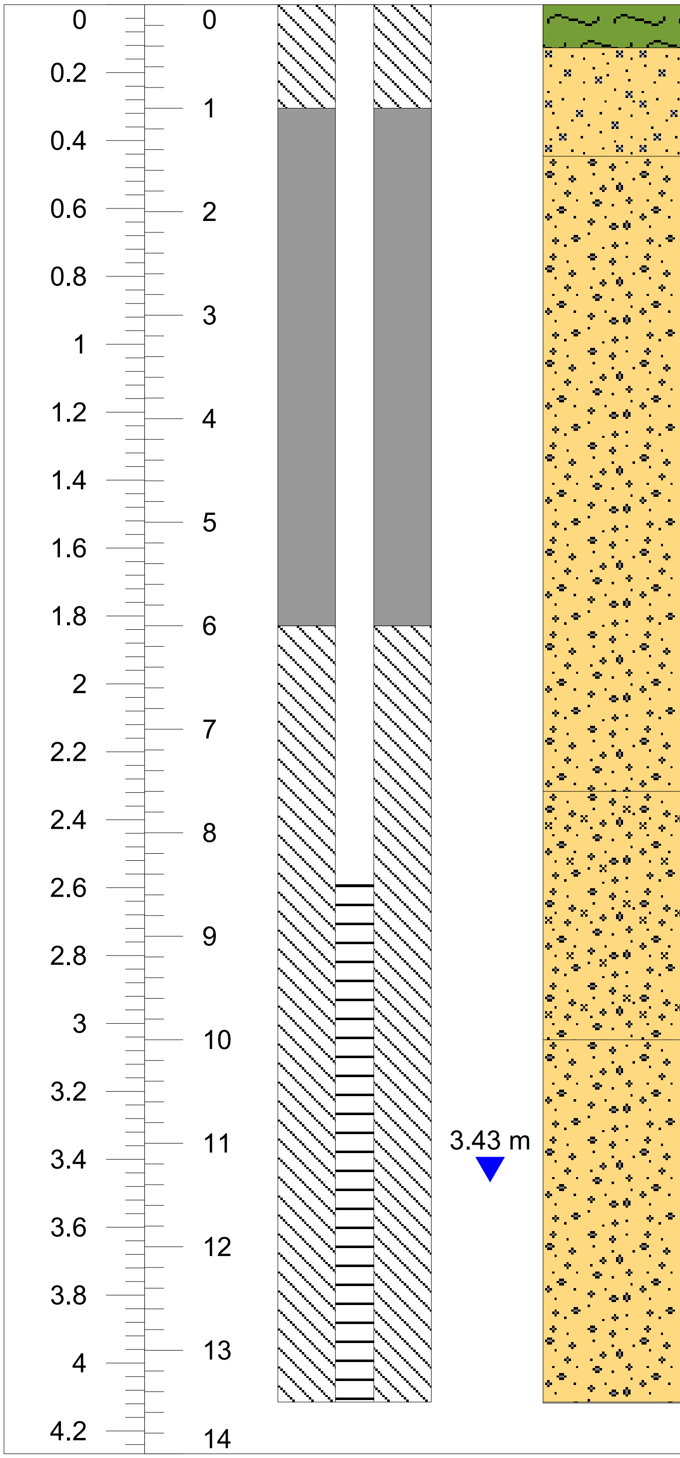
Technician: EH

Drilled By: Strata

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	**Log of Test Hole:**	MW9/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
Location:	Old Slys Road Smiths Falls, Ontario	Northing:	
		Elevation:	

Depth (m/ft) | Well Construction | Lithology | Description | Sample ID



Lithology	Description	Sample ID
Topsoil	Grass	A0251
Silty Sand	Brown	A0251
Sand and Gravel	Grey to brown, coarse	A0252
Sand and Gravel	Brown, coarse	A0253
Sand and Gravel	Orange/brown, coarse	A0253
Silty Sand and Gravel	Brown, damp	A0254
Sand and Gravel	Fine sand, wet	A0255

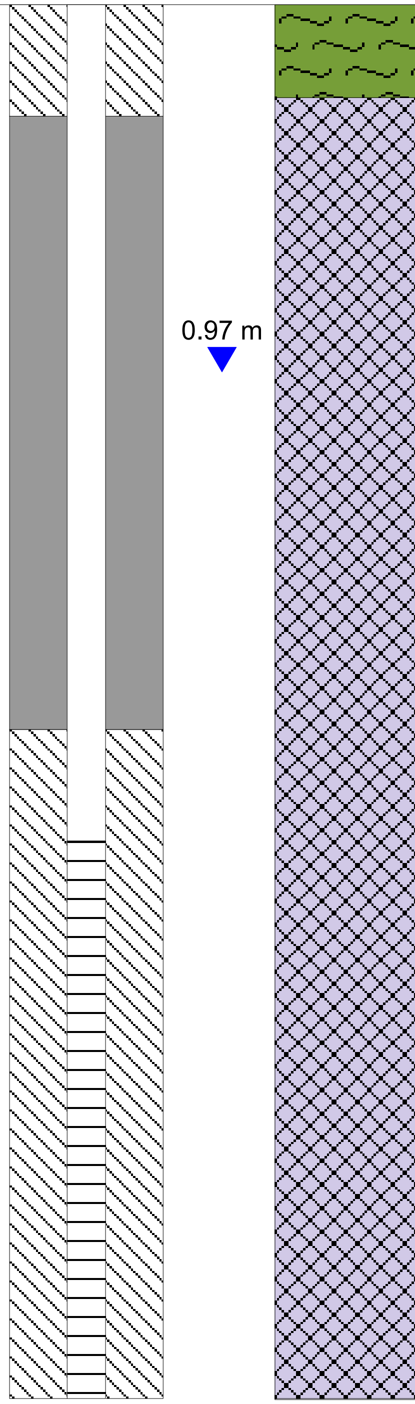
Refusal

Drill Method:	Direct Push / Auger	Hole Depth (m):	4.11 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	**Log of Test Hole:**	MW10/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
Location:	Old Slys Road Smiths Falls, Ontario	Northing:	
		Elevation:	

Depth (m/ft) | Well Construction | Lithology | Description | Sample ID



Depth (m)	Depth (ft)
0	0
0.2	
	1
0.4	
0.6	2
0.8	
	3
1	
1.2	4
1.4	
	5
1.6	
1.8	6
2	
	7
2.2	
2.4	8
2.6	
	9
2.8	
3	10
3.2	
	11
3.4	
3.6	12
3.8	
	13

Unit	Description	Sample ID
Topsoil	Brown, grass, moist	A0218
Fill	Brown, sandy silt, moist	A0218 / A0219
Fill	Brown, sandy silt, wood and plastic	A0219
Fill	Black, coarse sand, wood and metal, saturated	A0220
Fill	Black, coarse sand, wood, saturated	A0221
Fill	Grey, medium to fine sand, saturated, slight hydrocarbon odour	A0221

Refusal

Drill Method:	Direct Push / Auger	Hole Depth (m):	3.81 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	**Log of Test Hole:**	BH11/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
		Northing:	
Location:	Old Slys Road Smiths Falls, Ontario	Elevation:	

Depth (m)	Depth (ft)	Lithology	Description		Sample ID
0 – 0.4	0 – 1.4	Topsoil	Topsoil	Grass and gravel	A0226
0.4 – 1.5	1.4 – 5	Fill	Fill	Brown, silty sand, plastic, moist	A0226 / A0227
1.5 – 2.1	5 – 7	Fill	Fill	Brown, coarse silty sand, saturated	A0228
2.1 – 2.6	7 – 8.6	Fill	Fill	Brown/black, coarse sand, strong hydrocarbon odour	A0228
2.6 – 3.0	8.6 – 10	Fill	Fill	Grey, coarse sand and gravel	A0228
3.0 – 4.57	10 – 15	Fill	Fill	Brown, coarse sand and gravel, wet, slight hydrocarbon odour	A0229

Drill Method:	Direct Push	Hole Depth (m):	4.57 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	**Log of Test Hole:**	BH12/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
Location:	Old Slys Road Smiths Falls, Ontario	Northing:	
		Elevation:	

Depth (m): 0, 0.4, 0.8, 1.2, 1.6, 2, 2.4, 2.8, 3.2, 3.6, 4, 4.4

Depth (ft): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Depth (m/ft)	Lithology	Description		Sample ID
		Topsoil	Grass	A0222
		Fill	Grey, gravel	A0222
		Fill	Brown, silty sand, wood debris	A0223
		Fill	Brown, coarse sand and gravel, saturated	A0224
		Fill	Brown to black, silty sand, fine, slight hydrocarbon odour, saturated	A0224
		Fill	Grey to black, coarse sand and gravel, saturated, slight hydrocarbon odour	A0225
		Fill	Brown, coarse sand, wood debris, saturated	A0225

Drill Method:	Direct Push	Hole Depth (m):	4.57 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

1705 Argentia Road, Unit 3
Mississauga, ON, L5N 3A9
1-800-267-4797

Project No.:	10888	**Log of Test Hole:**	BH13/17
Project:	Old Slys Lockstation	Project Manager:	Paul Wilson
Client:	Parks Canada	Easting:	
Location:	Old Slys Road Smiths Falls, Ontario	Northing:	
		Elevation:	

Depth (m): 0, 0.4, 0.8, 1.2, 1.6, 2, 2.4, 2.8, 3.2, 3.6, 4, 4.4, 4.8

Depth (ft): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

Lithology	Description		Sample ID
Topsoil	Topsoil	Grass, wet	A0230
Fill	Fill	Brown, silty sand, wood, saturated	A0230
Fill	Fill	Brown, coarse sand and wood, saturated	A0231
Fill	Fill	Black, coarse sand and wood, wet, slight hydrocarbon odour	A0231
Fill	Fill	Grey, silty sand, wet	A0231
Fill	Fill	Black, coarse sand and gravel, metal, saturated, slight hydrocarbon odour	A0232
Fill	Fill	Grey, coarse sand and gravel	A0232

Drill Method:	Direct Push	Hole Depth (m):	4.57 m
Drill Date:	30-Aug-17	Technician:	EH
Hole Diameter:	3.8cm	Drilled By:	Strata

1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367| Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

APPENDIX 3
Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: 10888

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Your C.O.C. #: 625115-01-01, 625115-02-01, 625115-03-01

Report Date: 2017/09/12
Report #: R4695121
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J1295
Received: 2017/09/01, 14:36

Sample Matrix: Soil
Samples Received: 28

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum	2	N/A	2017/09/08	CAM SOP-00301	EPA 8270D m
Methylnaphthalene Sum	7	N/A	2017/09/11	CAM SOP-00301	EPA 8270D m
Semivolatile Organic Compounds (TCLP)	1	2017/09/08	2017/09/09	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron	10	2017/09/07	2017/09/07	CAM SOP-00408	R153 Ana. Prot. 2011
Hot Water Extractable Boron	7	2017/09/07	2017/09/08	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide	17	2017/09/07	2017/09/08	CAM SOP-00457	OMOE E3015 m
Cyanide (WAD) in Leachates	1	N/A	2017/09/08	CAM SOP-00457	OMOE 3015 m
Conductivity	17	2017/09/08	2017/09/08	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	17	2017/09/06	2017/09/08	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (2)	17	2017/09/07	2017/09/08	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric)	11	2017/09/09	2017/09/09	CAM SOP-00316	CCME PHC-CWS m
Fluoride by ISE in Leachates	1	2017/09/08	2017/09/09	CAM SOP-00449	SM 22 4500-F- C m
Soluble Fluoride analysis in Soil	17	2017/09/07	2017/09/08	CAM SOP-00449	SM 22 4500 F C m
Mercury (TCLP Leachable) (mg/L)	1	N/A	2017/09/08	CAM SOP-00453	EPA 7470A m
Strong Acid Leachable Metals by ICPMS	17	2017/09/07	2017/09/11	CAM SOP-00447	EPA 6020B m
Total Metals in TCLP Leachate by ICPMS	1	2017/09/08	2017/09/11	CAM SOP-00447	EPA 6020B m
Acid Extractable Metals Analysis by ICP	17	2017/09/07	2017/09/08	CAM SOP-00408	EPA 6010D m
Moisture	8	N/A	2017/09/06	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture	19	N/A	2017/09/07	CAM SOP-00445	Carter 2nd ed 51.2 m
Nitrate(NO3) + Nitrite(NO2) in Leachate	1	N/A	2017/09/08	CAM SOP-00440	SM 22 4500-NO3I/NO2B
PAH Compounds in Soil by GC/MS (SIM)	9	2017/09/07	2017/09/08	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Soil	5	2017/09/07	2017/09/07	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Soil	4	2017/09/07	2017/09/08	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Leachate	1	2017/09/08	2017/09/09	CAM SOP-00309	EPA 8082A m
pH CaCl2 EXTRACT	17	2017/09/07	2017/09/07	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	17	N/A	2017/09/11	CAM SOP-00102	EPA 6010C
TCLP - % Solids	1	2017/09/07	2017/09/08	CAM SOP-00401	EPA 1311 Update I m

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Your Project #: 10888

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Your C.O.C. #: 625115-01-01, 625115-02-01, 625115-03-01

Report Date: 2017/09/12
Report #: R4695121
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J1295
Received: 2017/09/01, 14:36

Sample Matrix: Soil
Samples Received: 28

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
TCLP - Extraction Fluid	1	N/A	2017/09/08	CAM SOP-00401	EPA 1311 Update I m
TCLP - Initial and final pH	1	N/A	2017/09/08	CAM SOP-00401	EPA 1311 Update I m
TCLP Zero Headspace Extraction	1	2017/09/07	2017/09/08	CAM SOP-00430	EPA 1311 m
Volatile Organic Compounds and F1 PHCs	17	N/A	2017/09/08	CAM SOP-00230	EPA 8260 m
VOCs in ZHE Leachates	1	2017/09/08	2017/09/08	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.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your Project #: 10888

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
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CANADA L5N 3A9

Your C.O.C. #: 625115-01-01, 625115-02-01, 625115-03-01

Report Date: 2017/09/12
Report #: R4695121
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J1295
Received: 2017/09/01, 14:36

(1) Soils are reported on a dry weight basis unless otherwise specified.
(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.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE228	FBE229		FBE230			
Sampling Date		2017/08/30 09:40	2017/08/30 09:54		2017/08/30 14:30			
COC Number		625115-01-01	625115-01-01		625115-01-01			
	UNITS	**A0215 MW7/17**	**A0217 MW7/17**	**QC Batch**	**A0234 MW8/17**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.21	0.29	5150107	0.15			5150107
Inorganics								
Conductivity	mS/cm	0.19	0.33	5153325	0.47	0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND	ND	5153414	ND	5	N/A	5153414
Available (CaCl2) pH	pH	6.80	7.37	5153106	7.55			5153106
WAD Cyanide (Free)	ug/g	0.18	0.05	5153321	0.06	0.01	0.005	5153321
Chromium (VI)	ug/g	ND	ND	5152238	ND	0.2	0.05	5152238
Metals								
Hot Water Ext. Boron (B)	ug/g	0.17	0.12	5153124	0.38	0.050	0.030	5153309
Acid Extractable Antimony (Sb)	ug/g	0.58	0.42	5153043	1.3	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	3.5	7.7	5153043	3.2	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	130	37	5153043	210	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	0.53	ND	5153043	0.37	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	0.40	0.21	5153043	1.9	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	24	9.8	5153043	39	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	7.9	2.6	5153043	6.8	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	66	320	5153043	47	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	35	27	5153043	210	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	320	1900	5153040	910	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	1.5	2.6	5153043	3.4	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	17	13	5153043	21	0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	ND	ND	5153043	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	ND	ND	5153043	0.38	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.14	0.11	5153043	0.14	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	15	8.6	5153043	77	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.66	0.19	5153043	0.52	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	35	6.9	5153043	46	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	82	53	5153043	310	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	0.12	ND	5153043	0.40	0.050	0.030	5153043

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

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CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE232	FBE235		FBE270			
Sampling Date		2017/08/30 11:04	2017/08/30 13:36		2017/08/30 13:19			
COC Number		625115-01-01	625115-01-01		625115-02-01			
	UNITS	A0219 MW10/17	A0228 BH11/17	QC Batch	A0224 BH12/17	RDL	MDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.15	0.10	5150107	0.18			5150107
Inorganics								
Conductivity	mS/cm	0.47	0.84	5153325	0.34	0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND	ND	5153414	ND	5	N/A	5153414
Available (CaCl2) pH	pH	7.19	11.6	5153106	7.48			5153106
WAD Cyanide (Free)	ug/g	0.13	0.03	5153321	0.10	0.01	0.005	5153321
Chromium (VI)	ug/g	ND	ND	5152238	ND	0.2	0.05	5152238
Metals								
Hot Water Ext. Boron (B)	ug/g	0.24	0.30	5153309	0.11	0.050	0.030	5153124
Acid Extractable Antimony (Sb)	ug/g	1.4	4.7	5153043	0.42	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	3.4	7.6	5153043	2.3	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	130	160	5153043	69	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	0.39	0.47	5153043	0.21	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	1.7	13	5153043	0.38	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	38	39	5153043	14	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	7.1	7.0	5153043	2.9	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	62	62	5153043	23	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	190	200	5153043	73	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	1400	1700	5153040	570	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	3.4	2.3	5153043	1.4	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	17	20	5153043	9.5	0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	ND	ND	5153043	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	0.38	0.30	5153043	ND	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.18	0.24	5153043	0.097	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	16	130	5153043	50	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.44	0.63	5153043	0.64	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	29	31	5153043	19	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	310	150	5153043	180	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	0.23	0.21	5153043	0.087	0.050	0.030	5153043

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

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE271				FBE273	FBE275			
Sampling Date		2017/08/30 13:22				2017/08/30 14:25	2017/08/31 08:00			
COC Number		625115-02-01				625115-02-01	625115-02-01			
	UNITS	**A0225 BH12/17**	**RDL**	**MDL**	**QC Batch**	**A0232 BH13/17**	**A0256 POND**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters										
Sodium Adsorption Ratio	N/A	0.14			5150107	0.14	0.25			5150107
Inorganics										
Conductivity	mS/cm	0.51	0.002	0.0005	5153325	0.49	0.20	0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND	5	N/A	5153414	ND	ND	5	N/A	5153414
Moisture	%	26	1.0	0.50	5151294			1.0	0.50	5151294
Available (CaCl2) pH	pH	7.32			5153106	8.90	5.78			5153106
WAD Cyanide (Free)	ug/g	0.06	0.01	0.005	5153321	0.10	0.09	0.01	0.005	5153321
Chromium (VI)	ug/g	ND	0.2	0.05	5152238	ND	ND	0.2	0.05	5152238
Metals										
Hot Water Ext. Boron (B)	ug/g	0.21	0.050	0.030	5153309	0.36	1.2	0.050	0.030	5153124
Acid Extractable Antimony (Sb)	ug/g	1.4	0.20	0.10	5153043	3.5	0.46	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	4.0	1.0	0.10	5153043	4.4	2.4	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	140	0.50	0.30	5153043	87	120	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	ND	0.20	0.020	5153043	0.30	0.31	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	4.3	0.10	0.030	5153043	0.86	0.29	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	20	1.0	0.20	5153043	23	15	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	4.1	0.10	0.020	5153043	4.9	5.2	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	51	0.50	0.20	5153043	710	17	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	330	1.0	0.10	5153043	90	47	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	1800	50	N/A	5153040	4100	530	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	3.2	0.50	0.10	5153043	3.1	1.2	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	18	0.50	0.20	5153043	13	13	0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	ND	0.50	0.10	5153043	ND	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	ND	0.20	0.040	5153043	0.84	0.24	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.16	0.050	0.010	5153043	0.19	0.20	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	150	1.0	0.20	5153043	15	11	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.35	0.050	0.030	5153043	0.71	0.33	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	13	5.0	0.50	5153043	21	19	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	4500	25	2.5	5153043	340	61	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	0.16	0.050	0.030	5153043	0.12	0.071	0.050	0.030	5153043

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

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE275	FBE276				FBE277			
Sampling Date		2017/08/31 08:00	2017/08/31 08:02				2017/08/30 09:48			
COC Number		625115-02-01	625115-02-01				625115-02-01			
	UNITS	A0256 POND Lab-Dup	A0257 POND	RDL	MDL	QC Batch	A0216 MW7/17	RDL	MDL	QC Batch
Calculated Parameters										
Sodium Adsorption Ratio	N/A		0.26			5150107	0.12			5150107
Inorganics										
Conductivity	mS/cm		0.17	0.002	0.0005	5153325	0.68	0.002	0.0005	5153325
Fluoride (F-)	ug/g		ND	5	N/A	5153414	ND	5	N/A	5153414
Moisture	%		42	1.0	0.50	5151294	31	1.0	0.50	5151294
Available (CaCl2) pH	pH	5.81	5.99			5153106	7.27			5153106
WAD Cyanide (Free)	ug/g	0.07	0.09	0.01	0.005	5153321	0.26	0.01	0.005	5153321
Chromium (VI)	ug/g	ND	ND	0.2	0.05	5152238	ND	0.2	0.05	5152238
Metals										
Hot Water Ext. Boron (B)	ug/g		1.1	0.050	0.030	5153124	0.32	0.050	0.030	5153309
Acid Extractable Antimony (Sb)	ug/g		0.30	0.20	0.10	5153043	5.9	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g		2.1	1.0	0.10	5153043	17	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g		100	0.50	0.30	5153043	100	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g		0.25	0.20	0.020	5153043	0.37	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g		0.25	0.10	0.030	5153043	3.4	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g		13	1.0	0.20	5153043	42	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g		4.7	0.10	0.020	5153043	8.6	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g		14	0.50	0.20	5153043	110	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g		40	1.0	0.10	5153043	350	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g		470	50	N/A	5153040	1700	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g		1.0	0.50	0.10	5153043	4.1	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g		11	0.50	0.20	5153043	550	2.5	1.0	5153043
Acid Extractable Selenium (Se)	ug/g		ND	0.50	0.10	5153043	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g		0.23	0.20	0.040	5153043	0.36	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g		0.18	0.050	0.010	5153043	0.19	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g		1.4	1.0	0.20	5153043	230	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g		0.33	0.050	0.030	5153043	0.65	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g		19	5.0	0.50	5153043	27	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g		50	5.0	0.50	5153043	590	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g		0.052	0.050	0.030	5153043	0.64	0.050	0.030	5153043

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
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N/A = Not Applicable

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE278		FBE279	FBE297			
Sampling Date		2017/08/30 11:09		2017/08/30 14:18	2017/08/31 08:26			
COC Number		625115-02-01		625115-02-01	625115-03-01			
	UNITS	**A0220 MW10/17**	**QC Batch**	**A0231 BH13/17**	**A0241 MW5**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.17	5150107	0.19	0.19			5150107
Inorganics								
Conductivity	mS/cm	0.38	5153325	0.31	0.28	0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND	5153414	ND	ND	5	N/A	5153414
Moisture	%	38	5151294	36		1.0	0.50	5151294
Available (CaCl2) pH	pH	6.82	5153106	7.29	7.52			5153106
WAD Cyanide (Free)	ug/g	0.20	5153321	0.13	0.04	0.01	0.005	5153321
Chromium (VI)	ug/g	ND	5152238	ND	ND	0.2	0.05	5152238
Metals								
Hot Water Ext. Boron (B)	ug/g	0.61	5153124	0.30	0.30	0.050	0.030	5153309
Acid Extractable Antimony (Sb)	ug/g	9.8	5153043	0.73	0.29	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	12	5153043	3.0	2.6	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	280	5153043	120	67	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	0.38	5153043	0.39	0.26	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	1.7	5153043	0.49	0.18	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	51	5153043	25	13	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	9.5	5153043	5.8	4.2	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	210	5153043	30	16	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	530	5153043	110	20	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	1800	5153040	890	720	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	6.7	5153043	1.9	1.7	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	43	5153043	14	8.6	0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	0.91	5153043	ND	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	0.99	5153043	ND	ND	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.21	5153043	0.13	0.14	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	210	5153043	57	5.8	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.66	5153043	0.53	0.53	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	23	5153043	32	18	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	880	5153043	230	32	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	0.27	5153043	0.15	ND	0.050	0.030	5153043

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE299		FBE301	FBE301			
Sampling Date		2017/08/31 08:34		2017/08/31 10:10	2017/08/31 10:10			
COC Number		625115-03-01		625115-03-01	625115-03-01			
	UNITS	**A0245 MW5**	**RDL**	**A0254 MW9/17**	**A0254 MW9/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.31		0.27				5150107
Inorganics								
Conductivity	mS/cm	0.24	0.002	0.13	0.13	0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND	5	ND		5	N/A	5153414
Moisture	%	11	1.0	13		1.0	0.50	5151294
Available (CaCl2) pH	pH	7.61		7.83				5153106
WAD Cyanide (Free)	ug/g	ND	0.01	ND		0.01	0.005	5153321
Chromium (VI)	ug/g	ND	0.2	ND		0.2	0.05	5152238
Metals								
Hot Water Ext. Boron (B)	ug/g	0.12	0.050	0.17		0.050	0.030	5153124
Acid Extractable Antimony (Sb)	ug/g	ND	0.20	ND		0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	13	1.0	3.2		1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	35	0.50	96		0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	ND	0.20	0.31		0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	ND	0.10	0.11		0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	9.9	1.0	11		1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	4.5	0.10	4.9		0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	18	0.50	7.4		0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	33	1.0	8.7		1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	4800	50	110		100	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	3.4	0.50	1.4		0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	18	0.50	7.8		0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	ND	0.50	ND		0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	ND	0.20	ND		0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.13	0.050	0.14		0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	16	1.0	ND		1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.69	0.050	0.32		0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	8.0	5.0	21		5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	37	5.0	13		5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	ND	0.050	ND		0.050	0.030	5153043

RDL = Reportable Detection Limit
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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME SOIL INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE304	FBE304			
Sampling Date		2017/08/31 10:00	2017/08/31 10:00			
COC Number		625115-03-01	625115-03-01			
	UNITS	**A0251 MW9/17**	**A0251 MW9/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters						
Sodium Adsorption Ratio	N/A	0.23				5150107
Inorganics						
Conductivity	mS/cm	0.15		0.002	0.0005	5153325
Fluoride (F-)	ug/g	ND		5	N/A	5153414
Moisture	%	12		1.0	0.50	5151294
Available (CaCl2) pH	pH	7.50				5153106
WAD Cyanide (Free)	ug/g	ND		0.01	0.005	5153321
Chromium (VI)	ug/g	ND		0.2	0.05	5152238
Metals						
Hot Water Ext. Boron (B)	ug/g	0.22		0.050	0.030	5153124
Acid Extractable Antimony (Sb)	ug/g	0.36	0.30	0.20	0.10	5153043
Acid Extractable Arsenic (As)	ug/g	4.5	3.9	1.0	0.10	5153043
Acid Extractable Barium (Ba)	ug/g	110	100	0.50	0.30	5153043
Acid Extractable Beryllium (Be)	ug/g	0.44	0.42	0.20	0.020	5153043
Acid Extractable Cadmium (Cd)	ug/g	0.15	0.24	0.10	0.030	5153043
Acid Extractable Chromium (Cr)	ug/g	17	17	1.0	0.20	5153043
Acid Extractable Cobalt (Co)	ug/g	6.2	5.8	0.10	0.020	5153043
Acid Extractable Copper (Cu)	ug/g	22	22	0.50	0.20	5153043
Acid Extractable Lead (Pb)	ug/g	32	31	1.0	0.10	5153043
Acid Extractable Sulphur (S)	ug/g	270	270	50	N/A	5153040
Acid Extractable Molybdenum (Mo)	ug/g	1.4	1.7	0.50	0.10	5153043
Acid Extractable Nickel (Ni)	ug/g	13	11	0.50	0.20	5153043
Acid Extractable Selenium (Se)	ug/g	ND	ND	0.50	0.10	5153043
Acid Extractable Silver (Ag)	ug/g	0.40	0.39	0.20	0.040	5153043
Acid Extractable Thallium (Tl)	ug/g	0.24	0.22	0.050	0.010	5153043
Acid Extractable Tin (Sn)	ug/g	1.9	2.3	1.0	0.20	5153043
Acid Extractable Uranium (U)	ug/g	0.46	0.47	0.050	0.030	5153043
Acid Extractable Vanadium (V)	ug/g	25	25	5.0	0.50	5153043
Acid Extractable Zinc (Zn)	ug/g	54	52	5.0	0.50	5153043
Acid Extractable Mercury (Hg)	ug/g	0.085	0.096	0.050	0.030	5153043

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CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE228		FBE229		FBE231			
Sampling Date		2017/08/30 09:40		2017/08/30 09:54		2017/08/30 14:38			
COC Number		625115-01-01		625115-01-01		625115-01-01			
	UNITS	A0215 MW7/17	QC Batch	A0217 MW7/17	QC Batch	A0235 MW8/17	RDL	MDL	QC Batch
Inorganics									
Moisture	%	21	5152888	17	5152888	32	1.0	0.50	5152888
Volatile Organics									
Acetone (2-Propanone)	ug/g	ND	5152114	ND	5152114	ND	0.50	0.50	5152114
Benzene	ug/g	ND	5152114	ND	5152114	ND	0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Bromoform	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Bromomethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Chlorobenzene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Chloroform	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	5152114	ND	5152114	ND	0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	5152114	ND	5152114	ND	0.040	0.040	5152114
Ethylbenzene	ug/g	ND	5152114	ND	5152114	0.048	0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Hexane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	5152114	ND	5152114	ND	0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	5152114	ND	5152114	ND	0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Styrene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,1,1,2-Tetrachloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE228		FBE229		FBE231			
Sampling Date		2017/08/30 09:40		2017/08/30 09:54		2017/08/30 14:38			
COC Number		625115-01-01		625115-01-01		625115-01-01			
	UNITS	A0215 MW7/17	QC Batch	A0217 MW7/17	QC Batch	A0235 MW8/17	RDL	MDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Toluene	ug/g	ND	5152114	ND	5152114	0.72	0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
Trichloroethylene	ug/g	ND	5152114	ND	5152114	0.011	0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	5152114	ND	5152114	ND	0.020	0.020	5152114
p+m-Xylene	ug/g	ND	5152114	ND	5152114	0.48	0.020	0.020	5152114
o-Xylene	ug/g	ND	5152114	ND	5152114	0.053	0.020	0.020	5152114
Total Xylenes	ug/g	ND	5152114	ND	5152114	0.53	0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	5152114	ND	5152114	ND	0.050	0.050	5152114
F1 (C6-C10)	ug/g	ND	5152114	ND	5152114	ND	10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	ND	5152114	ND	5152114	ND	10	N/A	5152114
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	ND	5154622	ND	5153651	110	10	5.0	5154622
F3 (C16-C34 Hydrocarbons)	ug/g	140	5154622	130	5153651	1400	50	5.0	5154622
F4 (C34-C50 Hydrocarbons)	ug/g	95	5154622	190	5153651	530	50	10	5154622
Reached Baseline at C50	ug/g	No	5154622	No	5153651	No			5154622
Surrogate Recovery (%)									
o-Terphenyl	%	87	5154622	94	5153651	90			5154622
4-Bromofluorobenzene	%	92	5152114	92	5152114	95			5152114
D10-o-Xylene	%	78	5152114	75	5152114	81			5152114
D4-1,2-Dichloroethane	%	109	5152114	109	5152114	109			5152114
D8-Toluene	%	94	5152114	94	5152114	93			5152114

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

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE232	FBE233	FBE235	FBE236			
Sampling Date		2017/08/30 11:04	2017/08/30 11:12	2017/08/30 13:36	2017/08/30 13:48			
COC Number		625115-01-01	625115-01-01	625115-01-01	625115-01-01			
	UNITS	A0219 MW10/17	A0221 MW10/17	A0228 BH11/17	A0229 BH11/17	RDL	MDL	QC Batch
Inorganics								
Moisture	%	27	25	24	25	1.0	0.50	5152888
Volatile Organics								
Acetone (2-Propanone)	ug/g	ND	ND	ND	ND	0.50	0.50	5152114
Benzene	ug/g	ND	ND	ND	ND	0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Bromoform	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Bromomethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Chlorobenzene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Chloroform	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	ND	0.060	ND	0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	ND	ND	ND	0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	ND	ND	ND	0.040	0.040	5152114
Ethylbenzene	ug/g	0.44	0.24	0.010	0.011	0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Hexane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	ND	ND	ND	0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND	ND	ND	0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Styrene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1,1,2-Tetrachloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE232	FBE233	FBE235	FBE236			
Sampling Date		2017/08/30 11:04	2017/08/30 11:12	2017/08/30 13:36	2017/08/30 13:48			
COC Number		625115-01-01	625115-01-01	625115-01-01	625115-01-01			
	UNITS	**A0219 MW10/17**	**A0221 MW10/17**	**A0228 BH11/17**	**A0229 BH11/17**	**RDL**	**MDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Toluene	ug/g	0.024	ND	0.030	0.024	0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Trichloroethylene	ug/g	ND	ND	ND	0.48	0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	ND	ND	ND	0.020	0.020	5152114
p+m-Xylene	ug/g	2.7	1.6	0.080	0.070	0.020	0.020	5152114
o-Xylene	ug/g	2.3	1.2	ND	ND	0.020	0.020	5152114
Total Xylenes	ug/g	5.0	2.8	0.080	0.070	0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
F1 (C6-C10)	ug/g	20	12	ND	ND	10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	15	ND	ND	ND	10	N/A	5152114
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	130	74	ND	32	10	5.0	5154622
F3 (C16-C34 Hydrocarbons)	ug/g	520	170	100	620	50	5.0	5154622
F4 (C34-C50 Hydrocarbons)	ug/g	190	110	65	370	50	10	5154622
Reached Baseline at C50	ug/g	No	No	No	No			5154622
Surrogate Recovery (%)								
o-Terphenyl	%	86	87	85	90			5154622
4-Bromofluorobenzene	%	103	100	97	97			5152114
D10-o-Xylene	%	83	84	77	77			5152114
D4-1,2-Dichloroethane	%	110	108	107	108			5152114
D8-Toluene	%	93	94	94	94			5152114

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

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE237	FBE270	FBE272	FBE272			
Sampling Date		2017/08/30 13:08	2017/08/30 13:19	2017/08/30 14:10	2017/08/30 14:10			
COC Number		625115-01-01	625115-02-01	625115-02-01	625115-02-01			
	UNITS	A0223 BH12/17	A0224 BH12/17	A0230 BH13/17	A0230 BH13/17 Lab-Dup	RDL	MDL	QC Batch
Inorganics								
Moisture	%	18	20	19		1.0	0.50	5152888
Volatile Organics								
Acetone (2-Propanone)	ug/g	ND	ND	ND		0.50	0.50	5152114
Benzene	ug/g	ND	ND	ND		0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	ND	ND		0.050	0.050	5152114
Bromoform	ug/g	ND	ND	ND		0.050	0.050	5152114
Bromomethane	ug/g	ND	ND	ND		0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	ND	ND		0.050	0.050	5152114
Chlorobenzene	ug/g	ND	ND	ND		0.050	0.050	5152114
Chloroform	ug/g	ND	ND	ND		0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	ND	ND		0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	ND	ND		0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	ND	ND		0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	ND	ND		0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND	ND		0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	ND	ND		0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	ND	ND		0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	ND	ND		0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	ND	ND		0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	ND	ND		0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	ND	ND		0.040	0.040	5152114
Ethylbenzene	ug/g	ND	ND	ND		0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	ND	ND		0.050	0.050	5152114
Hexane	ug/g	ND	ND	ND		0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	ND	ND		0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	ND	ND		0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND	ND		0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	ND	ND		0.050	0.050	5152114
Styrene	ug/g	ND	ND	ND		0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE237	FBE270	FBE272	FBE272			
Sampling Date		2017/08/30 13:08	2017/08/30 13:19	2017/08/30 14:10	2017/08/30 14:10			
COC Number		625115-01-01	625115-02-01	625115-02-01	625115-02-01			
	UNITS	**A0223 BH12/17**	**A0224 BH12/17**	**A0230 BH13/17**	**A0230 BH13/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
1,1,1,2-Tetrachloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
1,1,2,2-Tetrachloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	ND	ND		0.050	0.050	5152114
Toluene	ug/g	ND	ND	ND		0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	ND	ND		0.050	0.050	5152114
Trichloroethylene	ug/g	ND	ND	ND		0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	ND	ND		0.020	0.020	5152114
p+m-Xylene	ug/g	0.026	0.11	ND		0.020	0.020	5152114
o-Xylene	ug/g	ND	ND	ND		0.020	0.020	5152114
Total Xylenes	ug/g	0.026	0.11	ND		0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND	ND		0.050	0.050	5152114
F1 (C6-C10)	ug/g	ND	ND	ND		10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	ND	ND	ND		10	N/A	5152114
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	ND	ND	ND	ND	10	5.0	5154622
F3 (C16-C34 Hydrocarbons)	ug/g	150	210	ND	ND	50	5.0	5154622
F4 (C34-C50 Hydrocarbons)	ug/g	68	68	ND	ND	50	10	5154622
Reached Baseline at C50	ug/g	No	No	Yes	Yes			5154622
Surrogate Recovery (%)								
o-Terphenyl	%	91	84	85	86			5154622
4-Bromofluorobenzene	%	95	95	94				5152114
D10-o-Xylene	%	77	74	72				5152114
D4-1,2-Dichloroethane	%	109	109	109				5152114
D8-Toluene	%	92	93	92				5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE273	FBE274		FBE275			
Sampling Date		2017/08/30 14:25	2017/08/30 14:12		2017/08/31 08:00			
COC Number		625115-02-01	625115-02-01		625115-02-01			
	UNITS	**A0232 BH13/17**	**A0233 BH13/17**	**QC Batch**	**A0256 POND**	**RDL**	**MDL**	**QC Batch**
Inorganics								
Moisture	%	24	27	5152888	41	1.0	0.50	5152888
Volatile Organics								
Acetone (2-Propanone)	ug/g	ND	ND	5152114	0.57	0.50	0.50	5152114
Benzene	ug/g	ND	ND	5152114	ND	0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Bromoform	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Bromomethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Chlorobenzene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Chloroform	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	ND	5152114	ND	0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	ND	5152114	ND	0.040	0.040	5152114
Ethylbenzene	ug/g	0.015	ND	5152114	ND	0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Hexane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	ND	5152114	ND	0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND	5152114	ND	0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Styrene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,1,1,2-Tetrachloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE273	FBE274		FBE275			
Sampling Date		2017/08/30 14:25	2017/08/30 14:12		2017/08/31 08:00			
COC Number		625115-02-01	625115-02-01		625115-02-01			
	UNITS	A0232 BH13/17	A0233 BH13/17	QC Batch	A0256 POND	RDL	MDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Toluene	ug/g	0.020	ND	5152114	ND	0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
Trichloroethylene	ug/g	ND	ND	5152114	ND	0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	ND	5152114	ND	0.020	0.020	5152114
p+m-Xylene	ug/g	0.048	ND	5152114	ND	0.020	0.020	5152114
o-Xylene	ug/g	ND	ND	5152114	ND	0.020	0.020	5152114
Total Xylenes	ug/g	0.048	ND	5152114	ND	0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND	5152114	ND	0.050	0.050	5152114
F1 (C6-C10)	ug/g	ND	ND	5152114	ND	10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	ND	ND	5152114	ND	10	N/A	5152114
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	11	ND	5154622	13	10	5.0	5153651
F3 (C16-C34 Hydrocarbons)	ug/g	410	ND	5154622	76	50	5.0	5153651
F4 (C34-C50 Hydrocarbons)	ug/g	78	ND	5154622	ND	50	10	5153651
Reached Baseline at C50	ug/g	No	Yes	5154622	Yes			5153651
Surrogate Recovery (%)								
o-Terphenyl	%	90	86	5154622	97			5153651
4-Bromofluorobenzene	%	95	93	5152114	92			5152114
D10-o-Xylene	%	70	79	5152114	74			5152114
D4-1,2-Dichloroethane	%	108	108	5152114	109			5152114
D8-Toluene	%	92	93	5152114	94			5152114

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

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE297	FBE298	FBE300	FBE300			
Sampling Date		2017/08/31 08:26	2017/08/31 08:34	2017/08/31 10:00	2017/08/31 10:00			
COC Number		625115-03-01	625115-03-01	625115-03-01	625115-03-01			
	UNITS	**A0241 MW5**	**A0244 MW5**	**A0252 MW9/17**	**A0252 MW9/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Inorganics								
Moisture	%	15	29	6.0		1.0	0.50	5152888
Volatile Organics								
Acetone (2-Propanone)	ug/g	ND	0.54	ND	ND	0.50	0.50	5152114
Benzene	ug/g	ND	0.014	ND	ND	0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Bromoform	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Bromomethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Chlorobenzene	ug/g	ND	0.35	ND	ND	0.050	0.050	5152114
Chloroform	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	0.12	ND	ND	0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	ND	ND	ND	0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	ND	ND	ND	0.040	0.040	5152114
Ethylbenzene	ug/g	ND	0.034	ND	ND	0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Hexane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	ND	ND	ND	0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND	ND	ND	0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Styrene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE297	FBE298	FBE300	FBE300			
Sampling Date		2017/08/31 08:26	2017/08/31 08:34	2017/08/31 10:00	2017/08/31 10:00			
COC Number		625115-03-01	625115-03-01	625115-03-01	625115-03-01			
	UNITS	**A0241 MW5**	**A0244 MW5**	**A0252 MW9/17**	**A0252 MW9/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
1,1,1,2-Tetrachloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1,2,2-Tetrachloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Toluene	ug/g	ND	0.045	ND	ND	0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
Trichloroethylene	ug/g	ND	0.047	ND	ND	0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	ND	ND	ND	0.020	0.020	5152114
p+m-Xylene	ug/g	0.022	1.2	ND	ND	0.020	0.020	5152114
o-Xylene	ug/g	ND	0.058	ND	ND	0.020	0.020	5152114
Total Xylenes	ug/g	0.022	1.3	ND	ND	0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND	ND	ND	0.050	0.050	5152114
F1 (C6-C10)	ug/g	ND	ND	ND	ND	10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	ND	ND	ND	ND	10	N/A	5152114
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	ND	79	ND		10	5.0	5154622
F3 (C16-C34 Hydrocarbons)	ug/g	ND	1400	ND		50	5.0	5154622
F4 (C34-C50 Hydrocarbons)	ug/g	ND	1700	ND		50	10	5154622
Reached Baseline at C50	ug/g	Yes	No	Yes				5154622
Surrogate Recovery (%)								
o-Terphenyl	%	83	86	88				5154622
4-Bromofluorobenzene	%	94	99	93	92			5152114
D10-o-Xylene	%	72	77	76	75			5152114
D4-1,2-Dichloroethane	%	109	109	106	106			5152114
D8-Toluene	%	92	92	94	94			5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected
N/A = Not Applicable

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE302			
Sampling Date		2017/08/31 10:15			
COC Number		625115-03-01			
	UNITS	A0255 MW9/17	RDL	MDL	QC Batch
Inorganics					
Moisture	%	17	1.0	0.50	5152888
Volatile Organics					
Acetone (2-Propanone)	ug/g	ND	0.50	0.50	5152114
Benzene	ug/g	ND	0.0060	0.0060	5152114
Bromodichloromethane	ug/g	ND	0.050	0.050	5152114
Bromoform	ug/g	ND	0.050	0.050	5152114
Bromomethane	ug/g	ND	0.050	0.050	5152114
Carbon Tetrachloride	ug/g	ND	0.050	0.050	5152114
Chlorobenzene	ug/g	ND	0.050	0.050	5152114
Chloroform	ug/g	ND	0.050	0.050	5152114
Dibromochloromethane	ug/g	ND	0.050	0.050	5152114
1,2-Dichlorobenzene	ug/g	ND	0.050	0.050	5152114
1,3-Dichlorobenzene	ug/g	ND	0.050	0.050	5152114
1,4-Dichlorobenzene	ug/g	ND	0.050	0.050	5152114
Dichlorodifluoromethane (FREON 12)	ug/g	ND	0.050	0.050	5152114
1,1-Dichloroethane	ug/g	ND	0.050	0.050	5152114
1,2-Dichloroethane	ug/g	ND	0.050	0.050	5152114
1,1-Dichloroethylene	ug/g	ND	0.050	0.050	5152114
cis-1,2-Dichloroethylene	ug/g	ND	0.050	0.050	5152114
trans-1,2-Dichloroethylene	ug/g	ND	0.050	0.050	5152114
1,2-Dichloropropane	ug/g	ND	0.050	0.050	5152114
cis-1,3-Dichloropropene	ug/g	ND	0.030	0.030	5152114
trans-1,3-Dichloropropene	ug/g	ND	0.040	0.040	5152114
Ethylbenzene	ug/g	ND	0.010	0.010	5152114
Ethylene Dibromide	ug/g	ND	0.050	0.050	5152114
Hexane	ug/g	ND	0.050	0.050	5152114
Methylene Chloride(Dichloromethane)	ug/g	ND	0.050	0.050	5152114
Methyl Isobutyl Ketone	ug/g	ND	0.50	0.50	5152114
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	0.50	0.50	5152114
Methyl t-butyl ether (MTBE)	ug/g	ND	0.050	0.050	5152114
Styrene	ug/g	ND	0.050	0.050	5152114
1,1,1,2-Tetrachloroethane	ug/g	ND	0.050	0.050	5152114

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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CCME VOC F1-F4 (SOIL)

Maxxam ID		FBE302			
Sampling Date		2017/08/31 10:15			
COC Number		625115-03-01			
	UNITS	**A0255 MW9/17**	**RDL**	**MDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/g	ND	0.050	0.050	5152114
Tetrachloroethylene	ug/g	ND	0.050	0.050	5152114
Toluene	ug/g	ND	0.020	0.020	5152114
1,1,1-Trichloroethane	ug/g	ND	0.050	0.050	5152114
1,1,2-Trichloroethane	ug/g	ND	0.050	0.050	5152114
Trichloroethylene	ug/g	ND	0.010	0.010	5152114
Vinyl Chloride	ug/g	ND	0.020	0.020	5152114
p+m-Xylene	ug/g	ND	0.020	0.020	5152114
o-Xylene	ug/g	ND	0.020	0.020	5152114
Total Xylenes	ug/g	ND	0.020	0.020	5152114
Trichlorofluoromethane (FREON 11)	ug/g	ND	0.050	0.050	5152114
F1 (C6-C10)	ug/g	ND	10	N/A	5152114
F1 (C6-C10) - BTEX	ug/g	ND	10	N/A	5152114
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	ND	10	5.0	5154622
F3 (C16-C34 Hydrocarbons)	ug/g	ND	50	5.0	5154622
F4 (C34-C50 Hydrocarbons)	ug/g	ND	50	10	5154622
Reached Baseline at C50	ug/g	Yes			5154622
Surrogate Recovery (%)					
o-Terphenyl	%	87			5154622
4-Bromofluorobenzene	%	93			5152114
D10-o-Xylene	%	76			5152114
D4-1,2-Dichloroethane	%	107			5152114
D8-Toluene	%	94			5152114

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

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PAHS (SOIL)

Maxxam ID		FBE229				FBE230	FBE232			
Sampling Date		2017/08/30 09:54				2017/08/30 14:30	2017/08/30 11:04			
COC Number		625115-01-01				625115-01-01	625115-01-01			
	UNITS	A0217 MW7/17	RDL	MDL	QC Batch	A0234 MW8/17	A0219 MW10/17	RDL	MDL	QC Batch
Inorganics										
Moisture	%		1.0	0.50	5154063	20		1.0	0.50	5154063
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	ND	0.0071	N/A	5150108	0.057	5.3	0.0071	N/A	5150108
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.0050	0.0020	5153622	0.013	0.099	0.0050	0.0020	5153892
Acenaphthylene	ug/g	ND	0.0050	0.0010	5153622	ND	0.018	0.0050	0.0010	5153892
Anthracene	ug/g	ND (1)	0.010	0.0020	5153622	0.023	0.015	0.0050	0.0010	5153892
Benzo(a)anthracene	ug/g	ND	0.0050	0.0020	5153622	0.062	0.032	0.0050	0.0020	5153892
Benzo(a)pyrene	ug/g	0.029	0.0050	0.0010	5153622	0.053	0.029	0.0050	0.0010	5153892
Benzo(b/j)fluoranthene	ug/g	0.017	0.0050	0.0020	5153622	0.078	0.044	0.0050	0.0020	5153892
Benzo(g,h,i)perylene	ug/g	0.043	0.0050	0.0040	5153622	0.033	0.020	0.0050	0.0040	5153892
Benzo(k)fluoranthene	ug/g	ND	0.0050	0.0020	5153622	0.024	0.016	0.0050	0.0020	5153892
Chrysene	ug/g	ND (1)	0.010	0.0040	5153622	0.052	0.036	0.0050	0.0020	5153892
Dibenz(a,h)anthracene	ug/g	ND	0.0050	0.0040	5153622	0.0077	ND	0.0050	0.0040	5153892
Fluoranthene	ug/g	0.0054	0.0050	0.0010	5153622	0.14	0.073	0.0050	0.0010	5153892
Fluorene	ug/g	ND	0.0050	0.0010	5153622	0.014	0.21	0.0050	0.0010	5153892
Indeno(1,2,3-cd)pyrene	ug/g	0.014	0.0050	0.0040	5153622	0.034	0.020	0.0050	0.0040	5153892
1-Methylnaphthalene	ug/g	ND	0.0050	0.0010	5153622	0.021	2.3	0.0050	0.0010	5153892
2-Methylnaphthalene	ug/g	ND	0.0050	0.0010	5153622	0.036	2.9	0.0050	0.0010	5153892
Naphthalene	ug/g	ND	0.0050	0.0010	5153622	0.054	3.7	0.0050	0.0010	5153892
Phenanthrene	ug/g	0.0085	0.0050	0.0010	5153622	0.088	0.055	0.0050	0.0010	5153892
Pyrene	ug/g	0.021	0.0050	0.0010	5153622	0.12	0.076	0.0050	0.0010	5153892
Surrogate Recovery (%)										
D10-Anthracene	%	83			5153622	95	95			5153892
D14-Terphenyl (FS)	%	84			5153622	88	85			5153892
D8-Acenaphthylene	%	86			5153622	91	94			5153892

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
N/A = Not Applicable
(1) DL was raised due to matrix interference.

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PAHS (SOIL)

Maxxam ID		FBE234			FBE271			FBE272			
Sampling Date		2017/08/30 13:30			2017/08/30 13:22			2017/08/30 14:10			
COC Number		625115-01-01			625115-02-01			625115-02-01			
	UNITS	**A0227 BH11/17**	**RDL**	**MDL**	**A0225 BH12/17**	**RDL**	**MDL**	**A0230 BH13/17**	**RDL**	**MDL**	**QC Batch**
Inorganics											
Moisture	%	16	1.0	0.50		1.0	0.50		1.0	0.50	5154063
Calculated Parameters											
Methylnaphthalene, 2-(1-)	ug/g	ND	0.0071	N/A	ND	0.21	N/A	0.013	0.0071	N/A	5150108
Polyaromatic Hydrocarbons											
Acenaphthene	ug/g	ND	0.0050	0.0020	ND	0.050	0.020	ND	0.0050	0.0020	5153892
Acenaphthylene	ug/g	ND	0.0050	0.0010	ND	0.050	0.010	ND	0.0050	0.0010	5153892
Anthracene	ug/g	0.011	0.0050	0.0010	ND	0.050	0.010	0.010	0.0050	0.0010	5153892
Benzo(a)anthracene	ug/g	0.043	0.0050	0.0020	ND	0.050	0.020	0.039	0.0050	0.0020	5153892
Benzo(a)pyrene	ug/g	0.043	0.0050	0.0010	ND	0.050	0.010	0.039	0.0050	0.0010	5153892
Benzo(b/j)fluoranthene	ug/g	0.061	0.0050	0.0020	ND	0.050	0.020	0.053	0.0050	0.0020	5153892
Benzo(g,h,i)perylene	ug/g	0.024	0.0050	0.0040	ND	0.050	0.040	0.021	0.0050	0.0040	5153892
Benzo(k)fluoranthene	ug/g	0.019	0.0050	0.0020	ND	0.050	0.020	0.017	0.0050	0.0020	5153892
Chrysene	ug/g	0.044	0.0050	0.0020	ND	0.050	0.020	0.035	0.0050	0.0020	5153892
Dibenz(a,h)anthracene	ug/g	0.0062	0.0050	0.0040	ND	0.050	0.040	0.0062	0.0050	0.0040	5153892
Fluoranthene	ug/g	0.076	0.0050	0.0010	0.10	0.050	0.010	0.069	0.0050	0.0010	5153892
Fluorene	ug/g	ND	0.0050	0.0010	ND	0.050	0.010	ND	0.0050	0.0010	5153892
Indeno(1,2,3-cd)pyrene	ug/g	0.028	0.0050	0.0040	ND	0.050	0.040	0.023	0.0050	0.0040	5153892
1-Methylnaphthalene	ug/g	ND	0.0050	0.0010	ND	0.050	0.010	0.0051	0.0050	0.0010	5153892
2-Methylnaphthalene	ug/g	ND	0.0050	0.0010	ND (1)	0.20	0.040	0.0081	0.0050	0.0010	5153892
Naphthalene	ug/g	ND	0.0050	0.0010	ND	0.050	0.010	ND	0.0050	0.0010	5153892
Phenanthrene	ug/g	0.042	0.0050	0.0010	0.073	0.050	0.010	0.041	0.0050	0.0010	5153892
Pyrene	ug/g	0.065	0.0050	0.0010	0.10	0.050	0.010	0.058	0.0050	0.0010	5153892
Surrogate Recovery (%)											
D10-Anthracene	%	98			98			97			5153892
D14-Terphenyl (FS)	%	86			85			87			5153892
D8-Acenaphthylene	%	92			94			95			5153892

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
N/A = Not Applicable
(1) Detection Limit was raised due to matrix interferences.

Maxxam Job #: B7J1295
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AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PAHS (SOIL)

Maxxam ID		FBE275				FBE299			
Sampling Date		2017/08/31 08:00				2017/08/31 08:34			
COC Number		625115-02-01				625115-03-01			
	UNITS	**A0256 POND**	**RDL**	**MDL**	**QC Batch**	**A0245 MW5**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters									
Methylnaphthalene, 2-(1-)	ug/g	ND	0.014	N/A	5150108	ND	0.021	N/A	5150108
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	ND	0.010	0.0040	5153622	0.0058	0.0050	0.0020	5153892
Acenaphthylene	ug/g	ND	0.010	0.0020	5153622	ND	0.0050	0.0010	5153892
Anthracene	ug/g	ND (1)	0.020	0.0040	5153622	ND	0.0050	0.0010	5153892
Benzo(a)anthracene	ug/g	0.035	0.010	0.0040	5153622	ND	0.0050	0.0020	5153892
Benzo(a)pyrene	ug/g	0.041	0.010	0.0020	5153622	ND	0.0050	0.0010	5153892
Benzo(b/j)fluoranthene	ug/g	0.059	0.010	0.0040	5153622	ND	0.0050	0.0020	5153892
Benzo(g,h,i)perylene	ug/g	0.031	0.010	0.0080	5153622	ND	0.0050	0.0040	5153892
Benzo(k)fluoranthene	ug/g	0.020	0.010	0.0040	5153622	ND	0.0050	0.0020	5153892
Chrysene	ug/g	0.036	0.010	0.0040	5153622	ND	0.0050	0.0020	5153892
Dibenz(a,h)anthracene	ug/g	ND	0.010	0.0080	5153622	ND	0.0050	0.0040	5153892
Fluoranthene	ug/g	0.077	0.010	0.0020	5153622	0.012	0.0050	0.0010	5153892
Fluorene	ug/g	ND	0.010	0.0020	5153622	0.0063	0.0050	0.0010	5153892
Indeno(1,2,3-cd)pyrene	ug/g	0.029	0.010	0.0080	5153622	ND	0.0050	0.0040	5153892
1-Methylnaphthalene	ug/g	ND	0.010	0.0020	5153622	0.012	0.0050	0.0010	5153892
2-Methylnaphthalene	ug/g	ND	0.010	0.0020	5153622	ND (2)	0.020	0.0040	5153892
Naphthalene	ug/g	ND	0.010	0.0020	5153622	ND	0.0050	0.0010	5153892
Phenanthrene	ug/g	0.037	0.010	0.0020	5153622	0.018	0.0050	0.0010	5153892
Pyrene	ug/g	0.062	0.010	0.0020	5153622	0.011	0.0050	0.0010	5153892
Surrogate Recovery (%)									
D10-Anthracene	%	93			5153622	97			5153892
D14-Terphenyl (FS)	%	94			5153622	85			5153892
D8-Acenaphthylene	%	100			5153622	93			5153892

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
N/A = Not Applicable
(1) DL was raised due to matrix interference.
(2) Detection Limit was raised due to matrix interferences.

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PAHS (SOIL)

Maxxam ID		FBE301	FBE301			
Sampling Date		2017/08/31 10:10	2017/08/31 10:10			
COC Number		625115-03-01	625115-03-01			
	UNITS	**A0254 MW9/17**	**A0254 MW9/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters						
Methylnaphthalene, 2-(1-)	ug/g	ND		0.0071	N/A	5150108
Polyaromatic Hydrocarbons						
Acenaphthene	ug/g	ND	ND	0.0050	0.0020	5153892
Acenaphthylene	ug/g	ND	ND	0.0050	0.0010	5153892
Anthracene	ug/g	ND	ND	0.0050	0.0010	5153892
Benzo(a)anthracene	ug/g	ND	ND	0.0050	0.0020	5153892
Benzo(a)pyrene	ug/g	ND	ND	0.0050	0.0010	5153892
Benzo(b/j)fluoranthene	ug/g	ND	ND	0.0050	0.0020	5153892
Benzo(g,h,i)perylene	ug/g	ND	ND	0.0050	0.0040	5153892
Benzo(k)fluoranthene	ug/g	ND	ND	0.0050	0.0020	5153892
Chrysene	ug/g	ND	ND	0.0050	0.0020	5153892
Dibenz(a,h)anthracene	ug/g	ND	ND	0.0050	0.0040	5153892
Fluoranthene	ug/g	ND	ND	0.0050	0.0010	5153892
Fluorene	ug/g	ND	ND	0.0050	0.0010	5153892
Indeno(1,2,3-cd)pyrene	ug/g	ND	ND	0.0050	0.0040	5153892
1-Methylnaphthalene	ug/g	ND	ND	0.0050	0.0010	5153892
2-Methylnaphthalene	ug/g	ND	ND	0.0050	0.0010	5153892
Naphthalene	ug/g	ND	ND	0.0050	0.0010	5153892
Phenanthrene	ug/g	ND	ND	0.0050	0.0010	5153892
Pyrene	ug/g	ND	ND	0.0050	0.0010	5153892
Surrogate Recovery (%)						
D10-Anthracene	%	93	92			5153892
D14-Terphenyl (FS)	%	87	89			5153892
D8-Acenaphthylene	%	85	84			5153892

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PCBS (SOIL)

Maxxam ID		FBE229	FBE230	FBE232	FBE234	FBE271			
Sampling Date		2017/08/30 09:54	2017/08/30 14:30	2017/08/30 11:04	2017/08/30 13:30	2017/08/30 13:22			
COC Number		625115-01-01	625115-01-01	625115-01-01	625115-01-01	625115-02-01			
	UNITS	**A0217 MW7/17**	**A0234 MW8/17**	**A0219 MW10/17**	**A0227 BH11/17**	**A0225 BH12/17**	**RDL**	**MDL**	**QC Batch**
PCBs									
Aroclor 1242	ug/g	ND	0.012	0.073	ND	0.070	0.010	0.0070	5153229
Aroclor 1248	ug/g	ND	ND	ND	ND	ND	0.010	0.0070	5153229
Aroclor 1254	ug/g	ND	ND	0.025	ND	0.011	0.010	0.0070	5153229
Aroclor 1260	ug/g	ND	0.015	0.090	ND	0.018	0.010	0.0070	5153229
Total PCB	ug/g	ND	0.027	0.19	ND	0.099	0.010	0.0070	5153229
Surrogate Recovery (%)									
Decachlorobiphenyl	%	88	82	117	63	72			5153229

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam ID		FBE272			FBE275			FBE299			
Sampling Date		2017/08/30 14:10			2017/08/31 08:00			2017/08/31 08:34			
COC Number		625115-02-01			625115-02-01			625115-03-01			
	UNITS	**A0230 BH13/17**	**RDL**	**MDL**	**A0256 POND**	**RDL**	**MDL**	**A0245 MW5**	**RDL**	**MDL**	**QC Batch**
PCBs											
Aroclor 1242	ug/g	ND	0.010	0.0070	ND	0.020	0.014	ND	0.010	0.0070	5153229
Aroclor 1248	ug/g	ND	0.010	0.0070	ND	0.020	0.014	ND	0.010	0.0070	5153229
Aroclor 1254	ug/g	ND	0.010	0.0070	ND	0.020	0.014	ND	0.010	0.0070	5153229
Aroclor 1260	ug/g	ND	0.010	0.0070	ND	0.020	0.014	ND	0.010	0.0070	5153229
Total PCB	ug/g	ND	0.010	0.0070	ND	0.020	0.014	ND	0.010	0.0070	5153229
Surrogate Recovery (%)											
Decachlorobiphenyl	%	69			88			72			5153229

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 153 PCBS (SOIL)

Maxxam ID		FBE301			
Sampling Date		2017/08/31 10:10			
COC Number		625115-03-01			
	UNITS	**A0254 MW9/17**	**RDL**	**MDL**	**QC Batch**
PCBs					
Aroclor 1242	ug/g	ND	0.010	0.0070	5153229
Aroclor 1248	ug/g	ND	0.010	0.0070	5153229
Aroclor 1254	ug/g	ND	0.010	0.0070	5153229
Aroclor 1260	ug/g	ND	0.010	0.0070	5153229
Total PCB	ug/g	ND	0.010	0.0070	5153229
Surrogate Recovery (%)					
Decachlorobiphenyl	%	86			5153229

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
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O.REG 558 TCLP INORGANICS PACKAGE (SOIL)

Maxxam ID		FBE303			
Sampling Date		2017/08/31 13:45			
COC Number		625115-03-01			
	UNITS	**A0250 COMP**	**RDL**	**MDL**	**QC Batch**
Inorganics					
Leachable Fluoride (F-)	mg/L	0.14	0.10	0.020	5155747
Leachable WAD Cyanide (Free)	mg/L	ND	0.010	0.0050	5155728
Leachable Nitrite (N)	mg/L	ND	0.10	0.050	5155737
Leachable Nitrate (N)	mg/L	ND	1.0	0.20	5155737
Leachable Nitrate + Nitrite (N)	mg/L	ND	1.0	0.20	5155737
Metals					
Leachable Mercury (Hg)	mg/L	ND	0.0010	0.00010	5155278
Leachable Arsenic (As)	mg/L	ND	0.2	0.01	5155389
Leachable Barium (Ba)	mg/L	1.0	0.2	0.01	5155389
Leachable Boron (B)	mg/L	ND	0.1	0.02	5155389
Leachable Cadmium (Cd)	mg/L	ND	0.05	0.0007	5155389
Leachable Chromium (Cr)	mg/L	ND	0.1	0.01	5155389
Leachable Lead (Pb)	mg/L	ND	0.1	0.001	5155389
Leachable Selenium (Se)	mg/L	ND	0.1	0.01	5155389
Leachable Silver (Ag)	mg/L	ND	0.01	0.001	5155389
Leachable Uranium (U)	mg/L	ND	0.01	0.001	5155389

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 558 TCLP LEACHATE PREPARATION (SOIL)

Maxxam ID		FBE303			
Sampling Date		2017/08/31 13:45			
COC Number		625115-03-01			
	UNITS	**A0250 COMP**	**RDL**	**MDL**	**QC Batch**
Inorganics					
Final pH	pH	5.48			5155273
Initial pH	pH	8.62			5155273
TCLP - % Solids	%	100	0.2	N/A	5155269
TCLP Extraction Fluid	N/A	FLUID 1			5155271

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

O.REG 558 TCLP PCBS (SOIL)

Maxxam ID		FBE303			
Sampling Date		2017/08/31 13:45			
COC Number		625115-03-01			
	UNITS	A0250 COMP	RDL	MDL	QC Batch
PCBs					
Leachable Total PCB	ug/L	ND	3.0	0.20	5155494
Surrogate Recovery (%)					
Leachable Decachlorobiphenyl	%	86			5155494

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 558 TCLP SEMI-VOLATILE ORGANICS (SOIL)

Maxxam ID		FBE303			
Sampling Date		2017/08/31 13:45			
COC Number		625115-03-01			
	UNITS	**A0250 COMP**	**RDL**	**MDL**	**QC Batch**
Semivolatile Organics					
Leachable Benzo(a)pyrene	ug/L	ND	0.10	0.010	5155829
Leachable m/p-Cresol	ug/L	ND	2.5	0.10	5155829
Leachable o-Cresol	ug/L	ND	2.5	0.10	5155829
Leachable Cresol Total	ug/L	ND	2.5	0.10	5155829
Leachable 2,4-Dichlorophenol	ug/L	ND	2.5	0.10	5155829
Leachable 2,4-Dinitrotoluene	ug/L	ND	10	0.50	5155829
Leachable Hexachlorobenzene	ug/L	ND	10	0.50	5155829
Leachable Hexachlorobutadiene	ug/L	ND	10	0.50	5155829
Leachable Hexachloroethane	ug/L	ND	10	0.50	5155829
Leachable Nitrobenzene	ug/L	ND	10	0.50	5155829
Leachable Pentachlorophenol	ug/L	ND	2.5	0.10	5155829
Leachable Pyridine	ug/L	ND	10	1.0	5155829
Leachable 2,3,4,6-Tetrachlorophenol	ug/L	ND	2.5	0.10	5155829
Leachable 2,4,5-Trichlorophenol	ug/L	ND	0.50	0.10	5155829
Leachable 2,4,6-Trichlorophenol	ug/L	ND	2.5	0.10	5155829
Surrogate Recovery (%)					
Leachable 2,4,6-Tribromophenol	%	85			5155829
Leachable 2-Fluorobiphenyl	%	72			5155829
Leachable 2-Fluorophenol	%	29			5155829
Leachable D14-Terphenyl (FS)	%	91			5155829
Leachable D5-Nitrobenzene	%	89			5155829
Leachable D5-Phenol	%	29			5155829

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

O.REG 558 TCLP VOLATILE ORGANICS HS (SOIL)

Maxxam ID		FBE303			
Sampling Date		2017/08/31 13:45			
COC Number		625115-03-01			
	UNITS	**A0250 COMP**	**RDL**	**MDL**	**QC Batch**
Charge/Prep Analysis					
Amount Extracted (Wet Weight) (g)	N/A	23	N/A	N/A	5153174
Volatile Organics					
Leachable Benzene	mg/L	ND	0.020	0.0020	5154951
Leachable Carbon Tetrachloride	mg/L	ND	0.020	0.0020	5154951
Leachable Chlorobenzene	mg/L	ND	0.020	0.0020	5154951
Leachable Chloroform	mg/L	ND	0.020	0.0020	5154951
Leachable 1,2-Dichlorobenzene	mg/L	ND	0.050	0.0040	5154951
Leachable 1,4-Dichlorobenzene	mg/L	ND	0.050	0.0040	5154951
Leachable 1,2-Dichloroethane	mg/L	ND	0.050	0.0040	5154951
Leachable 1,1-Dichloroethylene	mg/L	ND	0.020	0.0020	5154951
Leachable Methylene Chloride(Dichloromethane)	mg/L	ND	0.20	0.010	5154951
Leachable Methyl Ethyl Ketone (2-Butanone)	mg/L	ND	1.0	1.0	5154951
Leachable Tetrachloroethylene	mg/L	ND	0.020	0.0020	5154951
Leachable Trichloroethylene	mg/L	ND	0.020	0.0020	5154951
Leachable Vinyl Chloride	mg/L	ND	0.020	0.0040	5154951
Surrogate Recovery (%)					
Leachable 4-Bromofluorobenzene	%	97			5154951
Leachable D4-1,2-Dichloroethane	%	96			5154951
Leachable D8-Toluene	%	98			5154951

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

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		FBE228	FBE229	FBE231	FBE232			
Sampling Date		2017/08/30 09:40	2017/08/30 09:54	2017/08/30 14:38	2017/08/30 11:04			
COC Number		625115-01-01	625115-01-01	625115-01-01	625115-01-01			
	UNITS	**A0215 MW7/17**	**A0217 MW7/17**	**A0235 MW8/17**	**A0219 MW10/17**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons								
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	390	560	1500	440	100	100	5156924

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		FBE233	FBE235	FBE236	FBE237			
Sampling Date		2017/08/30 11:12	2017/08/30 13:36	2017/08/30 13:48	2017/08/30 13:08			
COC Number		625115-01-01	625115-01-01	625115-01-01	625115-01-01			
	UNITS	**A0221 MW10/17**	**A0228 BH11/17**	**A0229 BH11/17**	**A0223 BH12/17**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons								
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	240	340	1000	ND	100	100	5156924

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam ID		FBE270	FBE273	FBE298			
Sampling Date		2017/08/30 13:19	2017/08/30 14:25	2017/08/31 08:34			
COC Number		625115-02-01	625115-02-01	625115-03-01			
	UNITS	**A0224 BH12/17**	**A0232 BH13/17**	**A0244 MW5**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons							
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	170	ND	7300	100	100	5156924

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE228
Sample ID: A0215 MW7/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE229
Sample ID: A0217 MW7/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/08	Automated Statchk
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5153651	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153622	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/07	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE230
Sample ID: A0234 MW8/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE230
Sample ID: A0234 MW8/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5154063	N/A	2017/09/07	Chun Yan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/07	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam ID: FBE231
Sample ID: A0235 MW8/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE232
Sample ID: A0219 MW10/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/07	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE233
Sample ID: A0221 MW10/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE234
Sample ID: A0227 BH11/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Moisture	BAL	5154063	N/A	2017/09/07	Chun Yan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/08	Dawn Alarie

Maxxam ID: FBE235
Sample ID: A0228 BH11/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE236
Sample ID: A0229 BH11/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE237
Sample ID: A0223 BH12/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE270
Sample ID: A0224 BH12/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE271
Sample ID: A0225 BH12/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/08	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

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Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE272
Sample ID: A0230 BH13/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/08	Dawn Alarie
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE272 Dup
Sample ID: A0230 BH13/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu

Maxxam ID: FBE273
Sample ID: A0232 BH13/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE274
Sample ID: A0233 BH13/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE275
Sample ID: A0256 POND
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/08	Automated Statchk
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5153651	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153622	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/07	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE275 Dup
Sample ID: A0256 POND
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar

Maxxam ID: FBE276
Sample ID: A0257 POND
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE277
Sample ID: A0216 MW7/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam ID: FBE278
Sample ID: A0220 MW10/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam ID: FBE279
Sample ID: A0231 BH13/17
Matrix: Soil

Collected: 2017/08/30
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE297
Sample ID: A0241 MW5
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153309	2017/09/07	2017/09/08	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE298
Sample ID: A0244 MW5
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5156924	2017/09/09	2017/09/09	Sandeep Kaur
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE299
Sample ID: A0245 MW5
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/08	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

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Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE300
Sample ID: A0252 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE300 Dup
Sample ID: A0252 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

Maxxam ID: FBE301
Sample ID: A0254 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5150108	N/A	2017/09/11	Automated Statchk
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5153229	2017/09/07	2017/09/07	Dawn Alarie
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam ID: FBE301 Dup
Sample ID: A0254 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5153892	2017/09/07	2017/09/08	Mitesh Raj

Maxxam ID: FBE302
Sample ID: A0255 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5154622	2017/09/07	2017/09/08	Zhiyue (Frank) Zhu
Moisture	BAL	5152888	N/A	2017/09/07	Min Yang
Volatile Organic Compounds and F1 PHCs	GC/MS	5152114	N/A	2017/09/08	Xueming Jiang

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Sampler Initials: EH

TEST SUMMARY

Maxxam ID: FBE303
Sample ID: A0250 COMP
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Semivolatile Organic Compounds (TCLP)	GC/MS	5155829	2017/09/08	2017/09/09	Wendy Zhao
Cyanide (WAD) in Leachates	SKAL/CN	5155728	N/A	2017/09/08	Louise Harding
Fluoride by ISE in Leachates	ISE	5155747	2017/09/08	2017/09/09	Surinder Rai
Mercury (TCLP Leachable) (mg/L)	CV/AA	5155278	N/A	2017/09/08	Ron Morrison
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	5155389	2017/09/08	2017/09/11	Arefa Dabhad
Nitrate(NO3) + Nitrite(NO2) in Leachate	LACH	5155737	N/A	2017/09/08	Chandra Nandlal
Polychlorinated Biphenyl in Leachate	GC/ECD	5155494	2017/09/08	2017/09/09	Sarah Huang
TCLP - % Solids	BAL	5155269	2017/09/07	2017/09/08	Jian (Ken) Wang
TCLP - Extraction Fluid		5155271	N/A	2017/09/08	Jian (Ken) Wang
TCLP - Initial and final pH	PH	5155273	N/A	2017/09/08	Jian (Ken) Wang
TCLP Zero Headspace Extraction		5153174	2017/09/07	2017/09/08	Walt Wang
VOCs in ZHE Leachates	GC/MS	5154951	2017/09/08	2017/09/08	Rebecca Schultz

Maxxam ID: FBE304
Sample ID: A0251 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	5153124	2017/09/07	2017/09/07	Jolly John
Free (WAD) Cyanide	TECH	5153321	2017/09/07	2017/09/08	Louise Harding
Conductivity	AT	5153325	2017/09/08	2017/09/08	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5152238	2017/09/06	2017/09/08	Sally Coughlin
Soluble Fluoride analysis in Soil	ISE	5153414	2017/09/07	2017/09/08	Surinder Rai
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli
Moisture	BAL	5151294	N/A	2017/09/06	Chun Yan
pH CaCl2 EXTRACT	AT	5153106	2017/09/07	2017/09/07	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5150107	N/A	2017/09/11	Automated Statchk

Maxxam ID: FBE304 Dup
Sample ID: A0251 MW9/17
Matrix: Soil

Collected: 2017/08/31
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5153043	2017/09/07	2017/09/11	Daniel Teclu
Acid Extractable Metals Analysis by ICP	ICP	5153040	2017/09/07	2017/09/08	Azita Fazaeli

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GENERAL COMMENTS

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

Package 1	2.7°C
Package 2	2.3°C

Custody Seal Present/Intact

Sample FBE228 [A0215 MW7/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE232 [A0219 MW10/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE235 [A0228 BH11/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE270 [A0224 BH12/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE271 [A0225 BH12/17] : PAH Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE273 [A0232 BH13/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE275 [A0256 POND] : PCB & PAH Analysis: Detection limits were adjusted for high moisture content.
SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE276 [A0257 POND] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE277 [A0216 MW7/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE278 [A0220 MW10/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE279 [A0231 BH13/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE297 [A0241 MW5] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE301 [A0254 MW9/17] : Metals: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FBE304 [A0251 MW9/17] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5151294	CYN	RPD	Moisture	2017/09/06	8.4		%	20
5152114	XJI	Matrix Spike [FBE300-02]	4-Bromofluorobenzene	2017/09/08		101	%	60 - 140
			D10-o-Xylene	2017/09/08		84	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/08		102	%	60 - 140
			D8-Toluene	2017/09/08		103	%	60 - 140
			Acetone (2-Propanone)	2017/09/08		99	%	60 - 140
			Benzene	2017/09/08		107	%	60 - 140
			Bromodichloromethane	2017/09/08		98	%	60 - 140
			Bromoform	2017/09/08		108	%	60 - 140
			Bromomethane	2017/09/08		108	%	60 - 140
			Carbon Tetrachloride	2017/09/08		100	%	60 - 140
			Chlorobenzene	2017/09/08		98	%	60 - 140
			Chloroform	2017/09/08		104	%	60 - 140
			Dibromochloromethane	2017/09/08		104	%	60 - 140
			1,2-Dichlorobenzene	2017/09/08		97	%	60 - 140
			1,3-Dichlorobenzene	2017/09/08		95	%	60 - 140
			1,4-Dichlorobenzene	2017/09/08		95	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2017/09/08		113	%	60 - 140
			1,1-Dichloroethane	2017/09/08		108	%	60 - 140
			1,2-Dichloroethane	2017/09/08		102	%	60 - 140
			1,1-Dichloroethylene	2017/09/08		112	%	60 - 140
			cis-1,2-Dichloroethylene	2017/09/08		102	%	60 - 140
			trans-1,2-Dichloroethylene	2017/09/08		109	%	60 - 140
			1,2-Dichloropropane	2017/09/08		92	%	60 - 140
			cis-1,3-Dichloropropene	2017/09/08		84	%	60 - 140
			trans-1,3-Dichloropropene	2017/09/08		91	%	60 - 140
			Ethylbenzene	2017/09/08		91	%	60 - 140
			Ethylene Dibromide	2017/09/08		104	%	60 - 140
			Hexane	2017/09/08		109	%	60 - 140
			Methylene Chloride(Dichloromethane)	2017/09/08		109	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/08		88	%	60 - 140
			Methyl Ethyl Ketone (2-Butanone)	2017/09/08		97	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/08		89	%	60 - 140
			Styrene	2017/09/08		88	%	60 - 140
			1,1,1,2-Tetrachloroethane	2017/09/08		110	%	60 - 140
			1,1,2,2-Tetrachloroethane	2017/09/08		107	%	60 - 140
			Tetrachloroethylene	2017/09/08		104	%	60 - 140
			Toluene	2017/09/08		98	%	60 - 140
			1,1,1-Trichloroethane	2017/09/08		100	%	60 - 140
			1,1,2-Trichloroethane	2017/09/08		108	%	60 - 140
			Trichloroethylene	2017/09/08		98	%	60 - 140
			Vinyl Chloride	2017/09/08		100	%	60 - 140
			p+m-Xylene	2017/09/08		91	%	60 - 140
			o-Xylene	2017/09/08		90	%	60 - 140
			Trichlorofluoromethane (FREON 11)	2017/09/08		111	%	60 - 140
			F1 (C6-C10)	2017/09/08		104	%	60 - 140
5152114	XJI	Spiked Blank	4-Bromofluorobenzene	2017/09/07		102	%	60 - 140
			D10-o-Xylene	2017/09/07		91	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/07		104	%	60 - 140
			D8-Toluene	2017/09/07		102	%	60 - 140
			Acetone (2-Propanone)	2017/09/07		97	%	60 - 140
			Benzene	2017/09/07		107	%	60 - 130
			Bromodichloromethane	2017/09/07		99	%	60 - 130
			Bromoform	2017/09/07		106	%	60 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromomethane	2017/09/07		103	%	60 - 140
			Carbon Tetrachloride	2017/09/07		101	%	60 - 130
			Chlorobenzene	2017/09/07		98	%	60 - 130
			Chloroform	2017/09/07		104	%	60 - 130
			Dibromochloromethane	2017/09/07		103	%	60 - 130
			1,2-Dichlorobenzene	2017/09/07		96	%	60 - 130
			1,3-Dichlorobenzene	2017/09/07		96	%	60 - 130
			1,4-Dichlorobenzene	2017/09/07		95	%	60 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/07		119	%	60 - 140
			1,1-Dichloroethane	2017/09/07		108	%	60 - 130
			1,2-Dichloroethane	2017/09/07		103	%	60 - 130
			1,1-Dichloroethylene	2017/09/07		113	%	60 - 130
			cis-1,2-Dichloroethylene	2017/09/07		103	%	60 - 130
			trans-1,2-Dichloroethylene	2017/09/07		110	%	60 - 130
			1,2-Dichloropropane	2017/09/07		93	%	60 - 130
			cis-1,3-Dichloropropene	2017/09/07		76	%	60 - 130
			trans-1,3-Dichloropropene	2017/09/07		78	%	60 - 130
			Ethylbenzene	2017/09/07		91	%	60 - 130
			Ethylene Dibromide	2017/09/07		103	%	60 - 130
			Hexane	2017/09/07		109	%	60 - 130
			Methylene Chloride(Dichloromethane)	2017/09/07		110	%	60 - 130
			Methyl Isobutyl Ketone	2017/09/07		87	%	60 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07		95	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/07		88	%	60 - 130
			Styrene	2017/09/07		88	%	60 - 130
			1,1,1,2-Tetrachloroethane	2017/09/07		109	%	60 - 130
			1,1,2,2-Tetrachloroethane	2017/09/07		105	%	60 - 130
			Tetrachloroethylene	2017/09/07		105	%	60 - 130
			Toluene	2017/09/07		98	%	60 - 130
			1,1,1-Trichloroethane	2017/09/07		100	%	60 - 130
			1,1,2-Trichloroethane	2017/09/07		106	%	60 - 130
			Trichloroethylene	2017/09/07		100	%	60 - 130
			Vinyl Chloride	2017/09/07		102	%	60 - 130
			p+m-Xylene	2017/09/07		91	%	60 - 130
			o-Xylene	2017/09/07		90	%	60 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/07		112	%	60 - 130
			F1 (C6-C10)	2017/09/07		96	%	80 - 120
5152114	XJI	Method Blank	4-Bromofluorobenzene	2017/09/07		94	%	60 - 140
			D10-o-Xylene	2017/09/07		74	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/07		108	%	60 - 140
			D8-Toluene	2017/09/07		95	%	60 - 140
			Acetone (2-Propanone)	2017/09/07	ND, RDL=0.50		ug/g	
			Benzene	2017/09/07	ND, RDL=0.0060		ug/g	
			Bromodichloromethane	2017/09/07	ND, RDL=0.050		ug/g	
			Bromoform	2017/09/07	ND, RDL=0.050		ug/g	
			Bromomethane	2017/09/07	ND, RDL=0.050		ug/g	
			Carbon Tetrachloride	2017/09/07	ND, RDL=0.050		ug/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chlorobenzene	2017/09/07	ND, RDL=0.050		ug/g	
			Chloroform	2017/09/07	ND, RDL=0.050		ug/g	
			Dibromochloromethane	2017/09/07	ND, RDL=0.050		ug/g	
			1,2-Dichlorobenzene	2017/09/07	ND, RDL=0.050		ug/g	
			1,3-Dichlorobenzene	2017/09/07	ND, RDL=0.050		ug/g	
			1,4-Dichlorobenzene	2017/09/07	ND, RDL=0.050		ug/g	
			Dichlorodifluoromethane (FREON 12)	2017/09/07	ND, RDL=0.050		ug/g	
			1,1-Dichloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			1,2-Dichloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			1,1-Dichloroethylene	2017/09/07	ND, RDL=0.050		ug/g	
			cis-1,2-Dichloroethylene	2017/09/07	ND, RDL=0.050		ug/g	
			trans-1,2-Dichloroethylene	2017/09/07	ND, RDL=0.050		ug/g	
			1,2-Dichloropropane	2017/09/07	ND, RDL=0.050		ug/g	
			cis-1,3-Dichloropropene	2017/09/07	ND, RDL=0.030		ug/g	
			trans-1,3-Dichloropropene	2017/09/07	ND, RDL=0.040		ug/g	
			Ethylbenzene	2017/09/07	ND, RDL=0.010		ug/g	
			Ethylene Dibromide	2017/09/07	ND, RDL=0.050		ug/g	
			Hexane	2017/09/07	ND, RDL=0.050		ug/g	
			Methylene Chloride(Dichloromethane)	2017/09/07	ND, RDL=0.050		ug/g	
			Methyl Isobutyl Ketone	2017/09/07	ND, RDL=0.50		ug/g	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07	ND, RDL=0.50		ug/g	
			Methyl t-butyl ether (MTBE)	2017/09/07	ND, RDL=0.050		ug/g	
			Styrene	2017/09/07	ND, RDL=0.050		ug/g	
			1,1,1,2-Tetrachloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			1,1,2,2-Tetrachloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			Tetrachloroethylene	2017/09/07	ND, RDL=0.050		ug/g	
			Toluene	2017/09/07	ND, RDL=0.020		ug/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1,1-Trichloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			1,1,2-Trichloroethane	2017/09/07	ND, RDL=0.050		ug/g	
			Trichloroethylene	2017/09/07	ND, RDL=0.010		ug/g	
			Vinyl Chloride	2017/09/07	ND, RDL=0.020		ug/g	
			p+m-Xylene	2017/09/07	ND, RDL=0.020		ug/g	
			o-Xylene	2017/09/07	ND, RDL=0.020		ug/g	
			Total Xylenes	2017/09/07	ND, RDL=0.020		ug/g	
			Trichlorofluoromethane (FREON 11)	2017/09/07	ND, RDL=0.050		ug/g	
			F1 (C6-C10)	2017/09/07	ND, RDL=10		ug/g	
			F1 (C6-C10) - BTEX	2017/09/07	ND, RDL=10		ug/g	
5152114	XJI	RPD [FBE300-02]	Acetone (2-Propanone)	2017/09/08	NC		%	50
			Benzene	2017/09/08	NC		%	50
			Bromodichloromethane	2017/09/08	NC		%	50
			Bromoform	2017/09/08	NC		%	50
			Bromomethane	2017/09/08	NC		%	50
			Carbon Tetrachloride	2017/09/08	NC		%	50
			Chlorobenzene	2017/09/08	NC		%	50
			Chloroform	2017/09/08	NC		%	50
			Dibromochloromethane	2017/09/08	NC		%	50
			1,2-Dichlorobenzene	2017/09/08	NC		%	50
			1,3-Dichlorobenzene	2017/09/08	NC		%	50
			1,4-Dichlorobenzene	2017/09/08	NC		%	50
			Dichlorodifluoromethane (FREON 12)	2017/09/08	NC		%	50
			1,1-Dichloroethane	2017/09/08	NC		%	50
			1,2-Dichloroethane	2017/09/08	NC		%	50
			1,1-Dichloroethylene	2017/09/08	NC		%	50
			cis-1,2-Dichloroethylene	2017/09/08	NC		%	50
			trans-1,2-Dichloroethylene	2017/09/08	NC		%	50
			1,2-Dichloropropane	2017/09/08	NC		%	50
			cis-1,3-Dichloropropene	2017/09/08	NC		%	50
			trans-1,3-Dichloropropene	2017/09/08	NC		%	50
			Ethylbenzene	2017/09/08	NC		%	50
			Ethylene Dibromide	2017/09/08	NC		%	50
			Hexane	2017/09/08	NC		%	50
			Methylene Chloride(Dichloromethane)	2017/09/08	NC		%	50
			Methyl Isobutyl Ketone	2017/09/08	NC		%	50
			Methyl Ethyl Ketone (2-Butanone)	2017/09/08	NC		%	50
			Methyl t-butyl ether (MTBE)	2017/09/08	NC		%	50
			Styrene	2017/09/08	NC		%	50
			1,1,1,2-Tetrachloroethane	2017/09/08	NC		%	50
			1,1,2,2-Tetrachloroethane	2017/09/08	NC		%	50
			Tetrachloroethylene	2017/09/08	NC		%	50
			Toluene	2017/09/08	NC		%	50
			1,1,1-Trichloroethane	2017/09/08	NC		%	50

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			1,1,2-Trichloroethane	2017/09/08	NC		%	50
			Trichloroethylene	2017/09/08	NC		%	50
			Vinyl Chloride	2017/09/08	NC		%	50
			p+m-Xylene	2017/09/08	NC		%	50
			o-Xylene	2017/09/08	NC		%	50
			Total Xylenes	2017/09/08	NC		%	50
			Trichlorofluoromethane (FREON 11)	2017/09/08	NC		%	50
			F1 (C6-C10)	2017/09/08	NC		%	30
			F1 (C6-C10) - BTEX	2017/09/08	NC		%	30
5152238	SAC	Matrix Spike [FBE275-01]	Chromium (VI)	2017/09/08		0.065 (1)	%	75 - 125
5152238	SAC	Spiked Blank	Chromium (VI)	2017/09/08		87	%	80 - 120
5152238	SAC	Method Blank	Chromium (VI)	2017/09/08	ND, RDL=0.2		ug/g	
5152238	SAC	RPD [FBE275-01]	Chromium (VI)	2017/09/08	NC		%	35
5152888	AV3	RPD	Moisture	2017/09/07	4.1		%	20
5153040	AFZ	Matrix Spike [FBE304-01]	Acid Extractable Sulphur (S)	2017/09/08		NC	%	75 - 125
5153040	AFZ	Spiked Blank	Acid Extractable Sulphur (S)	2017/09/08		100	%	80 - 120
5153040	AFZ	Method Blank	Acid Extractable Sulphur (S)	2017/09/08	ND, RDL=500		ug/g	
5153040	AFZ	RPD [FBE304-01]	Acid Extractable Sulphur (S)	2017/09/08	0.51		%	30
5153043	DT1	Matrix Spike [FBE304-01]	Acid Extractable Antimony (Sb)	2017/09/11		92	%	75 - 125
			Acid Extractable Arsenic (As)	2017/09/11		101	%	75 - 125
			Acid Extractable Barium (Ba)	2017/09/11		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2017/09/11		101	%	75 - 125
			Acid Extractable Cadmium (Cd)	2017/09/11		97	%	75 - 125
			Acid Extractable Chromium (Cr)	2017/09/11		100	%	75 - 125
			Acid Extractable Cobalt (Co)	2017/09/11		99	%	75 - 125
			Acid Extractable Copper (Cu)	2017/09/11		97	%	75 - 125
			Acid Extractable Lead (Pb)	2017/09/11		NC	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2017/09/11		96	%	75 - 125
			Acid Extractable Nickel (Ni)	2017/09/11		99	%	75 - 125
			Acid Extractable Selenium (Se)	2017/09/11		103	%	75 - 125
			Acid Extractable Silver (Ag)	2017/09/11		98	%	75 - 125
			Acid Extractable Thallium (Tl)	2017/09/11		100	%	75 - 125
			Acid Extractable Tin (Sn)	2017/09/11		98	%	75 - 125
			Acid Extractable Uranium (U)	2017/09/11		99	%	75 - 125
			Acid Extractable Vanadium (V)	2017/09/11		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2017/09/11		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2017/09/11		110	%	75 - 125
5153043	DT1	Spiked Blank	Acid Extractable Antimony (Sb)	2017/09/11		100	%	80 - 120
			Acid Extractable Arsenic (As)	2017/09/11		103	%	80 - 120
			Acid Extractable Barium (Ba)	2017/09/11		102	%	80 - 120
			Acid Extractable Beryllium (Be)	2017/09/11		102	%	80 - 120
			Acid Extractable Cadmium (Cd)	2017/09/11		98	%	80 - 120
			Acid Extractable Chromium (Cr)	2017/09/11		103	%	80 - 120
			Acid Extractable Cobalt (Co)	2017/09/11		104	%	80 - 120
			Acid Extractable Copper (Cu)	2017/09/11		100	%	80 - 120
			Acid Extractable Lead (Pb)	2017/09/11		104	%	80 - 120
			Acid Extractable Molybdenum (Mo)	2017/09/11		99	%	80 - 120
			Acid Extractable Nickel (Ni)	2017/09/11		101	%	80 - 120
			Acid Extractable Selenium (Se)	2017/09/11		106	%	80 - 120
			Acid Extractable Silver (Ag)	2017/09/11		101	%	80 - 120
			Acid Extractable Thallium (Tl)	2017/09/11		103	%	80 - 120
			Acid Extractable Tin (Sn)	2017/09/11		102	%	80 - 120

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			Acid Extractable Uranium (U)	2017/09/11		100	%	80 - 120
			Acid Extractable Vanadium (V)	2017/09/11		103	%	80 - 120
			Acid Extractable Zinc (Zn)	2017/09/11		103	%	80 - 120
			Acid Extractable Mercury (Hg)	2017/09/11		109	%	80 - 120
5153043	DT1	Method Blank	Acid Extractable Antimony (Sb)	2017/09/11	ND, RDL=0.20		ug/g	
			Acid Extractable Arsenic (As)	2017/09/11	ND, RDL=1.0		ug/g	
			Acid Extractable Barium (Ba)	2017/09/11	ND, RDL=0.50		ug/g	
			Acid Extractable Beryllium (Be)	2017/09/11	ND, RDL=0.20		ug/g	
			Acid Extractable Cadmium (Cd)	2017/09/11	ND, RDL=0.10		ug/g	
			Acid Extractable Chromium (Cr)	2017/09/11	ND, RDL=1.0		ug/g	
			Acid Extractable Cobalt (Co)	2017/09/11	ND, RDL=0.10		ug/g	
			Acid Extractable Copper (Cu)	2017/09/11	ND, RDL=0.50		ug/g	
			Acid Extractable Lead (Pb)	2017/09/11	ND, RDL=1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2017/09/11	ND, RDL=0.50		ug/g	
			Acid Extractable Nickel (Ni)	2017/09/11	ND, RDL=0.50		ug/g	
			Acid Extractable Selenium (Se)	2017/09/11	ND, RDL=0.50		ug/g	
			Acid Extractable Silver (Ag)	2017/09/11	ND, RDL=0.20		ug/g	
			Acid Extractable Thallium (Tl)	2017/09/11	ND, RDL=0.050		ug/g	
			Acid Extractable Tin (Sn)	2017/09/11	ND, RDL=1.0		ug/g	
			Acid Extractable Uranium (U)	2017/09/11	ND, RDL=0.050		ug/g	
			Acid Extractable Vanadium (V)	2017/09/11	ND, RDL=5.0		ug/g	
			Acid Extractable Zinc (Zn)	2017/09/11	ND, RDL=5.0		ug/g	
			Acid Extractable Mercury (Hg)	2017/09/11	ND, RDL=0.050		ug/g	
5153043	DT1	RPD [FBE304-01]	Acid Extractable Antimony (Sb)	2017/09/11	20		%	30
			Acid Extractable Arsenic (As)	2017/09/11	14		%	30
			Acid Extractable Barium (Ba)	2017/09/11	5.4		%	30
			Acid Extractable Beryllium (Be)	2017/09/11	3.1		%	30
			Acid Extractable Cadmium (Cd)	2017/09/11	NC		%	30
			Acid Extractable Chromium (Cr)	2017/09/11	2.2		%	30
			Acid Extractable Cobalt (Co)	2017/09/11	5.7		%	30
			Acid Extractable Copper (Cu)	2017/09/11	1.4		%	30
			Acid Extractable Lead (Pb)	2017/09/11	2.6		%	30
			Acid Extractable Molybdenum (Mo)	2017/09/11	23		%	30
			Acid Extractable Nickel (Ni)	2017/09/11	10		%	30
			Acid Extractable Selenium (Se)	2017/09/11	NC		%	30

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			Acid Extractable Silver (Ag)	2017/09/11	2.6		%	30
			Acid Extractable Thallium (Tl)	2017/09/11	5.7		%	30
			Acid Extractable Tin (Sn)	2017/09/11	20		%	30
			Acid Extractable Uranium (U)	2017/09/11	1.8		%	30
			Acid Extractable Vanadium (V)	2017/09/11	2.0		%	30
			Acid Extractable Zinc (Zn)	2017/09/11	3.3		%	30
			Acid Extractable Mercury (Hg)	2017/09/11	12		%	30
5153106	TA1	Spiked Blank	Available (CaCl2) pH	2017/09/07		100	%	97 - 103
5153106	TA1	RPD [FBE275-01]	Available (CaCl2) pH	2017/09/07	0.57		%	N/A
5153124	JOH	Matrix Spike	Hot Water Ext. Boron (B)	2017/09/07		101	%	75 - 125
5153124	JOH	Spiked Blank	Hot Water Ext. Boron (B)	2017/09/07		97	%	75 - 125
5153124	JOH	Method Blank	Hot Water Ext. Boron (B)	2017/09/07	ND, RDL=0.050		ug/g	
5153124	JOH	RPD	Hot Water Ext. Boron (B)	2017/09/07	4.4		%	40
5153229	DH	Matrix Spike	Decachlorobiphenyl	2017/09/07		85	%	60 - 130
			Aroclor 1260	2017/09/07		91	%	60 - 130
			Total PCB	2017/09/07		91	%	60 - 130
5153229	DH	Spiked Blank	Decachlorobiphenyl	2017/09/07		96	%	60 - 130
			Aroclor 1260	2017/09/07		96	%	60 - 130
			Total PCB	2017/09/07		96	%	60 - 130
5153229	DH	Method Blank	Decachlorobiphenyl	2017/09/07		87	%	60 - 130
			Aroclor 1242	2017/09/07	ND, RDL=0.010		ug/g	
			Aroclor 1248	2017/09/07	ND, RDL=0.010		ug/g	
			Aroclor 1254	2017/09/07	ND, RDL=0.010		ug/g	
			Aroclor 1260	2017/09/07	ND, RDL=0.010		ug/g	
			Total PCB	2017/09/07	ND, RDL=0.010		ug/g	
5153229	DH	RPD	Aroclor 1242	2017/09/07	NC		%	50
			Aroclor 1248	2017/09/07	NC		%	50
			Aroclor 1254	2017/09/07	NC		%	50
			Aroclor 1260	2017/09/07	NC		%	50
			Total PCB	2017/09/07	NC		%	50
5153309	JOH	Matrix Spike	Hot Water Ext. Boron (B)	2017/09/08		97	%	75 - 125
5153309	JOH	Spiked Blank	Hot Water Ext. Boron (B)	2017/09/07		92	%	75 - 125
5153309	JOH	Method Blank	Hot Water Ext. Boron (B)	2017/09/07	ND, RDL=0.050		ug/g	
5153309	JOH	RPD	Hot Water Ext. Boron (B)	2017/09/07	NC		%	40
5153321	LHA	Matrix Spike [FBE275-01]	WAD Cyanide (Free)	2017/09/08		88	%	75 - 125
5153321	LHA	Spiked Blank	WAD Cyanide (Free)	2017/09/08		97	%	80 - 120
5153321	LHA	Method Blank	WAD Cyanide (Free)	2017/09/08	ND, RDL=0.01		ug/g	
5153321	LHA	RPD [FBE275-01]	WAD Cyanide (Free)	2017/09/08	32		%	35
5153325	NYS	Spiked Blank	Conductivity	2017/09/08		102	%	90 - 110
5153325	NYS	Method Blank	Conductivity	2017/09/08	ND, RDL=0.002		mS/cm	
5153325	NYS	RPD [FBE301-01]	Conductivity	2017/09/08	0.079		%	10
5153414	SAU	Matrix Spike	Fluoride (F-)	2017/09/08		92	%	80 - 120
5153414	SAU	Spiked Blank	Fluoride (F-)	2017/09/08		103	%	80 - 120
5153414	SAU	Method Blank	Fluoride (F-)	2017/09/08	ND,RDL=5		ug/g	
5153414	SAU	RPD	Fluoride (F-)	2017/09/08	NC		%	25

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5153622	RAJ	Matrix Spike	D10-Anthracene	2017/09/07		97	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		94	%	50 - 130
			D8-Acenaphthylene	2017/09/07		90	%	50 - 130
			Acenaphthene	2017/09/07		88	%	50 - 130
			Acenaphthylene	2017/09/07		84	%	50 - 130
			Anthracene	2017/09/07		86	%	50 - 130
			Benzo(a)anthracene	2017/09/07		93	%	50 - 130
			Benzo(a)pyrene	2017/09/07		93	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		94	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		85	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		83	%	50 - 130
			Chrysene	2017/09/07		92	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/07		90	%	50 - 130
			Fluoranthene	2017/09/07		99	%	50 - 130
			Fluorene	2017/09/07		86	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		91	%	50 - 130
			1-Methylnaphthalene	2017/09/07		85	%	50 - 130
			2-Methylnaphthalene	2017/09/07		77	%	50 - 130
			Naphthalene	2017/09/07		72	%	50 - 130
			Phenanthrene	2017/09/07		94	%	50 - 130
			Pyrene	2017/09/07		100	%	50 - 130
5153622	RAJ	Spiked Blank	D10-Anthracene	2017/09/07		97	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		93	%	50 - 130
			D8-Acenaphthylene	2017/09/07		91	%	50 - 130
			Acenaphthene	2017/09/07		89	%	50 - 130
			Acenaphthylene	2017/09/07		85	%	50 - 130
			Anthracene	2017/09/07		86	%	50 - 130
			Benzo(a)anthracene	2017/09/07		93	%	50 - 130
			Benzo(a)pyrene	2017/09/07		94	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		93	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		87	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		90	%	50 - 130
			Chrysene	2017/09/07		93	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/07		92	%	50 - 130
			Fluoranthene	2017/09/07		99	%	50 - 130
			Fluorene	2017/09/07		87	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		93	%	50 - 130
			1-Methylnaphthalene	2017/09/07		85	%	50 - 130
			2-Methylnaphthalene	2017/09/07		77	%	50 - 130
			Naphthalene	2017/09/07		72	%	50 - 130
			Phenanthrene	2017/09/07		94	%	50 - 130
			Pyrene	2017/09/07		100	%	50 - 130
5153622	RAJ	Method Blank	D10-Anthracene	2017/09/07		96	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		91	%	50 - 130
			D8-Acenaphthylene	2017/09/07		86	%	50 - 130
			Acenaphthene	2017/09/07	ND, RDL=0.0050		ug/g	
			Acenaphthylene	2017/09/07	ND, RDL=0.0050		ug/g	
			Anthracene	2017/09/07	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2017/09/07	ND, RDL=0.0050		ug/g	

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			Benzo(a)pyrene	2017/09/07	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2017/09/07	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2017/09/07	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2017/09/07	ND, RDL=0.0050		ug/g	
			Chrysene	2017/09/07	ND, RDL=0.0050		ug/g	
			Dibenz(a,h)anthracene	2017/09/07	ND, RDL=0.0050		ug/g	
			Fluoranthene	2017/09/07	ND, RDL=0.0050		ug/g	
			Fluorene	2017/09/07	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2017/09/07	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2017/09/07	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2017/09/07	ND, RDL=0.0050		ug/g	
			Naphthalene	2017/09/07	ND, RDL=0.0050		ug/g	
			Phenanthrene	2017/09/07	ND, RDL=0.0050		ug/g	
			Pyrene	2017/09/07	ND, RDL=0.0050		ug/g	
5153622	RAJ	RPD	Acenaphthene	2017/09/07	NC		%	40
			Acenaphthylene	2017/09/07	NC		%	40
			Anthracene	2017/09/07	NC		%	40
			Benzo(a)anthracene	2017/09/07	NC		%	40
			Benzo(a)pyrene	2017/09/07	NC		%	40
			Benzo(b/j)fluoranthene	2017/09/07	NC		%	40
			Benzo(g,h,i)perylene	2017/09/07	NC		%	40
			Benzo(k)fluoranthene	2017/09/07	NC		%	40
			Chrysene	2017/09/07	NC		%	40
			Dibenz(a,h)anthracene	2017/09/07	NC		%	40
			Fluoranthene	2017/09/07	NC		%	40
			Fluorene	2017/09/07	NC		%	40
			Indeno(1,2,3-cd)pyrene	2017/09/07	NC		%	40
			1-Methylnaphthalene	2017/09/07	NC		%	40
			2-Methylnaphthalene	2017/09/07	NC		%	40
			Naphthalene	2017/09/07	NC		%	40
			Phenanthrene	2017/09/07	NC		%	40
			Pyrene	2017/09/07	NC		%	40
5153651	ZZ	Matrix Spike	o-Terphenyl	2017/09/08		89	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		91	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/08		89	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/08		85	%	50 - 130
5153651	ZZ	Spiked Blank	o-Terphenyl	2017/09/08		89	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		91	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2017/09/08		91	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2017/09/08		85	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5153651	ZZ	Method Blank	o-Terphenyl	2017/09/08		96	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08	ND, RDL=10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2017/09/08	ND, RDL=50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2017/09/08	ND, RDL=50		ug/g	
5153651	ZZ	RPD	F2 (C10-C16 Hydrocarbons)	2017/09/08	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/08	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/08	NC		%	30
5153892	RAJ	Matrix Spike [FBE301-02]	D10-Anthracene	2017/09/08		96	%	50 - 130
			D14-Terphenyl (FS)	2017/09/08		92	%	50 - 130
			D8-Acenaphthylene	2017/09/08		91	%	50 - 130
			Acenaphthene	2017/09/08		90	%	50 - 130
			Acenaphthylene	2017/09/08		83	%	50 - 130
			Anthracene	2017/09/08		84	%	50 - 130
			Benzo(a)anthracene	2017/09/08		89	%	50 - 130
			Benzo(a)pyrene	2017/09/08		89	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/08		86	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/08		82	%	50 - 130
			Benzo(k)fluoranthene	2017/09/08		77	%	50 - 130
			Chrysene	2017/09/08		89	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/08		90	%	50 - 130
			Fluoranthene	2017/09/08		87	%	50 - 130
			Fluorene	2017/09/08		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/08		81	%	50 - 130
			1-Methylnaphthalene	2017/09/08		111	%	50 - 130
			2-Methylnaphthalene	2017/09/08		98	%	50 - 130
			Naphthalene	2017/09/08		84	%	50 - 130
			Phenanthrene	2017/09/08		89	%	50 - 130
			Pyrene	2017/09/08		91	%	50 - 130
5153892	RAJ	Spiked Blank	D10-Anthracene	2017/09/08		91	%	50 - 130
			D14-Terphenyl (FS)	2017/09/08		88	%	50 - 130
			D8-Acenaphthylene	2017/09/08		86	%	50 - 130
			Acenaphthene	2017/09/08		90	%	50 - 130
			Acenaphthylene	2017/09/08		82	%	50 - 130
			Anthracene	2017/09/08		85	%	50 - 130
			Benzo(a)anthracene	2017/09/08		87	%	50 - 130
			Benzo(a)pyrene	2017/09/08		89	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/08		94	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/08		89	%	50 - 130
			Benzo(k)fluoranthene	2017/09/08		98	%	50 - 130
			Chrysene	2017/09/08		89	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/08		99	%	50 - 130
			Fluoranthene	2017/09/08		85	%	50 - 130
			Fluorene	2017/09/08		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/08		90	%	50 - 130
			1-Methylnaphthalene	2017/09/08		113	%	50 - 130
			2-Methylnaphthalene	2017/09/08		102	%	50 - 130
			Naphthalene	2017/09/08		85	%	50 - 130
			Phenanthrene	2017/09/08		87	%	50 - 130
			Pyrene	2017/09/08		89	%	50 - 130
5153892	RAJ	Method Blank	D10-Anthracene	2017/09/08		92	%	50 - 130
			D14-Terphenyl (FS)	2017/09/08		90	%	50 - 130

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			D8-Acenaphthylene	2017/09/08		86	%	50 - 130
			Acenaphthene	2017/09/08	ND, RDL=0.0050		ug/g	
			Acenaphthylene	2017/09/08	ND, RDL=0.0050		ug/g	
			Anthracene	2017/09/08	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2017/09/08	ND, RDL=0.0050		ug/g	
			Benzo(a)pyrene	2017/09/08	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2017/09/08	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2017/09/08	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2017/09/08	ND, RDL=0.0050		ug/g	
			Chrysene	2017/09/08	ND, RDL=0.0050		ug/g	
			Dibenz(a,h)anthracene	2017/09/08	ND, RDL=0.0050		ug/g	
			Fluoranthene	2017/09/08	ND, RDL=0.0050		ug/g	
			Fluorene	2017/09/08	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2017/09/08	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2017/09/08	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2017/09/08	ND, RDL=0.0050		ug/g	
			Naphthalene	2017/09/08	ND, RDL=0.0050		ug/g	
			Phenanthrene	2017/09/08	ND, RDL=0.0050		ug/g	
			Pyrene	2017/09/08	ND, RDL=0.0050		ug/g	
5153892	RAJ	RPD [FBE301-02]	Acenaphthene	2017/09/08	NC		%	40
			Acenaphthylene	2017/09/08	NC		%	40
			Anthracene	2017/09/08	NC		%	40
			Benzo(a)anthracene	2017/09/08	NC		%	40
			Benzo(a)pyrene	2017/09/08	NC		%	40
			Benzo(b/j)fluoranthene	2017/09/08	NC		%	40
			Benzo(g,h,i)perylene	2017/09/08	NC		%	40
			Benzo(k)fluoranthene	2017/09/08	NC		%	40
			Chrysene	2017/09/08	NC		%	40
			Dibenz(a,h)anthracene	2017/09/08	NC		%	40
			Fluoranthene	2017/09/08	NC		%	40
			Fluorene	2017/09/08	NC		%	40
			Indeno(1,2,3-cd)pyrene	2017/09/08	NC		%	40
			1-Methylnaphthalene	2017/09/08	NC		%	40
			2-Methylnaphthalene	2017/09/08	NC		%	40
			Naphthalene	2017/09/08	NC		%	40
			Phenanthrene	2017/09/08	NC		%	40

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			Pyrene	2017/09/08	NC		%	40
5154063	NS3	RPD	Moisture	2017/09/07	0.72		%	20
5154622	ZZ	Matrix Spike [FBE272-02]	o-Terphenyl	2017/09/08		88	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		92	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/08		95	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/08		98	%	50 - 130
5154622	ZZ	Spiked Blank	o-Terphenyl	2017/09/08		87	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		89	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2017/09/08		91	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2017/09/08		91	%	80 - 120
5154622	ZZ	Method Blank	o-Terphenyl	2017/09/08		88	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08	ND, RDL=10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2017/09/08	ND, RDL=50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2017/09/08	ND, RDL=50		ug/g	
5154622	ZZ	RPD [FBE272-02]	F2 (C10-C16 Hydrocarbons)	2017/09/08	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/08	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/08	NC		%	30
5154951	RSC	Matrix Spike	Leachable 4-Bromofluorobenzene	2017/09/08		99	%	70 - 130
			Leachable D4-1,2-Dichloroethane	2017/09/08		95	%	70 - 130
			Leachable D8-Toluene	2017/09/08		101	%	70 - 130
			Leachable Benzene	2017/09/08		105	%	70 - 130
			Leachable Carbon Tetrachloride	2017/09/08		102	%	70 - 130
			Leachable Chlorobenzene	2017/09/08		97	%	70 - 130
			Leachable Chloroform	2017/09/08		97	%	70 - 130
			Leachable 1,2-Dichlorobenzene	2017/09/08		97	%	70 - 130
			Leachable 1,4-Dichlorobenzene	2017/09/08		101	%	70 - 130
			Leachable 1,2-Dichloroethane	2017/09/08		90	%	70 - 130
			Leachable 1,1-Dichloroethylene	2017/09/08		107	%	70 - 130
			Leachable Methylene Chloride(Dichloromethan	2017/09/08		95	%	70 - 130
			Leachable Methyl Ethyl Ketone (2-Butanone)	2017/09/08		86	%	60 - 140
			Leachable Tetrachloroethylene	2017/09/08		99	%	70 - 130
			Leachable Trichloroethylene	2017/09/08		98	%	70 - 130
			Leachable Vinyl Chloride	2017/09/08		99	%	70 - 130
5154951	RSC	Spiked Blank	Leachable 4-Bromofluorobenzene	2017/09/08		99	%	70 - 130
			Leachable D4-1,2-Dichloroethane	2017/09/08		96	%	70 - 130
			Leachable D8-Toluene	2017/09/08		101	%	70 - 130
			Leachable Benzene	2017/09/08		106	%	70 - 130
			Leachable Carbon Tetrachloride	2017/09/08		103	%	70 - 130
			Leachable Chlorobenzene	2017/09/08		98	%	70 - 130
			Leachable Chloroform	2017/09/08		98	%	70 - 130
			Leachable 1,2-Dichlorobenzene	2017/09/08		98	%	70 - 130
			Leachable 1,4-Dichlorobenzene	2017/09/08		101	%	70 - 130
			Leachable 1,2-Dichloroethane	2017/09/08		92	%	70 - 130
			Leachable 1,1-Dichloroethylene	2017/09/08		108	%	70 - 130
			Leachable Methylene Chloride(Dichloromethan	2017/09/08		95	%	70 - 130
			Leachable Methyl Ethyl Ketone (2-Butanone)	2017/09/08		94	%	60 - 140
			Leachable Tetrachloroethylene	2017/09/08		98	%	70 - 130
			Leachable Trichloroethylene	2017/09/08		99	%	70 - 130
			Leachable Vinyl Chloride	2017/09/08		100	%	70 - 130
5154951	RSC	Method Blank	Leachable 4-Bromofluorobenzene	2017/09/08		97	%	70 - 130
			Leachable D4-1,2-Dichloroethane	2017/09/08		94	%	70 - 130

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			Leachable D8-Toluene	2017/09/08		96	%	70 - 130
			Leachable Benzene	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Carbon Tetrachloride	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Chlorobenzene	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Chloroform	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable 1,2-Dichlorobenzene	2017/09/08	ND, RDL=0.050		mg/L	
			Leachable 1,4-Dichlorobenzene	2017/09/08	ND, RDL=0.050		mg/L	
			Leachable 1,2-Dichloroethane	2017/09/08	ND, RDL=0.050		mg/L	
			Leachable 1,1-Dichloroethylene	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Methylene Chloride(Dichloromethane)	2017/09/08	ND, RDL=0.20		mg/L	
			Leachable Methyl Ethyl Ketone (2-Butanone)	2017/09/08	ND, RDL=1.0		mg/L	
			Leachable Tetrachloroethylene	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Trichloroethylene	2017/09/08	ND, RDL=0.020		mg/L	
			Leachable Vinyl Chloride	2017/09/08	ND, RDL=0.020		mg/L	
5154951	RSC	RPD	Leachable Benzene	2017/09/09	NC		%	30
			Leachable Carbon Tetrachloride	2017/09/09	NC		%	30
			Leachable Chlorobenzene	2017/09/09	NC		%	30
			Leachable Chloroform	2017/09/09	NC		%	30
			Leachable 1,2-Dichlorobenzene	2017/09/09	NC		%	30
			Leachable 1,4-Dichlorobenzene	2017/09/09	NC		%	30
			Leachable 1,2-Dichloroethane	2017/09/09	NC		%	30
			Leachable 1,1-Dichloroethylene	2017/09/09	NC		%	30
			Leachable Methylene Chloride(Dichloromethan	2017/09/09	NC		%	30
			Leachable Methyl Ethyl Ketone (2-Butanone)	2017/09/09	NC		%	30
			Leachable Tetrachloroethylene	2017/09/09	NC		%	30
			Leachable Trichloroethylene	2017/09/09	NC		%	30
			Leachable Vinyl Chloride	2017/09/09	NC		%	30
5155278	RON	Matrix Spike	Leachable Mercury (Hg)	2017/09/08		93	%	75 - 125
5155278	RON	Leachate Blank	Leachable Mercury (Hg)	2017/09/08	ND, RDL=0.0010		mg/L	
5155278	RON	Spiked Blank	Leachable Mercury (Hg)	2017/09/08		94	%	80 - 120
5155278	RON	Method Blank	Leachable Mercury (Hg)	2017/09/08	ND, RDL=0.0010		mg/L	
5155278	RON	RPD	Leachable Mercury (Hg)	2017/09/08	NC		%	25
5155389	ADA	Matrix Spike	Leachable Arsenic (As)	2017/09/11		101	%	80 - 120
			Leachable Barium (Ba)	2017/09/11		99	%	80 - 120
			Leachable Boron (B)	2017/09/11		101	%	80 - 120
			Leachable Cadmium (Cd)	2017/09/11		99	%	80 - 120
			Leachable Chromium (Cr)	2017/09/11		98	%	80 - 120
			Leachable Lead (Pb)	2017/09/11		95	%	80 - 120
			Leachable Selenium (Se)	2017/09/11		101	%	80 - 120

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			Leachable Silver (Ag)	2017/09/11		95	%	80 - 120
			Leachable Uranium (U)	2017/09/11		99	%	80 - 120
5155389	ADA	Leachate Blank	Leachable Arsenic (As)	2017/09/11	ND, RDL=0.2		mg/L	
			Leachable Barium (Ba)	2017/09/11	ND, RDL=0.2		mg/L	
			Leachable Boron (B)	2017/09/11	ND, RDL=0.1		mg/L	
			Leachable Cadmium (Cd)	2017/09/11	ND, RDL=0.05		mg/L	
			Leachable Chromium (Cr)	2017/09/11	ND, RDL=0.1		mg/L	
			Leachable Lead (Pb)	2017/09/11	ND, RDL=0.1		mg/L	
			Leachable Selenium (Se)	2017/09/11	ND, RDL=0.1		mg/L	
			Leachable Silver (Ag)	2017/09/11	ND, RDL=0.01		mg/L	
			Leachable Uranium (U)	2017/09/11	ND, RDL=0.01		mg/L	
5155389	ADA	Spiked Blank	Leachable Arsenic (As)	2017/09/11		97	%	80 - 120
			Leachable Barium (Ba)	2017/09/11		97	%	80 - 120
			Leachable Boron (B)	2017/09/11		95	%	80 - 120
			Leachable Cadmium (Cd)	2017/09/11		92	%	80 - 120
			Leachable Chromium (Cr)	2017/09/11		93	%	80 - 120
			Leachable Lead (Pb)	2017/09/11		94	%	80 - 120
			Leachable Selenium (Se)	2017/09/11		96	%	80 - 120
			Leachable Silver (Ag)	2017/09/11		90	%	80 - 120
			Leachable Uranium (U)	2017/09/11		97	%	80 - 120
5155389	ADA	RPD	Leachable Arsenic (As)	2017/09/11	NC		%	35
			Leachable Barium (Ba)	2017/09/11	3.4		%	35
			Leachable Boron (B)	2017/09/11	7.6		%	35
			Leachable Cadmium (Cd)	2017/09/11	NC		%	35
			Leachable Chromium (Cr)	2017/09/11	NC		%	35
			Leachable Lead (Pb)	2017/09/11	NC		%	35
			Leachable Selenium (Se)	2017/09/11	NC		%	35
			Leachable Silver (Ag)	2017/09/11	NC		%	35
			Leachable Uranium (U)	2017/09/11	NC		%	35
5155494	SHG	Matrix Spike	Leachable Decachlorobiphenyl	2017/09/09		77	%	30 - 130
			Leachable Total PCB	2017/09/09		84	%	30 - 130
5155494	SHG	Spiked Blank	Leachable Decachlorobiphenyl	2017/09/09		74	%	30 - 130
			Leachable Total PCB	2017/09/09		86	%	30 - 130
5155494	SHG	Method Blank	Leachable Decachlorobiphenyl	2017/09/09		74	%	30 - 130
			Leachable Total PCB	2017/09/09	ND, RDL=3.0		ug/L	
5155494	SHG	RPD	Leachable Total PCB	2017/09/09	NC		%	40
5155728	LHA	Matrix Spike	Leachable WAD Cyanide (Free)	2017/09/08		90	%	80 - 120
5155728	LHA	Leachate Blank	Leachable WAD Cyanide (Free)	2017/09/08	ND, RDL=0.010		mg/L	
5155728	LHA	Spiked Blank	Leachable WAD Cyanide (Free)	2017/09/08		100	%	80 - 120
5155728	LHA	Method Blank	Leachable WAD Cyanide (Free)	2017/09/08	ND, RDL=0.0020		mg/L	
5155728	LHA	RPD	Leachable WAD Cyanide (Free)	2017/09/08	NC		%	20
5155737	C_N	Matrix Spike	Leachable Nitrite (N)	2017/09/08		102	%	80 - 120

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			Leachable Nitrate (N)	2017/09/08		98	%	80 - 120
			Leachable Nitrate + Nitrite (N)	2017/09/08		99	%	80 - 120
5155737	C_N	Leachate Blank	Leachable Nitrite (N)	2017/09/08	ND, RDL=0.10		mg/L	
			Leachable Nitrate (N)	2017/09/08	ND, RDL=1.0		mg/L	
			Leachable Nitrate + Nitrite (N)	2017/09/08	ND, RDL=1.0		mg/L	
5155737	C_N	Spiked Blank	Leachable Nitrite (N)	2017/09/08		101	%	80 - 120
			Leachable Nitrate (N)	2017/09/08		100	%	80 - 120
			Leachable Nitrate + Nitrite (N)	2017/09/08		100	%	80 - 120
5155737	C_N	Method Blank	Leachable Nitrite (N)	2017/09/08	ND, RDL=0.10		mg/L	
			Leachable Nitrate (N)	2017/09/08	ND, RDL=1.0		mg/L	
			Leachable Nitrate + Nitrite (N)	2017/09/08	ND, RDL=1.0		mg/L	
5155737	C_N	RPD	Leachable Nitrite (N)	2017/09/08	NC		%	25
			Leachable Nitrate (N)	2017/09/08	NC		%	25
			Leachable Nitrate + Nitrite (N)	2017/09/08	NC		%	25
5155747	SAU	Matrix Spike	Leachable Fluoride (F-)	2017/09/09		87	%	80 - 120
5155747	SAU	Leachate Blank	Leachable Fluoride (F-)	2017/09/09	ND, RDL=0.10		mg/L	
5155747	SAU	Spiked Blank	Leachable Fluoride (F-)	2017/09/09		102	%	80 - 120
5155747	SAU	Method Blank	Leachable Fluoride (F-)	2017/09/09	ND, RDL=0.10		mg/L	
5155747	SAU	RPD	Leachable Fluoride (F-)	2017/09/09	NC		%	25
5155829	WZ	Matrix Spike [FBE303-01]	Leachable 2,4,6-Tribromophenol	2017/09/09		80	%	10 - 130
			Leachable 2-Fluorobiphenyl	2017/09/09		56	%	30 - 130
			Leachable 2-Fluorophenol	2017/09/09		30	%	10 - 130
			Leachable D14-Terphenyl (FS)	2017/09/09		93	%	30 - 130
			Leachable D5-Nitrobenzene	2017/09/09		68	%	30 - 130
			Leachable D5-Phenol	2017/09/09		25	%	10 - 130
			Leachable Benzo(a)pyrene	2017/09/09		103	%	30 - 130
			Leachable m/p-Cresol	2017/09/09		39	%	10 - 130
			Leachable o-Cresol	2017/09/09		56	%	10 - 130
			Leachable Cresol Total	2017/09/09		48	%	10 - 130
			Leachable 2,4-Dichlorophenol	2017/09/09		65	%	10 - 130
			Leachable 2,4-Dinitrotoluene	2017/09/09		79	%	30 - 130
			Leachable Hexachlorobenzene	2017/09/09		84	%	30 - 130
			Leachable Hexachlorobutadiene	2017/09/09		60	%	30 - 130
			Leachable Hexachloroethane	2017/09/09		65	%	30 - 130
			Leachable Nitrobenzene	2017/09/09		70	%	30 - 130
			Leachable Pentachlorophenol	2017/09/09		85	%	30 - 130
			Leachable Pyridine	2017/09/09		4.0 (2)	%	10 - 130
			Leachable 2,3,4,6-Tetrachlorophenol	2017/09/09		86	%	10 - 130
			Leachable 2,4,5-Trichlorophenol	2017/09/09		73	%	10 - 130
			Leachable 2,4,6-Trichlorophenol	2017/09/09		68	%	10 - 130
5155829	WZ	Spiked Blank	Leachable 2,4,6-Tribromophenol	2017/09/09		81	%	10 - 130
			Leachable 2-Fluorobiphenyl	2017/09/09		67	%	30 - 130
			Leachable 2-Fluorophenol	2017/09/09		39	%	10 - 130
			Leachable D14-Terphenyl (FS)	2017/09/09		93	%	30 - 130
			Leachable D5-Nitrobenzene	2017/09/09		79	%	30 - 130
			Leachable D5-Phenol	2017/09/09		34	%	10 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Leachable Benzo(a)pyrene	2017/09/09		102	%	30 - 130
			Leachable m/p-Cresol	2017/09/09		65	%	10 - 130
			Leachable o-Cresol	2017/09/09		80	%	10 - 130
			Leachable Cresol Total	2017/09/09		72	%	10 - 130
			Leachable 2,4-Dichlorophenol	2017/09/09		77	%	10 - 130
			Leachable 2,4-Dinitrotoluene	2017/09/09		78	%	30 - 130
			Leachable Hexachlorobenzene	2017/09/09		86	%	30 - 130
			Leachable Hexachlorobutadiene	2017/09/09		74	%	30 - 130
			Leachable Hexachloroethane	2017/09/09		75	%	30 - 130
			Leachable Nitrobenzene	2017/09/09		80	%	30 - 130
			Leachable Pentachlorophenol	2017/09/09		86	%	30 - 130
			Leachable Pyridine	2017/09/09		11	%	10 - 130
			Leachable 2,3,4,6-Tetrachlorophenol	2017/09/09		89	%	10 - 130
			Leachable 2,4,5-Trichlorophenol	2017/09/09		76	%	10 - 130
			Leachable 2,4,6-Trichlorophenol	2017/09/09		77	%	10 - 130
5155829	WZ	Method Blank	Leachable 2,4,6-Tribromophenol	2017/09/09		75	%	10 - 130
			Leachable 2-Fluorobiphenyl	2017/09/09		69	%	30 - 130
			Leachable 2-Fluorophenol	2017/09/09		36	%	10 - 130
			Leachable D14-Terphenyl (FS)	2017/09/09		91	%	30 - 130
			Leachable D5-Nitrobenzene	2017/09/09		78	%	30 - 130
			Leachable D5-Phenol	2017/09/09		30	%	10 - 130
			Leachable Benzo(a)pyrene	2017/09/09	ND, RDL=0.10		ug/L	
			Leachable m/p-Cresol	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable o-Cresol	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable Cresol Total	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable 2,4-Dichlorophenol	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable 2,4-Dinitrotoluene	2017/09/09	ND, RDL=10		ug/L	
			Leachable Hexachlorobenzene	2017/09/09	ND, RDL=10		ug/L	
			Leachable Hexachlorobutadiene	2017/09/09	ND, RDL=10		ug/L	
			Leachable Hexachloroethane	2017/09/09	ND, RDL=10		ug/L	
			Leachable Nitrobenzene	2017/09/09	ND, RDL=10		ug/L	
			Leachable Pentachlorophenol	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable Pyridine	2017/09/09	ND, RDL=10		ug/L	
			Leachable 2,3,4,6-Tetrachlorophenol	2017/09/09	ND, RDL=2.5		ug/L	
			Leachable 2,4,5-Trichlorophenol	2017/09/09	ND, RDL=0.50		ug/L	
			Leachable 2,4,6-Trichlorophenol	2017/09/09	ND, RDL=2.5		ug/L	
5155829	WZ	RPD	Leachable Benzo(a)pyrene	2017/09/09	NC (3)		%	40
			Leachable m/p-Cresol	2017/09/09	NC		%	40
			Leachable o-Cresol	2017/09/09	NC		%	40

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Leachable Cresol Total	2017/09/09	NC		%	40
			Leachable 2,4-Dichlorophenol	2017/09/09	NC		%	40
			Leachable 2,4-Dinitrotoluene	2017/09/09	NC		%	40
			Leachable Hexachlorobenzene	2017/09/09	NC		%	40
			Leachable Hexachlorobutadiene	2017/09/09	NC		%	40
			Leachable Hexachloroethane	2017/09/09	NC		%	40
			Leachable Nitrobenzene	2017/09/09	NC		%	40
			Leachable Pentachlorophenol	2017/09/09	NC		%	40
			Leachable Pyridine	2017/09/09	NC		%	40
			Leachable 2,3,4,6-Tetrachlorophenol	2017/09/09	NC		%	40
			Leachable 2,4,5-Trichlorophenol	2017/09/09	NC		%	40
			Leachable 2,4,6-Trichlorophenol	2017/09/09	NC		%	40
5156924	SK1	Matrix Spike	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/09		115	%	65 - 135
5156924	SK1	Spiked Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/09		101	%	65 - 135
5156924	SK1	Method Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/09	ND, RDL=100		ug/g	
5156924	SK1	RPD	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/09	0		%	50

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.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

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.

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

(3) Detection Limit was raised due to matrix interferences.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7J1295
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888
Sampler Initials: EH

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

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

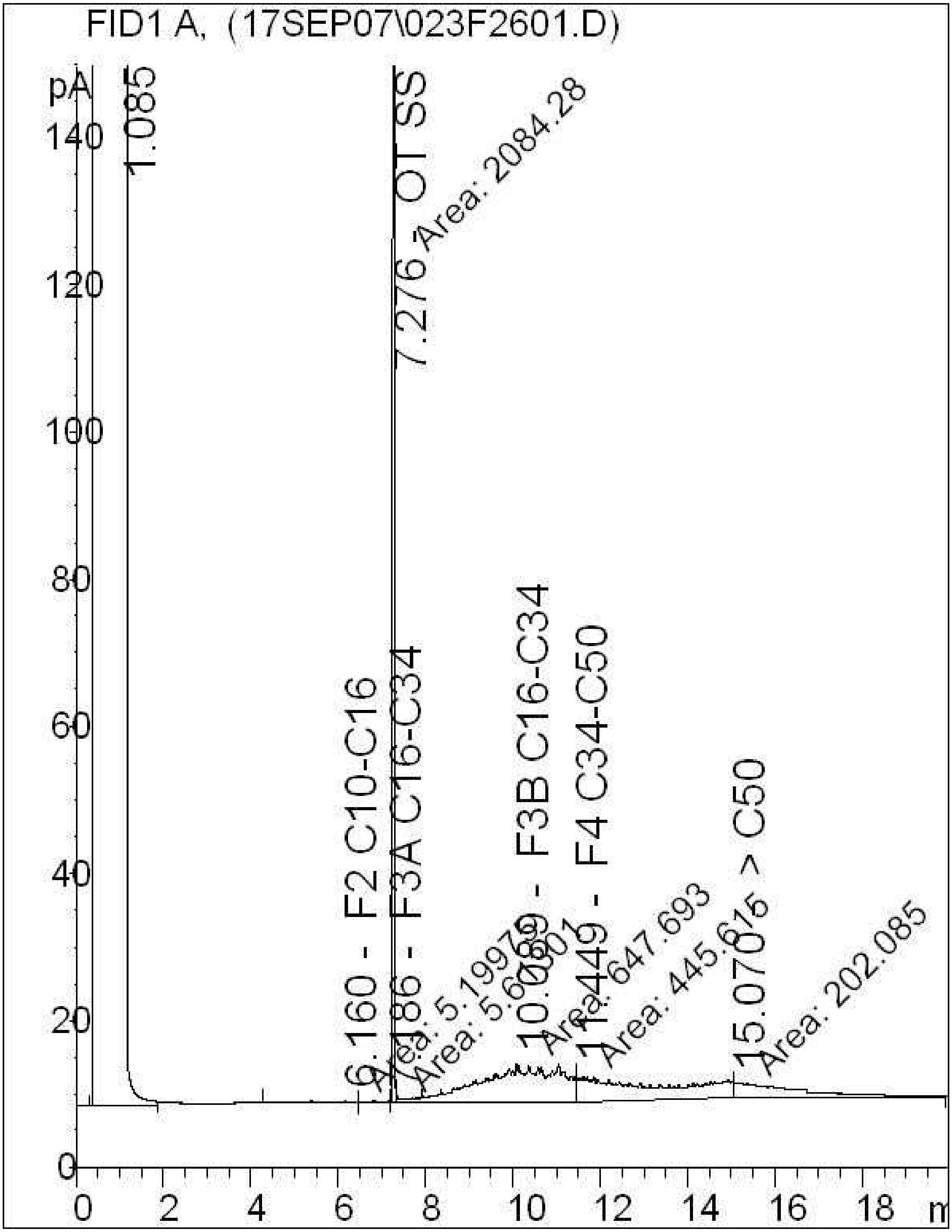
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE228

AEL Environment
Client Project #: 10888
Client ID: A0215 MW7/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

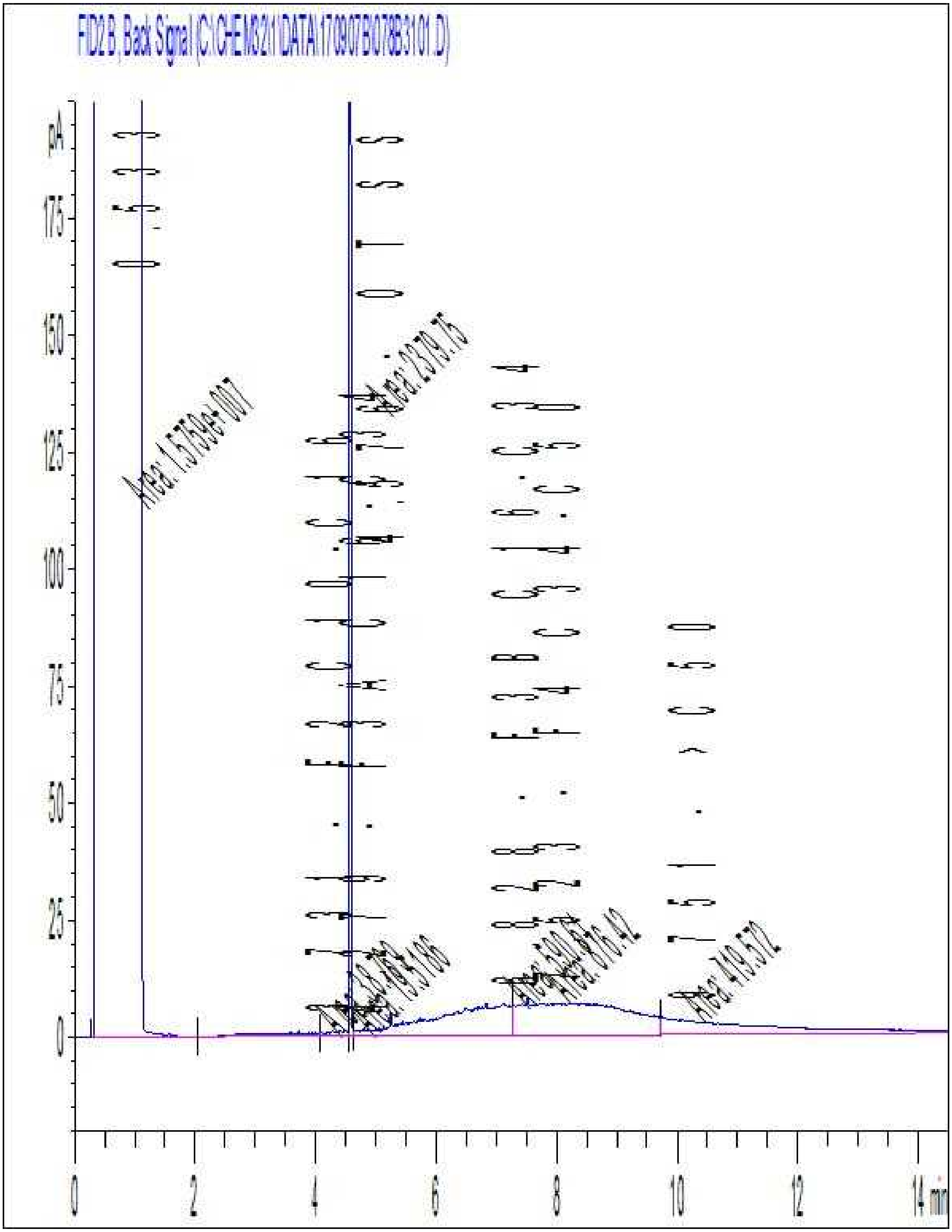


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE229

AEL Environment
Client Project #: 10888
Client ID: A0217 MW7/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

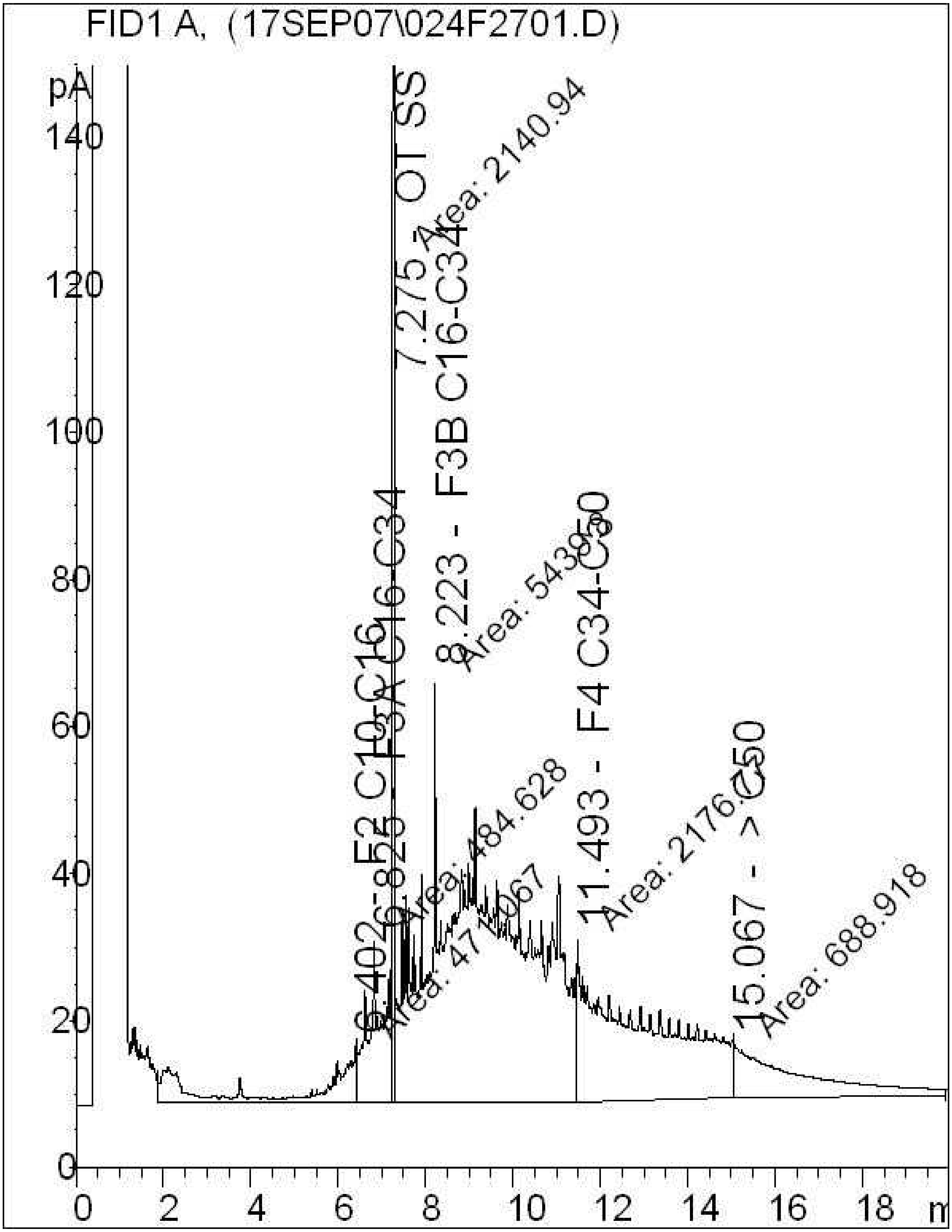


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE231

AEL Environment
Client Project #: 10888
Client ID: A0235 MW8/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

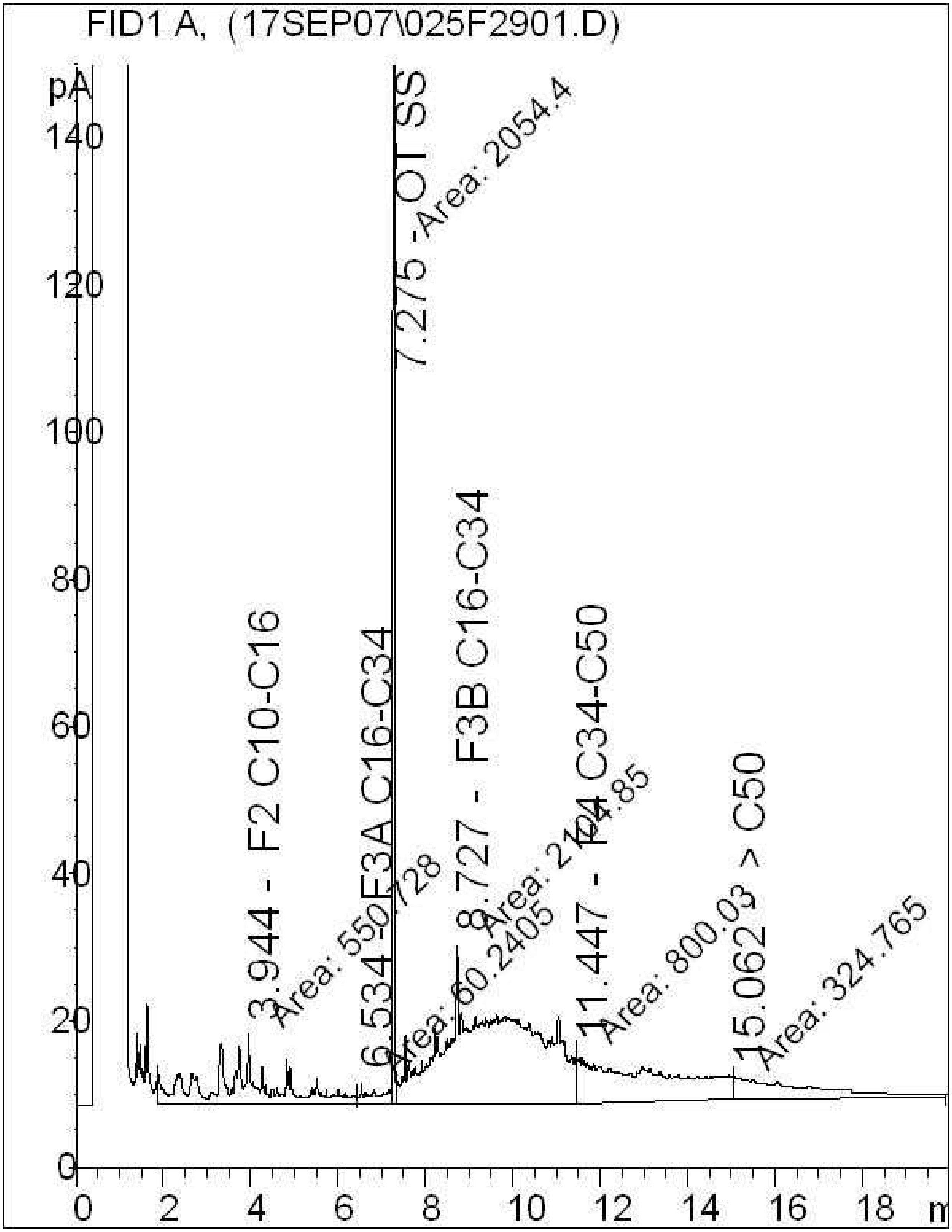


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE232

AEL Environment
Client Project #: 10888
Client ID: A0219 MW10/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

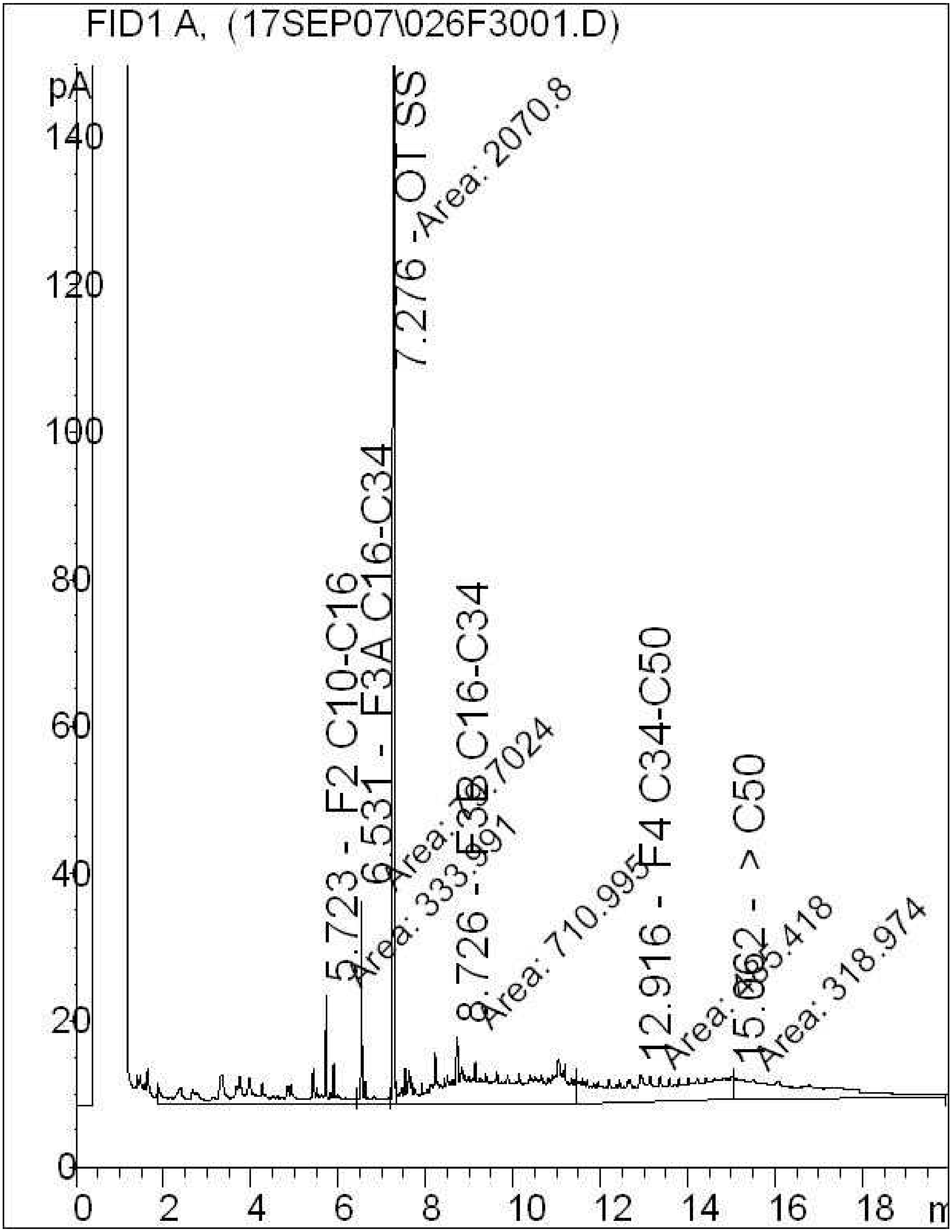


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE233

AEL Environment
Client Project #: 10888
Client ID: A0221 MW10/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

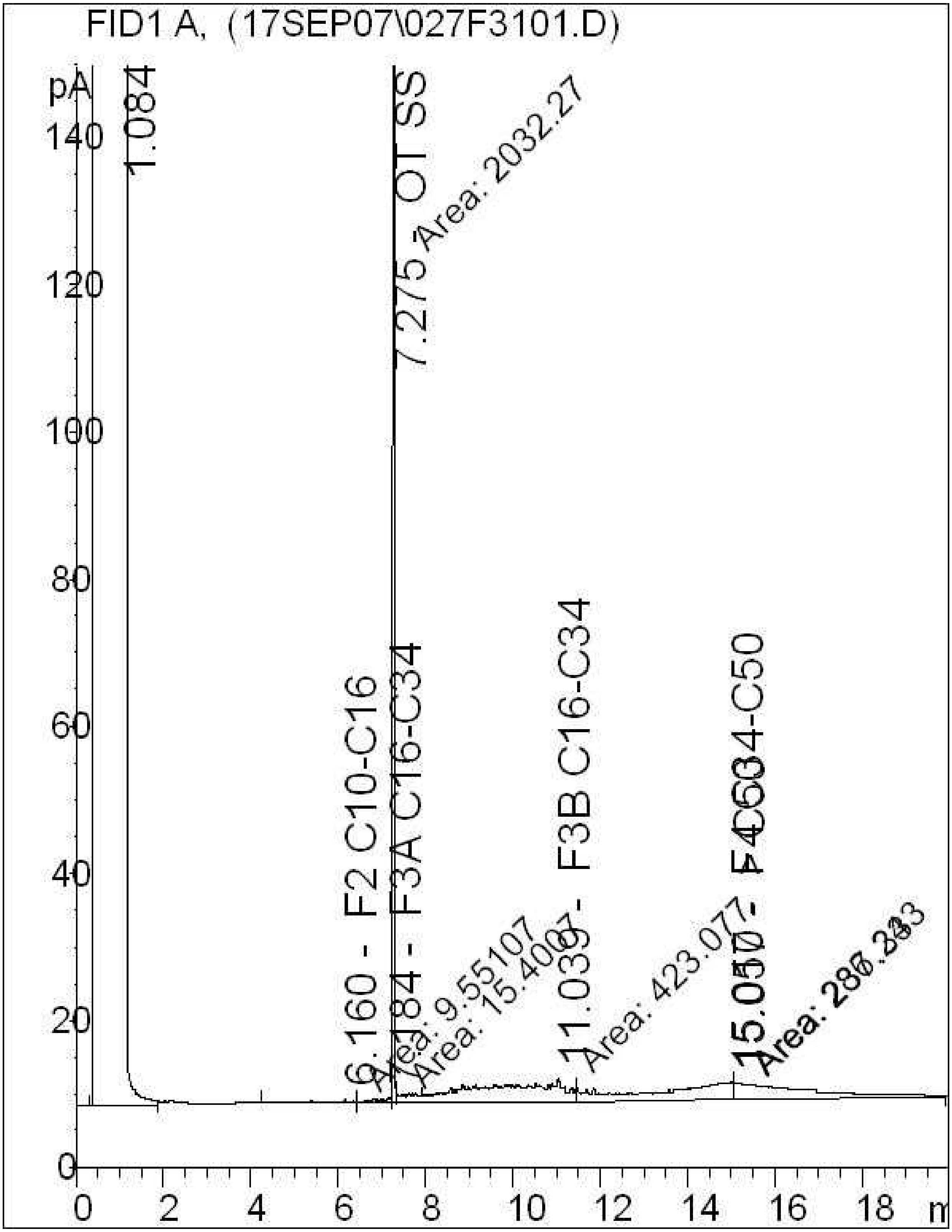


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE235

AEL Environment
Client Project #: 10888
Client ID: A0228 BH11/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

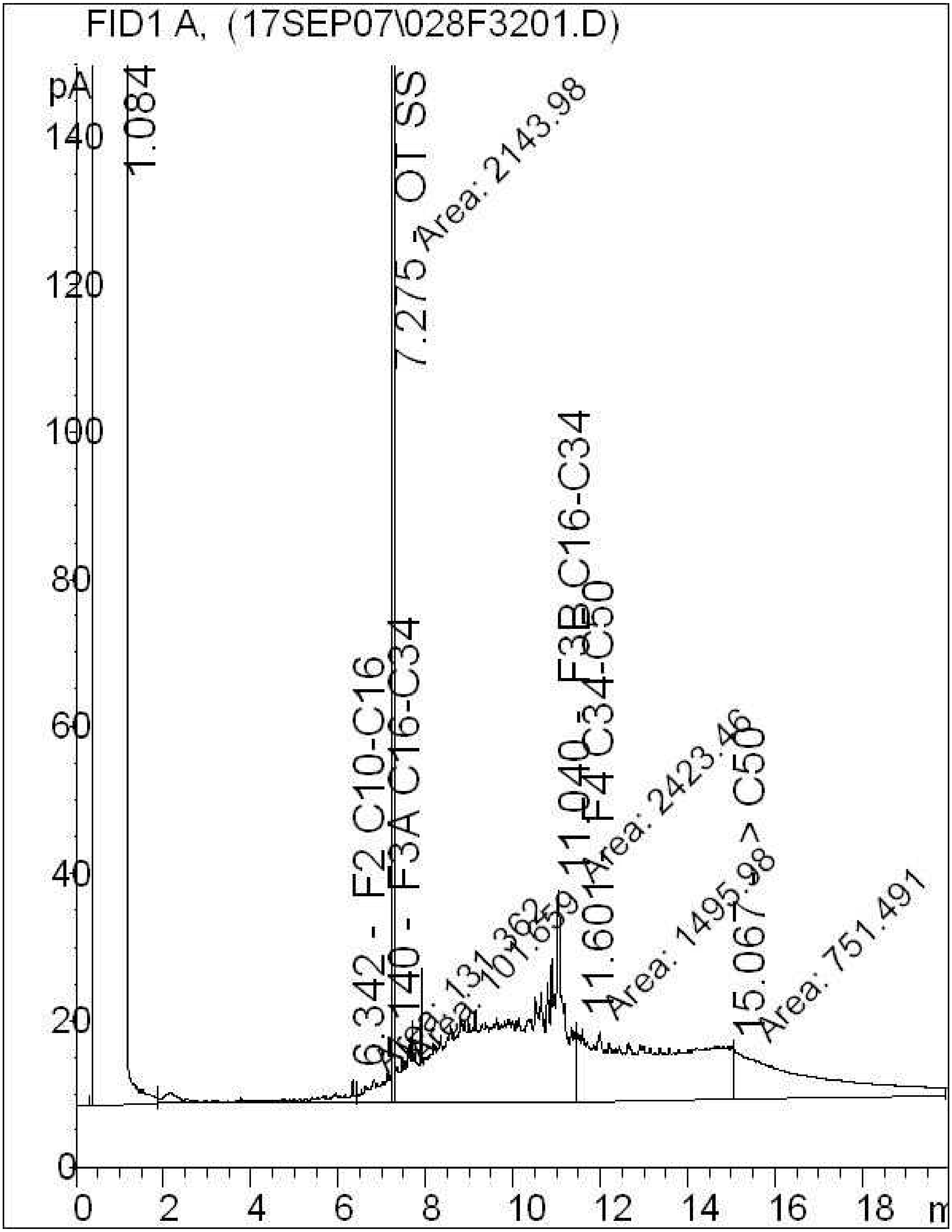


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE236

AEL Environment
Client Project #: 10888
Client ID: A0229 BH11/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

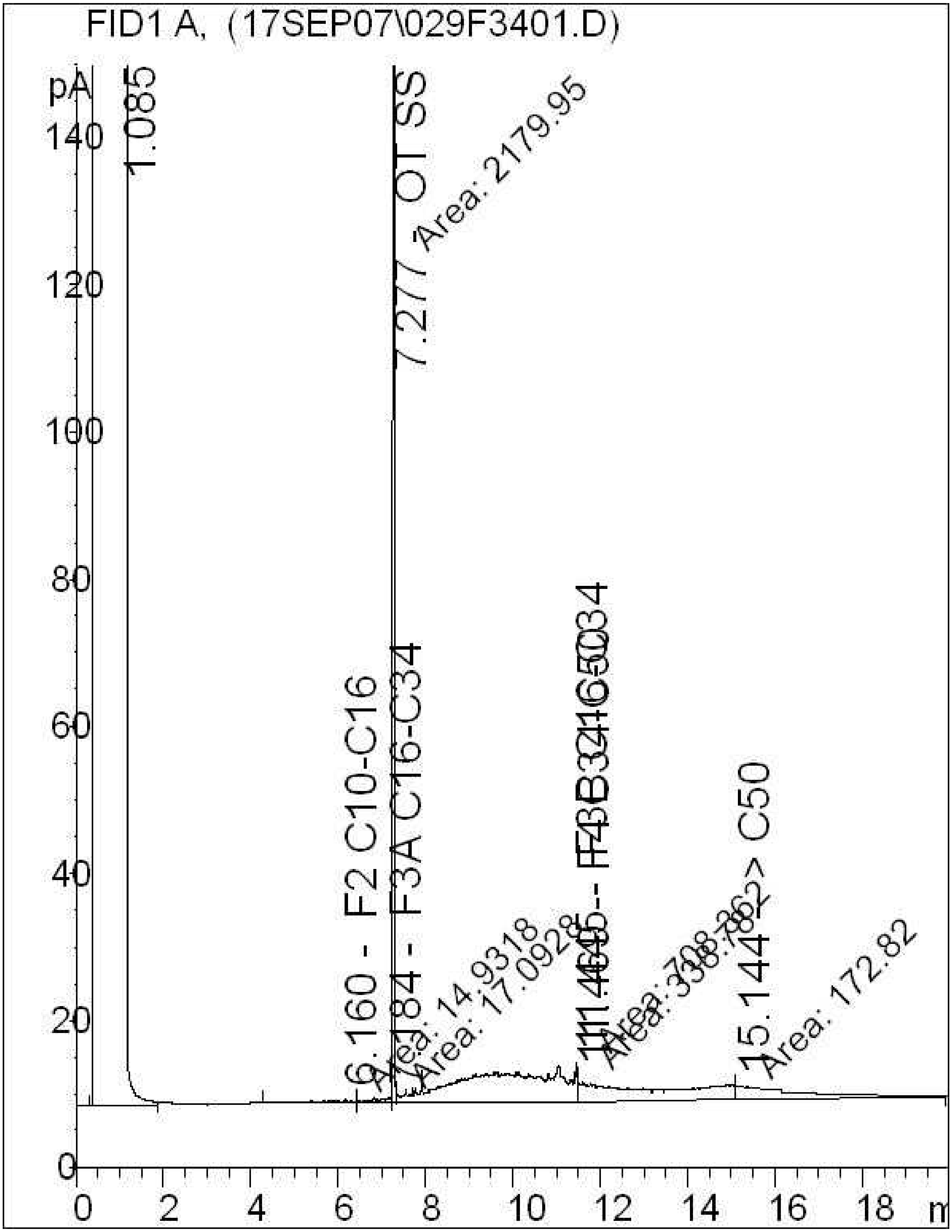


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE237

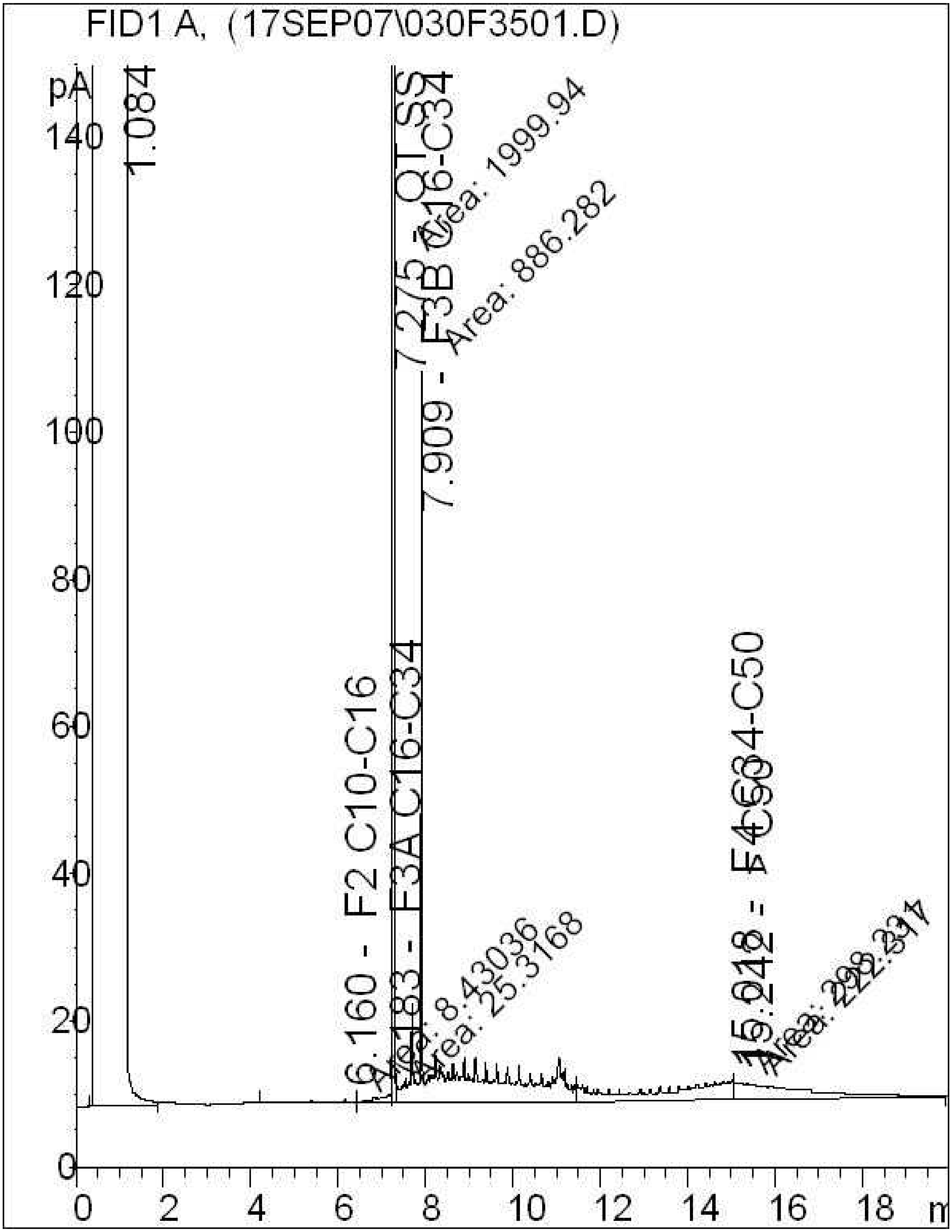
AEL Environment
Client Project #: 10888
Client ID: A0223 BH12/17

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

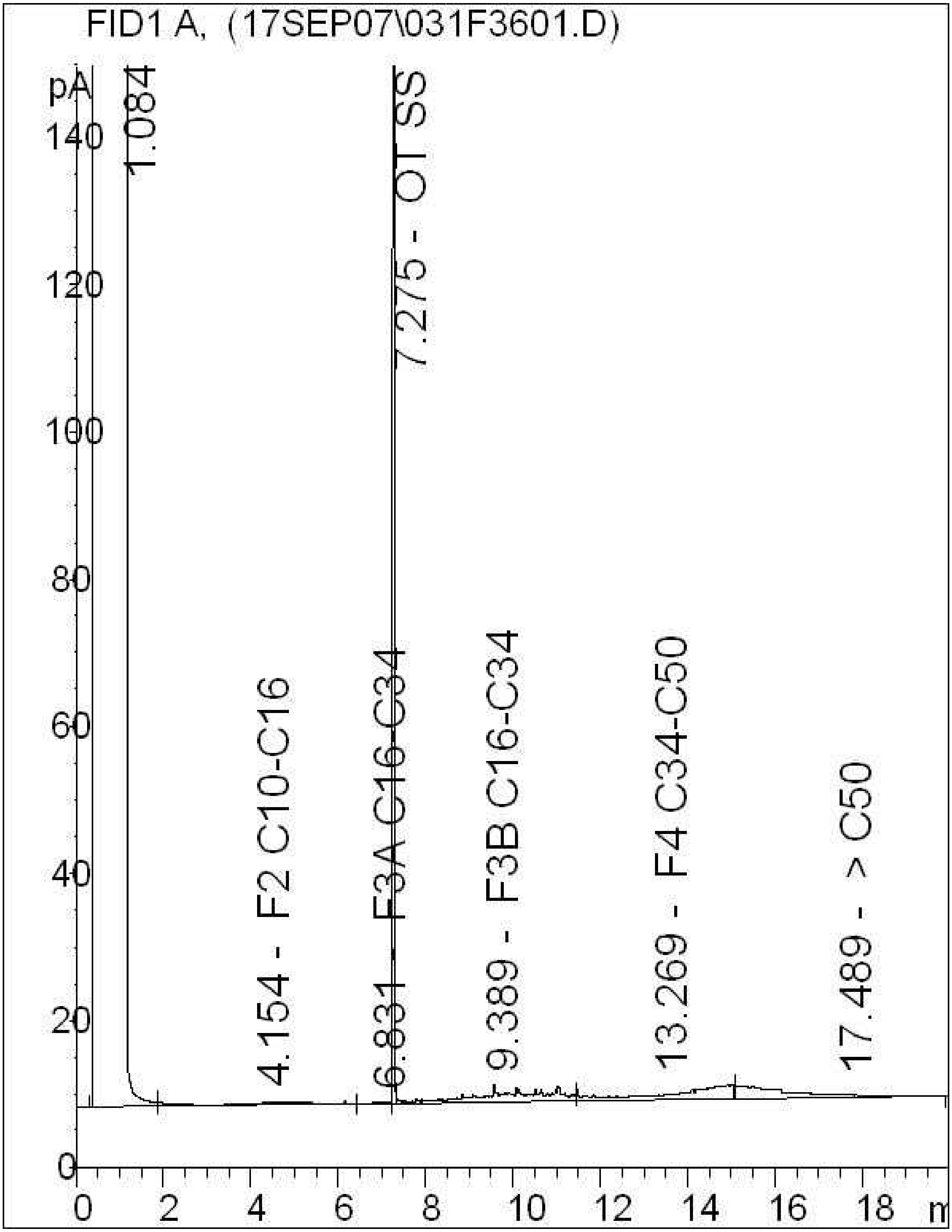


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE272

AEL Environment
Client Project #: 10888
Client ID: A0230 BH13/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

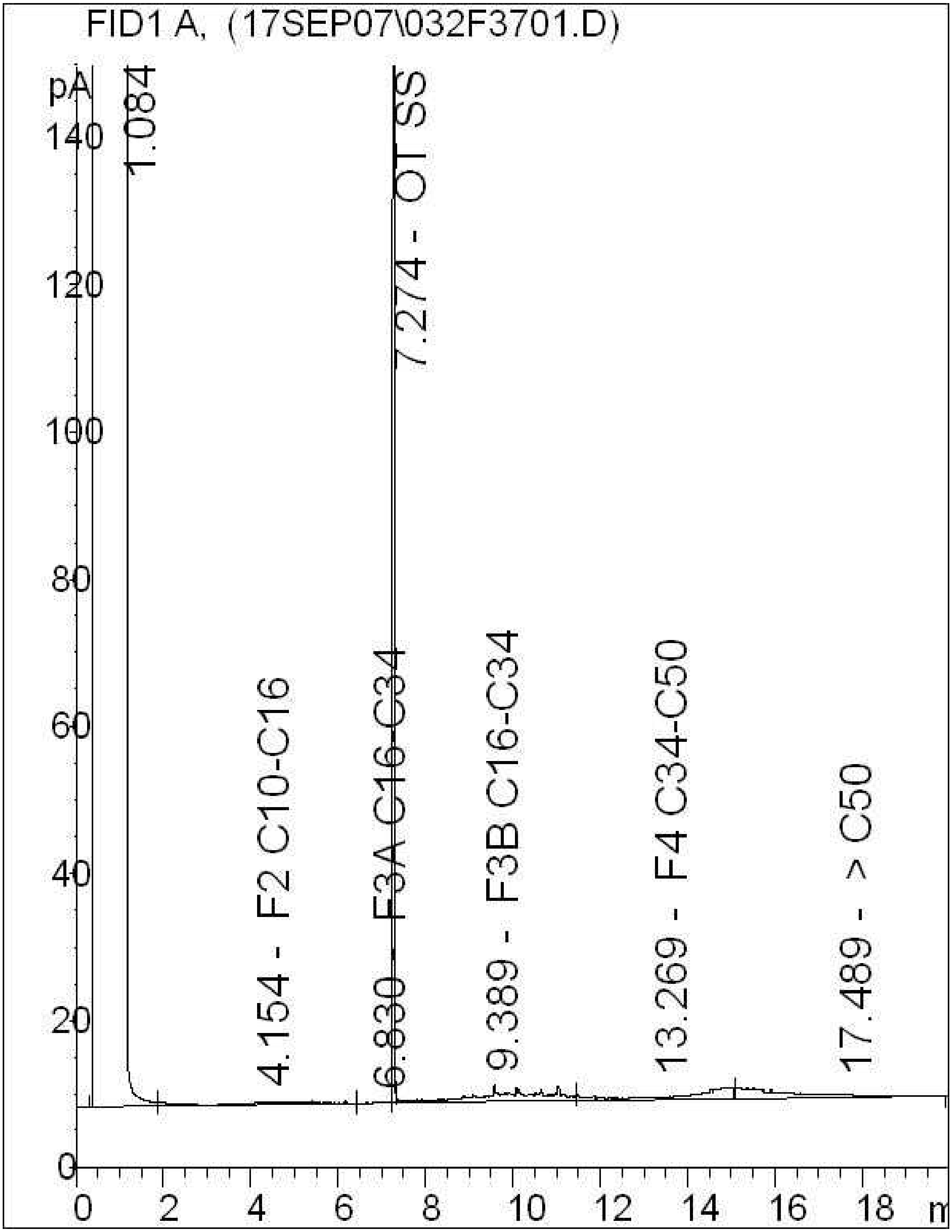


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE272 Lab-Dup

AEL Environment
Client Project #: 10888
Client ID: A0230 BH13/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

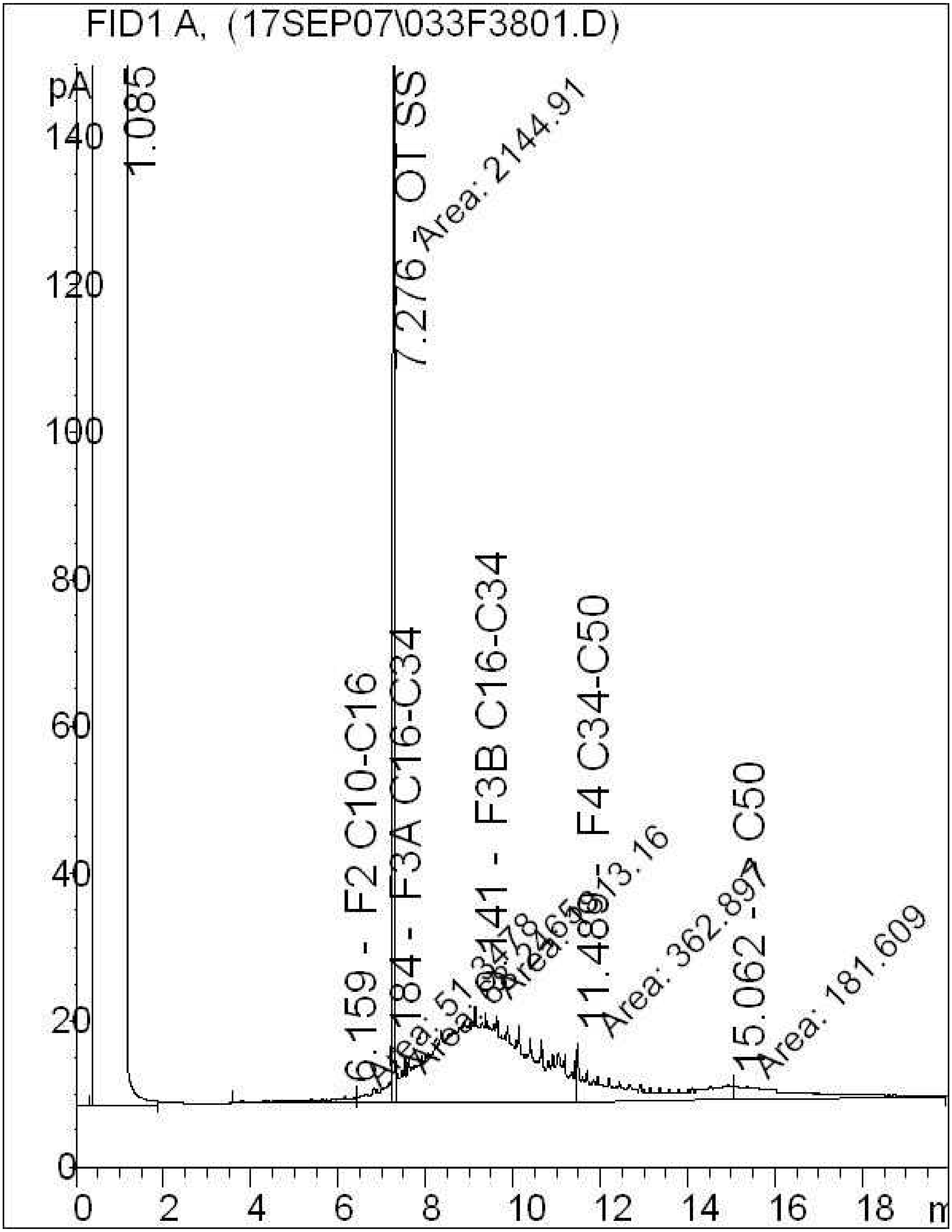


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE273

AEL Environment
Client Project #: 10888
Client ID: A0232 BH13/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

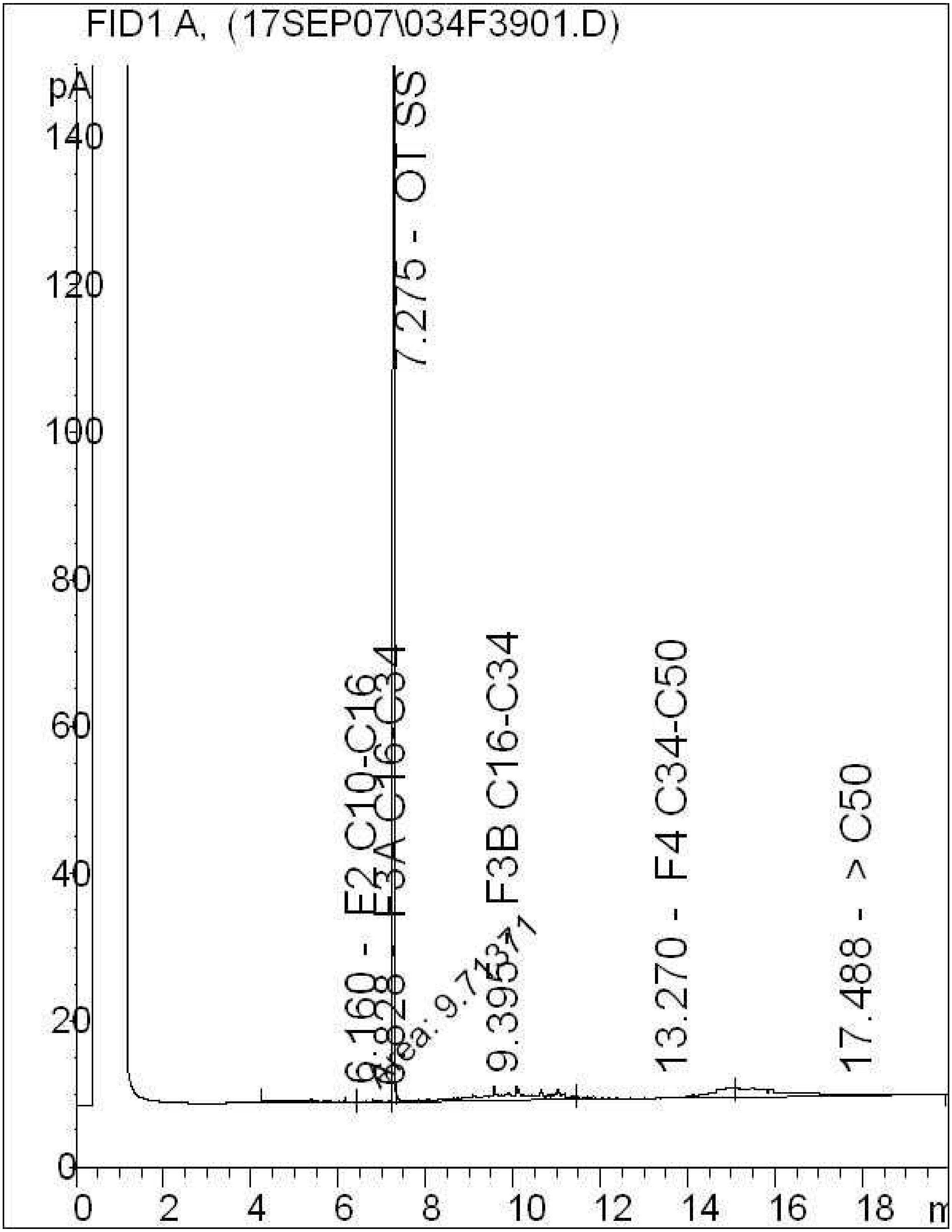


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE274

AEL Environment
Client Project #: 10888
Client ID: A0233 BH13/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

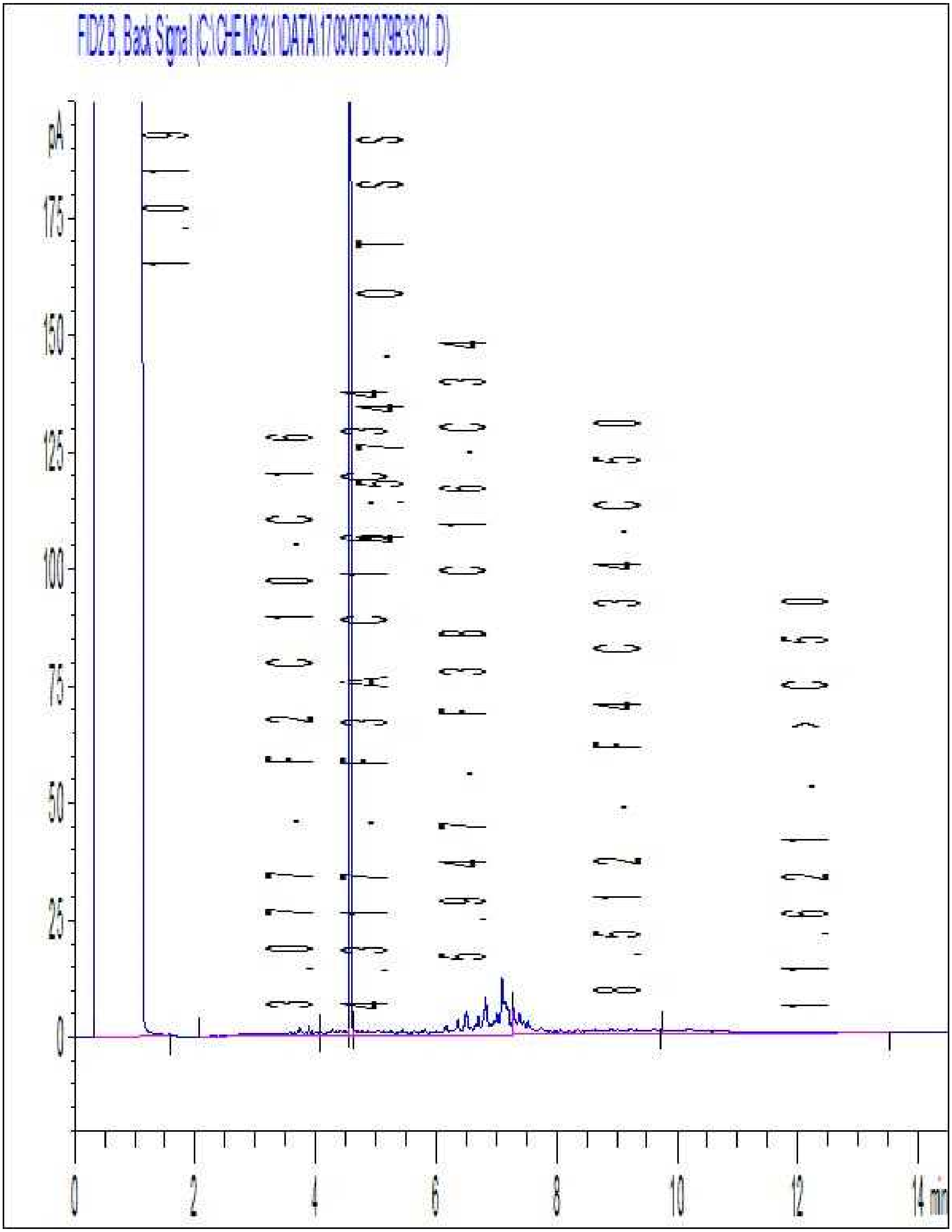


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE275

AEL Environment
Client Project #: 10888
Client ID: A0256 POND

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

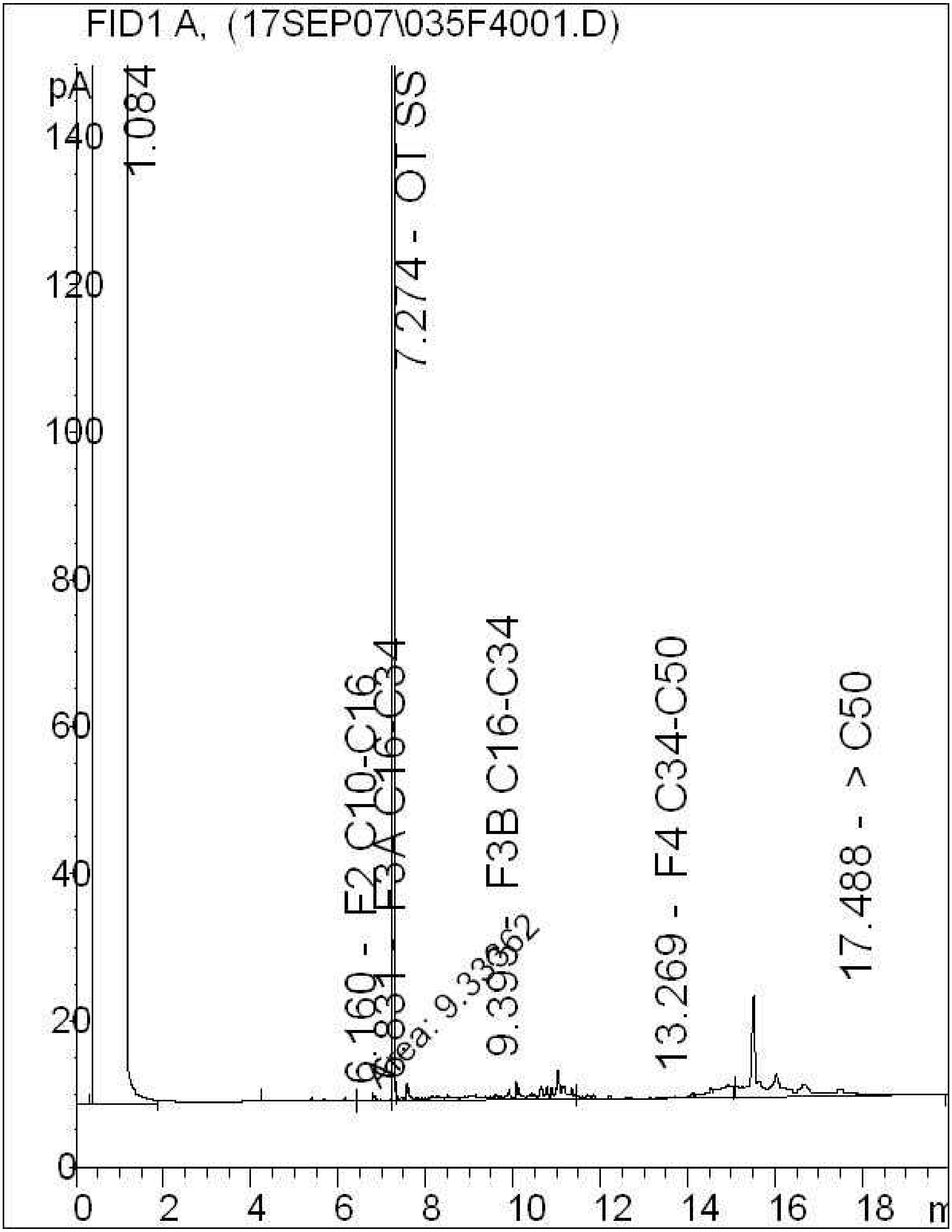


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE297

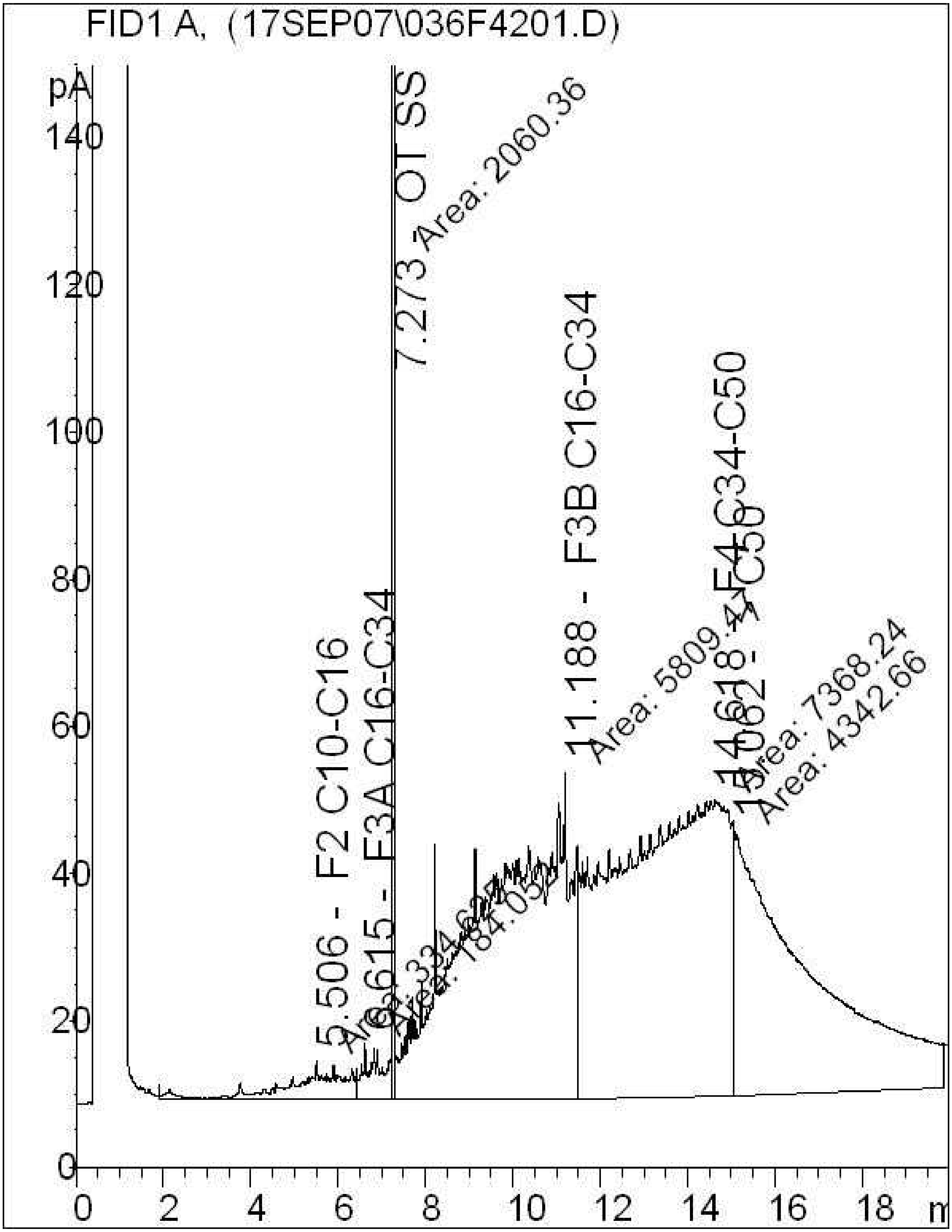
AEL Environment
Client Project #: 10888
Client ID: A0241 MW5

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

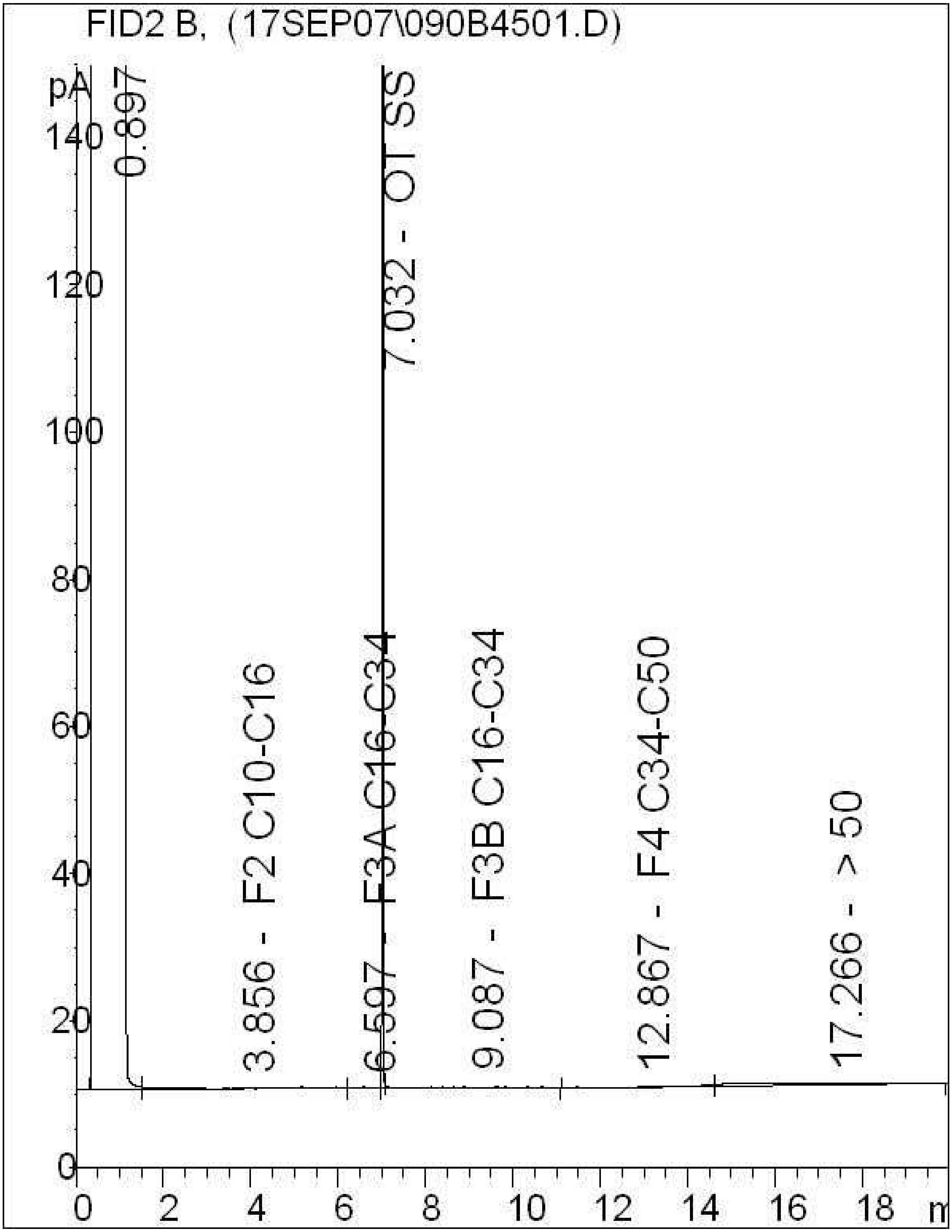


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE300

AEL Environment
Client Project #: 10888
Client ID: A0252 MW9/17

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

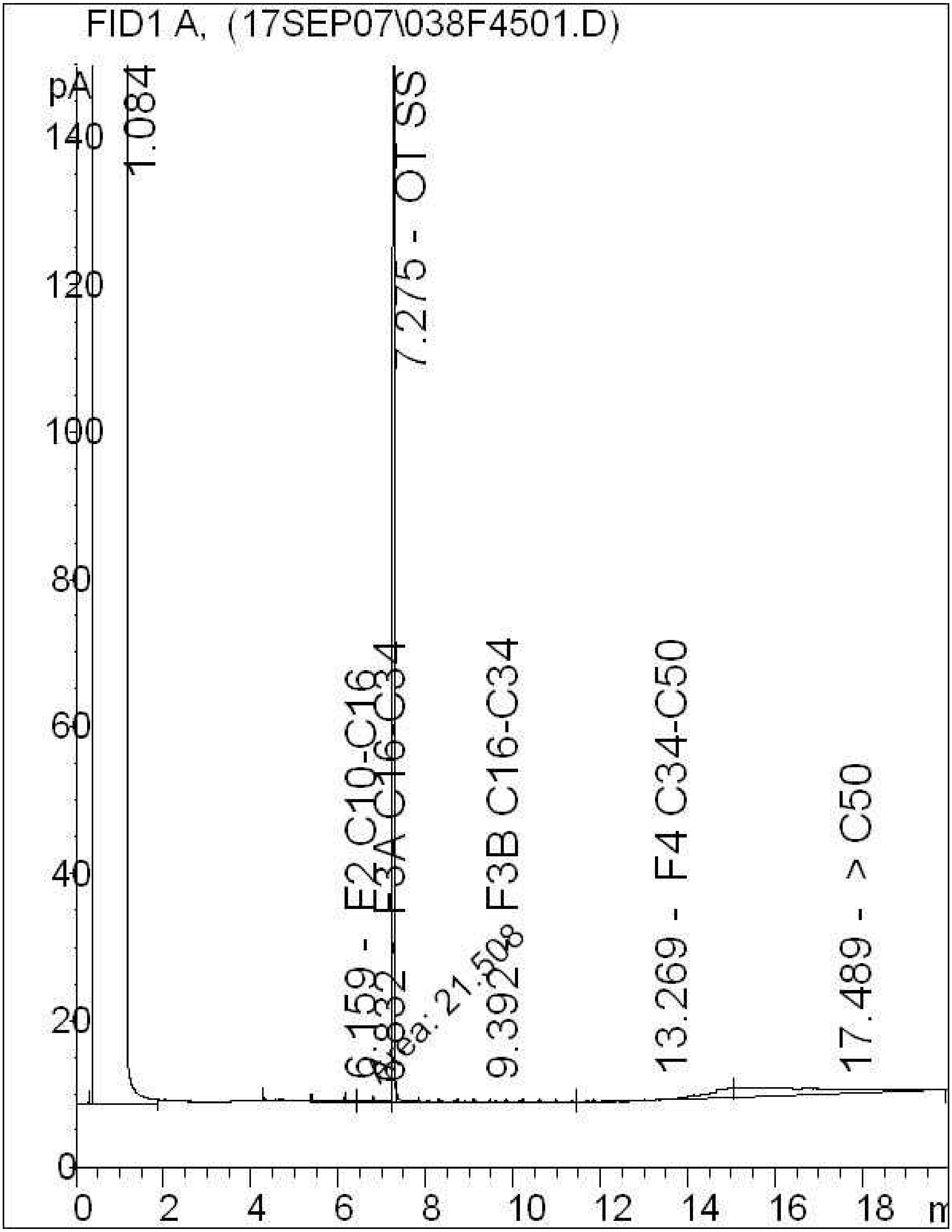


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1295
Report Date: 2017/09/12
Maxxam Sample: FBE302

AEL Environment
Client Project #: 10888
Client ID: A0255 MW9/17

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
A Bureau Veritas Group Company

Your Project #: 10888
Your C.O.C. #: 625116-01-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/07
Report #: R4689867
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8549
Received: 2017/08/29, 17:25

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum	2	N/A	2017/09/07	CAM SOP-00301	EPA 8270D m
1,3-Dichloropropene Sum	5	N/A	2017/09/06		EPA 8260C m
Chloride by Automated Colourimetry	4	N/A	2017/09/01	CAM SOP-00463	EPA 325.2 m
Chromium (VI) in Water	4	N/A	2017/08/31	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	4	N/A	2017/09/01	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2017/09/01	2017/09/03	CAM SOP-00316	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2017/09/01	2017/09/05	CAM SOP-00316	CCME PHC-CWS m
Mercury	4	2017/09/01	2017/09/05	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	4	N/A	2017/09/05	CAM SOP-00447	EPA 6020B m
PAH Compounds in Water by GC/MS (SIM)	2	2017/09/01	2017/09/02	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Water	2	2017/08/31	2017/09/01	CAM SOP-00309	EPA 8082A m
Volatile Organic Compounds and F1 PHCs	5	N/A	2017/09/02	CAM SOP-00230	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.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your Project #: 10888
Your C.O.C. #: 625116-01-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/07
Report #: R4689867
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8549

Received: 2017/08/29, 17:25

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

(1) 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.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		FAR103		
Sampling Date				
COC Number		625116-01-01		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	ND	0.50	5145154
Volatile Organics				
Acetone (2-Propanone)	ug/L	ND	10	5145411
Benzene	ug/L	ND	0.20	5145411
Bromodichloromethane	ug/L	ND	0.50	5145411
Bromoform	ug/L	ND	1.0	5145411
Bromomethane	ug/L	ND	0.50	5145411
Carbon Tetrachloride	ug/L	ND	0.20	5145411
Chlorobenzene	ug/L	ND	0.20	5145411
Chloroform	ug/L	ND	0.20	5145411
Dibromochloromethane	ug/L	ND	0.50	5145411
1,2-Dichlorobenzene	ug/L	ND	0.50	5145411
1,3-Dichlorobenzene	ug/L	ND	0.50	5145411
1,4-Dichlorobenzene	ug/L	ND	0.50	5145411
Dichlorodifluoromethane (FREON 12)	ug/L	ND	1.0	5145411
1,1-Dichloroethane	ug/L	ND	0.20	5145411
1,2-Dichloroethane	ug/L	ND	0.50	5145411
1,1-Dichloroethylene	ug/L	ND	0.20	5145411
cis-1,2-Dichloroethylene	ug/L	ND	0.50	5145411
trans-1,2-Dichloroethylene	ug/L	ND	0.50	5145411
1,2-Dichloropropane	ug/L	ND	0.20	5145411
cis-1,3-Dichloropropene	ug/L	ND	0.30	5145411
trans-1,3-Dichloropropene	ug/L	ND	0.40	5145411
Ethylbenzene	ug/L	ND	0.20	5145411
Ethylene Dibromide	ug/L	ND	0.20	5145411
Hexane	ug/L	ND	1.0	5145411
Methylene Chloride(Dichloromethane)	ug/L	ND	2.0	5145411
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	10	5145411
Methyl Isobutyl Ketone	ug/L	ND	5.0	5145411
Methyl t-butyl ether (MTBE)	ug/L	ND	0.50	5145411
Styrene	ug/L	ND	0.50	5145411
1,1,1,2-Tetrachloroethane	ug/L	ND	0.50	5145411
1,1,2,2-Tetrachloroethane	ug/L	ND	0.50	5145411
Tetrachloroethylene	ug/L	ND	0.20	5145411
Toluene	ug/L	ND	0.20	5145411

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		FAR103		
Sampling Date				
COC Number		625116-01-01		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
1,1,1-Trichloroethane	ug/L	ND	0.20	5145411
1,1,2-Trichloroethane	ug/L	ND	0.50	5145411
Trichloroethylene	ug/L	ND	0.20	5145411
Trichlorofluoromethane (FREON 11)	ug/L	ND	0.50	5145411
Vinyl Chloride	ug/L	ND	0.20	5145411
p+m-Xylene	ug/L	ND	0.20	5145411
o-Xylene	ug/L	ND	0.20	5145411
Total Xylenes	ug/L	ND	0.20	5145411
F1 (C6-C10)	ug/L	ND	25	5145411
F1 (C6-C10) - BTEX	ug/L	ND	25	5145411
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	97		5145411
D4-1,2-Dichloroethane	%	105		5145411
D8-Toluene	%	96		5145411

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

O.REG 153 METALS & INORGANICS PKG (WTR)

Maxxam ID		FAR099	FAR100		FAR101		FAR102		
Sampling Date		2017/08/28 13:40	2017/08/28 15:00		2017/08/28 17:15		2017/08/28 17:45		
COC Number		625116-01-01	625116-01-01		625116-01-01		625116-01-01		
	UNITS	**A0191 MW6**	**A0192 MW1**	**RDL**	**A0193 MW3D**	**RDL**	**A0194 MW3S**	**RDL**	**QC Batch**
Inorganics									
WAD Cyanide (Free)	ug/L	ND	ND	1	ND	1	ND	1	5145235
Dissolved Chloride (Cl)	mg/L	15	11	1.0	220	3.0	11	1.0	5145887
Metals									
Chromium (VI)	ug/L	ND	ND	0.50	ND	0.50	ND	0.50	5144886
Mercury (Hg)	ug/L	ND	ND	0.1	ND	0.1	ND	0.1	5146814
Dissolved Antimony (Sb)	ug/L	ND	ND	0.50	ND	0.50	ND	0.50	5145782
Dissolved Arsenic (As)	ug/L	ND	ND	1.0	12	1.0	ND	1.0	5145782
Dissolved Barium (Ba)	ug/L	110	120	2.0	500	2.0	150	2.0	5145782
Dissolved Beryllium (Be)	ug/L	ND	ND	0.50	ND	0.50	ND	0.50	5145782
Dissolved Boron (B)	ug/L	25	23	10	33	10	24	10	5145782
Dissolved Cadmium (Cd)	ug/L	ND	ND	0.10	ND	0.10	ND	0.10	5145782
Dissolved Chromium (Cr)	ug/L	ND	ND	5.0	ND	5.0	ND	5.0	5145782
Dissolved Cobalt (Co)	ug/L	0.56	ND	0.50	1.9	0.50	0.71	0.50	5145782
Dissolved Copper (Cu)	ug/L	ND	ND	1.0	ND	1.0	ND	1.0	5145782
Dissolved Iron (Fe)	ug/L	1700	9400	100	34000	100	10000	100	5145782
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	ND	0.50	ND	0.50	5145782
Dissolved Molybdenum (Mo)	ug/L	0.86	0.57	0.50	0.81	0.50	ND	0.50	5145782
Dissolved Nickel (Ni)	ug/L	1.2	ND	1.0	ND	1.0	7.9	1.0	5145782
Dissolved Selenium (Se)	ug/L	ND	ND	2.0	ND	2.0	ND	2.0	5145782
Dissolved Silver (Ag)	ug/L	ND	ND	0.10	ND	0.10	ND	0.10	5145782
Dissolved Sodium (Na)	ug/L	15000	6700	100	120000	100	6600	100	5145782
Dissolved Thallium (Tl)	ug/L	ND	ND	0.050	ND	0.050	ND	0.050	5145782
Dissolved Uranium (U)	ug/L	0.31	ND	0.10	ND	0.10	ND	0.10	5145782
Dissolved Vanadium (V)	ug/L	ND	ND	0.50	ND	0.50	ND	0.50	5145782
Dissolved Zinc (Zn)	ug/L	ND	ND	5.0	ND	5.0	ND	5.0	5145782

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

O.REG 153 PAHS (WATER)

Maxxam ID		FAR100	FAR101		
Sampling Date		2017/08/28 15:00	2017/08/28 17:15		
COC Number		625116-01-01	625116-01-01		
	UNITS	**A0192 MW1**	**A0193 MW3D**	**RDL**	**QC Batch**
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/L	0.26	0.23	0.071	5142569
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	0.59	0.11	0.050	5146932
Acenaphthylene	ug/L	ND	ND	0.050	5146932
Anthracene	ug/L	0.085	ND	0.050	5146932
Benzo(a)anthracene	ug/L	ND	ND	0.050	5146932
Benzo(a)pyrene	ug/L	ND	ND	0.010	5146932
Benzo(b/j)fluoranthene	ug/L	ND	ND	0.050	5146932
Benzo(g,h,i)perylene	ug/L	ND	ND	0.050	5146932
Benzo(k)fluoranthene	ug/L	ND	ND	0.050	5146932
Chrysene	ug/L	ND	ND	0.050	5146932
Dibenz(a,h)anthracene	ug/L	ND	ND	0.050	5146932
Fluoranthene	ug/L	0.11	ND	0.050	5146932
Fluorene	ug/L	0.53	ND	0.050	5146932
Indeno(1,2,3-cd)pyrene	ug/L	ND	ND	0.050	5146932
1-Methylnaphthalene	ug/L	0.26	0.23	0.050	5146932
2-Methylnaphthalene	ug/L	ND	ND	0.050	5146932
Naphthalene	ug/L	ND	ND	0.050	5146932
Phenanthrene	ug/L	0.56	0.051	0.030	5146932
Pyrene	ug/L	0.072	ND	0.050	5146932
Surrogate Recovery (%)					
D10-Anthracene	%	88	93		5146932
D14-Terphenyl (FS)	%	94	93		5146932
D8-Acenaphthylene	%	111	113		5146932

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

O.REG 153 PCBS (WATER)

Maxxam ID		FAR100		FAR101		
Sampling Date		2017/08/28 15:00		2017/08/28 17:15		
COC Number		625116-01-01		625116-01-01		
	UNITS	A0192 MW1	RDL	A0193 MW3D	RDL	QC Batch
PCBs						
Aroclor 1242	ug/L	0.11	0.05	ND	0.5	5145389
Aroclor 1248	ug/L	ND	0.05	ND	0.5	5145389
Aroclor 1254	ug/L	ND	0.05	ND	0.5	5145389
Aroclor 1260	ug/L	0.06	0.05	ND	0.5	5145389
Total PCB	ug/L	0.17	0.05	ND	0.5	5145389
Surrogate Recovery (%)						
Decachlorobiphenyl	%	69		74		5145389

RDL = Reportable Detection Limit
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ND = Not detected

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

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

Maxxam ID		FAR099		FAR100	FAR101		FAR102		
Sampling Date		2017/08/28 13:40		2017/08/28 15:00	2017/08/28 17:15		2017/08/28 17:45		
COC Number		625116-01-01		625116-01-01	625116-01-01		625116-01-01		
	UNITS	**A0191 MW6**	**QC Batch**	**A0192 MW1**	**A0193 MW3D**	**QC Batch**	**A0194 MW3S**	**RDL**	**QC Batch**
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/L	ND	5143947	ND	ND	5143947	ND	0.50	5143947
Volatile Organics									
Acetone (2-Propanone)	ug/L	ND	5145411	ND	ND	5145411	ND	10	5145411
Benzene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Bromodichloromethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Bromoform	ug/L	ND	5145411	ND	ND	5145411	ND	1.0	5145411
Bromomethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Carbon Tetrachloride	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Chlorobenzene	ug/L	ND	5145411	3.1	0.73	5145411	ND	0.20	5145411
Chloroform	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Dibromochloromethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,2-Dichlorobenzene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,3-Dichlorobenzene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,4-Dichlorobenzene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Dichlorodifluoromethane (FREON 12)	ug/L	ND	5145411	ND	ND	5145411	ND	1.0	5145411
1,1-Dichloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
1,2-Dichloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,1-Dichloroethylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
cis-1,2-Dichloroethylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
trans-1,2-Dichloroethylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,2-Dichloropropane	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
cis-1,3-Dichloropropene	ug/L	ND	5145411	ND	ND	5145411	ND	0.30	5145411
trans-1,3-Dichloropropene	ug/L	ND	5145411	ND	ND	5145411	ND	0.40	5145411
Ethylbenzene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Ethylene Dibromide	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Hexane	ug/L	ND	5145411	ND	ND	5145411	ND	1.0	5145411
Methylene Chloride(Dichloromethane)	ug/L	ND	5145411	ND	ND	5145411	ND	2.0	5145411
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	5145411	ND	ND	5145411	ND	10	5145411
Methyl Isobutyl Ketone	ug/L	ND	5145411	ND	ND	5145411	ND	5.0	5145411
Methyl t-butyl ether (MTBE)	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Styrene	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,1,1,2-Tetrachloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
1,1,2,2-Tetrachloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Tetrachloroethylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

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

Maxxam ID		FAR099		FAR100	FAR101		FAR102		
Sampling Date		2017/08/28 13:40		2017/08/28 15:00	2017/08/28 17:15		2017/08/28 17:45		
COC Number		625116-01-01		625116-01-01	625116-01-01		625116-01-01		
	UNITS	**A0191 MW6**	**QC Batch**	**A0192 MW1**	**A0193 MW3D**	**QC Batch**	**A0194 MW3S**	**RDL**	**QC Batch**
Toluene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
1,1,1-Trichloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
1,1,2-Trichloroethane	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Trichloroethylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Trichlorofluoromethane (FREON 11)	ug/L	ND	5145411	ND	ND	5145411	ND	0.50	5145411
Vinyl Chloride	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
p+m-Xylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
o-Xylene	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
Total Xylenes	ug/L	ND	5145411	ND	ND	5145411	ND	0.20	5145411
F1 (C6-C10)	ug/L	ND	5145411	ND	ND	5145411	ND	25	5145411
F1 (C6-C10) - BTEX	ug/L	ND	5145411	ND	ND	5145411	ND	25	5145411
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	ND	5146961	ND	ND	5146949	ND	100	5146961
F3 (C16-C34 Hydrocarbons)	ug/L	ND	5146961	260	ND	5146949	310	200	5146961
F4 (C34-C50 Hydrocarbons)	ug/L	ND	5146961	ND	ND	5146949	ND	200	5146961
Reached Baseline at C50	ug/L	Yes	5146961	Yes	Yes	5146949	Yes		5146961
Surrogate Recovery (%)									
o-Terphenyl	%	114	5146961	108	105	5146949	112		5146961
4-Bromofluorobenzene	%	98	5145411	99	97	5145411	97		5145411
D4-1,2-Dichloroethane	%	104	5145411	105	106	5145411	107		5145411
D8-Toluene	%	95	5145411	96	96	5145411	96		5145411

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAR099
Sample ID: A0191 MW6
Matrix: Water

Collected: 2017/08/28
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5143947	N/A	2017/09/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	5145887	N/A	2017/09/01	Deonarine Ramnarine
Chromium (VI) in Water	IC	5144886	N/A	2017/08/31	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145235	N/A	2017/09/01	Xuanhong Qiu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5146961	2017/09/01	2017/09/05	Zhiyue (Frank) Zhu
Mercury	CV/AA	5146814	2017/09/01	2017/09/05	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5145782	N/A	2017/09/05	Thao Nguyen
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5145411	N/A	2017/09/02	Blair Gannon

Maxxam ID: FAR100
Sample ID: A0192 MW1
Matrix: Water

Collected: 2017/08/28
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142569	N/A	2017/09/07	Automated Statchk
1,3-Dichloropropene Sum	CALC	5143947	N/A	2017/09/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	5145887	N/A	2017/09/01	Deonarine Ramnarine
Chromium (VI) in Water	IC	5144886	N/A	2017/08/31	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145235	N/A	2017/09/01	Xuanhong Qiu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5146949	2017/09/01	2017/09/03	Zhiyue (Frank) Zhu
Mercury	CV/AA	5146814	2017/09/01	2017/09/05	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5145782	N/A	2017/09/05	Thao Nguyen
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5146932	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Water	GC/ECD	5145389	2017/08/31	2017/09/01	Sarah Huang
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5145411	N/A	2017/09/02	Blair Gannon

Maxxam ID: FAR101
Sample ID: A0193 MW3D
Matrix: Water

Collected: 2017/08/28
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142569	N/A	2017/09/07	Automated Statchk
1,3-Dichloropropene Sum	CALC	5143947	N/A	2017/09/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	5145887	N/A	2017/09/01	Deonarine Ramnarine
Chromium (VI) in Water	IC	5144886	N/A	2017/08/31	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145235	N/A	2017/09/01	Xuanhong Qiu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5146949	2017/09/01	2017/09/03	Zhiyue (Frank) Zhu
Mercury	CV/AA	5146814	2017/09/01	2017/09/05	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5145782	N/A	2017/09/05	Thao Nguyen
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5146932	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Water	GC/ECD	5145389	2017/08/31	2017/09/01	Sarah Huang
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5145411	N/A	2017/09/02	Blair Gannon

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAR102
Sample ID: A0194 MW3S
Matrix: Water

Collected: 2017/08/28
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5143947	N/A	2017/09/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	5145887	N/A	2017/09/01	Deonarine Ramnarine
Chromium (VI) in Water	IC	5144886	N/A	2017/08/31	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145235	N/A	2017/09/01	Xuanhong Qiu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5146961	2017/09/01	2017/09/05	Zhiyue (Frank) Zhu
Mercury	CV/AA	5146814	2017/09/01	2017/09/05	Ron Morrison
Dissolved Metals by ICPMS	ICP/MS	5145782	N/A	2017/09/05	Thao Nguyen
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5145411	N/A	2017/09/02	Blair Gannon

Maxxam ID: FAR103
Sample ID: TRIP BLANK
Matrix: Water

Collected:
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5145154	N/A	2017/09/06	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5145411	N/A	2017/09/02	Blair Gannon

GENERAL COMMENTS

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

Package 1	18.3°C
Package 2	6.0°C
Package 3	19.0°C

All 250mL amber glass bottles for F2-F4 and PAH analyses contained visible sediment, which was included in the extraction.
all 40mL vials for F1BTEX and VOC analyses contained visible sediment except for Trip Blank sample
All 125mL plastic bottles for chromium VI and cyanide analyses contained visible sediment, the 500mL plastic bottle for chloride analysis contained visible sediment

Sample FAR101 [A0193 MW3D] : PCB Analysis: Due to the nature of the sample matrix, a smaller portion of the sample was extracted. DLs 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
5144886	LLE	Matrix Spike	Chromium (VI)	2017/08/31		101	%	80 - 120
5144886	LLE	Spiked Blank	Chromium (VI)	2017/08/31		102	%	80 - 120
5144886	LLE	Method Blank	Chromium (VI)	2017/08/31	ND, RDL=0.50		ug/L	
5144886	LLE	RPD	Chromium (VI)	2017/08/31	NC		%	20
5145235	XQI	Matrix Spike	WAD Cyanide (Free)	2017/09/01		109	%	80 - 120
5145235	XQI	Spiked Blank	WAD Cyanide (Free)	2017/09/01		101	%	80 - 120
5145235	XQI	Method Blank	WAD Cyanide (Free)	2017/09/01	ND,RDL=1		ug/L	
5145235	XQI	RPD	WAD Cyanide (Free)	2017/09/01	NC		%	20
5145389	SHG	Matrix Spike	Decachlorobiphenyl	2017/09/01		75	%	60 - 130
			Aroclor 1260	2017/09/01		86	%	60 - 130
			Total PCB	2017/09/01		86	%	60 - 130
5145389	SHG	Spiked Blank	Decachlorobiphenyl	2017/09/01		71	%	60 - 130
			Aroclor 1260	2017/09/01		81	%	60 - 130
			Total PCB	2017/09/01		81	%	60 - 130
5145389	SHG	Method Blank	Decachlorobiphenyl	2017/09/01		79	%	60 - 130
			Aroclor 1242	2017/09/01	ND, RDL=0.05		ug/L	
			Aroclor 1248	2017/09/01	ND, RDL=0.05		ug/L	
			Aroclor 1254	2017/09/01	ND, RDL=0.05		ug/L	
			Aroclor 1260	2017/09/01	ND, RDL=0.05		ug/L	
			Total PCB	2017/09/01	ND, RDL=0.05		ug/L	
5145389	SHG	RPD	Aroclor 1242	2017/09/01	NC		%	30
			Aroclor 1248	2017/09/01	NC		%	30
			Aroclor 1254	2017/09/01	NC		%	30
			Aroclor 1260	2017/09/01	NC		%	30
			Total PCB	2017/09/01	NC		%	40
5145411	BG1	Matrix Spike	4-Bromofluorobenzene	2017/09/05		102	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/05		108	%	70 - 130
			D8-Toluene	2017/09/05		102	%	70 - 130
			Acetone (2-Propanone)	2017/09/05		110	%	60 - 140
			Benzene	2017/09/05		115	%	70 - 130
			Bromodichloromethane	2017/09/05		111	%	70 - 130
			Bromoform	2017/09/05		120	%	70 - 130
			Bromomethane	2017/09/05		117	%	60 - 140
			Carbon Tetrachloride	2017/09/05		108	%	70 - 130
			Chlorobenzene	2017/09/05		106	%	70 - 130
			Chloroform	2017/09/05		115	%	70 - 130
			Dibromochloromethane	2017/09/05		116	%	70 - 130
			1,2-Dichlorobenzene	2017/09/05		104	%	70 - 130
			1,3-Dichlorobenzene	2017/09/05		105	%	70 - 130
			1,4-Dichlorobenzene	2017/09/05		106	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/05		129	%	60 - 140
			1,1-Dichloroethane	2017/09/05		117	%	70 - 130
			1,2-Dichloroethane	2017/09/05		114	%	70 - 130
			1,1-Dichloroethylene	2017/09/05		118	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/05		111	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/05		119	%	70 - 130
			1,2-Dichloropropane	2017/09/05		101	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/05		96	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/05		104	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Ethylbenzene	2017/09/05		97	%	70 - 130
			Ethylene Dibromide	2017/09/05		116	%	70 - 130
			Hexane	2017/09/05		113	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/05		120	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/05		108	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/05		98	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/05		95	%	70 - 130
			Styrene	2017/09/05		96	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/05		120	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/05		118	%	70 - 130
			Tetrachloroethylene	2017/09/05		113	%	70 - 130
			Toluene	2017/09/05		104	%	70 - 130
			1,1,1-Trichloroethane	2017/09/05		107	%	70 - 130
			1,1,2-Trichloroethane	2017/09/05		120	%	70 - 130
			Trichloroethylene	2017/09/05		107	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/05		118	%	70 - 130
			Vinyl Chloride	2017/09/05		108	%	70 - 130
			p+m-Xylene	2017/09/05		97	%	70 - 130
			o-Xylene	2017/09/05		98	%	70 - 130
			F1 (C6-C10)	2017/09/05		106	%	60 - 140
5145411	BG1	Spiked Blank	4-Bromofluorobenzene	2017/09/02		101	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/02		100	%	70 - 130
			D8-Toluene	2017/09/02		101	%	70 - 130
			Acetone (2-Propanone)	2017/09/02		99	%	60 - 140
			Benzene	2017/09/02		104	%	70 - 130
			Bromodichloromethane	2017/09/02		101	%	70 - 130
			Bromoform	2017/09/02		113	%	70 - 130
			Bromomethane	2017/09/02		103	%	60 - 140
			Carbon Tetrachloride	2017/09/02		103	%	70 - 130
			Chlorobenzene	2017/09/02		101	%	70 - 130
			Chloroform	2017/09/02		100	%	70 - 130
			Dibromochloromethane	2017/09/02		108	%	70 - 130
			1,2-Dichlorobenzene	2017/09/02		101	%	70 - 130
			1,3-Dichlorobenzene	2017/09/02		104	%	70 - 130
			1,4-Dichlorobenzene	2017/09/02		102	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/02		103	%	60 - 140
			1,1-Dichloroethane	2017/09/02		105	%	70 - 130
			1,2-Dichloroethane	2017/09/02		100	%	70 - 130
			1,1-Dichloroethylene	2017/09/02		113	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/02		101	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/02		106	%	70 - 130
			1,2-Dichloropropane	2017/09/02		97	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/02		95	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/02		98	%	70 - 130
			Ethylbenzene	2017/09/02		98	%	70 - 130
			Ethylene Dibromide	2017/09/02		106	%	70 - 130
			Hexane	2017/09/02		101	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/02		103	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/02		104	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/02		101	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/02		98	%	70 - 130
			Styrene	2017/09/02		97	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/02		110	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/02		106	%	70 - 130
			Tetrachloroethylene	2017/09/02		100	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Toluene	2017/09/02		98	%	70 - 130
			1,1,1-Trichloroethane	2017/09/02		100	%	70 - 130
			1,1,2-Trichloroethane	2017/09/02		102	%	70 - 130
			Trichloroethylene	2017/09/02		102	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/02		107	%	70 - 130
			Vinyl Chloride	2017/09/02		103	%	70 - 130
			p+m-Xylene	2017/09/02		101	%	70 - 130
			o-Xylene	2017/09/02		98	%	70 - 130
			F1 (C6-C10)	2017/09/02		99	%	60 - 140
5145411	BG1	Method Blank	4-Bromofluorobenzene	2017/09/02		98	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/02		101	%	70 - 130
			D8-Toluene	2017/09/02		97	%	70 - 130
			Acetone (2-Propanone)	2017/09/02	ND, RDL=10		ug/L	
			Benzene	2017/09/02	ND, RDL=0.20		ug/L	
			Bromodichloromethane	2017/09/02	ND, RDL=0.50		ug/L	
			Bromoform	2017/09/02	ND, RDL=1.0		ug/L	
			Bromomethane	2017/09/02	ND, RDL=0.50		ug/L	
			Carbon Tetrachloride	2017/09/02	ND, RDL=0.20		ug/L	
			Chlorobenzene	2017/09/02	ND, RDL=0.20		ug/L	
			Chloroform	2017/09/02	ND, RDL=0.20		ug/L	
			Dibromochloromethane	2017/09/02	ND, RDL=0.50		ug/L	
			1,2-Dichlorobenzene	2017/09/02	ND, RDL=0.50		ug/L	
			1,3-Dichlorobenzene	2017/09/02	ND, RDL=0.50		ug/L	
			1,4-Dichlorobenzene	2017/09/02	ND, RDL=0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2017/09/02	ND, RDL=1.0		ug/L	
			1,1-Dichloroethane	2017/09/02	ND, RDL=0.20		ug/L	
			1,2-Dichloroethane	2017/09/02	ND, RDL=0.50		ug/L	
			1,1-Dichloroethylene	2017/09/02	ND, RDL=0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/09/02	ND, RDL=0.50		ug/L	
			trans-1,2-Dichloroethylene	2017/09/02	ND, RDL=0.50		ug/L	
			1,2-Dichloropropane	2017/09/02	ND, RDL=0.20		ug/L	
			cis-1,3-Dichloropropene	2017/09/02	ND, RDL=0.30		ug/L	
			trans-1,3-Dichloropropene	2017/09/02	ND, RDL=0.40		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Ethylbenzene	2017/09/02	ND, RDL=0.20		ug/L	
			Ethylene Dibromide	2017/09/02	ND, RDL=0.20		ug/L	
			Hexane	2017/09/02	ND, RDL=1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2017/09/02	ND, RDL=2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/02	ND, RDL=10		ug/L	
			Methyl Isobutyl Ketone	2017/09/02	ND, RDL=5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/09/02	ND, RDL=0.50		ug/L	
			Styrene	2017/09/02	ND, RDL=0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2017/09/02	ND, RDL=0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/09/02	ND, RDL=0.50		ug/L	
			Tetrachloroethylene	2017/09/02	ND, RDL=0.20		ug/L	
			Toluene	2017/09/02	ND, RDL=0.20		ug/L	
			1,1,1-Trichloroethane	2017/09/02	ND, RDL=0.20		ug/L	
			1,1,2-Trichloroethane	2017/09/02	ND, RDL=0.50		ug/L	
			Trichloroethylene	2017/09/02	ND, RDL=0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2017/09/02	ND, RDL=0.50		ug/L	
			Vinyl Chloride	2017/09/02	ND, RDL=0.20		ug/L	
			p+m-Xylene	2017/09/02	ND, RDL=0.20		ug/L	
			o-Xylene	2017/09/02	ND, RDL=0.20		ug/L	
			Total Xylenes	2017/09/02	ND, RDL=0.20		ug/L	
			F1 (C6-C10)	2017/09/02	ND, RDL=25		ug/L	
			F1 (C6-C10) - BTEX	2017/09/02	ND, RDL=25		ug/L	
5145411	BG1	RPD	Acetone (2-Propanone)	2017/09/02	NC		%	30
			Benzene	2017/09/02	NC		%	30
			Bromodichloromethane	2017/09/02	NC		%	30
			Bromoform	2017/09/02	NC		%	30
			Bromomethane	2017/09/02	NC		%	30
			Carbon Tetrachloride	2017/09/02	NC		%	30
			Chlorobenzene	2017/09/02	NC		%	30
			Chloroform	2017/09/02	NC		%	30
			Dibromochloromethane	2017/09/02	NC		%	30
			1,2-Dichlorobenzene	2017/09/02	NC		%	30
			1,3-Dichlorobenzene	2017/09/02	NC		%	30

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,4-Dichlorobenzene	2017/09/02	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2017/09/02	NC		%	30
			1,1-Dichloroethane	2017/09/02	NC		%	30
			1,2-Dichloroethane	2017/09/02	NC		%	30
			1,1-Dichloroethylene	2017/09/02	NC		%	30
			cis-1,2-Dichloroethylene	2017/09/02	NC		%	30
			trans-1,2-Dichloroethylene	2017/09/02	NC		%	30
			1,2-Dichloropropane	2017/09/02	NC		%	30
			cis-1,3-Dichloropropene	2017/09/02	NC		%	30
			trans-1,3-Dichloropropene	2017/09/02	NC		%	30
			Ethylbenzene	2017/09/02	NC		%	30
			Ethylene Dibromide	2017/09/02	NC		%	30
			Hexane	2017/09/02	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/09/02	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/09/02	NC		%	30
			Methyl Isobutyl Ketone	2017/09/02	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/09/02	NC		%	30
			Styrene	2017/09/02	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/09/02	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/09/02	NC		%	30
			Tetrachloroethylene	2017/09/02	NC		%	30
			Toluene	2017/09/02	NC		%	30
			1,1,1-Trichloroethane	2017/09/02	NC		%	30
			1,1,2-Trichloroethane	2017/09/02	NC		%	30
			Trichloroethylene	2017/09/02	NC		%	30
			Trichlorofluoromethane (FREON 11)	2017/09/02	NC		%	30
			Vinyl Chloride	2017/09/02	NC		%	30
			p+m-Xylene	2017/09/02	NC		%	30
			o-Xylene	2017/09/02	NC		%	30
			Total Xylenes	2017/09/02	NC		%	30
			F1 (C6-C10)	2017/09/02	NC		%	30
			F1 (C6-C10) - BTEX	2017/09/02	NC		%	30
5145782	TNG	Matrix Spike	Dissolved Antimony (Sb)	2017/09/05		101	%	80 - 120
			Dissolved Arsenic (As)	2017/09/05		99	%	80 - 120
			Dissolved Barium (Ba)	2017/09/05		97	%	80 - 120
			Dissolved Beryllium (Be)	2017/09/05		99	%	80 - 120
			Dissolved Boron (B)	2017/09/05		99	%	80 - 120
			Dissolved Cadmium (Cd)	2017/09/05		97	%	80 - 120
			Dissolved Chromium (Cr)	2017/09/05		97	%	80 - 120
			Dissolved Cobalt (Co)	2017/09/05		94	%	80 - 120
			Dissolved Copper (Cu)	2017/09/05		96	%	80 - 120
			Dissolved Iron (Fe)	2017/09/05		98	%	80 - 120
			Dissolved Lead (Pb)	2017/09/05		92	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/09/05		102	%	80 - 120
			Dissolved Nickel (Ni)	2017/09/05		93	%	80 - 120
			Dissolved Selenium (Se)	2017/09/05		98	%	80 - 120
			Dissolved Silver (Ag)	2017/09/05		93	%	80 - 120
			Dissolved Sodium (Na)	2017/09/05		NC	%	80 - 120
			Dissolved Thallium (Tl)	2017/09/05		93	%	80 - 120
			Dissolved Uranium (U)	2017/09/05		99	%	80 - 120
			Dissolved Vanadium (V)	2017/09/05		97	%	80 - 120
			Dissolved Zinc (Zn)	2017/09/05		93	%	80 - 120
5145782	TNG	Spiked Blank	Dissolved Antimony (Sb)	2017/09/05		103	%	80 - 120
			Dissolved Arsenic (As)	2017/09/05		100	%	80 - 120
			Dissolved Barium (Ba)	2017/09/05		100	%	80 - 120

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

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Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2017/09/05		101	%	80 - 120
			Dissolved Boron (B)	2017/09/05		100	%	80 - 120
			Dissolved Cadmium (Cd)	2017/09/05		100	%	80 - 120
			Dissolved Chromium (Cr)	2017/09/05		98	%	80 - 120
			Dissolved Cobalt (Co)	2017/09/05		97	%	80 - 120
			Dissolved Copper (Cu)	2017/09/05		100	%	80 - 120
			Dissolved Iron (Fe)	2017/09/05		100	%	80 - 120
			Dissolved Lead (Pb)	2017/09/05		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2017/09/05		101	%	80 - 120
			Dissolved Nickel (Ni)	2017/09/05		97	%	80 - 120
			Dissolved Selenium (Se)	2017/09/05		102	%	80 - 120
			Dissolved Silver (Ag)	2017/09/05		98	%	80 - 120
			Dissolved Sodium (Na)	2017/09/05		102	%	80 - 120
			Dissolved Thallium (Tl)	2017/09/05		97	%	80 - 120
			Dissolved Uranium (U)	2017/09/05		101	%	80 - 120
			Dissolved Vanadium (V)	2017/09/05		97	%	80 - 120
			Dissolved Zinc (Zn)	2017/09/05		98	%	80 - 120
5145782	TNG	Method Blank	Dissolved Antimony (Sb)	2017/09/05	ND, RDL=0.50		ug/L	
			Dissolved Arsenic (As)	2017/09/05	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2017/09/05	ND, RDL=2.0		ug/L	
			Dissolved Beryllium (Be)	2017/09/05	ND, RDL=0.50		ug/L	
			Dissolved Boron (B)	2017/09/05	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2017/09/05	ND, RDL=0.10		ug/L	
			Dissolved Chromium (Cr)	2017/09/05	ND, RDL=5.0		ug/L	
			Dissolved Cobalt (Co)	2017/09/05	ND, RDL=0.50		ug/L	
			Dissolved Copper (Cu)	2017/09/05	ND, RDL=1.0		ug/L	
			Dissolved Iron (Fe)	2017/09/05	ND, RDL=100		ug/L	
			Dissolved Lead (Pb)	2017/09/05	ND, RDL=0.50		ug/L	
			Dissolved Molybdenum (Mo)	2017/09/05	ND, RDL=0.50		ug/L	
			Dissolved Nickel (Ni)	2017/09/05	ND, RDL=1.0		ug/L	
			Dissolved Selenium (Se)	2017/09/05	ND, RDL=2.0		ug/L	
			Dissolved Silver (Ag)	2017/09/05	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2017/09/05	ND, RDL=100		ug/L	
			Dissolved Thallium (Tl)	2017/09/05	ND, RDL=0.050		ug/L	
			Dissolved Uranium (U)	2017/09/05	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2017/09/05	ND, RDL=0.50		ug/L	

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Zinc (Zn)	2017/09/05	ND, RDL=5.0		ug/L	
5145782	TNG	RPD	Dissolved Antimony (Sb)	2017/09/05	NC		%	20
			Dissolved Arsenic (As)	2017/09/05	2.7		%	20
			Dissolved Barium (Ba)	2017/09/05	1.4		%	20
			Dissolved Beryllium (Be)	2017/09/05	NC		%	20
			Dissolved Boron (B)	2017/09/05	0.076		%	20
			Dissolved Cadmium (Cd)	2017/09/05	NC		%	20
			Dissolved Chromium (Cr)	2017/09/05	NC		%	20
			Dissolved Cobalt (Co)	2017/09/05	3.0		%	20
			Dissolved Copper (Cu)	2017/09/05	NC		%	20
			Dissolved Iron (Fe)	2017/09/05	0.11		%	20
			Dissolved Lead (Pb)	2017/09/05	NC		%	20
			Dissolved Molybdenum (Mo)	2017/09/05	2.3		%	20
			Dissolved Nickel (Ni)	2017/09/05	5.6		%	20
			Dissolved Selenium (Se)	2017/09/05	NC		%	20
			Dissolved Silver (Ag)	2017/09/05	NC		%	20
			Dissolved Sodium (Na)	2017/09/05	0.42		%	20
			Dissolved Thallium (Tl)	2017/09/05	3.8		%	20
			Dissolved Uranium (U)	2017/09/05	0.15		%	20
			Dissolved Vanadium (V)	2017/09/05	NC		%	20
			Dissolved Zinc (Zn)	2017/09/05	NC		%	20
5145887	DRM	Matrix Spike	Dissolved Chloride (Cl)	2017/09/01		102	%	80 - 120
5145887	DRM	Spiked Blank	Dissolved Chloride (Cl)	2017/09/01		103	%	80 - 120
5145887	DRM	Method Blank	Dissolved Chloride (Cl)	2017/09/01	ND, RDL=1.0		mg/L	
5145887	DRM	RPD	Dissolved Chloride (Cl)	2017/09/01	NC		%	20
5146814	RON	Matrix Spike	Mercury (Hg)	2017/09/05		110	%	75 - 125
5146814	RON	Spiked Blank	Mercury (Hg)	2017/09/05		111	%	80 - 120
5146814	RON	Method Blank	Mercury (Hg)	2017/09/05	ND, RDL=0.1		ug/L	
5146814	RON	RPD	Mercury (Hg)	2017/09/05	NC		%	20
5146932	RAJ	Matrix Spike	D10-Anthracene	2017/09/01		103	%	50 - 130
			D14-Terphenyl (FS)	2017/09/01		118	%	50 - 130
			D8-Acenaphthylene	2017/09/01		116	%	50 - 130
			Acenaphthene	2017/09/01		95	%	50 - 130
			Acenaphthylene	2017/09/01		102	%	50 - 130
			Anthracene	2017/09/01		95	%	50 - 130
			Benzo(a)anthracene	2017/09/01		89	%	50 - 130
			Benzo(a)pyrene	2017/09/01		91	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/01		87	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/01		96	%	50 - 130
			Benzo(k)fluoranthene	2017/09/01		90	%	50 - 130
			Chrysene	2017/09/01		93	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/01		100	%	50 - 130
			Fluoranthene	2017/09/01		100	%	50 - 130
			Fluorene	2017/09/01		89	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/01		92	%	50 - 130
			1-Methylnaphthalene	2017/09/01		99	%	50 - 130
			2-Methylnaphthalene	2017/09/01		90	%	50 - 130
			Naphthalene	2017/09/01		90	%	50 - 130
			Phenanthrene	2017/09/01		98	%	50 - 130
			Pyrene	2017/09/01		112	%	50 - 130
5146932	RAJ	Spiked Blank	D10-Anthracene	2017/09/01		97	%	50 - 130
			D14-Terphenyl (FS)	2017/09/01		97	%	50 - 130

Maxxam Job #: B7I8549
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D8-Acenaphthylene	2017/09/01		108	%	50 - 130
			Acenaphthene	2017/09/01		96	%	50 - 130
			Acenaphthylene	2017/09/01		100	%	50 - 130
			Anthracene	2017/09/01		94	%	50 - 130
			Benzo(a)anthracene	2017/09/01		90	%	50 - 130
			Benzo(a)pyrene	2017/09/01		93	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/01		93	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/01		98	%	50 - 130
			Benzo(k)fluoranthene	2017/09/01		86	%	50 - 130
			Chrysene	2017/09/01		95	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/01		101	%	50 - 130
			Fluoranthene	2017/09/01		94	%	50 - 130
			Fluorene	2017/09/01		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/01		95	%	50 - 130
			1-Methylnaphthalene	2017/09/01		99	%	50 - 130
			2-Methylnaphthalene	2017/09/01		90	%	50 - 130
			Naphthalene	2017/09/01		91	%	50 - 130
			Phenanthrene	2017/09/01		97	%	50 - 130
			Pyrene	2017/09/01		97	%	50 - 130
5146932	RAJ	Method Blank	D10-Anthracene	2017/09/01		95	%	50 - 130
			D14-Terphenyl (FS)	2017/09/01		100	%	50 - 130
			D8-Acenaphthylene	2017/09/01		106	%	50 - 130
			Acenaphthene	2017/09/01	ND, RDL=0.050		ug/L	
			Acenaphthylene	2017/09/01	ND, RDL=0.050		ug/L	
			Anthracene	2017/09/01	ND, RDL=0.050		ug/L	
			Benzo(a)anthracene	2017/09/01	ND, RDL=0.050		ug/L	
			Benzo(a)pyrene	2017/09/01	ND, RDL=0.010		ug/L	
			Benzo(b/j)fluoranthene	2017/09/01	ND, RDL=0.050		ug/L	
			Benzo(g,h,i)perylene	2017/09/01	ND, RDL=0.050		ug/L	
			Benzo(k)fluoranthene	2017/09/01	ND, RDL=0.050		ug/L	
			Chrysene	2017/09/01	ND, RDL=0.050		ug/L	
			Dibenz(a,h)anthracene	2017/09/01	ND, RDL=0.050		ug/L	
			Fluoranthene	2017/09/01	ND, RDL=0.050		ug/L	
			Fluorene	2017/09/01	ND, RDL=0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2017/09/01	ND, RDL=0.050		ug/L	
			1-Methylnaphthalene	2017/09/01	ND, RDL=0.050		ug/L	
			2-Methylnaphthalene	2017/09/01	ND, RDL=0.050		ug/L	
			Naphthalene	2017/09/01	ND, RDL=0.050		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2017/09/01	ND, RDL=0.030		ug/L	
			Pyrene	2017/09/01	ND, RDL=0.050		ug/L	
5146932	RAJ	RPD	Acenaphthene	2017/09/01	NC		%	30
			Acenaphthylene	2017/09/01	NC		%	30
			Anthracene	2017/09/01	NC		%	30
			Benzo(a)anthracene	2017/09/01	NC		%	30
			Benzo(a)pyrene	2017/09/01	NC		%	30
			Benzo(b/j)fluoranthene	2017/09/01	NC		%	30
			Benzo(g,h,i)perylene	2017/09/01	NC		%	30
			Benzo(k)fluoranthene	2017/09/01	NC		%	30
			Chrysene	2017/09/01	NC		%	30
			Dibenz(a,h)anthracene	2017/09/01	NC		%	30
			Fluoranthene	2017/09/01	NC		%	30
			Fluorene	2017/09/01	NC		%	30
			Indeno(1,2,3-cd)pyrene	2017/09/01	NC		%	30
			1-Methylnaphthalene	2017/09/01	NC		%	30
			2-Methylnaphthalene	2017/09/01	NC		%	30
			Naphthalene	2017/09/01	NC		%	30
			Phenanthrene	2017/09/01	NC		%	30
			Pyrene	2017/09/01	NC		%	30
5146949	ZZ	Matrix Spike	o-Terphenyl	2017/09/03		107	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/03		95	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/03		94	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/03		92	%	50 - 130
5146949	ZZ	Spiked Blank	o-Terphenyl	2017/09/03		109	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/03		97	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/03		98	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/03		93	%	60 - 130
5146949	ZZ	Method Blank	o-Terphenyl	2017/09/03		106	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/03	ND, RDL=100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/09/03	ND, RDL=200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2017/09/03	ND, RDL=200		ug/L	
5146949	ZZ	RPD	F2 (C10-C16 Hydrocarbons)	2017/09/03	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/03	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/03	NC		%	30
5146961	ZZ	Matrix Spike	o-Terphenyl	2017/09/05		120	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/05		110	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/05		111	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/05		110	%	50 - 130
5146961	ZZ	Spiked Blank	o-Terphenyl	2017/09/05		118	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/05		107	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/05		113	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/05		111	%	60 - 130
5146961	ZZ	Method Blank	o-Terphenyl	2017/09/05		114	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/05	ND, RDL=100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/09/05	ND, RDL=200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2017/09/05	ND, RDL=200		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5146961	ZZ	RPD	F2 (C10-C16 Hydrocarbons)	2017/09/05	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/05	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/05	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).

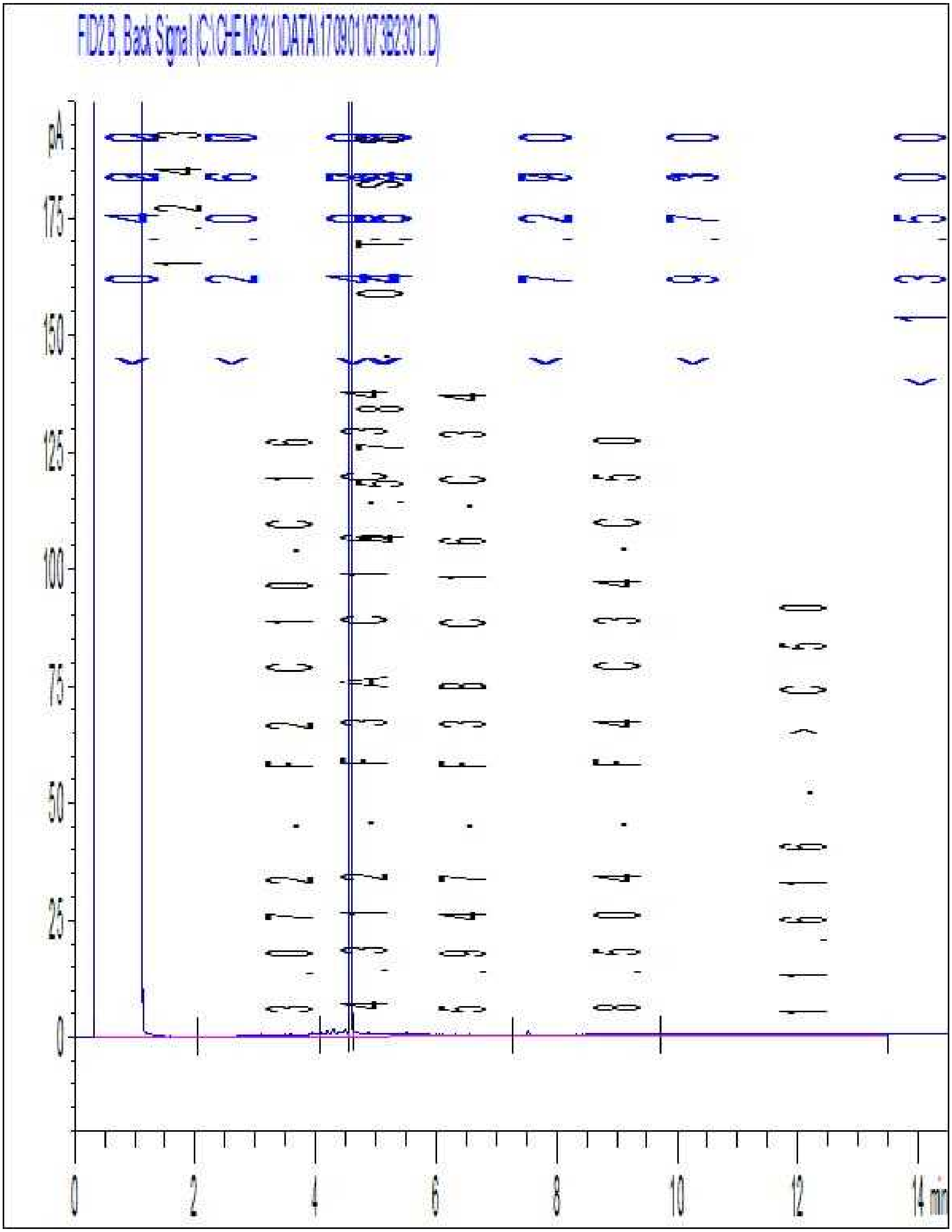
VALIDATION SIGNATURE PAGE

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

CHARTERED
Eva Pranjic
CHEMIST

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

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

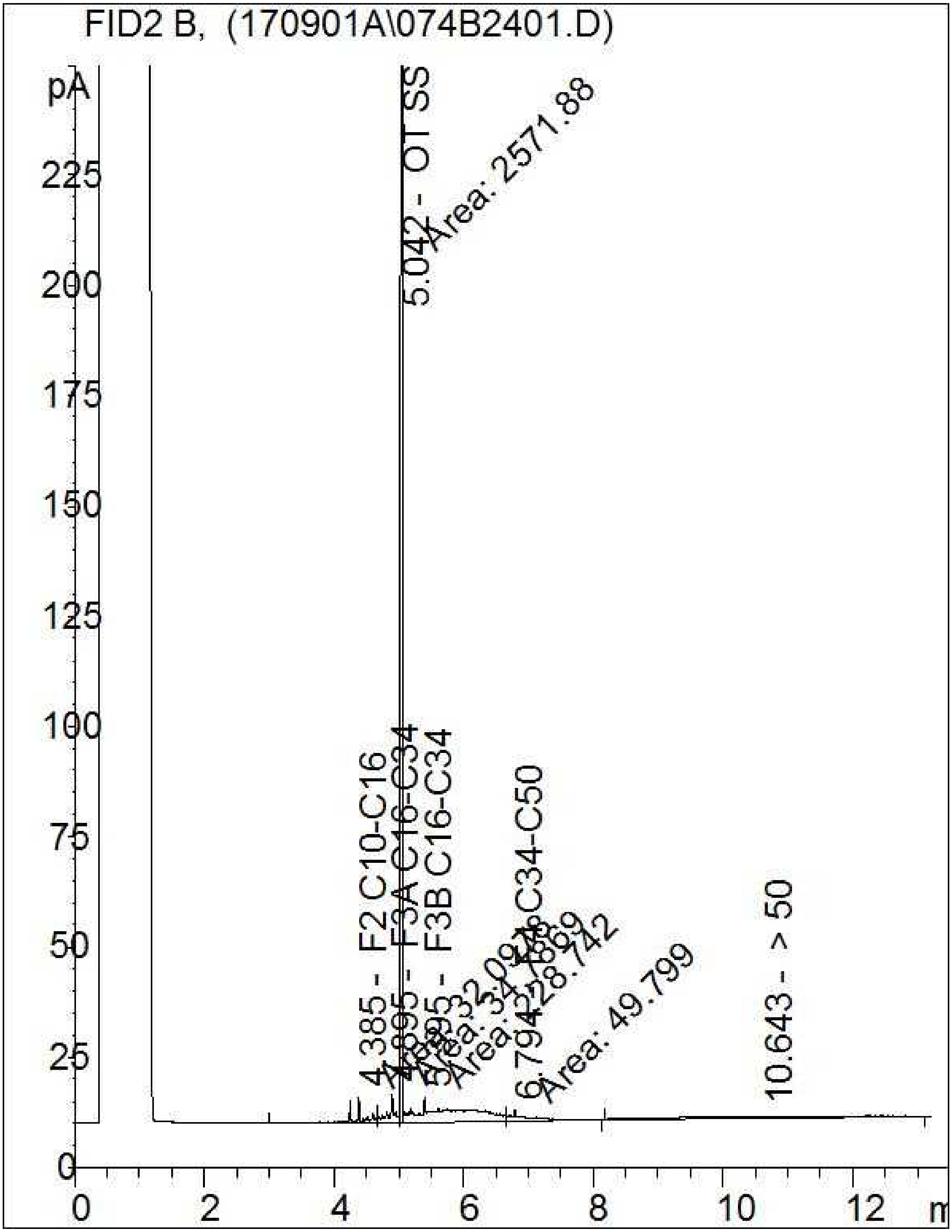


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8549
Report Date: 2017/09/07
Maxxam Sample: FAR100

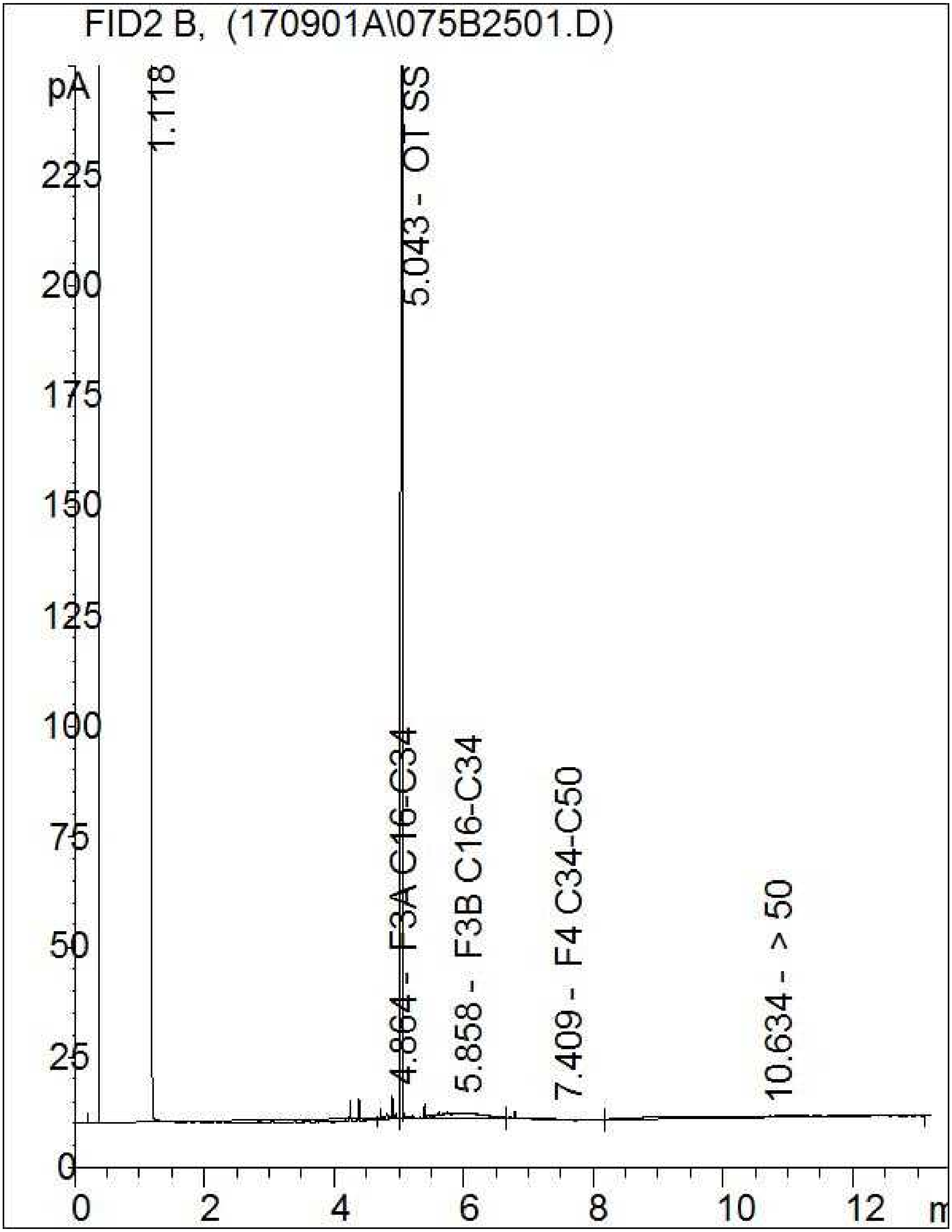
AEL Environment
Client Project #: 10888
Client ID: A0192 MW1

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

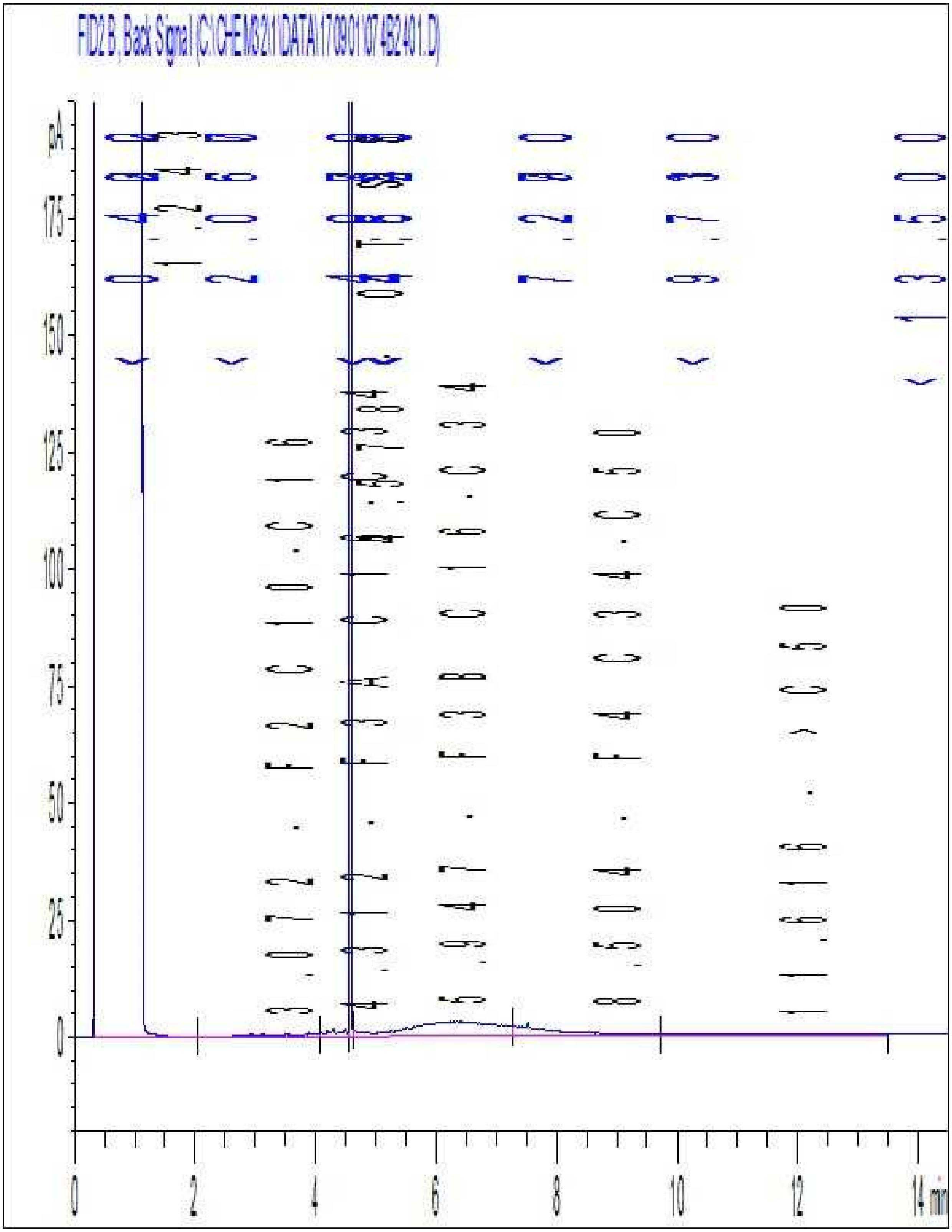


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8549
Report Date: 2017/09/07
Maxxam Sample: FAR102

AEL Environment
Client Project #: 10888
Client ID: A0194 MW3S

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
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Your Project #: 10888
Your C.O.C. #: 625116-02-01

Attention:Reporting Group
AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/12
Report #: R4695926
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J0380
Received: 2017/08/31, 16:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum (1)	4	N/A	2017/09/07		EPA 8260C m
Chloride by Automated Colourimetry (1)	4	N/A	2017/09/05	CAM SOP-00463	EPA 325.2 m
Chromium (VI) in Water (1)	4	N/A	2017/09/07	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide (1)	4	N/A	2017/09/08	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	4	2017/09/06	2017/09/07	CAM SOP-00316	CCME PHC-CWS m
F4G (CCME Hydrocarbons Gravimetric) (1)	3	2017/09/08	2017/09/08	CAM SOP-00326	CCME PHC-CWS m
Fluoride (1)	4	2017/09/06	2017/09/07	CAM SOP-00449	SM 22 4500-F C m
Mercury (low level) (1)	4	2017/09/06	2017/09/07	CAM SOP-00453	EPA 7470 m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 3)	4	N/A	2017/09/06	CAM SOP-00440	SM 22 4500-NO3I/NO2B
PAH Compounds in Water by GC/MS (SIM) (1)	1	2017/09/06	2017/09/07	CAM SOP-00318	EPA 8270 m
Polychlorinated Biphenyl (PCB) (1)	1	2017/09/05	2017/09/06	CAM SOP-00309	EPA 8082A m
pH (1)	4	N/A	2017/09/06	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry (1)	4	N/A	2017/09/06	CAM SOP-00464	EPA 375.4 m
Volatile Organic Compounds and F1 PHCs (1)	4	N/A	2017/09/05	CAM SOP-00230	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.

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

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

Maxxam
A Bureau Veritas Group Company

Your Project #: 10888
Your C.O.C. #: 625116-02-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/12
Report #: R4695926
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J0380
Received: 2017/08/31, 16:00

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) 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.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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
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Maxxam Job #: B7J0380
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

CCME GROUNDWATER INORGANICS PACKAGE (WATER)

Maxxam ID		FAZ634	FAZ635		FAZ636	FAZ636			
Sampling Date		2017/08/31 09:10	2017/08/31 11:20		2017/08/31 11:25	2017/08/31 11:25			
COC Number		625116-02-01	625116-02-01		625116-02-01	625116-02-01			
	UNITS	**A0240- MW7/17**	**A0246- MW8/17**	**QC Batch**	**A0247- MW8/17**	**A0247- MW8/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Inorganics									
Fluoride (F-)	mg/L	0.12	ND	5152347	ND		0.10	0.020	5152347
pH	pH	6.93	6.97	5150362	7.21				5150362
Dissolved Sulphate (SO4)	mg/L	6.3	6.3	5150939	6.2		1.0	0.10	5150021
WAD Cyanide (Free)	mg/L	0.0023	ND	5155526	ND		0.0010	0.00040	5155526
Dissolved Chloride (Cl)	mg/L	9.5	140	5148483	140	140	1.0	0.30	5148654
Nitrite (N)	mg/L	ND	ND	5150274	ND		0.010	0.0020	5150274
Nitrate (N)	mg/L	ND	ND	5150274	ND		0.10	0.010	5150274
Nitrate + Nitrite (N)	mg/L	ND	ND	5150274	ND		0.10	0.010	5150274
Metals									
Mercury (Hg)	ug/L	ND	ND	5150783	ND		0.01	0.004	5150783

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

Maxxam ID		FAZ637			
Sampling Date		2017/08/31 12:35			
COC Number		625116-02-01			
	UNITS	**A0248- MW10/17**	**RDL**	**MDL**	**QC Batch**
Inorganics					
Fluoride (F-)	mg/L	ND	0.10	0.020	5152347
pH	pH	6.81			5150362
Dissolved Sulphate (SO4)	mg/L	5.2	1.0	0.10	5150021
WAD Cyanide (Free)	mg/L	ND	0.0010	0.00040	5155526
Dissolved Chloride (Cl)	mg/L	22	1.0	0.30	5148483
Nitrite (N)	mg/L	ND	0.010	0.0020	5150274
Nitrate (N)	mg/L	ND	0.10	0.010	5150274
Nitrate + Nitrite (N)	mg/L	ND	0.10	0.010	5150274
Metals					
Mercury (Hg)	ug/L	ND	0.01	0.004	5150783

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		FAZ634	FAZ635	FAZ636	FAZ637			
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25	2017/08/31 12:35			
COC Number		625116-02-01	625116-02-01	625116-02-01	625116-02-01			
	UNITS	A0240- MW7/17	A0246- MW8/17	A0247- MW8/17	A0248- MW10/17	RDL	MDL	QC Batch
Metals								
Chromium (VI)	ug/L	ND	ND	ND	ND	0.50	0.30	5152223

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		FAZ637			
Sampling Date		2017/08/31 12:35			
COC Number		625116-02-01			
	UNITS	**A0248- MW10/17**	**RDL**	**MDL**	**QC Batch**
Polyaromatic Hydrocarbons					
Acenaphthene	ug/L	0.46	0.010	0.010	5152033
Acenaphthylene	ug/L	0.013	0.010	0.010	5152033
Anthracene	ug/L	0.053	0.010	0.010	5152033
Benzo(a)anthracene	ug/L	0.060	0.010	0.010	5152033
Benzo(a)pyrene	ug/L	0.055	0.010	0.010	5152033
Benzo(b/j)fluoranthene	ug/L	0.055	0.010	0.010	5152033
Benzo(g,h,i)perylene	ug/L	0.059	0.010	0.010	5152033
Benzo(k)fluoranthene	ug/L	0.022	0.010	0.010	5152033
Chrysene	ug/L	0.062	0.010	0.010	5152033
Dibenz(a,h)anthracene	ug/L	ND	0.010	0.010	5152033
Fluoranthene	ug/L	0.18	0.010	0.010	5152033
Fluorene	ug/L	0.45	0.010	0.010	5152033
Indeno(1,2,3-cd)pyrene	ug/L	0.049	0.010	0.010	5152033
1-Methylnaphthalene	ug/L	6.0	0.010	0.010	5152033
2-Methylnaphthalene	ug/L	7.8	0.010	0.010	5152033
Naphthalene	ug/L	27	0.010	0.010	5152033
Phenanthrene	ug/L	0.33	0.010	0.010	5152033
Pyrene	ug/L	0.12	0.010	0.010	5152033
Surrogate Recovery (%)					
D10-Anthracene	%	58			5152033
D14-Terphenyl (FS)	%	33 (1)			5152033
D8-Acenaphthylene	%	108			5152033

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) Surrogate recovery was below the lower control limit due to matrix interference. This may represent a low bias in some results.

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PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		FAZ634	FAZ636	FAZ637			
Sampling Date		2017/08/31 09:10	2017/08/31 11:25	2017/08/31 12:35			
COC Number		625116-02-01	625116-02-01	625116-02-01			
	UNITS	**A0240- MW7/17**	**A0247- MW8/17**	**A0248- MW10/17**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons							
F4G-sg (Grav. Heavy Hydrocarbons)	ug/L	6400	30000	1600	500	N/A	5154922

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

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Maxxam Job #: B7J0380
Report Date: 2017/09/12

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Client Project #: 10888

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		FAZ637	FAZ637			
Sampling Date		2017/08/31 12:35	2017/08/31 12:35			
COC Number		625116-02-01	625116-02-01			
	UNITS	**A0248- MW10/17**	**A0248- MW10/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
PCBs						
Aroclor 1016	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1221	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1232	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1262	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1268	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1242	ug/L	0.27	0.29	0.01	N/A	5150530
Aroclor 1248	ug/L	ND	ND	0.01	N/A	5150530
Aroclor 1254	ug/L	0.06	0.06	0.01	N/A	5150530
Aroclor 1260	ug/L	0.18	0.20	0.01	N/A	5150530
Total PCB	ug/L	0.51	0.56	0.01	N/A	5150530
Surrogate Recovery (%)						
Decachlorobiphenyl	%	85	86			5150530

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected
N/A = Not Applicable

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Maxxam Job #: B7J0380
Report Date: 2017/09/12

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

Maxxam ID		FAZ634	FAZ635	FAZ636	FAZ637			
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25	2017/08/31 12:35			
COC Number		625116-02-01	625116-02-01	625116-02-01	625116-02-01			
	UNITS	**A0240- MW7/17**	**A0246- MW8/17**	**A0247- MW8/17**	**A0248- MW10/17**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	ND	ND	ND	ND	0.50	0.50	5146863
Volatile Organics								
Acetone (2-Propanone)	ug/L	ND	ND	ND	15	10	1.0	5147029
Benzene	ug/L	ND	ND	ND	0.71	0.20	0.020	5147029
Bromodichloromethane	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
Bromoform	ug/L	ND	ND	ND	ND	1.0	0.10	5147029
Bromomethane	ug/L	ND	ND	ND	ND	0.50	0.10	5147029
Carbon Tetrachloride	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
Chlorobenzene	ug/L	0.37	ND	ND	2.2	0.20	0.010	5147029
Chloroform	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
Dibromochloromethane	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
Dichlorodifluoromethane (FREON 12)	ug/L	ND	ND	ND	ND	1.0	0.050	5147029
1,1-Dichloroethane	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
1,2-Dichloroethane	ug/L	ND	ND	ND	ND	0.50	0.020	5147029
1,1-Dichloroethylene	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
1,2-Dichloropropane	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	0.30	0.050	5147029
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	0.40	0.050	5147029
Ethylbenzene	ug/L	ND	ND	ND	29	0.20	0.010	5147029
Ethylene Dibromide	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
Hexane	ug/L	ND	ND	ND	ND	1.0	0.10	5147029
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	ND	2.0	0.10	5147029
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	ND	ND	10	0.50	5147029
Methyl Isobutyl Ketone	ug/L	ND	ND	ND	ND	5.0	0.10	5147029
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
Styrene	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	0.50	0.050	5147029

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Job #: B7J0380
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

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

Maxxam ID		FAZ634	FAZ635	FAZ636	FAZ637			
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25	2017/08/31 12:35			
COC Number		625116-02-01	625116-02-01	625116-02-01	625116-02-01			
	UNITS	**A0240- MW7/17**	**A0246- MW8/17**	**A0247- MW8/17**	**A0248- MW10/17**	**RDL**	**MDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
Tetrachloroethylene	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
Toluene	ug/L	ND	0.27	0.30	2.7	0.20	0.010	5147029
1,1,1-Trichloroethane	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
1,1,2-Trichloroethane	ug/L	ND	ND	ND	ND	0.50	0.050	5147029
Trichloroethylene	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	ND	ND	0.50	0.10	5147029
Vinyl Chloride	ug/L	ND	ND	ND	ND	0.20	0.050	5147029
p+m-Xylene	ug/L	0.34	ND	ND	160	0.20	0.010	5147029
o-Xylene	ug/L	ND	ND	ND	170	0.20	0.010	5147029
Total Xylenes	ug/L	0.34	ND	ND	340	0.20	0.010	5147029
F1 (C6-C10)	ug/L	ND	ND	ND	690	25	N/A	5147029
F1 (C6-C10) - BTEX	ug/L	ND	ND	ND	320	25	N/A	5147029
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	ND	270	340	530	100	50	5152340
F3 (C16-C34 Hydrocarbons)	ug/L	3700	4100	19000	350	200	70	5152340
F4 (C34-C50 Hydrocarbons)	ug/L	2100	7300	9700	530	200	50	5152340
Reached Baseline at C50	ug/L	No	No	No	No			5152340
Surrogate Recovery (%)								
o-Terphenyl	%	108	107	109	106			5152340
4-Bromofluorobenzene	%	93	95	93	103			5147029
D4-1,2-Dichloroethane	%	114	116	116	118			5147029
D8-Toluene	%	92	92	92	93			5147029

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

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

Maxxam ID		FAZ637			
Sampling Date		2017/08/31 12:35			
COC Number		625116-02-01			
	UNITS	**A0248-MW10/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	530	100	50	5152340
F3 (C16-C34 Hydrocarbons)	ug/L	520	200	70	5152340
F4 (C34-C50 Hydrocarbons)	ug/L	700	200	50	5152340
Reached Baseline at C50	ug/L	No			5152340
Surrogate Recovery (%)					
o-Terphenyl	%	106			5152340

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

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Maxxam Job #: B7J0380
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAZ634
Sample ID: A0240- MW7/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5146863	N/A	2017/09/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5148483	N/A	2017/09/05	Alina Dobreanu
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5155526	N/A	2017/09/08	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5152340	2017/09/06	2017/09/07	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5154922	2017/09/08	2017/09/08	Francis Afonso
Fluoride	ISE	5152347	2017/09/06	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5150783	2017/09/06	2017/09/07	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5150274	N/A	2017/09/06	Chandra Nandlal
pH	AT	5150362	N/A	2017/09/06	Tahir Anwar
Sulphate by Automated Colourimetry	KONE	5150939	N/A	2017/09/06	Alina Dobreanu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5147029	N/A	2017/09/05	Xueming Jiang

Maxxam ID: FAZ635
Sample ID: A0246- MW8/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5146863	N/A	2017/09/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5148483	N/A	2017/09/05	Alina Dobreanu
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5155526	N/A	2017/09/08	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5152340	2017/09/06	2017/09/07	Zhiyue (Frank) Zhu
Fluoride	ISE	5152347	2017/09/06	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5150783	2017/09/06	2017/09/07	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5150274	N/A	2017/09/06	Chandra Nandlal
pH	AT	5150362	N/A	2017/09/06	Tahir Anwar
Sulphate by Automated Colourimetry	KONE	5150939	N/A	2017/09/06	Alina Dobreanu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5147029	N/A	2017/09/05	Xueming Jiang

Maxxam ID: FAZ636
Sample ID: A0247- MW8/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5146863	N/A	2017/09/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5148654	N/A	2017/09/05	Alina Dobreanu
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5155526	N/A	2017/09/08	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5152340	2017/09/06	2017/09/07	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5154922	2017/09/08	2017/09/08	Francis Afonso
Fluoride	ISE	5152347	2017/09/06	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5150783	2017/09/06	2017/09/07	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5150274	N/A	2017/09/06	Chandra Nandlal
pH	AT	5150362	N/A	2017/09/06	Tahir Anwar
Sulphate by Automated Colourimetry	KONE	5150021	N/A	2017/09/06	Alina Dobreanu

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TEST SUMMARY

Maxxam ID: FAZ636
Sample ID: A0247- MW8/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5147029	N/A	2017/09/05	Xueming Jiang

Maxxam ID: FAZ636 Dup
Sample ID: A0247- MW8/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	5148654	N/A	2017/09/05	Alina Dobreanu

Maxxam ID: FAZ637
Sample ID: A0248- MW10/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5146863	N/A	2017/09/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	5148483	N/A	2017/09/05	Alina Dobreanu
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5155526	N/A	2017/09/08	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5152340	2017/09/06	2017/09/07	Zhiyue (Frank) Zhu
F4G (CCME Hydrocarbons Gravimetric)	BAL	5154922	2017/09/08	2017/09/08	Francis Afonso
Fluoride	ISE	5152347	2017/09/06	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5150783	2017/09/06	2017/09/07	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5150274	N/A	2017/09/06	Chandra Nandlal
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5152033	2017/09/06	2017/09/07	Mitesh Raj
Polychlorinated Biphenyl (PCB)	GC/ECD	5150530	2017/09/05	2017/09/06	Dawn Alarie
pH	AT	5150362	N/A	2017/09/06	Tahir Anwar
Sulphate by Automated Colourimetry	KONE	5150021	N/A	2017/09/06	Alina Dobreanu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5147029	N/A	2017/09/05	Xueming Jiang

Maxxam ID: FAZ637 Dup
Sample ID: A0248- MW10/17
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5152340	2017/09/06	2017/09/07	Zhiyue (Frank) Zhu
Polychlorinated Biphenyl (PCB)	GC/ECD	5150530	2017/09/05	2017/09/06	Dawn Alarie

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GENERAL COMMENTS

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

Package 1	7.0°C

Cooler custody seal was present and intact.

Results relate only to the items tested.

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Client Project #: 10888

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5147029	XJI	Matrix Spike	4-Bromofluorobenzene	2017/09/05		102	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/05		112	%	70 - 130
			D8-Toluene	2017/09/05		100	%	70 - 130
			Acetone (2-Propanone)	2017/09/05		115	%	60 - 140
			Benzene	2017/09/05		111	%	70 - 130
			Bromodichloromethane	2017/09/05		108	%	70 - 130
			Bromoform	2017/09/05		120	%	70 - 130
			Bromomethane	2017/09/05		113	%	60 - 140
			Carbon Tetrachloride	2017/09/05		100	%	70 - 130
			Chlorobenzene	2017/09/05		102	%	70 - 130
			Chloroform	2017/09/05		109	%	70 - 130
			Dibromochloromethane	2017/09/05		114	%	70 - 130
			1,2-Dichlorobenzene	2017/09/05		101	%	70 - 130
			1,3-Dichlorobenzene	2017/09/05		100	%	70 - 130
			1,4-Dichlorobenzene	2017/09/05		100	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/05		120	%	60 - 140
			1,1-Dichloroethane	2017/09/05		112	%	70 - 130
			1,2-Dichloroethane	2017/09/05		115	%	70 - 130
			1,1-Dichloroethylene	2017/09/05		112	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/05		108	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/05		113	%	70 - 130
			1,2-Dichloropropane	2017/09/05		100	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/05		97	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/05		107	%	70 - 130
			Ethylbenzene	2017/09/05		93	%	70 - 130
			Ethylene Dibromide	2017/09/05		117	%	70 - 130
			Hexane	2017/09/05		106	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/05		118	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/05		116	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/05		106	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/05		95	%	70 - 130
			Styrene	2017/09/05		91	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/05		114	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/05		106	%	70 - 130
			Tetrachloroethylene	2017/09/05		105	%	70 - 130
			Toluene	2017/09/05		98	%	70 - 130
			1,1,1-Trichloroethane	2017/09/05		101	%	70 - 130
			1,1,2-Trichloroethane	2017/09/05		118	%	70 - 130
			Trichloroethylene	2017/09/05		118	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/05		109	%	70 - 130
			Vinyl Chloride	2017/09/05		100	%	70 - 130
			p+m-Xylene	2017/09/05		92	%	70 - 130
			o-Xylene	2017/09/05		91	%	70 - 130
			F1 (C6-C10)	2017/09/05		98	%	60 - 140
5147029	XJI	Spiked Blank	4-Bromofluorobenzene	2017/09/05		101	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/05		105	%	70 - 130
			D8-Toluene	2017/09/05		103	%	70 - 130
			Acetone (2-Propanone)	2017/09/05		98	%	60 - 140
			Benzene	2017/09/05		109	%	70 - 130
			Bromodichloromethane	2017/09/05		102	%	70 - 130
			Bromoform	2017/09/05		107	%	70 - 130
			Bromomethane	2017/09/05		109	%	60 - 140
			Carbon Tetrachloride	2017/09/05		104	%	70 - 130
			Chlorobenzene	2017/09/05		99	%	70 - 130
			Chloroform	2017/09/05		106	%	70 - 130

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			Dibromochloromethane	2017/09/05		105	%	70 - 130
			1,2-Dichlorobenzene	2017/09/05		97	%	70 - 130
			1,3-Dichlorobenzene	2017/09/05		99	%	70 - 130
			1,4-Dichlorobenzene	2017/09/05		99	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/05		125	%	60 - 140
			1,1-Dichloroethane	2017/09/05		109	%	70 - 130
			1,2-Dichloroethane	2017/09/05		103	%	70 - 130
			1,1-Dichloroethylene	2017/09/05		113	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/05		103	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/05		113	%	70 - 130
			1,2-Dichloropropane	2017/09/05		93	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/05		89	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/05		95	%	70 - 130
			Ethylbenzene	2017/09/05		93	%	70 - 130
			Ethylene Dibromide	2017/09/05		103	%	70 - 130
			Hexane	2017/09/05		108	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/05		110	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/05		95	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/05		88	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/05		89	%	70 - 130
			Styrene	2017/09/05		91	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/05		111	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/05		106	%	70 - 130
			Tetrachloroethylene	2017/09/05		107	%	70 - 130
			Toluene	2017/09/05		98	%	70 - 130
			1,1,1-Trichloroethane	2017/09/05		103	%	70 - 130
			1,1,2-Trichloroethane	2017/09/05		107	%	70 - 130
			Trichloroethylene	2017/09/05		102	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/05		113	%	70 - 130
			Vinyl Chloride	2017/09/05		103	%	70 - 130
			p+m-Xylene	2017/09/05		93	%	70 - 130
			o-Xylene	2017/09/05		92	%	70 - 130
			F1 (C6-C10)	2017/09/05		96	%	60 - 140
5147029	XJI	Method Blank	4-Bromofluorobenzene	2017/09/05		94	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/05		113	%	70 - 130
			D8-Toluene	2017/09/05		93	%	70 - 130
			Acetone (2-Propanone)	2017/09/05	ND, RDL=10		ug/L	
			Benzene	2017/09/05	ND, RDL=0.20		ug/L	
			Bromodichloromethane	2017/09/05	ND, RDL=0.50		ug/L	
			Bromoform	2017/09/05	ND, RDL=1.0		ug/L	
			Bromomethane	2017/09/05	ND, RDL=0.50		ug/L	
			Carbon Tetrachloride	2017/09/05	ND, RDL=0.20		ug/L	
			Chlorobenzene	2017/09/05	ND, RDL=0.20		ug/L	
			Chloroform	2017/09/05	ND, RDL=0.20		ug/L	
			Dibromochloromethane	2017/09/05	ND, RDL=0.50		ug/L	

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			1,2-Dichlorobenzene	2017/09/05	ND, RDL=0.50		ug/L	
			1,3-Dichlorobenzene	2017/09/05	ND, RDL=0.50		ug/L	
			1,4-Dichlorobenzene	2017/09/05	ND, RDL=0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2017/09/05	ND, RDL=1.0		ug/L	
			1,1-Dichloroethane	2017/09/05	ND, RDL=0.20		ug/L	
			1,2-Dichloroethane	2017/09/05	ND, RDL=0.50		ug/L	
			1,1-Dichloroethylene	2017/09/05	ND, RDL=0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/09/05	ND, RDL=0.50		ug/L	
			trans-1,2-Dichloroethylene	2017/09/05	ND, RDL=0.50		ug/L	
			1,2-Dichloropropane	2017/09/05	ND, RDL=0.20		ug/L	
			cis-1,3-Dichloropropene	2017/09/05	ND, RDL=0.30		ug/L	
			trans-1,3-Dichloropropene	2017/09/05	ND, RDL=0.40		ug/L	
			Ethylbenzene	2017/09/05	ND, RDL=0.20		ug/L	
			Ethylene Dibromide	2017/09/05	ND, RDL=0.20		ug/L	
			Hexane	2017/09/05	ND, RDL=1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2017/09/05	ND, RDL=2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/05	ND, RDL=10		ug/L	
			Methyl Isobutyl Ketone	2017/09/05	ND, RDL=5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/09/05	ND, RDL=0.50		ug/L	
			Styrene	2017/09/05	ND, RDL=0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2017/09/05	ND, RDL=0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/09/05	ND, RDL=0.50		ug/L	
			Tetrachloroethylene	2017/09/05	ND, RDL=0.20		ug/L	
			Toluene	2017/09/05	ND, RDL=0.20		ug/L	
			1,1,1-Trichloroethane	2017/09/05	ND, RDL=0.20		ug/L	
			1,1,2-Trichloroethane	2017/09/05	ND, RDL=0.50		ug/L	
			Trichloroethylene	2017/09/05	ND, RDL=0.20		ug/L	

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			Trichlorofluoromethane (FREON 11)	2017/09/05	ND, RDL=0.50		ug/L	
			Vinyl Chloride	2017/09/05	ND, RDL=0.20		ug/L	
			p+m-Xylene	2017/09/05	ND, RDL=0.20		ug/L	
			o-Xylene	2017/09/05	ND, RDL=0.20		ug/L	
			Total Xylenes	2017/09/05	ND, RDL=0.20		ug/L	
			F1 (C6-C10)	2017/09/05	ND, RDL=25		ug/L	
			F1 (C6-C10) - BTEX	2017/09/05	ND, RDL=25		ug/L	
5147029	XJI	RPD	Acetone (2-Propanone)	2017/09/05	NC		%	30
			Benzene	2017/09/05	NC		%	30
			Bromodichloromethane	2017/09/05	NC		%	30
			Bromoform	2017/09/05	NC		%	30
			Bromomethane	2017/09/05	NC		%	30
			Carbon Tetrachloride	2017/09/05	NC		%	30
			Chlorobenzene	2017/09/05	NC		%	30
			Chloroform	2017/09/05	NC		%	30
			Dibromochloromethane	2017/09/05	NC		%	30
			1,2-Dichlorobenzene	2017/09/05	NC		%	30
			1,3-Dichlorobenzene	2017/09/05	NC		%	30
			1,4-Dichlorobenzene	2017/09/05	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2017/09/05	NC		%	30
			1,1-Dichloroethane	2017/09/05	NC		%	30
			1,2-Dichloroethane	2017/09/05	NC		%	30
			1,1-Dichloroethylene	2017/09/05	NC		%	30
			cis-1,2-Dichloroethylene	2017/09/05	NC		%	30
			trans-1,2-Dichloroethylene	2017/09/05	NC		%	30
			1,2-Dichloropropane	2017/09/05	NC		%	30
			cis-1,3-Dichloropropene	2017/09/05	NC		%	30
			trans-1,3-Dichloropropene	2017/09/05	NC		%	30
			Ethylbenzene	2017/09/05	NC		%	30
			Ethylene Dibromide	2017/09/05	NC		%	30
			Hexane	2017/09/05	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/09/05	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/09/05	NC		%	30
			Methyl Isobutyl Ketone	2017/09/05	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/09/05	NC		%	30
			Styrene	2017/09/05	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/09/05	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/09/05	NC		%	30
			Tetrachloroethylene	2017/09/05	NC		%	30
			Toluene	2017/09/05	NC		%	30
			1,1,1-Trichloroethane	2017/09/05	NC		%	30
			1,1,2-Trichloroethane	2017/09/05	NC		%	30
			Trichloroethylene	2017/09/05	NC		%	30
			Trichlorofluoromethane (FREON 11)	2017/09/05	NC		%	30
			Vinyl Chloride	2017/09/05	NC		%	30
			p+m-Xylene	2017/09/05	NC		%	30
			o-Xylene	2017/09/05	NC		%	30
			Total Xylenes	2017/09/05	NC		%	30

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			F1 (C6-C10)	2017/09/05	NC		%	30
			F1 (C6-C10) - BTEX	2017/09/05	NC		%	30
5148483	ADB	Matrix Spike	Dissolved Chloride (Cl)	2017/09/05		NC	%	80 - 120
5148483	ADB	Spiked Blank	Dissolved Chloride (Cl)	2017/09/05		102	%	80 - 120
5148483	ADB	Method Blank	Dissolved Chloride (Cl)	2017/09/05	ND, RDL=1.0		mg/L	
5148483	ADB	RPD	Dissolved Chloride (Cl)	2017/09/05	1.0		%	20
5148654	ADB	Matrix Spike [FAZ636-01]	Dissolved Chloride (Cl)	2017/09/05		NC	%	80 - 120
5148654	ADB	Spiked Blank	Dissolved Chloride (Cl)	2017/09/05		101	%	80 - 120
5148654	ADB	Method Blank	Dissolved Chloride (Cl)	2017/09/05	ND, RDL=1.0		mg/L	
5148654	ADB	RPD [FAZ636-01]	Dissolved Chloride (Cl)	2017/09/05	0.059		%	20
5150021	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2017/09/06		106	%	75 - 125
5150021	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2017/09/06		104	%	80 - 120
5150021	ADB	Method Blank	Dissolved Sulphate (SO4)	2017/09/06	ND, RDL=1.0		mg/L	
5150021	ADB	RPD	Dissolved Sulphate (SO4)	2017/09/06	2.0		%	20
5150274	C_N	Matrix Spike	Nitrite (N)	2017/09/06		105	%	80 - 120
			Nitrate (N)	2017/09/06		104	%	80 - 120
5150274	C_N	Spiked Blank	Nitrite (N)	2017/09/06		103	%	80 - 120
			Nitrate (N)	2017/09/06		99	%	80 - 120
5150274	C_N	Method Blank	Nitrite (N)	2017/09/06	ND, RDL=0.010		mg/L	
			Nitrate (N)	2017/09/06	ND, RDL=0.10		mg/L	
5150274	C_N	RPD	Nitrite (N)	2017/09/06	NC		%	20
			Nitrate (N)	2017/09/06	NC		%	20
5150362	TA1	Spiked Blank	pH	2017/09/06		102	%	98 - 103
5150362	TA1	RPD	pH	2017/09/06	0.26		%	N/A
5150530	DH	Matrix Spike	Decachlorobiphenyl	2017/09/06		92	%	60 - 130
			Aroclor 1260	2017/09/06		104	%	60 - 130
			Total PCB	2017/09/06		104	%	60 - 130
5150530	DH	Spiked Blank	Decachlorobiphenyl	2017/09/06		107	%	60 - 130
			Aroclor 1260	2017/09/06		113	%	60 - 130
			Total PCB	2017/09/06		113	%	60 - 130
5150530	DH	Method Blank	Aroclor 1016	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1221	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1232	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1262	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1268	2017/09/06	ND, RDL=0.01		ug/L	
			Decachlorobiphenyl	2017/09/06		104	%	60 - 130
			Aroclor 1242	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1248	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1254	2017/09/06	ND, RDL=0.01		ug/L	
			Aroclor 1260	2017/09/06	ND, RDL=0.01		ug/L	

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			Total PCB	2017/09/06	ND, RDL=0.01		ug/L	
5150530	DH	RPD [FAZ637-09]	Aroclor 1016	2017/09/06	NC		%	40
			Aroclor 1221	2017/09/06	NC		%	40
			Aroclor 1232	2017/09/06	NC		%	40
			Aroclor 1262	2017/09/06	NC		%	40
			Aroclor 1268	2017/09/06	NC		%	40
			Aroclor 1242	2017/09/06	7.4		%	40
			Aroclor 1248	2017/09/06	NC		%	40
			Aroclor 1254	2017/09/06	15		%	40
			Aroclor 1260	2017/09/06	9.8		%	40
			Total PCB	2017/09/06	9.1		%	40
5150783	RON	Matrix Spike	Mercury (Hg)	2017/09/07		106	%	75 - 125
5150783	RON	Spiked Blank	Mercury (Hg)	2017/09/07		108	%	80 - 120
5150783	RON	Method Blank	Mercury (Hg)	2017/09/07	ND, RDL=0.01		ug/L	
5150783	RON	RPD	Mercury (Hg)	2017/09/07	NC		%	20
5150939	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2017/09/06		105	%	75 - 125
5150939	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2017/09/06		102	%	80 - 120
5150939	ADB	Method Blank	Dissolved Sulphate (SO4)	2017/09/06	ND, RDL=1.0		mg/L	
5150939	ADB	RPD	Dissolved Sulphate (SO4)	2017/09/06	0.48		%	20
5152033	RAJ	Matrix Spike	D10-Anthracene	2017/09/07		83	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		92	%	50 - 130
			D8-Acenaphthylene	2017/09/07		100	%	50 - 130
			Acenaphthene	2017/09/07		80	%	50 - 130
			Acenaphthylene	2017/09/07		98	%	50 - 130
			Anthracene	2017/09/07		79	%	50 - 130
			Benzo(a)anthracene	2017/09/07		83	%	50 - 130
			Benzo(a)pyrene	2017/09/07		85	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		72	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		82	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		73	%	50 - 130
			Chrysene	2017/09/07		95	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/07		74	%	50 - 130
			Fluoranthene	2017/09/07		96	%	50 - 130
			Fluorene	2017/09/07		85	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		80	%	50 - 130
			1-Methylnaphthalene	2017/09/07		94	%	50 - 130
			2-Methylnaphthalene	2017/09/07		87	%	50 - 130
			Naphthalene	2017/09/07		76	%	50 - 130
			Phenanthrene	2017/09/07		85	%	50 - 130
			Pyrene	2017/09/07		94	%	50 - 130
5152033	RAJ	Spiked Blank	D10-Anthracene	2017/09/07		98	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		104	%	50 - 130
			D8-Acenaphthylene	2017/09/07		117	%	50 - 130
			Acenaphthene	2017/09/07		97	%	50 - 130
			Acenaphthylene	2017/09/07		115	%	50 - 130
			Anthracene	2017/09/07		94	%	50 - 130
			Benzo(a)anthracene	2017/09/07		99	%	50 - 130
			Benzo(a)pyrene	2017/09/07		107	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		104	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		111	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		106	%	50 - 130
			Chrysene	2017/09/07		111	%	50 - 130

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			Dibenz(a,h)anthracene	2017/09/07		95	%	50 - 130
			Fluoranthene	2017/09/07		104	%	50 - 130
			Fluorene	2017/09/07		100	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		113	%	50 - 130
			1-Methylnaphthalene	2017/09/07		115	%	50 - 130
			2-Methylnaphthalene	2017/09/07		98	%	50 - 130
			Naphthalene	2017/09/07		92	%	50 - 130
			Phenanthrene	2017/09/07		100	%	50 - 130
			Pyrene	2017/09/07		107	%	50 - 130
5152033	RAJ	Method Blank	D10-Anthracene	2017/09/07		89	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		93	%	50 - 130
			D8-Acenaphthylene	2017/09/07		106	%	50 - 130
			Acenaphthene	2017/09/07	ND, RDL=0.010		ug/L	
			Acenaphthylene	2017/09/07	ND, RDL=0.010		ug/L	
			Anthracene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(a)anthracene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(a)pyrene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(b/j)fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(g,h,i)perylene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(k)fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Chrysene	2017/09/07	ND, RDL=0.010		ug/L	
			Dibenz(a,h)anthracene	2017/09/07	ND, RDL=0.010		ug/L	
			Fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Fluorene	2017/09/07	ND, RDL=0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2017/09/07	ND, RDL=0.010		ug/L	
			1-Methylnaphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			2-Methylnaphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			Naphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			Phenanthrene	2017/09/07	ND, RDL=0.010		ug/L	
			Pyrene	2017/09/07	ND, RDL=0.010		ug/L	
5152033	RAJ	RPD	Acenaphthene	2017/09/07	NC		%	30
			Acenaphthylene	2017/09/07	NC		%	30
			Anthracene	2017/09/07	NC		%	30
			Benzo(a)anthracene	2017/09/07	NC		%	30
			Benzo(a)pyrene	2017/09/07	NC		%	30
			Benzo(b/j)fluoranthene	2017/09/07	NC		%	30
			Benzo(g,h,i)perylene	2017/09/07	NC		%	30

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A Bureau Veritas Group Company

Maxxam Job #: B7J0380
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(k)fluoranthene	2017/09/07	NC		%	30
			Chrysene	2017/09/07	NC		%	30
			Dibenz(a,h)anthracene	2017/09/07	NC		%	30
			Fluoranthene	2017/09/07	1.6		%	30
			Fluorene	2017/09/07	NC		%	30
			Indeno(1,2,3-cd)pyrene	2017/09/07	NC		%	30
			1-Methylnaphthalene	2017/09/07	NC		%	30
			2-Methylnaphthalene	2017/09/07	NC		%	30
			Naphthalene	2017/09/07	NC		%	30
			Phenanthrene	2017/09/07	NC		%	30
			Pyrene	2017/09/07	NC		%	30
5152223	LLE	Matrix Spike	Chromium (VI)	2017/09/07		93	%	80 - 120
5152223	LLE	Spiked Blank	Chromium (VI)	2017/09/07		102	%	80 - 120
5152223	LLE	Method Blank	Chromium (VI)	2017/09/07	ND, RDL=0.50		ug/L	
5152223	LLE	RPD	Chromium (VI)	2017/09/07	NC		%	20
5152340	ZZ	Matrix Spike [FAZ635-07]	o-Terphenyl	2017/09/07		110	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/07		NC	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/07		NC	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/07		NC	%	50 - 130
5152340	ZZ	Spiked Blank	o-Terphenyl	2017/09/07		108	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/07		93	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/07		107	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/07		112	%	60 - 130
5152340	ZZ	Method Blank	o-Terphenyl	2017/09/07		105	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/07	ND, RDL=100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/09/07	ND, RDL=200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2017/09/07	ND, RDL=200		ug/L	
5152340	ZZ	RPD [FAZ637-07]	F2 (C10-C16 Hydrocarbons)	2017/09/07	1.1		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/07	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/07	28		%	30
5152347	SAU	Matrix Spike	Fluoride (F-)	2017/09/07		102	%	80 - 120
5152347	SAU	Spiked Blank	Fluoride (F-)	2017/09/07		105	%	80 - 120
5152347	SAU	Method Blank	Fluoride (F-)	2017/09/07	ND, RDL=0.10		mg/L	
5152347	SAU	RPD	Fluoride (F-)	2017/09/07	NC		%	20
5154922	FA	Spiked Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/08		92	%	65 - 135
5154922	FA	RPD	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/08	NC		%	20
5154922	FA	Method Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/08	ND, RDL=500		ug/L	
5155526	LHA	Matrix Spike	WAD Cyanide (Free)	2017/09/08		101	%	80 - 120
5155526	LHA	Spiked Blank	WAD Cyanide (Free)	2017/09/08		103	%	80 - 120
5155526	LHA	Method Blank	WAD Cyanide (Free)	2017/09/08	ND, RDL=0.0010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5155526	LHA	RPD	WAD Cyanide (Free)	2017/09/08	0		%	20

N/A = Not Applicable

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

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

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).

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

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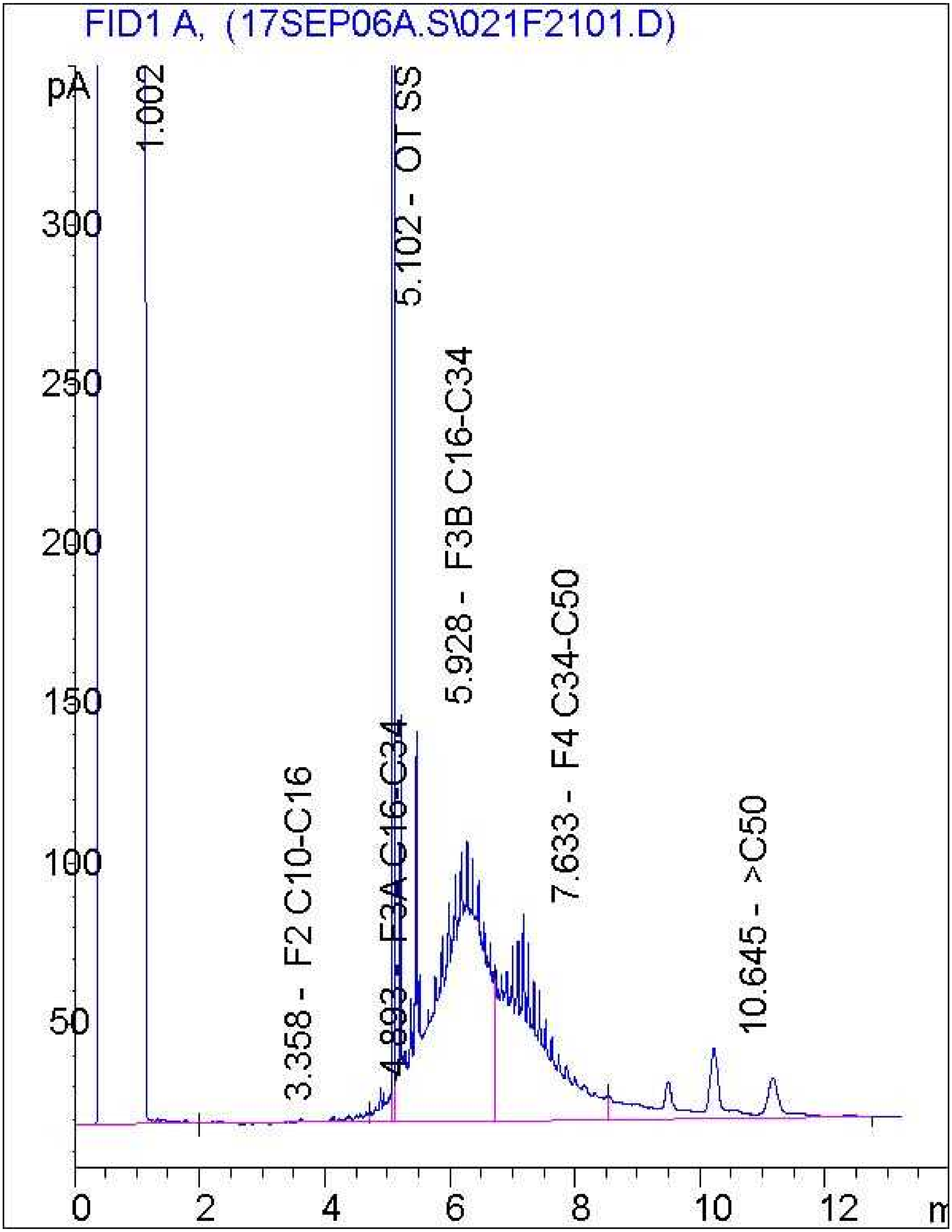
Maxxam Job #: B7J0380
Report Date: 2017/09/12
Maxxam Sample: FAZ634

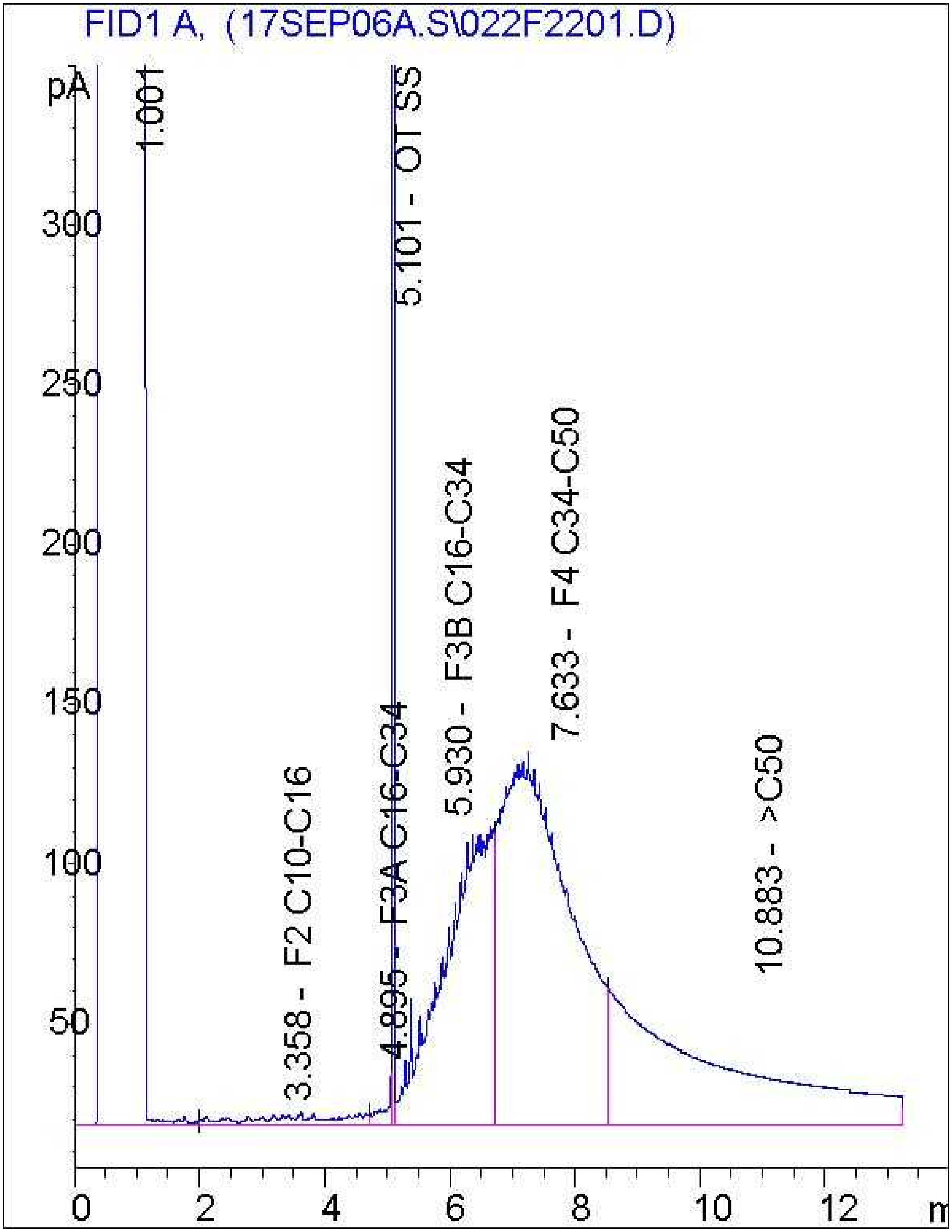
AEL Environment
Client Project #: 10888
Client ID: A0240- MW7/17

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

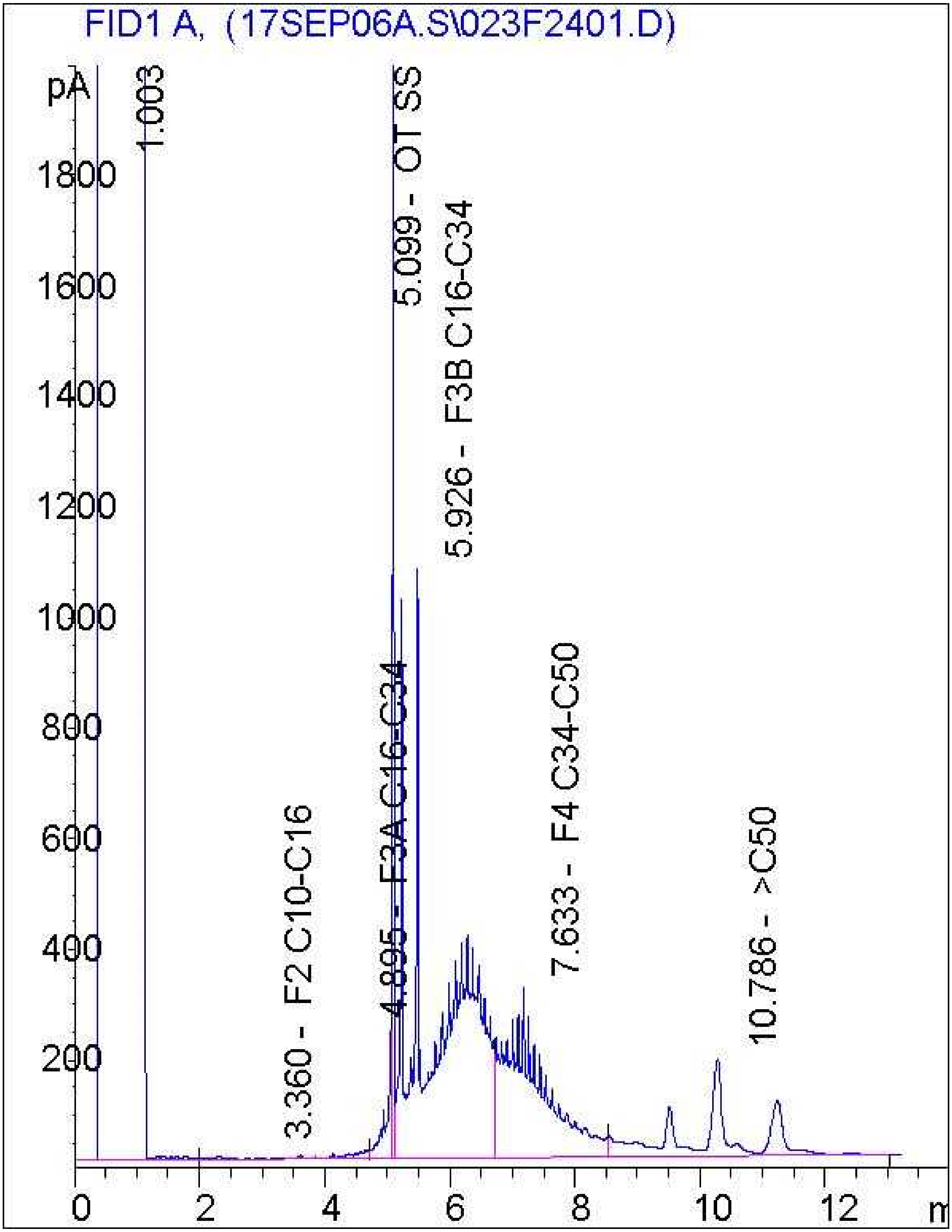


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J0380
Report Date: 2017/09/12
Maxxam Sample: FAZ636

AEL Environment
Client Project #: 10888
Client ID: A0247- MW8/17

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

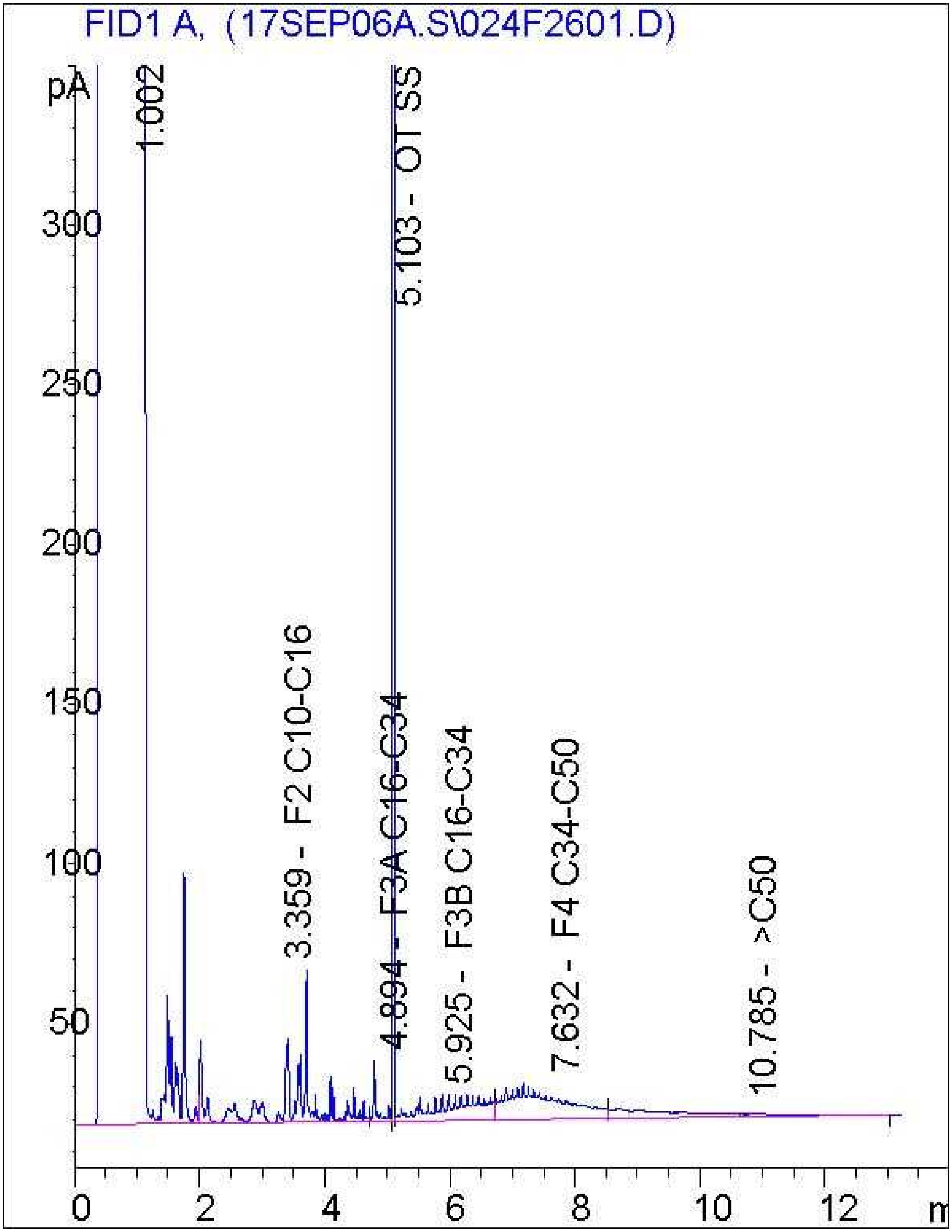


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J0380
Report Date: 2017/09/12
Maxxam Sample: FAZ637

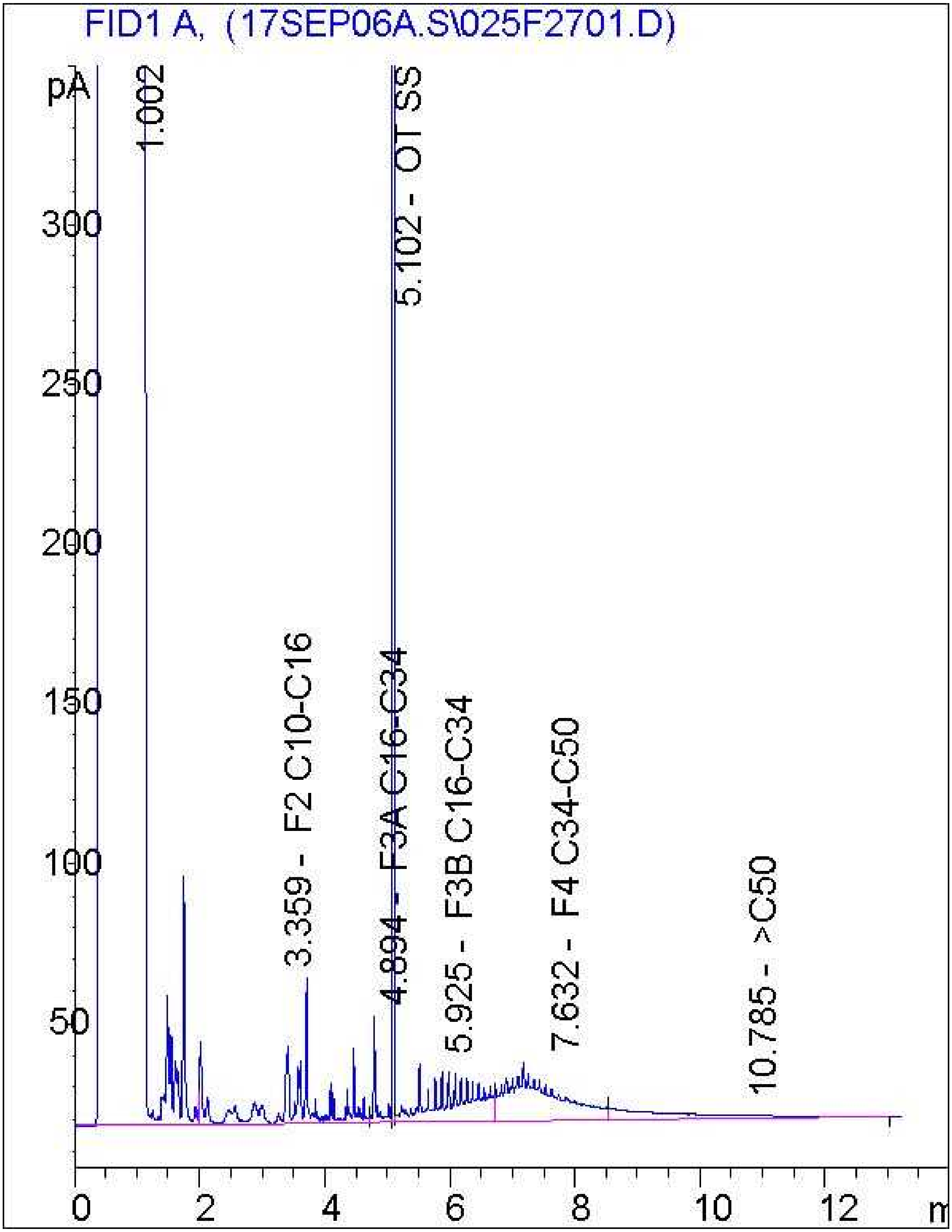
AEL Environment
Client Project #: 10888
Client ID: A0248- MW10/17

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



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Your Project #: MB776505
Site#: 10888
Your C.O.C. #: B7J0380-M058-01-01

Attention:ANTONELLA BRASIL

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2017/09/08
Report #: R2440874
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B776505
Received: 2017/09/06, 09:00

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hardness (calculated as CaCO3)	4	N/A	2017/09/08	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	4	N/A	2017/09/08	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	4	N/A	2017/09/07	BBY7SOP-00002	EPA 6020B R2 m
Filter and HNO3 Preserve for Metals	3	N/A	2017/09/07	BBY7 WI-00004	BCMOE Reqs 08/14
Filter and HNO3 Preserve for Metals	1	N/A	2017/09/08	BBY7 WI-00004	BCMOE Reqs 08/14

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Success Through Science®

Your Project #: MB776505
Site#: 10888
Your C.O.C. #: B7J0380-M058-01-01

Attention:ANTONELLA BRASIL

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2017/09/08
Report #: R2440874
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B776505
Received: 2017/09/06, 09:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jenna Williamson, Project Manager 1
Email: JWilliamson@maxxam.ca
Phone# (604) 734 7276
==
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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RX2993	RX2994	RX2995	
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25	
COC Number		B7J0380-M058-01-01	B7J0380-M058-01-01	B7J0380-M058-01-01	
	UNITS	**A0240-MW7/17 (FAZ634)**	**A0246-MW8/17 (FAZ635)**	**A0247-MW8/17 (FAZ636)**	**QC Batch**
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD	FIELD	FIELD	ONSITE

Maxxam ID		RX2996	
Sampling Date		2017/08/31 12:35	
COC Number		B7J0380-M058-01-01	
	UNITS	**A0248-MW10/17 (FAZ637)**	**QC Batch**
Calculated Parameters			
Filter and HNO3 Preservation	N/A	FIELD	ONSITE

Maxxam Job #: B776505
Report Date: 2017/09/08

MAXXAM ANALYTICS
Client Project #: MB776505

CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX2993	RX2994	RX2995		
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25		
COC Number		B7J0380-M058-01-01	B7J0380-M058-01-01	B7J0380-M058-01-01		
	UNITS	**A0240-MW7/17 (FAZ634)**	**A0246-MW8/17 (FAZ635)**	**A0247-MW8/17 (FAZ636)**	**RDL**	**QC Batch**
Misc. Inorganics						
Dissolved Hardness (CaCO3)	mg/L	192	215	211	0.50	8749948
Dissolved Metals by ICPMS						
Dissolved Aluminum (Al)	ug/L	8.1	6.7	7.5	3.0	8750536
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	8750536
Dissolved Arsenic (As)	ug/L	2.19	0.43	0.31	0.10	8750536
Dissolved Barium (Ba)	ug/L	182	152	149	1.0	8750536
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	<0.10	0.10	8750536
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	<1.0	1.0	8750536
Dissolved Boron (B)	ug/L	<50	<50	<50	50	8750536
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.010	8750536
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	1.0	8750536
Dissolved Cobalt (Co)	ug/L	1.19	<0.20	<0.20	0.20	8750536
Dissolved Copper (Cu)	ug/L	<0.20	<0.20	<0.20	0.20	8750536
Dissolved Iron (Fe)	ug/L	18700	8790	8770	5.0	8750536
Dissolved Lead (Pb)	ug/L	0.29	<0.20	<0.20	0.20	8750536
Dissolved Lithium (Li)	ug/L	<2.0	<2.0	<2.0	2.0	8750536
Dissolved Manganese (Mn)	ug/L	1100	684	691	1.0	8750536
Dissolved Molybdenum (Mo)	ug/L	1.6	<1.0	<1.0	1.0	8750536
Dissolved Nickel (Ni)	ug/L	1.3	<1.0	<1.0	1.0	8750536
Dissolved Selenium (Se)	ug/L	<0.10	<0.10	<0.10	0.10	8750536
Dissolved Silicon (Si)	ug/L	5040	5300	5370	100	8750536
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	<0.020	0.020	8750536
Dissolved Strontium (Sr)	ug/L	162	168	171	1.0	8750536
Dissolved Thallium (Tl)	ug/L	<0.010	<0.010	<0.010	0.010	8750536
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	<5.0	5.0	8750536
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	<5.0	5.0	8750536
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	0.10	8750536
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	<5.0	5.0	8750536
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5.0	8750536
Dissolved Zirconium (Zr)	ug/L	<0.10	<0.10	<0.10	0.10	8750536
Dissolved Calcium (Ca)	mg/L	58.9	67.2	65.5	0.050	8750104
Dissolved Magnesium (Mg)	mg/L	10.9	11.5	11.5	0.050	8750104
Dissolved Potassium (K)	mg/L	1.28	1.46	1.49	0.050	8750104
RDL = Reportable Detection Limit						

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Maxxam Job #: B776505
Report Date: 2017/09/08

MAXXAM ANALYTICS
Client Project #: MB776505

CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX2993	RX2994	RX2995		
Sampling Date		2017/08/31 09:10	2017/08/31 11:20	2017/08/31 11:25		
COC Number		B7J0380-M058-01-01	B7J0380-M058-01-01	B7J0380-M058-01-01		
	UNITS	**A0240-MW7/17 (FAZ634)**	**A0246-MW8/17 (FAZ635)**	**A0247-MW8/17 (FAZ636)**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	10.9	89.9	89.0	0.050	8750104
Dissolved Sulphur (S)	mg/L	<3.0	<3.0	<3.0	3.0	8750104
RDL = Reportable Detection Limit						

CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX2996		
Sampling Date		2017/08/31 12:35		
COC Number		B7J0380-M058-01-01		
	UNITS	A0248-MW10/17 (FAZ637)	RDL	QC Batch
Misc. Inorganics				
Dissolved Hardness (CaCO3)	mg/L	332	0.50	8749948
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	ug/L	6.4	3.0	8750536
Dissolved Antimony (Sb)	ug/L	2.63	0.50	8750536
Dissolved Arsenic (As)	ug/L	4.74	0.10	8750536
Dissolved Barium (Ba)	ug/L	581	1.0	8750536
Dissolved Beryllium (Be)	ug/L	<0.10	0.10	8750536
Dissolved Bismuth (Bi)	ug/L	<1.0	1.0	8750536
Dissolved Boron (B)	ug/L	109	50	8750536
Dissolved Cadmium (Cd)	ug/L	<0.010	0.010	8750536
Dissolved Chromium (Cr)	ug/L	<1.0	1.0	8750536
Dissolved Cobalt (Co)	ug/L	2.15	0.20	8750536
Dissolved Copper (Cu)	ug/L	<0.20	0.20	8750536
Dissolved Iron (Fe)	ug/L	24800	5.0	8750536
Dissolved Lead (Pb)	ug/L	0.24	0.20	8750536
Dissolved Lithium (Li)	ug/L	7.6	2.0	8750536
Dissolved Manganese (Mn)	ug/L	1330	1.0	8750536
Dissolved Molybdenum (Mo)	ug/L	3.3	1.0	8750536
Dissolved Nickel (Ni)	ug/L	1.8	1.0	8750536
Dissolved Selenium (Se)	ug/L	<0.10	0.10	8750536
Dissolved Silicon (Si)	ug/L	12200	100	8750536
Dissolved Silver (Ag)	ug/L	<0.020	0.020	8750536
Dissolved Strontium (Sr)	ug/L	323	1.0	8750536
Dissolved Thallium (Tl)	ug/L	<0.010	0.010	8750536
Dissolved Tin (Sn)	ug/L	<5.0	5.0	8750536
Dissolved Titanium (Ti)	ug/L	<5.0	5.0	8750536
Dissolved Uranium (U)	ug/L	0.13	0.10	8750536
Dissolved Vanadium (V)	ug/L	<5.0	5.0	8750536
Dissolved Zinc (Zn)	ug/L	<5.0	5.0	8750536
Dissolved Zirconium (Zr)	ug/L	<0.10	0.10	8750536
Dissolved Calcium (Ca)	mg/L	109	0.050	8750104
Dissolved Magnesium (Mg)	mg/L	14.4	0.050	8750104
Dissolved Potassium (K)	mg/L	3.52	0.050	8750104
RDL = Reportable Detection Limit				

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CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX2996		
Sampling Date		2017/08/31 12:35		
COC Number		B7J0380-M058-01-01		
	UNITS	A0248-MW10/17 (FAZ637)	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	14.1	0.050	8750104
Dissolved Sulphur (S)	mg/L	<3.0	3.0	8750104
RDL = Reportable Detection Limit				

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Maxxam Job #: B776505
Report Date: 2017/09/08

MAXXAM ANALYTICS
Client Project #: MB776505

TEST SUMMARY

Maxxam ID: RX2993
Sample ID: A0240-MW7/17 (FAZ634)
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/09/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8749948	N/A	2017/09/08	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8750104	N/A	2017/09/08	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8750536	N/A	2017/09/07	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/07	Kevin Chong

Maxxam ID: RX2994
Sample ID: A0246-MW8/17 (FAZ635)
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/09/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8749948	N/A	2017/09/08	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8750104	N/A	2017/09/08	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8750536	N/A	2017/09/07	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/07	Kevin Chong

Maxxam ID: RX2995
Sample ID: A0247-MW8/17 (FAZ636)
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/09/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8749948	N/A	2017/09/08	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8750104	N/A	2017/09/08	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8750536	N/A	2017/09/07	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/07	Kevin Chong

Maxxam ID: RX2996
Sample ID: A0248-MW10/17 (FAZ637)
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/09/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8749948	N/A	2017/09/08	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8750104	N/A	2017/09/08	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8750536	N/A	2017/09/07	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/07	Kevin Chong

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GENERAL COMMENTS

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

Package 1	3.7°C

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8750536	Dissolved Aluminum (Al)	2017/09/07	115	80 - 120	112	80 - 120	<3.0	ug/L		
8750536	Dissolved Antimony (Sb)	2017/09/07	98	80 - 120	98	80 - 120	<0.50	ug/L		
8750536	Dissolved Arsenic (As)	2017/09/07	100	80 - 120	96	80 - 120	<0.10	ug/L	4.9 (1)	20
8750536	Dissolved Barium (Ba)	2017/09/07	NC	80 - 120	96	80 - 120	<1.0	ug/L	1.2 (1)	20
8750536	Dissolved Beryllium (Be)	2017/09/07	103	80 - 120	101	80 - 120	<0.10	ug/L		
8750536	Dissolved Bismuth (Bi)	2017/09/07	93	80 - 120	97	80 - 120	<1.0	ug/L		
8750536	Dissolved Boron (B)	2017/09/07	104	80 - 120	111	80 - 120	<50	ug/L		
8750536	Dissolved Cadmium (Cd)	2017/09/07	95	80 - 120	96	80 - 120	<0.010	ug/L	0 (1)	20
8750536	Dissolved Chromium (Cr)	2017/09/07	96	80 - 120	94	80 - 120	<1.0	ug/L	NC (1)	20
8750536	Dissolved Cobalt (Co)	2017/09/07	91	80 - 120	95	80 - 120	<0.20	ug/L		
8750536	Dissolved Copper (Cu)	2017/09/07	87	80 - 120	96	80 - 120	<0.20	ug/L	6.8 (1)	20
8750536	Dissolved Iron (Fe)	2017/09/07	105	80 - 120	106	80 - 120	<5.0	ug/L		
8750536	Dissolved Lead (Pb)	2017/09/07	96	80 - 120	99	80 - 120	<0.20	ug/L	1.3 (1)	20
8750536	Dissolved Lithium (Li)	2017/09/07	99	80 - 120	94	80 - 120	<2.0	ug/L		
8750536	Dissolved Manganese (Mn)	2017/09/07	NC	80 - 120	95	80 - 120	<1.0	ug/L		
8750536	Dissolved Molybdenum (Mo)	2017/09/07	NC	80 - 120	96	80 - 120	<1.0	ug/L		
8750536	Dissolved Nickel (Ni)	2017/09/07	90	80 - 120	97	80 - 120	<1.0	ug/L		
8750536	Dissolved Selenium (Se)	2017/09/07	102	80 - 120	103	80 - 120	<0.10	ug/L		
8750536	Dissolved Silicon (Si)	2017/09/07					<100	ug/L		
8750536	Dissolved Silver (Ag)	2017/09/07	99	80 - 120	103	80 - 120	<0.020	ug/L		
8750536	Dissolved Strontium (Sr)	2017/09/07	NC	80 - 120	97	80 - 120	<1.0	ug/L		
8750536	Dissolved Thallium (Tl)	2017/09/07	95	80 - 120	97	80 - 120	<0.010	ug/L		
8750536	Dissolved Tin (Sn)	2017/09/07	NC	80 - 120	91	80 - 120	<5.0	ug/L		
8750536	Dissolved Titanium (Ti)	2017/09/07	97	80 - 120	92	80 - 120	<5.0	ug/L		
8750536	Dissolved Uranium (U)	2017/09/07	99	80 - 120	96	80 - 120	<0.10	ug/L		
8750536	Dissolved Vanadium (V)	2017/09/07	93	80 - 120	94	80 - 120	<5.0	ug/L		
8750536	Dissolved Zinc (Zn)	2017/09/07	94	80 - 120	95	80 - 120	<5.0	ug/L	NC (1)	20

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8750536	Dissolved Zirconium (Zr)	2017/09/07	93	80 - 120	92	80 - 120	<0.10	ug/L		

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

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

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

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

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) Duplicate Parent ID

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B776505
Report Date: 2017/09/08

MAXXAM ANALYTICS
Client Project #: MB776505

VALIDATION SIGNATURE PAGE

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

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

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.

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Maxxam
A Bureau Veritas Group Company

Your Project #: 10888
Your C.O.C. #: 98218

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/12
Report #: R4695894
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J1336
Received: 2017/09/01, 14:35

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	2	N/A	2017/09/08		EPA 8260C m
Chloride by Automated Colourimetry	2	N/A	2017/09/07	CAM SOP-00463	EPA 325.2 m
Chromium (VI) in Water	2	N/A	2017/09/07	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	2	N/A	2017/09/07	CAM SOP-00457	OMOE E3015 m
Petroleum Hydrocarbons F2-F4 in Water (1)	2	2017/09/07	2017/09/08	CAM SOP-00316	CCME PHC-CWS m
F4G (CCME Hydrocarbons Gravimetric)	1	2017/09/11	2017/09/11	CAM SOP-00326	CCME PHC-CWS m
Fluoride	2	2017/09/07	2017/09/07	CAM SOP-00449	SM 22 4500-F C m
Mercury (low level)	2	2017/09/07	2017/09/08	CAM SOP-00453	EPA 7470 m
Nitrate (NO3) and Nitrite (NO2) in Water (2)	2	N/A	2017/09/07	CAM SOP-00440	SM 22 4500-NO3I/NO2B
PAH Compounds in Water by GC/MS (SIM)	2	2017/09/06	2017/09/07	CAM SOP-00318	EPA 8270 m
Polychlorinated Biphenyl (PCB)	2	2017/09/06	2017/09/07	CAM SOP-00309	EPA 8082A m
pH	2	N/A	2017/09/07	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry	2	N/A	2017/09/07	CAM SOP-00464	EPA 375.4 m
Volatile Organic Compounds and F1 PHCs	2	N/A	2017/09/07	CAM SOP-00230	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.

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

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

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Your Project #: 10888
Your C.O.C. #: 98218

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/12
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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J1336

Received: 2017/09/01, 14:35

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) 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.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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.

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

CCME GROUNDWATER INORGANICS PACKAGE (WATER)

Maxxam ID		FBE473	FBE473			FBE474			
Sampling Date		2017/09/01 08:40	2017/09/01 08:40			2017/09/01 08:05			
COC Number		98218	98218			98218			
	UNITS	**A0262-MW9/17**	**A0262-MW9/17 Lab-Dup**	**RDL**	**MDL**	**A0261-MW5/17**	**RDL**	**MDL**	**QC Batch**
Inorganics									
Fluoride (F-)	mg/L	ND		0.10	0.020	0.12	0.10	0.020	5153456
pH	pH	7.61				7.42			5153459
Dissolved Sulphate (SO4)	mg/L	22		1.0	0.10	1.2	1.0	0.10	5152324
WAD Cyanide (Free)	mg/L	ND	ND	0.0010	0.00040	0.0012	0.0010	0.00040	5153042
Dissolved Chloride (Cl)	mg/L	220		3.0	0.90	68	1.0	0.30	5152319
Nitrite (N)	mg/L	ND		0.010	0.0020	ND	0.010	0.0020	5152042
Nitrate (N)	mg/L	0.15		0.10	0.010	ND	0.10	0.010	5152042
Nitrate + Nitrite (N)	mg/L	0.15		0.10	0.010	ND	0.10	0.010	5152042
Metals									
Mercury (Hg)	ug/L	ND		0.01	0.004	ND	0.01	0.004	5153882

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		FBE473	FBE474			
Sampling Date		2017/09/01 08:40	2017/09/01 08:05			
COC Number		98218	98218			
	UNITS	**A0262-MW9/17**	**A0261-MW5/17**	**RDL**	**MDL**	**QC Batch**
Metals						
Chromium (VI)	ug/L	ND	ND	0.50	0.30	5153336

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		FBE473	FBE474			
Sampling Date		2017/09/01 08:40	2017/09/01 08:05			
COC Number		98218	98218			
	UNITS	A0262-MW9/17	A0261-MW5/17	RDL	MDL	QC Batch
Polyaromatic Hydrocarbons						
Acenaphthene	ug/L	ND	1.0	0.010	0.010	5152033
Acenaphthylene	ug/L	ND	0.024	0.010	0.010	5152033
Anthracene	ug/L	ND	0.12	0.010	0.010	5152033
Benzo(a)anthracene	ug/L	ND	0.063	0.010	0.010	5152033
Benzo(a)pyrene	ug/L	ND	0.060	0.010	0.010	5152033
Benzo(b/j)fluoranthene	ug/L	ND	0.079	0.010	0.010	5152033
Benzo(g,h,i)perylene	ug/L	ND	0.061	0.010	0.010	5152033
Benzo(k)fluoranthene	ug/L	ND	0.032	0.010	0.010	5152033
Chrysene	ug/L	ND	0.068	0.010	0.010	5152033
Dibenz(a,h)anthracene	ug/L	ND	0.015	0.010	0.010	5152033
Fluoranthene	ug/L	0.010	0.42	0.010	0.010	5152033
Fluorene	ug/L	ND	0.87	0.010	0.010	5152033
Indeno(1,2,3-cd)pyrene	ug/L	ND	0.054	0.010	0.010	5152033
1-Methylnaphthalene	ug/L	0.012	2.1	0.010	0.010	5152033
2-Methylnaphthalene	ug/L	0.015	0.19	0.010	0.010	5152033
Naphthalene	ug/L	0.016	0.31	0.010	0.010	5152033
Phenanthrene	ug/L	0.016	0.94	0.010	0.010	5152033
Pyrene	ug/L	0.013	0.24	0.010	0.010	5152033
Surrogate Recovery (%)						
D10-Anthracene	%	78	56			5152033
D14-Terphenyl (FS)	%	57	25 (1)			5152033
D8-Acenaphthylene	%	103	100			5152033

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) Surrogate recovery was below the lower control limit due to matrix interference. This may represent a low bias in some results.

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PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		FBE474			
Sampling Date		2017/09/01 08:05			
COC Number		98218			
	UNITS	**A0261-MW5/17**	**RDL**	**MDL**	**QC Batch**
F2-F4 Hydrocarbons					
F4G-sg (Grav. Heavy Hydrocarbons)	ug/L	6000	500	N/A	5158364

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

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		FBE473		FBE474	FBE474			
Sampling Date		2017/09/01 08:40		2017/09/01 08:05	2017/09/01 08:05			
COC Number		98218		98218	98218			
	UNITS	**A0262-MW9/17**	**RDL**	**A0261-MW5/17**	**A0261-MW5/17 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
PCBs								
Aroclor 1016	ug/L	ND	0.05	ND	ND	0.01	N/A	5152144
Aroclor 1221	ug/L	ND	0.05	ND	ND	0.01	N/A	5152144
Aroclor 1232	ug/L	ND	0.05	ND	ND	0.01	N/A	5152144
Aroclor 1262	ug/L	ND	0.01	ND	ND	0.01	N/A	5152144
Aroclor 1268	ug/L	ND	0.01	0.02	0.01	0.01	N/A	5152144
Aroclor 1242	ug/L	ND	0.05	0.73	0.77	0.01	N/A	5152144
Aroclor 1248	ug/L	ND	0.02	ND	ND	0.01	N/A	5152144
Aroclor 1254	ug/L	ND	0.01	ND	ND	0.01	N/A	5152144
Aroclor 1260	ug/L	ND	0.01	0.04	0.04	0.01	N/A	5152144
Total PCB	ug/L	ND	0.05	0.79	0.82	0.01	N/A	5152144
Surrogate Recovery (%)								
Decachlorobiphenyl	%	75		91	88			5152144

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected
N/A = Not Applicable

Maxxam
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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

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

Maxxam ID		FBE473	FBE474			
Sampling Date		2017/09/01 08:40	2017/09/01 08:05			
COC Number		98218	98218			
	UNITS	A0262-MW9/17	A0261-MW5/17	RDL	MDL	QC Batch
Calculated Parameters						
1,3-Dichloropropene (cis+trans)	ug/L	ND	ND	0.50	0.50	5149436
Volatile Organics						
Acetone (2-Propanone)	ug/L	ND	ND	10	1.0	5149355
Benzene	ug/L	ND	0.30	0.20	0.020	5149355
Bromodichloromethane	ug/L	ND	ND	0.50	0.050	5149355
Bromoform	ug/L	ND	ND	1.0	0.10	5149355
Bromomethane	ug/L	ND	ND	0.50	0.10	5149355
Carbon Tetrachloride	ug/L	ND	ND	0.20	0.050	5149355
Chlorobenzene	ug/L	ND	5.4	0.20	0.010	5149355
Chloroform	ug/L	ND	ND	0.20	0.050	5149355
Dibromochloromethane	ug/L	ND	ND	0.50	0.050	5149355
1,2-Dichlorobenzene	ug/L	ND	ND	0.50	0.050	5149355
1,3-Dichlorobenzene	ug/L	ND	ND	0.50	0.050	5149355
1,4-Dichlorobenzene	ug/L	ND	1.1	0.50	0.050	5149355
Dichlorodifluoromethane (FREON 12)	ug/L	ND	ND	1.0	0.050	5149355
1,1-Dichloroethane	ug/L	ND	ND	0.20	0.050	5149355
1,2-Dichloroethane	ug/L	ND	ND	0.50	0.020	5149355
1,1-Dichloroethylene	ug/L	ND	ND	0.20	0.050	5149355
cis-1,2-Dichloroethylene	ug/L	ND	ND	0.50	0.050	5149355
trans-1,2-Dichloroethylene	ug/L	ND	ND	0.50	0.050	5149355
1,2-Dichloropropane	ug/L	ND	ND	0.20	0.050	5149355
cis-1,3-Dichloropropene	ug/L	ND	ND	0.30	0.050	5149355
trans-1,3-Dichloropropene	ug/L	ND	ND	0.40	0.050	5149355
Ethylbenzene	ug/L	ND	ND	0.20	0.010	5149355
Ethylene Dibromide	ug/L	ND	ND	0.20	0.050	5149355
Hexane	ug/L	ND	ND	1.0	0.10	5149355
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	2.0	0.10	5149355
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	10	0.50	5149355
Methyl Isobutyl Ketone	ug/L	ND	ND	5.0	0.10	5149355
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	0.50	0.050	5149355
Styrene	ug/L	ND	ND	0.50	0.050	5149355
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	0.50	0.050	5149355
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	0.50	0.050	5149355
Tetrachloroethylene	ug/L	ND	ND	0.20	0.050	5149355

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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

Maxxam ID		FBE473	FBE474			
Sampling Date		2017/09/01 08:40	2017/09/01 08:05			
COC Number		98218	98218			
	UNITS	**A0262-MW9/17**	**A0261-MW5/17**	**RDL**	**MDL**	**QC Batch**
Toluene	ug/L	ND	0.26	0.20	0.010	5149355
1,1,1-Trichloroethane	ug/L	ND	ND	0.20	0.050	5149355
1,1,2-Trichloroethane	ug/L	ND	ND	0.50	0.050	5149355
Trichloroethylene	ug/L	ND	ND	0.20	0.050	5149355
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	0.50	0.10	5149355
Vinyl Chloride	ug/L	ND	ND	0.20	0.050	5149355
p+m-Xylene	ug/L	ND	14	0.20	0.010	5149355
o-Xylene	ug/L	ND	0.37	0.20	0.010	5149355
Total Xylenes	ug/L	ND	15	0.20	0.010	5149355
F1 (C6-C10)	ug/L	ND	ND	25	N/A	5149355
F1 (C6-C10) - BTEX	ug/L	ND	ND	25	N/A	5149355
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	ND	390	100	50	5154580
F3 (C16-C34 Hydrocarbons)	ug/L	ND	2600	200	70	5154580
F4 (C34-C50 Hydrocarbons)	ug/L	ND	2700	200	50	5154580
Reached Baseline at C50	ug/L	Yes	No			5154580
Surrogate Recovery (%)						
o-Terphenyl	%	100	101			5154580
4-Bromofluorobenzene	%	97	99			5149355
D4-1,2-Dichloroethane	%	106	106			5149355
D8-Toluene	%	92	92			5149355

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

Maxxam Job #: B7J1336
Report Date: 2017/09/12

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TEST SUMMARY

Maxxam ID: FBE473
Sample ID: A0262-MW9/17
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5149436	N/A	2017/09/08	Automated Statchk
Chloride by Automated Colourimetry	KONE	5152319	N/A	2017/09/07	Alina Dobreanu
Chromium (VI) in Water	IC	5153336	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5153042	N/A	2017/09/07	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5154580	2017/09/07	2017/09/08	Dorina Popa
Fluoride	ISE	5153456	2017/09/07	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5153882	2017/09/07	2017/09/08	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5152042	N/A	2017/09/07	Chandra Nandlal
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5152033	2017/09/06	2017/09/07	Mitesh Raj
Polychlorinated Biphenyl (PCB)	GC/ECD	5152144	2017/09/06	2017/09/07	Dawn Alarie
pH	AT	5153459	N/A	2017/09/07	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5152324	N/A	2017/09/07	Alina Dobreanu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5149355	N/A	2017/09/07	Xueming Jiang

Maxxam ID: FBE473 Dup
Sample ID: A0262-MW9/17
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	5153042	N/A	2017/09/07	Louise Harding

Maxxam ID: FBE474
Sample ID: A0261-MW5/17
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5149436	N/A	2017/09/08	Automated Statchk
Chloride by Automated Colourimetry	KONE	5152319	N/A	2017/09/07	Alina Dobreanu
Chromium (VI) in Water	IC	5153336	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5153042	N/A	2017/09/07	Louise Harding
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5154580	2017/09/07	2017/09/08	Dorina Popa
F4G (CCME Hydrocarbons Gravimetric)	BAL	5158364	2017/09/11	2017/09/11	Francis Afonso
Fluoride	ISE	5153456	2017/09/07	2017/09/07	Surinder Rai
Mercury (low level)	CV/AA	5153882	2017/09/07	2017/09/08	Ron Morrison
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	5152042	N/A	2017/09/07	Chandra Nandlal
PAH Compounds in Water by GC/MS (SIM)	GC/MS	5152033	2017/09/06	2017/09/07	Mitesh Raj
Polychlorinated Biphenyl (PCB)	GC/ECD	5152144	2017/09/06	2017/09/07	Dawn Alarie
pH	AT	5153459	N/A	2017/09/07	Surinder Rai
Sulphate by Automated Colourimetry	KONE	5152324	N/A	2017/09/07	Alina Dobreanu
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5149355	N/A	2017/09/07	Xueming Jiang

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TEST SUMMARY

Maxxam ID: FBE474 Dup
Sample ID: A0261-MW5/17
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl (PCB)	GC/ECD	5152144	2017/09/06	2017/09/07	Dawn Alarie

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GENERAL COMMENTS

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

Package 1	2.7°C

Sample FBE473 [A0262-MW9/17] : PCB Analysis: Detection Limits were raised due to matrix interferences.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5149355	XJI	Matrix Spike	4-Bromofluorobenzene	2017/09/07		107	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/07		100	%	70 - 130
			D8-Toluene	2017/09/07		100	%	70 - 130
			Acetone (2-Propanone)	2017/09/07		100	%	60 - 140
			Benzene	2017/09/07		108	%	70 - 130
			Bromodichloromethane	2017/09/07		98	%	70 - 130
			Bromoform	2017/09/07		108	%	70 - 130
			Bromomethane	2017/09/07		107	%	60 - 140
			Carbon Tetrachloride	2017/09/07		99	%	70 - 130
			Chlorobenzene	2017/09/07		102	%	70 - 130
			Chloroform	2017/09/07		102	%	70 - 130
			Dibromochloromethane	2017/09/07		103	%	70 - 130
			1,2-Dichlorobenzene	2017/09/07		100	%	70 - 130
			1,3-Dichlorobenzene	2017/09/07		101	%	70 - 130
			1,4-Dichlorobenzene	2017/09/07		102	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/07		117	%	60 - 140
			1,1-Dichloroethane	2017/09/07		107	%	70 - 130
			1,2-Dichloroethane	2017/09/07		102	%	70 - 130
			1,1-Dichloroethylene	2017/09/07		112	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/07		105	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/07		112	%	70 - 130
			1,2-Dichloropropane	2017/09/07		93	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/07		89	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/07		96	%	70 - 130
			Ethylbenzene	2017/09/07		97	%	70 - 130
			Ethylene Dibromide	2017/09/07		106	%	70 - 130
			Hexane	2017/09/07		110	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/07		110	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07		97	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/07		89	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/07		92	%	70 - 130
			Styrene	2017/09/07		90	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/07		110	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/07		107	%	70 - 130
			Tetrachloroethylene	2017/09/07		109	%	70 - 130
			Toluene	2017/09/07		100	%	70 - 130
			1,1,1-Trichloroethane	2017/09/07		98	%	70 - 130
			1,1,2-Trichloroethane	2017/09/07		106	%	70 - 130
			Trichloroethylene	2017/09/07		102	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/07		109	%	70 - 130
			Vinyl Chloride	2017/09/07		103	%	70 - 130
			p+m-Xylene	2017/09/07		97	%	70 - 130
			o-Xylene	2017/09/07		94	%	70 - 130
			F1 (C6-C10)	2017/09/07		105	%	60 - 140
5149355	XJI	Spiked Blank	4-Bromofluorobenzene	2017/09/07		106	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/07		100	%	70 - 130
			D8-Toluene	2017/09/07		101	%	70 - 130
			Acetone (2-Propanone)	2017/09/07		98	%	60 - 140
			Benzene	2017/09/07		103	%	70 - 130
			Bromodichloromethane	2017/09/07		93	%	70 - 130
			Bromoform	2017/09/07		102	%	70 - 130
			Bromomethane	2017/09/07		99	%	60 - 140
			Carbon Tetrachloride	2017/09/07		95	%	70 - 130
			Chlorobenzene	2017/09/07		96	%	70 - 130
			Chloroform	2017/09/07		97	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibromochloromethane	2017/09/07		97	%	70 - 130
			1,2-Dichlorobenzene	2017/09/07		95	%	70 - 130
			1,3-Dichlorobenzene	2017/09/07		96	%	70 - 130
			1,4-Dichlorobenzene	2017/09/07		97	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/07		112	%	60 - 140
			1,1-Dichloroethane	2017/09/07		101	%	70 - 130
			1,2-Dichloroethane	2017/09/07		97	%	70 - 130
			1,1-Dichloroethylene	2017/09/07		107	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/07		99	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/07		106	%	70 - 130
			1,2-Dichloropropane	2017/09/07		89	%	70 - 130
			cis-1,3-Dichloropropene	2017/09/07		83	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/07		84	%	70 - 130
			Ethylbenzene	2017/09/07		92	%	70 - 130
			Ethylene Dibromide	2017/09/07		99	%	70 - 130
			Hexane	2017/09/07		105	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/07		104	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07		96	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/07		88	%	70 - 130
			Methyl t-butyl ether (MTBE)	2017/09/07		89	%	70 - 130
			Styrene	2017/09/07		88	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/07		103	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/07		99	%	70 - 130
			Tetrachloroethylene	2017/09/07		102	%	70 - 130
			Toluene	2017/09/07		94	%	70 - 130
			1,1,1-Trichloroethane	2017/09/07		94	%	70 - 130
			1,1,2-Trichloroethane	2017/09/07		99	%	70 - 130
			Trichloroethylene	2017/09/07		98	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/07		104	%	70 - 130
			Vinyl Chloride	2017/09/07		103	%	70 - 130
			p+m-Xylene	2017/09/07		93	%	70 - 130
			o-Xylene	2017/09/07		90	%	70 - 130
			F1 (C6-C10)	2017/09/07		97	%	60 - 140
5149355	XJI	Method Blank	4-Bromofluorobenzene	2017/09/07		99	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/07		97	%	70 - 130
			D8-Toluene	2017/09/07		95	%	70 - 130
			Acetone (2-Propanone)	2017/09/07	ND, RDL=10		ug/L	
			Benzene	2017/09/07	ND, RDL=0.20		ug/L	
			Bromodichloromethane	2017/09/07	ND, RDL=0.50		ug/L	
			Bromoform	2017/09/07	ND, RDL=1.0		ug/L	
			Bromomethane	2017/09/07	ND, RDL=0.50		ug/L	
			Carbon Tetrachloride	2017/09/07	ND, RDL=0.20		ug/L	
			Chlorobenzene	2017/09/07	ND, RDL=0.20		ug/L	
			Chloroform	2017/09/07	ND, RDL=0.20		ug/L	
			Dibromochloromethane	2017/09/07	ND, RDL=0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichlorobenzene	2017/09/07	ND, RDL=0.50		ug/L	
			1,3-Dichlorobenzene	2017/09/07	ND, RDL=0.50		ug/L	
			1,4-Dichlorobenzene	2017/09/07	ND, RDL=0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2017/09/07	ND, RDL=1.0		ug/L	
			1,1-Dichloroethane	2017/09/07	ND, RDL=0.20		ug/L	
			1,2-Dichloroethane	2017/09/07	ND, RDL=0.50		ug/L	
			1,1-Dichloroethylene	2017/09/07	ND, RDL=0.20		ug/L	
			cis-1,2-Dichloroethylene	2017/09/07	ND, RDL=0.50		ug/L	
			trans-1,2-Dichloroethylene	2017/09/07	ND, RDL=0.50		ug/L	
			1,2-Dichloropropane	2017/09/07	ND, RDL=0.20		ug/L	
			cis-1,3-Dichloropropene	2017/09/07	ND, RDL=0.30		ug/L	
			trans-1,3-Dichloropropene	2017/09/07	ND, RDL=0.40		ug/L	
			Ethylbenzene	2017/09/07	ND, RDL=0.20		ug/L	
			Ethylene Dibromide	2017/09/07	ND, RDL=0.20		ug/L	
			Hexane	2017/09/07	ND, RDL=1.0		ug/L	
			Methylene Chloride(Dichloromethane)	2017/09/07	ND, RDL=2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07	ND, RDL=10		ug/L	
			Methyl Isobutyl Ketone	2017/09/07	ND, RDL=5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/09/07	ND, RDL=0.50		ug/L	
			Styrene	2017/09/07	ND, RDL=0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2017/09/07	ND, RDL=0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2017/09/07	ND, RDL=0.50		ug/L	
			Tetrachloroethylene	2017/09/07	ND, RDL=0.20		ug/L	
			Toluene	2017/09/07	ND, RDL=0.20		ug/L	
			1,1,1-Trichloroethane	2017/09/07	ND, RDL=0.20		ug/L	
			1,1,2-Trichloroethane	2017/09/07	ND, RDL=0.50		ug/L	
			Trichloroethylene	2017/09/07	ND, RDL=0.20		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Trichlorofluoromethane (FREON 11)	2017/09/07	ND, RDL=0.50		ug/L	
			Vinyl Chloride	2017/09/07	ND, RDL=0.20		ug/L	
			p+m-Xylene	2017/09/07	ND, RDL=0.20		ug/L	
			o-Xylene	2017/09/07	ND, RDL=0.20		ug/L	
			Total Xylenes	2017/09/07	ND, RDL=0.20		ug/L	
			F1 (C6-C10)	2017/09/07	ND, RDL=25		ug/L	
			F1 (C6-C10) - BTEX	2017/09/07	ND, RDL=25		ug/L	
5149355	XJI	RPD	Acetone (2-Propanone)	2017/09/07	NC		%	30
			Benzene	2017/09/07	0.24		%	30
			Bromodichloromethane	2017/09/07	NC		%	30
			Bromoform	2017/09/07	NC		%	30
			Bromomethane	2017/09/07	NC		%	30
			Carbon Tetrachloride	2017/09/07	NC		%	30
			Chlorobenzene	2017/09/07	1.8		%	30
			Chloroform	2017/09/07	NC		%	30
			Dibromochloromethane	2017/09/07	NC		%	30
			1,2-Dichlorobenzene	2017/09/07	0.85		%	30
			1,3-Dichlorobenzene	2017/09/07	NC		%	30
			1,4-Dichlorobenzene	2017/09/07	0.62		%	30
			Dichlorodifluoromethane (FREON 12)	2017/09/07	NC		%	30
			1,1-Dichloroethane	2017/09/07	1.4		%	30
			1,2-Dichloroethane	2017/09/07	NC		%	30
			1,1-Dichloroethylene	2017/09/07	NC		%	30
			cis-1,2-Dichloroethylene	2017/09/07	NC		%	30
			trans-1,2-Dichloroethylene	2017/09/07	NC		%	30
			1,2-Dichloropropane	2017/09/07	NC		%	30
			cis-1,3-Dichloropropene	2017/09/07	NC		%	30
			trans-1,3-Dichloropropene	2017/09/07	NC		%	30
			Ethylbenzene	2017/09/07	0.13		%	30
			Ethylene Dibromide	2017/09/07	NC		%	30
			Hexane	2017/09/07	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/09/07	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/09/07	NC		%	30
			Methyl Isobutyl Ketone	2017/09/07	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/09/07	NC		%	30
			Styrene	2017/09/07	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/09/07	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/09/07	NC		%	30
			Tetrachloroethylene	2017/09/07	NC		%	30
			Toluene	2017/09/07	0.14		%	30
			1,1,1-Trichloroethane	2017/09/07	NC		%	30
			1,1,2-Trichloroethane	2017/09/07	NC		%	30
			Trichloroethylene	2017/09/07	NC		%	30
			Trichlorofluoromethane (FREON 11)	2017/09/07	NC		%	30
			Vinyl Chloride	2017/09/07	NC		%	30
			p+m-Xylene	2017/09/07	2.4		%	30
			o-Xylene	2017/09/07	0.84		%	30
			Total Xylenes	2017/09/07	2.3		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			F1 (C6-C10)	2017/09/07	2.4		%	30
			F1 (C6-C10) - BTEX	2017/09/07	4.0		%	30
5152033	RAJ	Matrix Spike	D10-Anthracene	2017/09/07		83	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		92	%	50 - 130
			D8-Acenaphthylene	2017/09/07		100	%	50 - 130
			Acenaphthene	2017/09/07		80	%	50 - 130
			Acenaphthylene	2017/09/07		98	%	50 - 130
			Anthracene	2017/09/07		79	%	50 - 130
			Benzo(a)anthracene	2017/09/07		83	%	50 - 130
			Benzo(a)pyrene	2017/09/07		85	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		72	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		82	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		73	%	50 - 130
			Chrysene	2017/09/07		95	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/07		74	%	50 - 130
			Fluoranthene	2017/09/07		96	%	50 - 130
			Fluorene	2017/09/07		85	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		80	%	50 - 130
			1-Methylnaphthalene	2017/09/07		94	%	50 - 130
			2-Methylnaphthalene	2017/09/07		87	%	50 - 130
			Naphthalene	2017/09/07		76	%	50 - 130
			Phenanthrene	2017/09/07		85	%	50 - 130
			Pyrene	2017/09/07		94	%	50 - 130
5152033	RAJ	Spiked Blank	D10-Anthracene	2017/09/07		98	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		104	%	50 - 130
			D8-Acenaphthylene	2017/09/07		117	%	50 - 130
			Acenaphthene	2017/09/07		97	%	50 - 130
			Acenaphthylene	2017/09/07		115	%	50 - 130
			Anthracene	2017/09/07		94	%	50 - 130
			Benzo(a)anthracene	2017/09/07		99	%	50 - 130
			Benzo(a)pyrene	2017/09/07		107	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/07		104	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/07		111	%	50 - 130
			Benzo(k)fluoranthene	2017/09/07		106	%	50 - 130
			Chrysene	2017/09/07		111	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/07		95	%	50 - 130
			Fluoranthene	2017/09/07		104	%	50 - 130
			Fluorene	2017/09/07		100	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/07		113	%	50 - 130
			1-Methylnaphthalene	2017/09/07		115	%	50 - 130
			2-Methylnaphthalene	2017/09/07		98	%	50 - 130
			Naphthalene	2017/09/07		92	%	50 - 130
			Phenanthrene	2017/09/07		100	%	50 - 130
			Pyrene	2017/09/07		107	%	50 - 130
5152033	RAJ	Method Blank	D10-Anthracene	2017/09/07		89	%	50 - 130
			D14-Terphenyl (FS)	2017/09/07		93	%	50 - 130
			D8-Acenaphthylene	2017/09/07		106	%	50 - 130
			Acenaphthene	2017/09/07	ND, RDL=0.010		ug/L	
			Acenaphthylene	2017/09/07	ND, RDL=0.010		ug/L	
			Anthracene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(a)anthracene	2017/09/07	ND, RDL=0.010		ug/L	

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(b/j)fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(g,h,i)perylene	2017/09/07	ND, RDL=0.010		ug/L	
			Benzo(k)fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Chrysene	2017/09/07	ND, RDL=0.010		ug/L	
			Dibenz(a,h)anthracene	2017/09/07	ND, RDL=0.010		ug/L	
			Fluoranthene	2017/09/07	ND, RDL=0.010		ug/L	
			Fluorene	2017/09/07	ND, RDL=0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2017/09/07	ND, RDL=0.010		ug/L	
			1-Methylnaphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			2-Methylnaphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			Naphthalene	2017/09/07	ND, RDL=0.010		ug/L	
			Phenanthrene	2017/09/07	ND, RDL=0.010		ug/L	
			Pyrene	2017/09/07	ND, RDL=0.010		ug/L	
5152033	RAJ	RPD	Acenaphthene	2017/09/07	NC		%	30
			Acenaphthylene	2017/09/07	NC		%	30
			Anthracene	2017/09/07	NC		%	30
			Benzo(a)anthracene	2017/09/07	NC		%	30
			Benzo(a)pyrene	2017/09/07	NC		%	30
			Benzo(b/j)fluoranthene	2017/09/07	NC		%	30
			Benzo(g,h,i)perylene	2017/09/07	NC		%	30
			Benzo(k)fluoranthene	2017/09/07	NC		%	30
			Chrysene	2017/09/07	NC		%	30
			Dibenz(a,h)anthracene	2017/09/07	NC		%	30
			Fluoranthene	2017/09/07	1.6		%	30
			Fluorene	2017/09/07	NC		%	30
			Indeno(1,2,3-cd)pyrene	2017/09/07	NC		%	30
			1-Methylnaphthalene	2017/09/07	NC		%	30
			2-Methylnaphthalene	2017/09/07	NC		%	30
			Naphthalene	2017/09/07	NC		%	30
			Phenanthrene	2017/09/07	NC		%	30
			Pyrene	2017/09/07	NC		%	30
5152042	C_N	Matrix Spike	Nitrite (N)	2017/09/07		101	%	80 - 120
			Nitrate (N)	2017/09/07		96	%	80 - 120
5152042	C_N	Spiked Blank	Nitrite (N)	2017/09/07		102	%	80 - 120
			Nitrate (N)	2017/09/07		96	%	80 - 120
5152042	C_N	Method Blank	Nitrite (N)	2017/09/07	ND, RDL=0.010		mg/L	
			Nitrate (N)	2017/09/07	ND, RDL=0.10		mg/L	
5152042	C_N	RPD	Nitrite (N)	2017/09/07	1.7		%	20

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Nitrate (N)	2017/09/07	0.053		%	20
5152144	DH	Matrix Spike	Decachlorobiphenyl	2017/09/07		78	%	60 - 130
			Aroclor 1260	2017/09/07		78	%	60 - 130
			Total PCB	2017/09/07		78	%	60 - 130
5152144	DH	Spiked Blank	Decachlorobiphenyl	2017/09/07		107	%	60 - 130
			Aroclor 1260	2017/09/07		101	%	60 - 130
			Total PCB	2017/09/07		101	%	60 - 130
5152144	DH	Method Blank	Aroclor 1016	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1221	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1232	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1262	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1268	2017/09/07	ND, RDL=0.01		ug/L	
			Decachlorobiphenyl	2017/09/07		111	%	60 - 130
			Aroclor 1242	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1248	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1254	2017/09/07	ND, RDL=0.01		ug/L	
			Aroclor 1260	2017/09/07	ND, RDL=0.01		ug/L	
			Total PCB	2017/09/07	ND, RDL=0.01		ug/L	
5152144	DH	RPD [FBE474-01]	Aroclor 1016	2017/09/07	NC		%	40
			Aroclor 1221	2017/09/07	NC		%	40
			Aroclor 1232	2017/09/07	NC		%	40
			Aroclor 1262	2017/09/07	NC		%	40
			Aroclor 1268	2017/09/07	4.9		%	40
			Aroclor 1242	2017/09/07	4.2		%	40
			Aroclor 1248	2017/09/07	NC		%	40
			Aroclor 1254	2017/09/07	NC		%	40
			Aroclor 1260	2017/09/07	2.3		%	40
			Total PCB	2017/09/07	4.0		%	40
5152319	ADB	Matrix Spike	Dissolved Chloride (Cl)	2017/09/07		NC	%	80 - 120
5152319	ADB	Spiked Blank	Dissolved Chloride (Cl)	2017/09/07		103	%	80 - 120
5152319	ADB	Method Blank	Dissolved Chloride (Cl)	2017/09/07	ND, RDL=1.0		mg/L	
5152319	ADB	RPD	Dissolved Chloride (Cl)	2017/09/07	0.25		%	20
5152324	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2017/09/07		NC	%	75 - 125
5152324	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2017/09/07		96	%	80 - 120
5152324	ADB	Method Blank	Dissolved Sulphate (SO4)	2017/09/07	ND, RDL=1.0		mg/L	
5152324	ADB	RPD	Dissolved Sulphate (SO4)	2017/09/07	0.49		%	20
5153042	LHA	Matrix Spike [FBE473-04]	WAD Cyanide (Free)	2017/09/07		88	%	80 - 120
5153042	LHA	Spiked Blank	WAD Cyanide (Free)	2017/09/07		102	%	80 - 120
5153042	LHA	Method Blank	WAD Cyanide (Free)	2017/09/07	ND, RDL=0.0010		mg/L	
5153042	LHA	RPD [FBE473-04]	WAD Cyanide (Free)	2017/09/07	NC		%	20
5153336	LLE	Matrix Spike	Chromium (VI)	2017/09/07		99	%	80 - 120
5153336	LLE	Spiked Blank	Chromium (VI)	2017/09/07		102	%	80 - 120

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Maxxam Job #: B7J1336
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5153336	LLE	Method Blank	Chromium (VI)	2017/09/07	ND, RDL=0.50		ug/L	
5153336	LLE	RPD	Chromium (VI)	2017/09/07	2.9		%	20
5153456	SAU	Matrix Spike	Fluoride (F-)	2017/09/07		111	%	80 - 120
5153456	SAU	Spiked Blank	Fluoride (F-)	2017/09/07		104	%	80 - 120
5153456	SAU	Method Blank	Fluoride (F-)	2017/09/07	ND, RDL=0.10		mg/L	
5153456	SAU	RPD	Fluoride (F-)	2017/09/07	0		%	20
5153459	SAU	Spiked Blank	pH	2017/09/07		101	%	98 - 103
5153459	SAU	RPD	pH	2017/09/07	0.21		%	N/A
5153882	RON	Matrix Spike	Mercury (Hg)	2017/09/08		104	%	75 - 125
5153882	RON	Spiked Blank	Mercury (Hg)	2017/09/08		97	%	80 - 120
5153882	RON	Method Blank	Mercury (Hg)	2017/09/08	ND, RDL=0.01		ug/L	
5153882	RON	RPD	Mercury (Hg)	2017/09/08	NC		%	20
5154580	DPO	Matrix Spike	o-Terphenyl	2017/09/08		105	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		97	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/08		96	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/08		103	%	50 - 130
5154580	DPO	Spiked Blank	o-Terphenyl	2017/09/08		101	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08		83	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/08		93	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/08		101	%	60 - 130
5154580	DPO	Method Blank	o-Terphenyl	2017/09/08		98	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/08	ND, RDL=100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2017/09/08	ND, RDL=200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2017/09/08	ND, RDL=200		ug/L	
5154580	DPO	RPD	F2 (C10-C16 Hydrocarbons)	2017/09/08	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/08	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/08	NC		%	30
5158364	FA	Spiked Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/11		95	%	65 - 135
5158364	FA	RPD	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/11	NC		%	20
5158364	FA	Method Blank	F4G-sg (Grav. Heavy Hydrocarbons)	2017/09/11	ND, RDL=500		ug/L	

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.

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).

Brad Newman, Scientific Service Specialist

Cristina Carriere, Scientific Service Specialist

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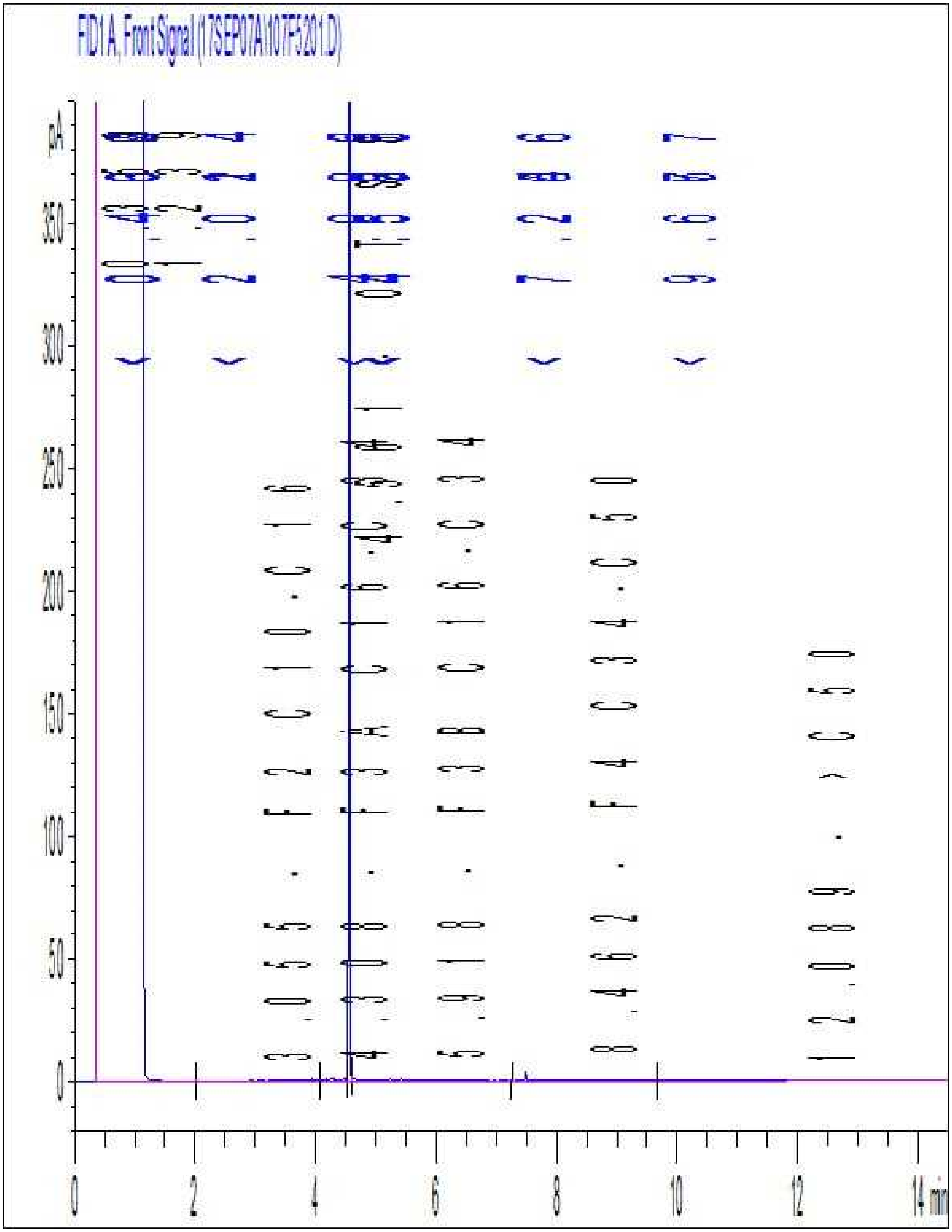
Maxxam Job #: B7J1336
Report Date: 2017/09/12
Maxxam Sample: FBE473

AEL Environment
Client Project #: 10888
Client ID: A0262-MW9/17

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

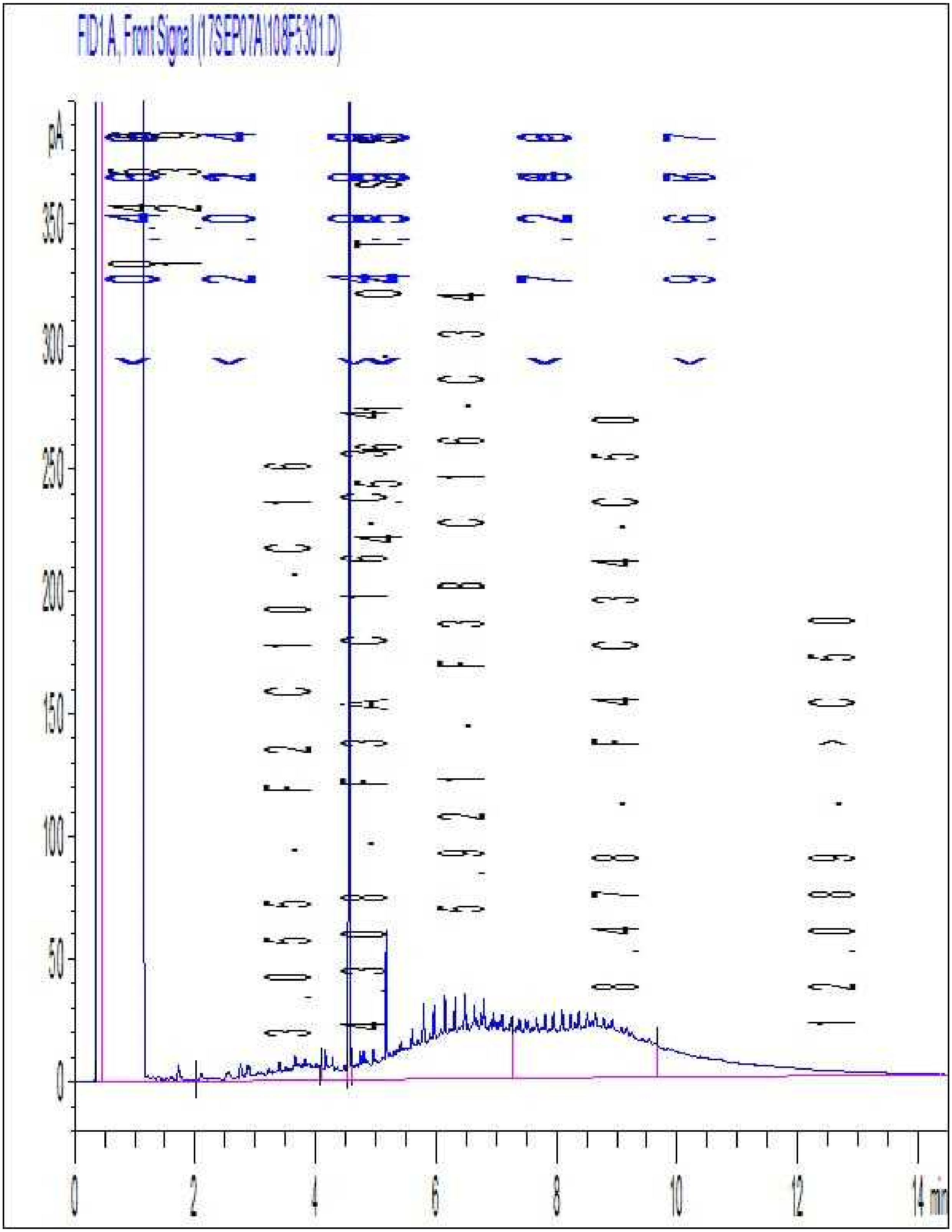


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7J1336
Report Date: 2017/09/12
Maxxam Sample: FBE474

AEL Environment
Client Project #: 10888
Client ID: A0261-MW5/17

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.

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Your Project #: MB7J1336
Site Location: 10888
Your C.O.C. #: B7J1336-M058-01-01

Attention:ANTONELLA BRASIL

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2017/09/11
Report #: R2441871
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B776676
Received: 2017/09/07, 08:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hardness (calculated as CaCO3)	2	N/A	2017/09/11	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2017/09/11	BBY7SOP-00002	EPA 6020B R2 m
Elements by CRC ICPMS (dissolved)	2	N/A	2017/09/08	BBY7SOP-00002	EPA 6020B R2 m
Filter and HNO3 Preserve for Metals	2	N/A	2017/09/08	BBY7 WI-00004	BCMOE Reqs 08/14

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your Project #: MB7J1336
Site Location: 10888
Your C.O.C. #: B7J1336-M058-01-01

Attention:ANTONELLA BRASIL

MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2017/09/11
Report #: R2441871
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B776676
Received: 2017/09/07, 08:45

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jenna Williamson, Project Manager 1
Email: JWilliamson@maxxam.ca
Phone# (604) 734 7276
==
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Maxxam Job #: B776676
Report Date: 2017/09/11

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		RX3917	RX3918	
Sampling Date		2017/09/01 08:40	2017/09/01 08:05	
COC Number		B7J1336-M058-01-01	B7J1336-M058-01-01	
	UNITS	**A0262-MW9/17 (FBE473)**	**A0261-MW5/17 (FBE474)**	**QC Batch**
Calculated Parameters				
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE

Maxxam Job #: B776676
Report Date: 2017/09/11

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX3917	RX3918		
Sampling Date		2017/09/01 08:40	2017/09/01 08:05		
COC Number		B7J1336-M058-01-01	B7J1336-M058-01-01		
	UNITS	A0262-MW9/17 (FBE473)	A0261-MW5/17 (FBE474)	RDL	QC Batch
Misc. Inorganics					
Dissolved Hardness (CaCO3)	mg/L	463	250	0.50	8751329
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	<3.0	6.2	3.0	8751690
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	0.50	8751690
Dissolved Arsenic (As)	ug/L	2.16	3.33	0.10	8751690
Dissolved Barium (Ba)	ug/L	410	399	1.0	8751690
Dissolved Beryllium (Be)	ug/L	<0.10	<0.10	0.10	8751690
Dissolved Bismuth (Bi)	ug/L	<1.0	<1.0	1.0	8751690
Dissolved Boron (B)	ug/L	55	52	50	8751690
Dissolved Cadmium (Cd)	ug/L	0.024	<0.010	0.010	8751690
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	1.0	8751690
Dissolved Cobalt (Co)	ug/L	7.78	0.81	0.20	8751690
Dissolved Copper (Cu)	ug/L	0.23	<0.20	0.20	8751690
Dissolved Iron (Fe)	ug/L	138	19800	5.0	8751690
Dissolved Lead (Pb)	ug/L	<0.20	<0.20	0.20	8751690
Dissolved Lithium (Li)	ug/L	<2.0	3.3	2.0	8751690
Dissolved Manganese (Mn)	ug/L	4930	666	1.0	8751690
Dissolved Molybdenum (Mo)	ug/L	1.8	1.1	1.0	8751690
Dissolved Nickel (Ni)	ug/L	7.1	1.5	1.0	8751690
Dissolved Selenium (Se)	ug/L	0.11	<0.10	0.10	8751690
Dissolved Silicon (Si)	ug/L	5650	6360	100	8751690
Dissolved Silver (Ag)	ug/L	<0.020	<0.020	0.020	8751690
Dissolved Strontium (Sr)	ug/L	259	253	1.0	8751690
Dissolved Thallium (Tl)	ug/L	0.287	<0.010	0.010	8751690
Dissolved Tin (Sn)	ug/L	<5.0	<5.0	5.0	8751690
Dissolved Titanium (Ti)	ug/L	<5.0	<5.0	5.0	8751690
Dissolved Uranium (U)	ug/L	0.66	0.16	0.10	8751690
Dissolved Vanadium (V)	ug/L	<5.0	<5.0	5.0	8751690
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5.0	8751690
Dissolved Zirconium (Zr)	ug/L	0.24	<0.10	0.10	8751690
Dissolved Calcium (Ca)	mg/L	148	82.5	0.050	8751330
Dissolved Magnesium (Mg)	mg/L	22.8	10.7	0.050	8751330
RDL = Reportable Detection Limit					

Maxxam Job #: B776676
Report Date: 2017/09/11

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

CCME DISSOLVED METALS IN WATER (WATER)

Maxxam ID		RX3917	RX3918		
Sampling Date		2017/09/01 08:40	2017/09/01 08:05		
COC Number		B7J1336-M058-01-01	B7J1336-M058-01-01		
	UNITS	**A0262-MW9/17 (FBE473)**	**A0261-MW5/17 (FBE474)**	**RDL**	**QC Batch**
Dissolved Potassium (K)	mg/L	3.07	1.68	0.050	8751330
Dissolved Sodium (Na)	mg/L	141	40.4	0.050	8751330
Dissolved Sulphur (S)	mg/L	7.3	<3.0	3.0	8751330

RDL = Reportable Detection Limit

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Maxxam Job #: B776676
Report Date: 2017/09/11

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

TEST SUMMARY

Maxxam ID: RX3917
Sample ID: A0262-MW9/17 (FBE473)
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8751329	N/A	2017/09/11	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8751330	N/A	2017/09/11	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8751690	N/A	2017/09/08	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/08	Marilou H. Truant

Maxxam ID: RX3918
Sample ID: A0261-MW5/17 (FBE474)
Matrix: Water

Collected: 2017/09/01
Shipped:
Received: 2017/09/07

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hardness (calculated as CaCO3)	CALC	8751329	N/A	2017/09/11	Automated Statchk
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	ICP/CRCM	8751330	N/A	2017/09/11	Automated Statchk
Elements by CRC ICPMS (dissolved)	ICP/CRCM	8751690	N/A	2017/09/08	Jeffrey Laporte
Filter and HNO3 Preserve for Metals	ICP	ONSITE	N/A	2017/09/08	Marilou H. Truant

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GENERAL COMMENTS

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

Package 1	1.7°C

CCME DISSOLVED METALS IN WATER (WATER) Comments

Matrix Spike Elements by CRC ICPMS (dissolved): RDL raised due to concentration over linear range, sample dilution required

Results relate only to the items tested.

Maxxam Job #: B776676
Report Date: 2017/09/11

QUALITY ASSURANCE REPORT

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8751690	Dissolved Aluminum (Al)	2017/09/08	103	80 - 120	103	80 - 120	<3.0	ug/L	NC (1)	20
8751690	Dissolved Antimony (Sb)	2017/09/08	104	80 - 120	103	80 - 120	<0.50	ug/L	NC (1)	20
8751690	Dissolved Arsenic (As)	2017/09/08	101	80 - 120	100	80 - 120	<0.10	ug/L	6.7 (1)	20
8751690	Dissolved Barium (Ba)	2017/09/08	NC	80 - 120	101	80 - 120	<1.0	ug/L	0.42 (1)	20
8751690	Dissolved Beryllium (Be)	2017/09/08	100	80 - 120	100	80 - 120	<0.10	ug/L	NC (1)	20
8751690	Dissolved Bismuth (Bi)	2017/09/08	94	80 - 120	106	80 - 120	<1.0	ug/L	NC (1)	20
8751690	Dissolved Boron (B)	2017/09/08	NC	80 - 120	96	80 - 120	<50	ug/L	1.1 (1)	20
8751690	Dissolved Cadmium (Cd)	2017/09/08	100	80 - 120	102	80 - 120	<0.010	ug/L	NC (1)	20
8751690	Dissolved Chromium (Cr)	2017/09/08	100	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
8751690	Dissolved Cobalt (Co)	2017/09/08	99	80 - 120	102	80 - 120	<0.20	ug/L	NC (1)	20
8751690	Dissolved Copper (Cu)	2017/09/08	98	80 - 120	101	80 - 120	<0.20	ug/L	NC (1)	20
8751690	Dissolved Iron (Fe)	2017/09/08	NC	80 - 120	103	80 - 120	<5.0	ug/L	1.4 (1)	20
8751690	Dissolved Lead (Pb)	2017/09/08	97	80 - 120	104	80 - 120	<0.20	ug/L	NC (1)	20
8751690	Dissolved Lithium (Li)	2017/09/08	NC	80 - 120	97	80 - 120	<2.0	ug/L	5.2 (1)	20
8751690	Dissolved Manganese (Mn)	2017/09/08	NC	80 - 120	103	80 - 120	<1.0	ug/L	1.0 (1)	20
8751690	Dissolved Molybdenum (Mo)	2017/09/08	NC	80 - 120	104	80 - 120	<1.0	ug/L	NC (1)	20
8751690	Dissolved Nickel (Ni)	2017/09/08	102	80 - 120	103	80 - 120	<1.0	ug/L	NC (1)	20
8751690	Dissolved Selenium (Se)	2017/09/08	99	80 - 120	103	80 - 120	<0.10	ug/L	NC (1)	20
8751690	Dissolved Silicon (Si)	2017/09/08					<100	ug/L	3.4 (1)	20
8751690	Dissolved Silver (Ag)	2017/09/08	91	80 - 120	111	80 - 120	<0.020	ug/L	NC (1)	20
8751690	Dissolved Strontium (Sr)	2017/09/08	NC	80 - 120	99	80 - 120	<1.0	ug/L	0.094 (1)	20
8751690	Dissolved Thallium (Tl)	2017/09/08	98	80 - 120	104	80 - 120	<0.010	ug/L	NC (1)	20
8751690	Dissolved Tin (Sn)	2017/09/08	100	80 - 120	99	80 - 120	<5.0	ug/L	NC (1)	20
8751690	Dissolved Titanium (Ti)	2017/09/08	101	80 - 120	103	80 - 120	<5.0	ug/L	NC (1)	20
8751690	Dissolved Uranium (U)	2017/09/08	101	80 - 120	105	80 - 120	<0.10	ug/L	NC (1)	20
8751690	Dissolved Vanadium (V)	2017/09/08	102	80 - 120	101	80 - 120	<5.0	ug/L	NC (1)	20
8751690	Dissolved Zinc (Zn)	2017/09/08	114	80 - 120	102	80 - 120	<5.0	ug/L	NC (1)	20

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			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8751690	Dissolved Zirconium (Zr)	2017/09/08	95	80 - 120	101	80 - 120	<0.10	ug/L	NC (1)	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.

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) Duplicate Parent ID

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Maxxam Job #: B776676
Report Date: 2017/09/11

MAXXAM ANALYTICS
Client Project #: MB7J1336
Site Location: 10888

VALIDATION SIGNATURE PAGE

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

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

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.

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Maxxam
A Bureau Veritas Group Company

Your Project #: 10888
Your C.O.C. #: 625118-01-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/06
Report #: R4688813
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8095
Received: 2017/08/29, 17:30

Sample Matrix: Soil
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum (1)	7	N/A	2017/09/06	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron (1)	6	2017/09/02	2017/09/05	CAM SOP-00408	R153 Ana. Prot. 2011
Hot Water Extractable Boron (1)	1	2017/09/05	2017/09/05	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum (1)	7	N/A	2017/09/05		EPA 8260C m
Free (WAD) Cyanide (1)	7	2017/09/01	2017/09/05	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	7	2017/09/05	2017/09/05	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 2)	5	2017/09/01	2017/09/01	CAM SOP-00436	EPA 3060/7199 m
Hexavalent Chromium in Soil by IC (1, 2)	2	2017/09/01	2017/09/05	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	7	2017/09/01	2017/09/02	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS (1)	7	2017/09/02	2017/09/06	CAM SOP-00447	EPA 6020B m
Moisture (1)	7	N/A	2017/09/01	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	7	2017/09/01	2017/09/02	CAM SOP-00318	EPA 8270D m
Polychlorinated Biphenyl in Soil (1)	7	2017/09/01	2017/09/01	CAM SOP-00309	EPA 8082A m
pH CaCl2 EXTRACT (1)	7	2017/09/01	2017/09/01	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	7	N/A	2017/09/05	CAM SOP-00102	EPA 6010C
SAR - ICP Metals (1)	7	2017/09/05	2017/09/05	CAM SOP-00408	EPA 6010D m
Volatile Organic Compounds and F1 PHCs (1)	7	N/A	2017/09/01	CAM SOP-00230	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.

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.

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Your Project #: 10888
Your C.O.C. #: 625118-01-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/06
Report #: R4688813
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8095
Received: 2017/08/29, 17:30

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.
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.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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.

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

O.REG 153 METALS & INORGANICS PKG (SOIL)

Maxxam ID		FAO977		FAO978	FAO979		FAO980		
Sampling Date		2017/08/29 09:30		2017/08/29 09:45	2017/08/29 10:40		2017/08/29 11:10		
COC Number		625118-01-01		625118-01-01	625118-01-01		625118-01-01		
	UNITS	**A0197**	**QC Batch**	**A0198**	**A0200**	**QC Batch**	**A0202**	**RDL**	**QC Batch**
Calculated Parameters									
Sodium Adsorption Ratio	N/A	0.22	5142827	0.31	0.28	5142827	0.28		5142827
Inorganics									
Conductivity	mS/cm	0.20	5149238	0.10	0.11	5149238	0.36	0.002	5149357
Available (CaCl2) pH	pH	6.37	5146357	6.61	5.87	5146357	6.16		5146357
WAD Cyanide (Free)	ug/g	0.07	5146766	0.02	0.20	5146766	0.20	0.01	5146766
Metals									
Soluble Calcium (Ca)	mg/L	29.6	5149224	17.6	19.8	5149224	43.0	0.5	5149341
Soluble Magnesium (Mg)	mg/L	6.3	5149224	1.4	3.0	5149224	11.3	0.5	5149341
Soluble Sodium (Na)	mg/L	5	5149224	ND	5	5149224	8	5	5149341
Inorganics									
Chromium (VI)	ug/g	ND	5146405	ND	ND	5146206	ND	0.2	5146206
Metals									
Hot Water Ext. Boron (B)	ug/g	0.37	5148365	0.11	0.67	5148365	0.32	0.050	5149073
Acid Extractable Antimony (Sb)	ug/g	0.21	5148391	0.64	0.42	5148391	0.27	0.20	5148391
Acid Extractable Arsenic (As)	ug/g	ND	5148391	1.6	82	5148391	1.5	1.0	5148391
Acid Extractable Barium (Ba)	ug/g	55	5148391	34	210	5148391	76	0.50	5148391
Acid Extractable Beryllium (Be)	ug/g	ND	5148391	ND	0.33	5148391	ND	0.20	5148391
Acid Extractable Boron (B)	ug/g	ND	5148391	ND	ND	5148391	5.8	5.0	5148391
Acid Extractable Cadmium (Cd)	ug/g	0.18	5148391	ND	0.46	5148391	0.30	0.10	5148391
Acid Extractable Chromium (Cr)	ug/g	8.2	5148391	4.0	8.8	5148391	12	1.0	5148391
Acid Extractable Cobalt (Co)	ug/g	1.5	5148391	0.85	54	5148391	2.0	0.10	5148391
Acid Extractable Copper (Cu)	ug/g	7.8	5148391	4.5	15	5148391	20	0.50	5148391
Acid Extractable Lead (Pb)	ug/g	29	5148391	15	31	5148391	100	1.0	5148391
Acid Extractable Molybdenum (Mo)	ug/g	ND	5148391	ND	4.9	5148391	ND	0.50	5148391
Acid Extractable Nickel (Ni)	ug/g	4.0	5148391	2.6	38	5148391	6.1	0.50	5148391
Acid Extractable Selenium (Se)	ug/g	ND	5148391	ND	1.1	5148391	0.68	0.50	5148391
Acid Extractable Silver (Ag)	ug/g	ND	5148391	ND	ND	5148391	0.27	0.20	5148391
Acid Extractable Thallium (Tl)	ug/g	0.067	5148391	ND	0.95	5148391	0.11	0.050	5148391
Acid Extractable Uranium (U)	ug/g	0.58	5148391	0.19	2.6	5148391	1.3	0.050	5148391
Acid Extractable Vanadium (V)	ug/g	9.8	5148391	8.9	15	5148391	9.2	5.0	5148391
Acid Extractable Zinc (Zn)	ug/g	46	5148391	7.9	52	5148391	71	5.0	5148391
Acid Extractable Mercury (Hg)	ug/g	0.19	5148391	ND	0.057	5148391	0.16	0.050	5148391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

O.REG 153 METALS & INORGANICS PKG (SOIL)

Maxxam ID		FAO981		FAO982		FAO983		
Sampling Date		2017/08/29 12:00		2017/08/29 12:20		2017/08/29 09:32		
COC Number		625118-01-01		625118-01-01		625118-01-01		
	UNITS	A0204	QC Batch	A0206	QC Batch	A0213	RDL	QC Batch
Calculated Parameters								
Sodium Adsorption Ratio	N/A	0.40	5142827	0.33	5142827	0.25		5142827
Inorganics								
Conductivity	mS/cm	0.067	5149238	0.091	5149238	0.29	0.002	5149238
Available (CaCl2) pH	pH	6.50	5146357	7.25	5146357	6.54		5146357
WAD Cyanide (Free)	ug/g	0.02	5146766	0.01	5146766	0.10	0.01	5146766
Metals								
Soluble Calcium (Ca)	mg/L	8.4	5149224	12.7	5149224	39.4	0.5	5149224
Soluble Magnesium (Mg)	mg/L	1.9	5149224	2.7	5149224	7.4	0.5	5149224
Soluble Sodium (Na)	mg/L	ND	5149224	ND	5149224	7	5	5149224
Inorganics								
Chromium (VI)	ug/g	ND	5146206	ND	5146405	ND	0.2	5146206
Metals								
Hot Water Ext. Boron (B)	ug/g	0.22	5148365	0.16	5148365	0.13	0.050	5148365
Acid Extractable Antimony (Sb)	ug/g	0.77	5148391	0.47	5148391	0.22	0.20	5148391
Acid Extractable Arsenic (As)	ug/g	2.5	5148391	1.3	5148391	ND	1.0	5148391
Acid Extractable Barium (Ba)	ug/g	79	5148391	28	5148391	60	0.50	5148391
Acid Extractable Beryllium (Be)	ug/g	ND	5148391	ND	5148391	ND	0.20	5148391
Acid Extractable Boron (B)	ug/g	ND	5148391	ND	5148391	ND	5.0	5148391
Acid Extractable Cadmium (Cd)	ug/g	ND	5148391	ND	5148391	0.17	0.10	5148391
Acid Extractable Chromium (Cr)	ug/g	5.8	5148391	10	5148391	8.3	1.0	5148391
Acid Extractable Cobalt (Co)	ug/g	2.2	5148391	2.6	5148391	1.6	0.10	5148391
Acid Extractable Copper (Cu)	ug/g	6.1	5148391	14	5148391	7.5	0.50	5148391
Acid Extractable Lead (Pb)	ug/g	110	5148391	50	5148391	33	1.0	5148391
Acid Extractable Molybdenum (Mo)	ug/g	0.61	5148391	ND	5148391	ND	0.50	5148391
Acid Extractable Nickel (Ni)	ug/g	3.7	5148391	5.2	5148391	3.9	0.50	5148391
Acid Extractable Selenium (Se)	ug/g	ND	5148391	ND	5148391	ND	0.50	5148391
Acid Extractable Silver (Ag)	ug/g	ND	5148391	ND	5148391	ND	0.20	5148391
Acid Extractable Thallium (Tl)	ug/g	0.086	5148391	ND	5148391	0.064	0.050	5148391
Acid Extractable Uranium (U)	ug/g	0.17	5148391	0.42	5148391	0.61	0.050	5148391
Acid Extractable Vanadium (V)	ug/g	5.5	5148391	32	5148391	11	5.0	5148391
Acid Extractable Zinc (Zn)	ug/g	35	5148391	27	5148391	37	5.0	5148391
Acid Extractable Mercury (Hg)	ug/g	0.13	5148391	ND	5148391	0.11	0.050	5148391

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

O.REG 153 PAHS (SOIL)

Maxxam ID		FAO977		FAO978		FAO979		FAO980		
Sampling Date		2017/08/29 09:30		2017/08/29 09:45		2017/08/29 10:40		2017/08/29 11:10		
COC Number		625118-01-01		625118-01-01		625118-01-01		625118-01-01		
	UNITS	**A0197**	**RDL**	**A0198**	**RDL**	**A0200**	**RDL**	**A0202**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	ND	0.014	ND	0.0071	ND	0.014	0.028	0.028	5142859
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.010	0.0078	0.0050	ND	0.010	ND	0.020	5147221
Acenaphthylene	ug/g	ND	0.010	ND	0.0050	ND	0.010	ND	0.020	5147221
Anthracene	ug/g	0.011	0.010	0.0062	0.0050	ND	0.010	0.024	0.020	5147221
Benzo(a)anthracene	ug/g	0.050	0.010	ND	0.0050	ND	0.010	0.073	0.020	5147221
Benzo(a)pyrene	ug/g	0.043	0.010	ND	0.0050	ND	0.010	0.065	0.020	5147221
Benzo(b/j)fluoranthene	ug/g	0.062	0.010	0.0090	0.0050	0.019	0.010	0.11	0.020	5147221
Benzo(g,h,i)perylene	ug/g	0.034	0.010	ND	0.0050	0.012	0.010	0.057	0.020	5147221
Benzo(k)fluoranthene	ug/g	0.024	0.010	ND	0.0050	ND	0.010	0.039	0.020	5147221
Chrysene	ug/g	0.043	0.010	0.0062	0.0050	0.012	0.010	0.071	0.020	5147221
Dibenz(a,h)anthracene	ug/g	ND	0.010	ND	0.0050	ND	0.010	ND	0.020	5147221
Fluoranthene	ug/g	0.095	0.010	0.025	0.0050	0.031	0.010	0.15	0.020	5147221
Fluorene	ug/g	ND	0.010	0.010	0.0050	ND	0.010	ND	0.020	5147221
Indeno(1,2,3-cd)pyrene	ug/g	0.037	0.010	ND	0.0050	0.011	0.010	0.055	0.020	5147221
1-Methylnaphthalene	ug/g	ND	0.010	ND	0.0050	ND	0.010	ND	0.020	5147221
2-Methylnaphthalene	ug/g	ND	0.010	ND	0.0050	ND	0.010	0.028	0.020	5147221
Naphthalene	ug/g	ND	0.010	ND	0.0050	ND	0.010	ND	0.020	5147221
Phenanthrene	ug/g	0.042	0.010	0.0088	0.0050	0.010	0.010	0.053	0.020	5147221
Pyrene	ug/g	0.077	0.010	0.021	0.0050	0.026	0.010	0.12	0.020	5147221
Surrogate Recovery (%)										
D10-Anthracene	%	95		97		96		100		5147221
D14-Terphenyl (FS)	%	86		88		87		84		5147221
D8-Acenaphthylene	%	107		106		108		107		5147221

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

O.REG 153 PAHS (SOIL)

Maxxam ID		FAO981	FAO982		FAO983		
Sampling Date		2017/08/29 12:00	2017/08/29 12:20		2017/08/29 09:32		
COC Number		625118-01-01	625118-01-01		625118-01-01		
	UNITS	A0204	A0206	RDL	A0213	RDL	QC Batch
Calculated Parameters							
Methylnaphthalene, 2-(1-)	ug/g	ND	ND	0.0071	ND	0.014	5142859
Polyaromatic Hydrocarbons							
Acenaphthene	ug/g	0.0098	ND	0.0050	ND	0.010	5147221
Acenaphthylene	ug/g	0.0086	ND	0.0050	ND	0.010	5147221
Anthracene	ug/g	0.021	ND	0.0050	ND	0.010	5147221
Benzo(a)anthracene	ug/g	0.073	0.015	0.0050	0.036	0.010	5147221
Benzo(a)pyrene	ug/g	0.063	0.012	0.0050	0.030	0.010	5147221
Benzo(b/j)fluoranthene	ug/g	0.097	0.032	0.0050	0.040	0.010	5147221
Benzo(g,h,i)perylene	ug/g	0.042	0.0095	0.0050	0.019	0.010	5147221
Benzo(k)fluoranthene	ug/g	0.035	0.0078	0.0050	0.016	0.010	5147221
Chrysene	ug/g	0.070	0.026	0.0050	0.029	0.010	5147221
Dibenz(a,h)anthracene	ug/g	0.011	ND	0.0050	ND	0.010	5147221
Fluoranthene	ug/g	0.14	0.056	0.0050	0.065	0.010	5147221
Fluorene	ug/g	0.0094	ND	0.0050	ND	0.010	5147221
Indeno(1,2,3-cd)pyrene	ug/g	0.046	0.0093	0.0050	0.020	0.010	5147221
1-Methylnaphthalene	ug/g	ND	ND	0.0050	ND	0.010	5147221
2-Methylnaphthalene	ug/g	ND	0.0052	0.0050	ND	0.010	5147221
Naphthalene	ug/g	ND	ND	0.0050	ND	0.010	5147221
Phenanthrene	ug/g	0.083	0.019	0.0050	0.027	0.010	5147221
Pyrene	ug/g	0.11	0.042	0.0050	0.052	0.010	5147221
Surrogate Recovery (%)							
D10-Anthracene	%	93	94		92		5147221
D14-Terphenyl (FS)	%	85	86		85		5147221
D8-Acenaphthylene	%	109	98		106		5147221

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

O.REG 153 PCBS (SOIL)

Maxxam ID		FAO977		FAO978		FAO979		FAO980		
Sampling Date		2017/08/29 09:30		2017/08/29 09:45		2017/08/29 10:40		2017/08/29 11:10		
COC Number		625118-01-01		625118-01-01		625118-01-01		625118-01-01		
	UNITS	**A0197**	**RDL**	**A0198**	**RDL**	**A0200**	**RDL**	**A0202**	**RDL**	**QC Batch**
PCBs										
Aroclor 1242	ug/g	ND	0.020	ND	0.010	ND	0.030	ND	0.050	5146552
Aroclor 1248	ug/g	ND	0.020	ND	0.010	ND	0.030	ND	0.050	5146552
Aroclor 1254	ug/g	ND	0.020	ND	0.010	ND	0.030	ND	0.050	5146552
Aroclor 1260	ug/g	ND	0.020	ND	0.010	ND	0.030	ND	0.050	5146552
Total PCB	ug/g	ND	0.020	ND	0.010	ND	0.030	ND	0.050	5146552
Surrogate Recovery (%)										
Decachlorobiphenyl	%	111		96		97		87		5146552

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam ID		FAO981	FAO982		FAO983		
Sampling Date		2017/08/29 12:00	2017/08/29 12:20		2017/08/29 09:32		
COC Number		625118-01-01	625118-01-01		625118-01-01		
	UNITS	**A0204**	**A0206**	**RDL**	**A0213**	**RDL**	**QC Batch**
PCBs							
Aroclor 1242	ug/g	ND	ND	0.010	ND	0.030	5146552
Aroclor 1248	ug/g	ND	ND	0.010	ND	0.030	5146552
Aroclor 1254	ug/g	ND	ND	0.010	ND	0.030	5146552
Aroclor 1260	ug/g	ND	ND	0.010	ND	0.030	5146552
Total PCB	ug/g	ND	ND	0.010	ND	0.030	5146552
Surrogate Recovery (%)							
Decachlorobiphenyl	%	102	101		131 (1)		5146552

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected
(1) Surrogate recovery was above the upper control limit. This may represent a high bias in some results. For results that are ND, this potential bias has no impact.

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

Maxxam ID		FAO977		FAO978		FAO979		FAO980		
Sampling Date		2017/08/29 09:30		2017/08/29 09:45		2017/08/29 10:40		2017/08/29 11:10		
COC Number		625118-01-01		625118-01-01		625118-01-01		625118-01-01		
	UNITS	**A0197**	**RDL**	**A0198**	**RDL**	**A0200**	**RDL**	**A0202**	**RDL**	**QC Batch**
Inorganics										
Moisture	%	47	1.0	21	1.0	59	1.0	80	1.0	5146858
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5142296
Volatile Organics										
Acetone (2-Propanone)	ug/g	ND	0.50	ND	0.50	ND	1.0	1.5	1.5	5144807
Benzene	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
Bromodichloromethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Bromoform	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Bromomethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Carbon Tetrachloride	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Chlorobenzene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Chloroform	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Dibromochloromethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,2-Dichlorobenzene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,3-Dichlorobenzene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,4-Dichlorobenzene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Dichlorodifluoromethane (FREON 12)	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,1-Dichloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,2-Dichloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,1-Dichloroethylene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
cis-1,2-Dichloroethylene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
trans-1,2-Dichloroethylene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,2-Dichloropropane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
cis-1,3-Dichloropropene	ug/g	ND	0.030	ND	0.030	ND	0.060	ND	0.090	5144807
trans-1,3-Dichloropropene	ug/g	ND	0.040	ND	0.040	ND	0.080	ND	0.12	5144807
Ethylbenzene	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
Ethylene Dibromide	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Hexane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Methylene Chloride(Dichloromethane)	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	0.50	ND	0.50	ND	1.0	ND	1.5	5144807
Methyl Isobutyl Ketone	ug/g	ND	0.50	ND	0.50	ND	1.0	ND	1.5	5144807
Methyl t-butyl ether (MTBE)	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Styrene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,1,1,2-Tetrachloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

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

Maxxam ID		FAO977		FAO978		FAO979		FAO980		
Sampling Date		2017/08/29 09:30		2017/08/29 09:45		2017/08/29 10:40		2017/08/29 11:10		
COC Number		625118-01-01		625118-01-01		625118-01-01		625118-01-01		
	UNITS	A0197	RDL	A0198	RDL	A0200	RDL	A0202	RDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Tetrachloroethylene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Toluene	ug/g	ND	0.020	ND	0.020	ND	0.040	0.079	0.060	5144807
1,1,1-Trichloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
1,1,2-Trichloroethane	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Trichloroethylene	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Trichlorofluoromethane (FREON 11)	ug/g	ND	0.050	ND	0.050	ND	0.10	ND	0.15	5144807
Vinyl Chloride	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
p+m-Xylene	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
o-Xylene	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
Total Xylenes	ug/g	ND	0.020	ND	0.020	ND	0.040	ND	0.060	5144807
F1 (C6-C10)	ug/g	ND	10	ND	10	ND	20	ND	30	5144807
F1 (C6-C10) - BTEX	ug/g	ND	10	ND	10	ND	20	ND	30	5144807
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/g	ND	20	ND	10	ND	20	ND	50	5147212
F3 (C16-C34 Hydrocarbons)	ug/g	110	100	ND	50	ND	100	270	250	5147212
F4 (C34-C50 Hydrocarbons)	ug/g	ND	100	ND	50	ND	100	ND	250	5147212
Reached Baseline at C50	ug/g	Yes		Yes		Yes		Yes		5147212
Surrogate Recovery (%)										
o-Terphenyl	%	96		97		97		95		5147212
4-Bromofluorobenzene	%	94		94		94		95		5144807
D10-o-Xylene	%	80		80		75		75		5144807
D4-1,2-Dichloroethane	%	107		108		107		106		5144807
D8-Toluene	%	96		94		96		95		5144807

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Client Project #: 10888

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

Maxxam ID		FAO981	FAO982	FAO982		FAO983		
Sampling Date		2017/08/29 12:00	2017/08/29 12:20	2017/08/29 12:20		2017/08/29 09:32		
COC Number		625118-01-01	625118-01-01	625118-01-01		625118-01-01		
	UNITS	**A0204**	**A0206**	**A0206 Lab-Dup**	**RDL**	**A0213**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	27	21	20	1.0	56	1.0	5146858
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/g	ND	ND		0.050	ND	0.050	5142296
Volatile Organics								
Acetone (2-Propanone)	ug/g	ND	ND		0.50	ND	0.50	5144807
Benzene	ug/g	ND	ND		0.020	ND	0.020	5144807
Bromodichloromethane	ug/g	ND	ND		0.050	ND	0.050	5144807
Bromoform	ug/g	ND	ND		0.050	ND	0.050	5144807
Bromomethane	ug/g	ND	ND		0.050	ND	0.050	5144807
Carbon Tetrachloride	ug/g	ND	ND		0.050	ND	0.050	5144807
Chlorobenzene	ug/g	ND	ND		0.050	ND	0.050	5144807
Chloroform	ug/g	ND	ND		0.050	ND	0.050	5144807
Dibromochloromethane	ug/g	ND	ND		0.050	ND	0.050	5144807
1,2-Dichlorobenzene	ug/g	ND	ND		0.050	ND	0.050	5144807
1,3-Dichlorobenzene	ug/g	ND	ND		0.050	ND	0.050	5144807
1,4-Dichlorobenzene	ug/g	ND	ND		0.050	ND	0.050	5144807
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND		0.050	ND	0.050	5144807
1,1-Dichloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
1,2-Dichloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
1,1-Dichloroethylene	ug/g	ND	ND		0.050	ND	0.050	5144807
cis-1,2-Dichloroethylene	ug/g	ND	ND		0.050	ND	0.050	5144807
trans-1,2-Dichloroethylene	ug/g	ND	ND		0.050	ND	0.050	5144807
1,2-Dichloropropane	ug/g	ND	ND		0.050	ND	0.050	5144807
cis-1,3-Dichloropropene	ug/g	ND	ND		0.030	ND	0.030	5144807
trans-1,3-Dichloropropene	ug/g	ND	ND		0.040	ND	0.040	5144807
Ethylbenzene	ug/g	ND	ND		0.020	ND	0.020	5144807
Ethylene Dibromide	ug/g	ND	ND		0.050	ND	0.050	5144807
Hexane	ug/g	ND	ND		0.050	ND	0.050	5144807
Methylene Chloride(Dichloromethane)	ug/g	ND	ND		0.050	ND	0.050	5144807
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND		0.50	ND	0.50	5144807
Methyl Isobutyl Ketone	ug/g	ND	ND		0.50	ND	0.50	5144807
Methyl t-butyl ether (MTBE)	ug/g	ND	ND		0.050	ND	0.050	5144807
Styrene	ug/g	ND	ND		0.050	ND	0.050	5144807

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

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

Maxxam ID		FAO981	FAO982	FAO982		FAO983		
Sampling Date		2017/08/29 12:00	2017/08/29 12:20	2017/08/29 12:20		2017/08/29 09:32		
COC Number		625118-01-01	625118-01-01	625118-01-01		625118-01-01		
	UNITS	**A0204**	**A0206**	**A0206 Lab-Dup**	**RDL**	**A0213**	**RDL**	**QC Batch**
1,1,1,2-Tetrachloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
1,1,2,2-Tetrachloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
Tetrachloroethylene	ug/g	ND	ND		0.050	ND	0.050	5144807
Toluene	ug/g	ND	ND		0.020	0.13	0.020	5144807
1,1,1-Trichloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
1,1,2-Trichloroethane	ug/g	ND	ND		0.050	ND	0.050	5144807
Trichloroethylene	ug/g	ND	ND		0.050	ND	0.050	5144807
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND		0.050	ND	0.050	5144807
Vinyl Chloride	ug/g	ND	ND		0.020	ND	0.020	5144807
p+m-Xylene	ug/g	ND	ND		0.020	ND	0.020	5144807
o-Xylene	ug/g	ND	ND		0.020	ND	0.020	5144807
Total Xylenes	ug/g	ND	ND		0.020	ND	0.020	5144807
F1 (C6-C10)	ug/g	ND	ND		10	ND	10	5144807
F1 (C6-C10) - BTEX	ug/g	ND	ND		10	ND	10	5144807
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	ND	ND		10	ND	20	5147212
F3 (C16-C34 Hydrocarbons)	ug/g	ND	ND		50	ND	100	5147212
F4 (C34-C50 Hydrocarbons)	ug/g	ND	ND		50	ND	100	5147212
Reached Baseline at C50	ug/g	Yes	Yes			Yes		5147212
Surrogate Recovery (%)								
o-Terphenyl	%	98	97			96		5147212
4-Bromofluorobenzene	%	95	94			95		5144807
D10-o-Xylene	%	79	91			85		5144807
D4-1,2-Dichloroethane	%	105	107			107		5144807
D8-Toluene	%	97	96			96		5144807

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Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAO977
Sample ID: A0197
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146405	2017/09/01	2017/09/05	Manoj Kumar Gera
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO978
Sample ID: A0198
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146206	2017/09/01	2017/09/01	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO979
Sample ID: A0200
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAO979
Sample ID: A0200
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146206	2017/09/01	2017/09/01	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO980
Sample ID: A0202
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5149073	2017/09/05	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149357	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146206	2017/09/01	2017/09/01	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149341	2017/09/05	2017/09/05	Azita Fazaeli
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO981
Sample ID: A0204
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146206	2017/09/01	2017/09/01	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAO981
Sample ID: A0204
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO982
Sample ID: A0206
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	5146405	2017/09/01	2017/09/05	Manoj Kumar Gera
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

Maxxam ID: FAO982 Dup
Sample ID: A0206
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani

Maxxam ID: FAO983
Sample ID: A0213
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	5142859	N/A	2017/09/06	Automated Statchk
Hot Water Extractable Boron	ICP	5148365	2017/09/02	2017/09/05	Jolly John
1,3-Dichloropropene Sum	CALC	5142296	N/A	2017/09/05	Automated Statchk
Free (WAD) Cyanide	TECH	5146766	2017/09/01	2017/09/05	Louise Harding
Conductivity	AT	5149238	2017/09/05	2017/09/05	Neil Dassanayake

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

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Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAO983
Sample ID: A0213
Matrix: Soil

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	5146206	2017/09/01	2017/09/01	Sally Coughlin
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5147212	2017/09/01	2017/09/02	Zhiyue (Frank) Zhu
Strong Acid Leachable Metals by ICPMS	ICP/MS	5148391	2017/09/02	2017/09/06	Daniel Teclu
Moisture	BAL	5146858	N/A	2017/09/01	Valentina Kaftani
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	5147221	2017/09/01	2017/09/02	Mitesh Raj
Polychlorinated Biphenyl in Soil	GC/ECD	5146552	2017/09/01	2017/09/01	Dawn Alarie
pH CaCl2 EXTRACT	AT	5146357	2017/09/01	2017/09/01	Tahir Anwar
Sodium Adsorption Ratio (SAR)	CALC/MET	5142827	N/A	2017/09/05	Automated Statchk
SAR - ICP Metals	ICP	5149224	2017/09/05	2017/09/05	Jolly John
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5144807	N/A	2017/09/01	Karen Hughes

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

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Client Project #: 10888

GENERAL COMMENTS

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

Package 1	15.0°C

Sample FAO977 [A0197] : F24FID Analysis: Detection limits were adjusted for high moisture content.

PCB Analysis: Detection limits were adjusted for high moisture content.

PAH analysis: Detection limits were adjusted for high moisture content.

Sample FAO978 [A0198] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FAO979 [A0200] : F24FID Analysis: Detection limits were adjusted for high moisture content.

PCB Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content of soil provided.

PAH analysis: Detection limits were adjusted for high moisture content.

Sample FAO980 [A0202] : F24FID Analysis: Detection limits were adjusted for high moisture content.

SAR-ICP/CONDUCT-SB: Sample entirely absorbed the extraction fluid when 1:2 ratios were used. Due to the organic and highly absorbent nature of the sample, the sample/fluid ratio was changed to 1:4.Please view results with discretion.

PCB Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content of soil provided.

PAH analysis: Detection limits were adjusted for high moisture content.

Sample FAO981 [A0204] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FAO982 [A0206] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample FAO983 [A0213] : F24FID Analysis: Detection limits were adjusted for high moisture content.

PCB Analysis: Detection limits were adjusted for high moisture content.
PAH analysis: Detection limits were adjusted for high moisture content.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5144807	KH2	Matrix Spike	4-Bromofluorobenzene	2017/09/01		99	%	60 - 140
			D10-o-Xylene	2017/09/01		81	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/01		104	%	60 - 140
			D8-Toluene	2017/09/01		101	%	60 - 140
			Acetone (2-Propanone)	2017/09/01		105	%	60 - 140
			Benzene	2017/09/01		103	%	60 - 140
			Bromodichloromethane	2017/09/01		99	%	60 - 140
			Bromoform	2017/09/01		106	%	60 - 140
			Bromomethane	2017/09/01		101	%	60 - 140
			Carbon Tetrachloride	2017/09/01		98	%	60 - 140
			Chlorobenzene	2017/09/01		97	%	60 - 140
			Chloroform	2017/09/01		99	%	60 - 140
			Dibromochloromethane	2017/09/01		103	%	60 - 140
			1,2-Dichlorobenzene	2017/09/01		94	%	60 - 140
			1,3-Dichlorobenzene	2017/09/01		96	%	60 - 140
			1,4-Dichlorobenzene	2017/09/01		94	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2017/09/01		107	%	60 - 140
			1,1-Dichloroethane	2017/09/01		105	%	60 - 140
			1,2-Dichloroethane	2017/09/01		99	%	60 - 140
			1,1-Dichloroethylene	2017/09/01		111	%	60 - 140
			cis-1,2-Dichloroethylene	2017/09/01		99	%	60 - 140
			trans-1,2-Dichloroethylene	2017/09/01		103	%	60 - 140
			1,2-Dichloropropane	2017/09/01		97	%	60 - 140
			cis-1,3-Dichloropropene	2017/09/01		91	%	60 - 140
			trans-1,3-Dichloropropene	2017/09/01		95	%	60 - 140
			Ethylbenzene	2017/09/01		94	%	60 - 140
			Ethylene Dibromide	2017/09/01		104	%	60 - 140
			Hexane	2017/09/01		102	%	60 - 140
			Methylene Chloride(Dichloromethane)	2017/09/01		102	%	60 - 140
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01		109	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/01		103	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/01		95	%	60 - 140
			Styrene	2017/09/01		93	%	60 - 140
			1,1,1,2-Tetrachloroethane	2017/09/01		104	%	60 - 140
			1,1,2,2-Tetrachloroethane	2017/09/01		106	%	60 - 140
			Tetrachloroethylene	2017/09/01		93	%	60 - 140
			Toluene	2017/09/01		95	%	60 - 140
			1,1,1-Trichloroethane	2017/09/01		96	%	60 - 140
			1,1,2-Trichloroethane	2017/09/01		99	%	60 - 140
			Trichloroethylene	2017/09/01		97	%	60 - 140
			Trichlorofluoromethane (FREON 11)	2017/09/01		103	%	60 - 140
			Vinyl Chloride	2017/09/01		111	%	60 - 140
			p+m-Xylene	2017/09/01		96	%	60 - 140
			o-Xylene	2017/09/01		93	%	60 - 140
			F1 (C6-C10)	2017/09/01		89	%	60 - 140
5144807	KH2	Spiked Blank	4-Bromofluorobenzene	2017/09/01		99	%	60 - 140
			D10-o-Xylene	2017/09/01		99	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/01		106	%	60 - 140
			D8-Toluene	2017/09/01		100	%	60 - 140
			Acetone (2-Propanone)	2017/09/01		110	%	60 - 140
			Benzene	2017/09/01		104	%	60 - 130
			Bromodichloromethane	2017/09/01		101	%	60 - 130
			Bromoform	2017/09/01		109	%	60 - 130
			Bromomethane	2017/09/01		102	%	60 - 140
			Carbon Tetrachloride	2017/09/01		97	%	60 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chlorobenzene	2017/09/01		97	%	60 - 130
			Chloroform	2017/09/01		100	%	60 - 130
			Dibromochloromethane	2017/09/01		105	%	60 - 130
			1,2-Dichlorobenzene	2017/09/01		93	%	60 - 130
			1,3-Dichlorobenzene	2017/09/01		94	%	60 - 130
			1,4-Dichlorobenzene	2017/09/01		94	%	60 - 130
			Dichlorodifluoromethane (FREON 12)	2017/09/01		107	%	60 - 140
			1,1-Dichloroethane	2017/09/01		106	%	60 - 130
			1,2-Dichloroethane	2017/09/01		102	%	60 - 130
			1,1-Dichloroethylene	2017/09/01		110	%	60 - 130
			cis-1,2-Dichloroethylene	2017/09/01		100	%	60 - 130
			trans-1,2-Dichloroethylene	2017/09/01		103	%	60 - 130
			1,2-Dichloropropane	2017/09/01		99	%	60 - 130
			cis-1,3-Dichloropropene	2017/09/01		95	%	60 - 130
			trans-1,3-Dichloropropene	2017/09/01		97	%	60 - 130
			Ethylbenzene	2017/09/01		92	%	60 - 130
			Ethylene Dibromide	2017/09/01		107	%	60 - 130
			Hexane	2017/09/01		101	%	60 - 130
			Methylene Chloride(Dichloromethane)	2017/09/01		105	%	60 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01		116	%	60 - 140
			Methyl Isobutyl Ketone	2017/09/01		110	%	60 - 130
			Methyl t-butyl ether (MTBE)	2017/09/01		98	%	60 - 130
			Styrene	2017/09/01		93	%	60 - 130
			1,1,1,2-Tetrachloroethane	2017/09/01		104	%	60 - 130
			1,1,2,2-Tetrachloroethane	2017/09/01		108	%	60 - 130
			Tetrachloroethylene	2017/09/01		91	%	60 - 130
			Toluene	2017/09/01		94	%	60 - 130
			1,1,1-Trichloroethane	2017/09/01		96	%	60 - 130
			1,1,2-Trichloroethane	2017/09/01		100	%	60 - 130
			Trichloroethylene	2017/09/01		97	%	60 - 130
			Trichlorofluoromethane (FREON 11)	2017/09/01		102	%	60 - 130
			Vinyl Chloride	2017/09/01		104	%	60 - 130
			p+m-Xylene	2017/09/01		95	%	60 - 130
			o-Xylene	2017/09/01		92	%	60 - 130
			F1 (C6-C10)	2017/09/01		97	%	80 - 120
5144807	KH2	Method Blank	4-Bromofluorobenzene	2017/09/01		95	%	60 - 140
			D10-o-Xylene	2017/09/01		93	%	60 - 130
			D4-1,2-Dichloroethane	2017/09/01		101	%	60 - 140
			D8-Toluene	2017/09/01		98	%	60 - 140
			Acetone (2-Propanone)	2017/09/01	ND, RDL=0.50		ug/g	
			Benzene	2017/09/01	ND, RDL=0.020		ug/g	
			Bromodichloromethane	2017/09/01	ND, RDL=0.050		ug/g	
			Bromoform	2017/09/01	ND, RDL=0.050		ug/g	
			Bromomethane	2017/09/01	ND, RDL=0.050		ug/g	
			Carbon Tetrachloride	2017/09/01	ND, RDL=0.050		ug/g	
			Chlorobenzene	2017/09/01	ND, RDL=0.050		ug/g	
			Chloroform	2017/09/01	ND, RDL=0.050		ug/g	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dibromochloromethane	2017/09/01	ND, RDL=0.050		ug/g	
			1,2-Dichlorobenzene	2017/09/01	ND, RDL=0.050		ug/g	
			1,3-Dichlorobenzene	2017/09/01	ND, RDL=0.050		ug/g	
			1,4-Dichlorobenzene	2017/09/01	ND, RDL=0.050		ug/g	
			Dichlorodifluoromethane (FREON 12)	2017/09/01	ND, RDL=0.050		ug/g	
			1,1-Dichloroethane	2017/09/01	ND, RDL=0.050		ug/g	
			1,2-Dichloroethane	2017/09/01	ND, RDL=0.050		ug/g	
			1,1-Dichloroethylene	2017/09/01	ND, RDL=0.050		ug/g	
			cis-1,2-Dichloroethylene	2017/09/01	ND, RDL=0.050		ug/g	
			trans-1,2-Dichloroethylene	2017/09/01	ND, RDL=0.050		ug/g	
			1,2-Dichloropropane	2017/09/01	ND, RDL=0.050		ug/g	
			cis-1,3-Dichloropropene	2017/09/01	ND, RDL=0.030		ug/g	
			trans-1,3-Dichloropropene	2017/09/01	ND, RDL=0.040		ug/g	
			Ethylbenzene	2017/09/01	ND, RDL=0.020		ug/g	
			Ethylene Dibromide	2017/09/01	ND, RDL=0.050		ug/g	
			Hexane	2017/09/01	ND, RDL=0.050		ug/g	
			Methylene Chloride(Dichloromethane)	2017/09/01	ND, RDL=0.050		ug/g	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01	ND, RDL=0.50		ug/g	
			Methyl Isobutyl Ketone	2017/09/01	ND, RDL=0.50		ug/g	
			Methyl t-butyl ether (MTBE)	2017/09/01	ND, RDL=0.050		ug/g	
			Styrene	2017/09/01	ND, RDL=0.050		ug/g	
			1,1,1,2-Tetrachloroethane	2017/09/01	ND, RDL=0.050		ug/g	
			1,1,2,2-Tetrachloroethane	2017/09/01	ND, RDL=0.050		ug/g	
			Tetrachloroethylene	2017/09/01	ND, RDL=0.050		ug/g	
			Toluene	2017/09/01	ND, RDL=0.020		ug/g	
			1,1,1-Trichloroethane	2017/09/01	ND, RDL=0.050		ug/g	
			1,1,2-Trichloroethane	2017/09/01	ND, RDL=0.050		ug/g	

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			Trichloroethylene	2017/09/01	ND, RDL=0.050		ug/g	
			Trichlorofluoromethane (FREON 11)	2017/09/01	ND, RDL=0.050		ug/g	
			Vinyl Chloride	2017/09/01	ND, RDL=0.020		ug/g	
			p+m-Xylene	2017/09/01	ND, RDL=0.020		ug/g	
			o-Xylene	2017/09/01	ND, RDL=0.020		ug/g	
			Total Xylenes	2017/09/01	ND, RDL=0.020		ug/g	
			F1 (C6-C10)	2017/09/01	ND, RDL=10		ug/g	
			F1 (C6-C10) - BTEX	2017/09/01	ND, RDL=10		ug/g	
5144807	KH2	RPD	Acetone (2-Propanone)	2017/09/01	NC		%	50
			Benzene	2017/09/01	NC		%	50
			Bromodichloromethane	2017/09/01	NC		%	50
			Bromoform	2017/09/01	NC		%	50
			Bromomethane	2017/09/01	NC		%	50
			Carbon Tetrachloride	2017/09/01	NC		%	50
			Chlorobenzene	2017/09/01	NC		%	50
			Chloroform	2017/09/01	NC		%	50
			Dibromochloromethane	2017/09/01	NC		%	50
			1,2-Dichlorobenzene	2017/09/01	NC		%	50
			1,3-Dichlorobenzene	2017/09/01	NC		%	50
			1,4-Dichlorobenzene	2017/09/01	NC		%	50
			Dichlorodifluoromethane (FREON 12)	2017/09/01	NC		%	50
			1,1-Dichloroethane	2017/09/01	NC		%	50
			1,2-Dichloroethane	2017/09/01	NC		%	50
			1,1-Dichloroethylene	2017/09/01	NC		%	50
			cis-1,2-Dichloroethylene	2017/09/01	NC		%	50
			trans-1,2-Dichloroethylene	2017/09/01	NC		%	50
			1,2-Dichloropropane	2017/09/01	NC		%	50
			cis-1,3-Dichloropropene	2017/09/01	NC		%	50
			trans-1,3-Dichloropropene	2017/09/01	NC		%	50
			Ethylbenzene	2017/09/01	NC		%	50
			Ethylene Dibromide	2017/09/01	NC		%	50
			Hexane	2017/09/01	NC		%	50
			Methylene Chloride(Dichloromethane)	2017/09/01	NC		%	50
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01	NC		%	50
			Methyl Isobutyl Ketone	2017/09/01	NC		%	50
			Methyl t-butyl ether (MTBE)	2017/09/01	NC		%	50
			Styrene	2017/09/01	NC		%	50
			1,1,1,2-Tetrachloroethane	2017/09/01	NC		%	50
			1,1,2,2-Tetrachloroethane	2017/09/01	NC		%	50
			Tetrachloroethylene	2017/09/01	NC		%	50
			Toluene	2017/09/01	NC		%	50
			1,1,1-Trichloroethane	2017/09/01	NC		%	50
			1,1,2-Trichloroethane	2017/09/01	NC		%	50
			Trichloroethylene	2017/09/01	NC		%	50
			Trichlorofluoromethane (FREON 11)	2017/09/01	NC		%	50
			Vinyl Chloride	2017/09/01	NC		%	50
			p+m-Xylene	2017/09/01	NC		%	50

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			o-Xylene	2017/09/01	NC		%	50
			Total Xylenes	2017/09/01	NC		%	50
			F1 (C6-C10)	2017/09/01	NC		%	30
			F1 (C6-C10) - BTEX	2017/09/01	NC		%	30
5146206	SAC	Matrix Spike	Chromium (VI)	2017/09/01		2.2 (1)	%	75 - 125
5146206	SAC	Spiked Blank	Chromium (VI)	2017/09/01		88	%	80 - 120
5146206	SAC	Method Blank	Chromium (VI)	2017/09/01	ND, RDL=0.2		ug/g	
5146206	SAC	RPD	Chromium (VI)	2017/09/01	NC		%	35
5146357	TA1	Spiked Blank	Available (CaCl2) pH	2017/09/01		99	%	97 - 103
5146357	TA1	RPD	Available (CaCl2) pH	2017/09/01	0.41		%	N/A
5146405	MGE	Matrix Spike	Chromium (VI)	2017/09/05		81	%	75 - 125
5146405	MGE	Spiked Blank	Chromium (VI)	2017/09/05		86	%	80 - 120
5146405	MGE	Method Blank	Chromium (VI)	2017/09/05	ND, RDL=0.2		ug/g	
5146405	MGE	RPD	Chromium (VI)	2017/09/05	22		%	35
5146552	DH	Matrix Spike	Decachlorobiphenyl	2017/09/05		80	%	60 - 130
			Aroclor 1260	2017/09/05		98	%	60 - 130
			Total PCB	2017/09/05		98	%	60 - 130
5146552	DH	Spiked Blank	Decachlorobiphenyl	2017/09/01		97	%	60 - 130
			Aroclor 1260	2017/09/01		101	%	60 - 130
			Total PCB	2017/09/01		101	%	60 - 130
5146552	DH	Method Blank	Decachlorobiphenyl	2017/09/01		102	%	60 - 130
			Aroclor 1242	2017/09/01	ND, RDL=0.010		ug/g	
			Aroclor 1248	2017/09/01	ND, RDL=0.010		ug/g	
			Aroclor 1254	2017/09/01	ND, RDL=0.010		ug/g	
			Aroclor 1260	2017/09/01	ND, RDL=0.010		ug/g	
			Total PCB	2017/09/01	ND, RDL=0.010		ug/g	
5146552	DH	RPD	Aroclor 1242	2017/09/05	NC		%	50
			Aroclor 1248	2017/09/05	NC		%	50
			Aroclor 1254	2017/09/05	28		%	50
			Aroclor 1260	2017/09/05	25		%	50
			Total PCB	2017/09/05	26		%	50
5146766	LHA	Matrix Spike	WAD Cyanide (Free)	2017/09/05		97	%	75 - 125
5146766	LHA	Spiked Blank	WAD Cyanide (Free)	2017/09/05		99	%	80 - 120
5146766	LHA	Method Blank	WAD Cyanide (Free)	2017/09/05	ND, RDL=0.01		ug/g	
5146766	LHA	RPD	WAD Cyanide (Free)	2017/09/05	NC		%	35
5146858	GKR	RPD [FAO982-03]	Moisture	2017/09/01	2.5		%	20
5147212	ZZ	Matrix Spike	o-Terphenyl	2017/09/02		94	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/02		96	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2017/09/02		95	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2017/09/02		93	%	50 - 130
5147212	ZZ	Spiked Blank	o-Terphenyl	2017/09/02		95	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/02		97	%	80 - 120
			F3 (C16-C34 Hydrocarbons)	2017/09/02		98	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2017/09/02		94	%	80 - 120
5147212	ZZ	Method Blank	o-Terphenyl	2017/09/01		97	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2017/09/01	ND, RDL=10		ug/g	

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			F3 (C16-C34 Hydrocarbons)	2017/09/01	ND, RDL=50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2017/09/01	ND, RDL=50		ug/g	
5147212	ZZ	RPD	F2 (C10-C16 Hydrocarbons)	2017/09/02	2.5		%	30
			F3 (C16-C34 Hydrocarbons)	2017/09/02	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2017/09/02	NC		%	30
5147221	RAJ	Matrix Spike	D10-Anthracene	2017/09/02		93	%	50 - 130
			D14-Terphenyl (FS)	2017/09/02		86	%	50 - 130
			D8-Acenaphthylene	2017/09/02		107	%	50 - 130
			Acenaphthene	2017/09/02		79	%	50 - 130
			Acenaphthylene	2017/09/02		94	%	50 - 130
			Anthracene	2017/09/02		84	%	50 - 130
			Benzo(a)anthracene	2017/09/02		86	%	50 - 130
			Benzo(a)pyrene	2017/09/02		75	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/02		75	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/02		75	%	50 - 130
			Benzo(k)fluoranthene	2017/09/02		77	%	50 - 130
			Chrysene	2017/09/02		83	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/02		80	%	50 - 130
			Fluoranthene	2017/09/02		85	%	50 - 130
			Fluorene	2017/09/02		86	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/02		76	%	50 - 130
			1-Methylnaphthalene	2017/09/02		85	%	50 - 130
			2-Methylnaphthalene	2017/09/02		77	%	50 - 130
			Naphthalene	2017/09/02		71	%	50 - 130
			Phenanthrene	2017/09/02		82	%	50 - 130
			Pyrene	2017/09/02		84	%	50 - 130
5147221	RAJ	Spiked Blank	D10-Anthracene	2017/09/02		91	%	50 - 130
			D14-Terphenyl (FS)	2017/09/02		84	%	50 - 130
			D8-Acenaphthylene	2017/09/02		102	%	50 - 130
			Acenaphthene	2017/09/02		79	%	50 - 130
			Acenaphthylene	2017/09/02		92	%	50 - 130
			Anthracene	2017/09/02		80	%	50 - 130
			Benzo(a)anthracene	2017/09/02		83	%	50 - 130
			Benzo(a)pyrene	2017/09/02		76	%	50 - 130
			Benzo(b/j)fluoranthene	2017/09/02		72	%	50 - 130
			Benzo(g,h,i)perylene	2017/09/02		79	%	50 - 130
			Benzo(k)fluoranthene	2017/09/02		90	%	50 - 130
			Chrysene	2017/09/02		79	%	50 - 130
			Dibenz(a,h)anthracene	2017/09/02		81	%	50 - 130
			Fluoranthene	2017/09/02		83	%	50 - 130
			Fluorene	2017/09/02		84	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2017/09/02		78	%	50 - 130
			1-Methylnaphthalene	2017/09/02		87	%	50 - 130
			2-Methylnaphthalene	2017/09/02		78	%	50 - 130
			Naphthalene	2017/09/02		74	%	50 - 130
			Phenanthrene	2017/09/02		81	%	50 - 130
			Pyrene	2017/09/02		82	%	50 - 130
5147221	RAJ	Method Blank	D10-Anthracene	2017/09/02		90	%	50 - 130
			D14-Terphenyl (FS)	2017/09/02		84	%	50 - 130
			D8-Acenaphthylene	2017/09/02		101	%	50 - 130
			Acenaphthene	2017/09/02	ND, RDL=0.0050		ug/g	

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			Acenaphthylene	2017/09/02	ND, RDL=0.0050		ug/g	
			Anthracene	2017/09/02	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2017/09/02	ND, RDL=0.0050		ug/g	
			Benzo(a)pyrene	2017/09/02	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2017/09/02	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2017/09/02	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2017/09/02	ND, RDL=0.0050		ug/g	
			Chrysene	2017/09/02	ND, RDL=0.0050		ug/g	
			Dibenz(a,h)anthracene	2017/09/02	ND, RDL=0.0050		ug/g	
			Fluoranthene	2017/09/02	ND, RDL=0.0050		ug/g	
			Fluorene	2017/09/02	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2017/09/02	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2017/09/02	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2017/09/02	ND, RDL=0.0050		ug/g	
			Naphthalene	2017/09/02	ND, RDL=0.0050		ug/g	
			Phenanthrene	2017/09/02	ND, RDL=0.0050		ug/g	
			Pyrene	2017/09/02	ND, RDL=0.0050		ug/g	
5147221	RAJ	RPD	Acenaphthene	2017/09/02	NC		%	40
			Acenaphthylene	2017/09/02	NC		%	40
			Anthracene	2017/09/02	NC		%	40
			Benzo(a)anthracene	2017/09/02	NC		%	40
			Benzo(a)pyrene	2017/09/02	NC		%	40
			Benzo(b/j)fluoranthene	2017/09/02	NC		%	40
			Benzo(g,h,i)perylene	2017/09/02	NC		%	40
			Benzo(k)fluoranthene	2017/09/02	NC		%	40
			Chrysene	2017/09/02	NC		%	40
			Dibenz(a,h)anthracene	2017/09/02	NC		%	40
			Fluoranthene	2017/09/02	NC		%	40
			Fluorene	2017/09/02	NC		%	40
			Indeno(1,2,3-cd)pyrene	2017/09/02	NC		%	40
			1-Methylnaphthalene	2017/09/02	NC		%	40
			2-Methylnaphthalene	2017/09/02	NC		%	40
			Naphthalene	2017/09/02	NC		%	40
			Phenanthrene	2017/09/02	NC		%	40
			Pyrene	2017/09/02	NC		%	40
5148365	JOH	Matrix Spike	Hot Water Ext. Boron (B)	2017/09/05		107	%	75 - 125
5148365	JOH	Spiked Blank	Hot Water Ext. Boron (B)	2017/09/05		99	%	75 - 125

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5148365	JOH	Method Blank	Hot Water Ext. Boron (B)	2017/09/05	ND, RDL=0.050		ug/g	
5148365	JOH	RPD	Hot Water Ext. Boron (B)	2017/09/05	4.3		%	40
5148391	DT1	Matrix Spike	Acid Extractable Antimony (Sb)	2017/09/06		69 (2)	%	75 - 125
			Acid Extractable Arsenic (As)	2017/09/06		95	%	75 - 125
			Acid Extractable Barium (Ba)	2017/09/06		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2017/09/06		104	%	75 - 125
			Acid Extractable Boron (B)	2017/09/06		97	%	75 - 125
			Acid Extractable Cadmium (Cd)	2017/09/06		103	%	75 - 125
			Acid Extractable Chromium (Cr)	2017/09/06		NC	%	75 - 125
			Acid Extractable Cobalt (Co)	2017/09/06		NC	%	75 - 125
			Acid Extractable Copper (Cu)	2017/09/06		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2017/09/06		98	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2017/09/06		99	%	75 - 125
			Acid Extractable Nickel (Ni)	2017/09/06		NC	%	75 - 125
			Acid Extractable Selenium (Se)	2017/09/06		98	%	75 - 125
			Acid Extractable Silver (Ag)	2017/09/06		102	%	75 - 125
			Acid Extractable Thallium (Tl)	2017/09/06		98	%	75 - 125
			Acid Extractable Uranium (U)	2017/09/06		98	%	75 - 125
			Acid Extractable Vanadium (V)	2017/09/06		NC	%	75 - 125
			Acid Extractable Zinc (Zn)	2017/09/06		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2017/09/06		97	%	75 - 125
5148391	DT1	Spiked Blank	Acid Extractable Antimony (Sb)	2017/09/06		101	%	80 - 120
			Acid Extractable Arsenic (As)	2017/09/06		102	%	80 - 120
			Acid Extractable Barium (Ba)	2017/09/06		104	%	80 - 120
			Acid Extractable Beryllium (Be)	2017/09/06		102	%	80 - 120
			Acid Extractable Boron (B)	2017/09/06		100	%	80 - 120
			Acid Extractable Cadmium (Cd)	2017/09/06		100	%	80 - 120
			Acid Extractable Chromium (Cr)	2017/09/06		99	%	80 - 120
			Acid Extractable Cobalt (Co)	2017/09/06		101	%	80 - 120
			Acid Extractable Copper (Cu)	2017/09/06		103	%	80 - 120
			Acid Extractable Lead (Pb)	2017/09/06		100	%	80 - 120
			Acid Extractable Molybdenum (Mo)	2017/09/06		101	%	80 - 120
			Acid Extractable Nickel (Ni)	2017/09/06		99	%	80 - 120
			Acid Extractable Selenium (Se)	2017/09/06		102	%	80 - 120
			Acid Extractable Silver (Ag)	2017/09/06		99	%	80 - 120
			Acid Extractable Thallium (Tl)	2017/09/06		100	%	80 - 120
			Acid Extractable Uranium (U)	2017/09/06		97	%	80 - 120
			Acid Extractable Vanadium (V)	2017/09/06		101	%	80 - 120
			Acid Extractable Zinc (Zn)	2017/09/06		110	%	80 - 120
			Acid Extractable Mercury (Hg)	2017/09/06		103	%	80 - 120
5148391	DT1	Method Blank	Acid Extractable Antimony (Sb)	2017/09/06	ND, RDL=0.20		ug/g	
			Acid Extractable Arsenic (As)	2017/09/06	ND, RDL=1.0		ug/g	
			Acid Extractable Barium (Ba)	2017/09/06	ND, RDL=0.50		ug/g	
			Acid Extractable Beryllium (Be)	2017/09/06	ND, RDL=0.20		ug/g	
			Acid Extractable Boron (B)	2017/09/06	ND, RDL=5.0		ug/g	
			Acid Extractable Cadmium (Cd)	2017/09/06	ND, RDL=0.10		ug/g	
			Acid Extractable Chromium (Cr)	2017/09/06	ND, RDL=1.0		ug/g	

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			Acid Extractable Cobalt (Co)	2017/09/06	ND, RDL=0.10		ug/g	
			Acid Extractable Copper (Cu)	2017/09/06	ND, RDL=0.50		ug/g	
			Acid Extractable Lead (Pb)	2017/09/06	ND, RDL=1.0		ug/g	
			Acid Extractable Molybdenum (Mo)	2017/09/06	ND, RDL=0.50		ug/g	
			Acid Extractable Nickel (Ni)	2017/09/06	ND, RDL=0.50		ug/g	
			Acid Extractable Selenium (Se)	2017/09/06	ND, RDL=0.50		ug/g	
			Acid Extractable Silver (Ag)	2017/09/06	ND, RDL=0.20		ug/g	
			Acid Extractable Thallium (Tl)	2017/09/06	ND, RDL=0.050		ug/g	
			Acid Extractable Uranium (U)	2017/09/06	ND, RDL=0.050		ug/g	
			Acid Extractable Vanadium (V)	2017/09/06	ND, RDL=5.0		ug/g	
			Acid Extractable Zinc (Zn)	2017/09/06	ND, RDL=5.0		ug/g	
			Acid Extractable Mercury (Hg)	2017/09/06	ND, RDL=0.050		ug/g	
5148391	DT1	RPD	Acid Extractable Antimony (Sb)	2017/09/06	NC		%	30
			Acid Extractable Arsenic (As)	2017/09/06	19		%	30
			Acid Extractable Barium (Ba)	2017/09/06	1.9		%	30
			Acid Extractable Beryllium (Be)	2017/09/06	9.2		%	30
			Acid Extractable Cadmium (Cd)	2017/09/06	NC		%	30
			Acid Extractable Chromium (Cr)	2017/09/06	4.5		%	30
			Acid Extractable Cobalt (Co)	2017/09/06	1.1		%	30
			Acid Extractable Copper (Cu)	2017/09/06	0.68		%	30
			Acid Extractable Lead (Pb)	2017/09/06	4.0		%	30
			Acid Extractable Molybdenum (Mo)	2017/09/06	2.9		%	30
			Acid Extractable Nickel (Ni)	2017/09/06	1.6		%	30
			Acid Extractable Selenium (Se)	2017/09/06	NC		%	30
			Acid Extractable Silver (Ag)	2017/09/06	NC		%	30
			Acid Extractable Thallium (Tl)	2017/09/06	11		%	30
			Acid Extractable Uranium (U)	2017/09/06	3.7		%	30
			Acid Extractable Vanadium (V)	2017/09/06	5.4		%	30
			Acid Extractable Zinc (Zn)	2017/09/06	1.3		%	30
			Acid Extractable Mercury (Hg)	2017/09/06	NC		%	30
5149073	JOH	Matrix Spike	Hot Water Ext. Boron (B)	2017/09/05		101	%	75 - 125
5149073	JOH	Spiked Blank	Hot Water Ext. Boron (B)	2017/09/05		101	%	75 - 125
5149073	JOH	Method Blank	Hot Water Ext. Boron (B)	2017/09/05	ND, RDL=0.050		ug/g	
5149073	JOH	RPD	Hot Water Ext. Boron (B)	2017/09/05	3.4		%	40
5149224	JOH	Spiked Blank	Soluble Calcium (Ca)	2017/09/05		86	%	80 - 120
			Soluble Magnesium (Mg)	2017/09/05		87	%	80 - 120
			Soluble Sodium (Na)	2017/09/05		90	%	80 - 120
5149224	JOH	Method Blank	Soluble Calcium (Ca)	2017/09/05	ND, RDL=0.5		mg/L	
			Soluble Magnesium (Mg)	2017/09/05	ND, RDL=0.5		mg/L	
			Soluble Sodium (Na)	2017/09/05	ND,RDL=5		mg/L	

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Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5149224	JOH	RPD	Soluble Calcium (Ca)	2017/09/05	3.0		%	30
			Soluble Magnesium (Mg)	2017/09/05	7.8		%	30
			Soluble Sodium (Na)	2017/09/05	4.9		%	30
5149238	NYS	Spiked Blank	Conductivity	2017/09/05		101	%	90 - 110
5149238	NYS	Method Blank	Conductivity	2017/09/05	ND, RDL=0.002		mS/cm	
5149238	NYS	RPD	Conductivity	2017/09/05	0.35		%	10
5149341	AFZ	Spiked Blank	Soluble Calcium (Ca)	2017/09/05		98	%	80 - 120
			Soluble Magnesium (Mg)	2017/09/05		95	%	80 - 120
			Soluble Sodium (Na)	2017/09/05		102	%	80 - 120
5149341	AFZ	Method Blank	Soluble Calcium (Ca)	2017/09/05	ND, RDL=0.5		mg/L	
			Soluble Magnesium (Mg)	2017/09/05	ND, RDL=0.5		mg/L	
			Soluble Sodium (Na)	2017/09/05	ND,RDL=5		mg/L	
5149341	AFZ	RPD	Soluble Calcium (Ca)	2017/09/05	0.42		%	30
			Soluble Magnesium (Mg)	2017/09/05	0.66		%	30
			Soluble Sodium (Na)	2017/09/05	0.14		%	30
5149357	NYS	Spiked Blank	Conductivity	2017/09/05		100	%	90 - 110
5149357	NYS	Method Blank	Conductivity	2017/09/05	ND, RDL=0.002		mS/cm	
5149357	NYS	RPD	Conductivity	2017/09/05	2.0		%	10

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.

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.

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

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B7I8095
Report Date: 2017/09/06

AEL Environment
Client Project #: 10888

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

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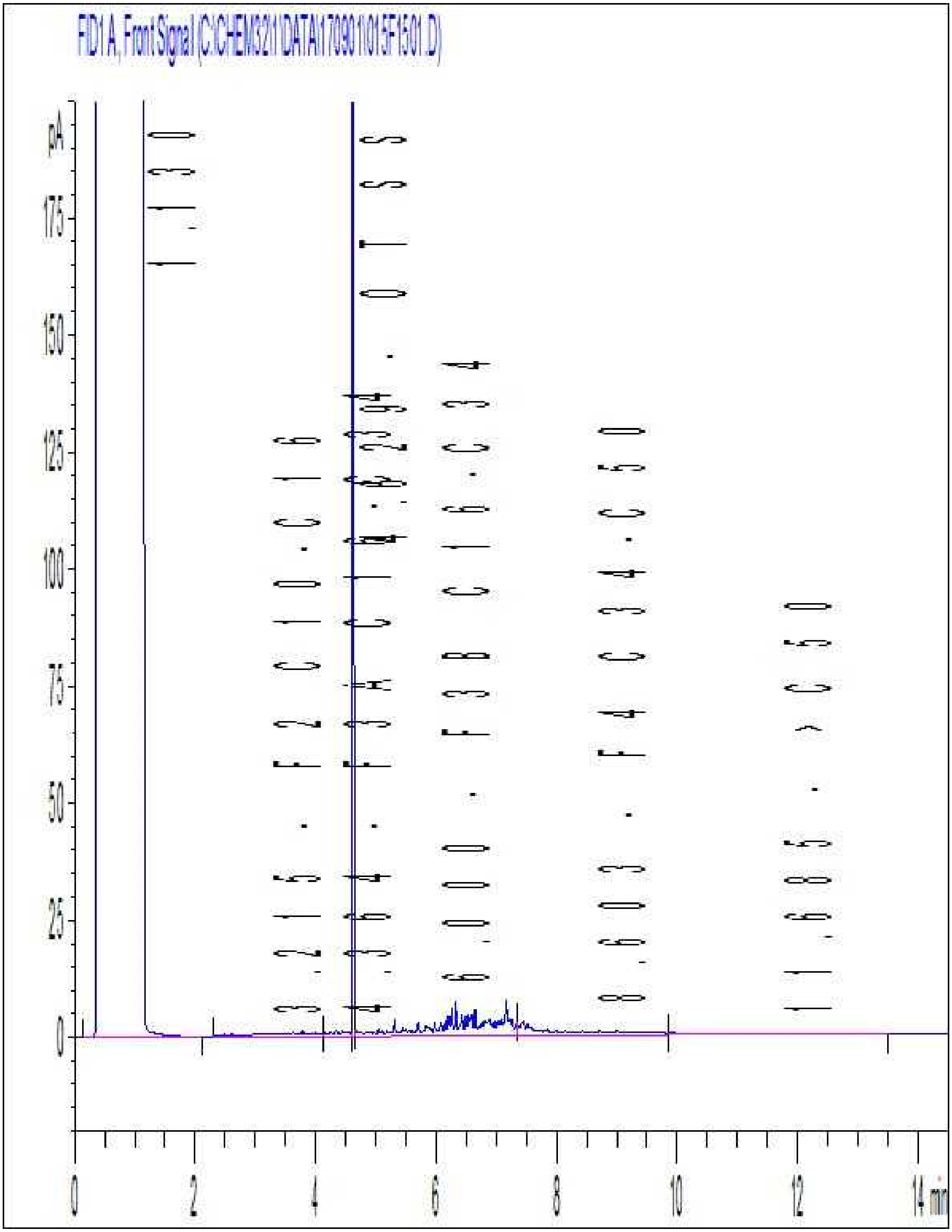
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

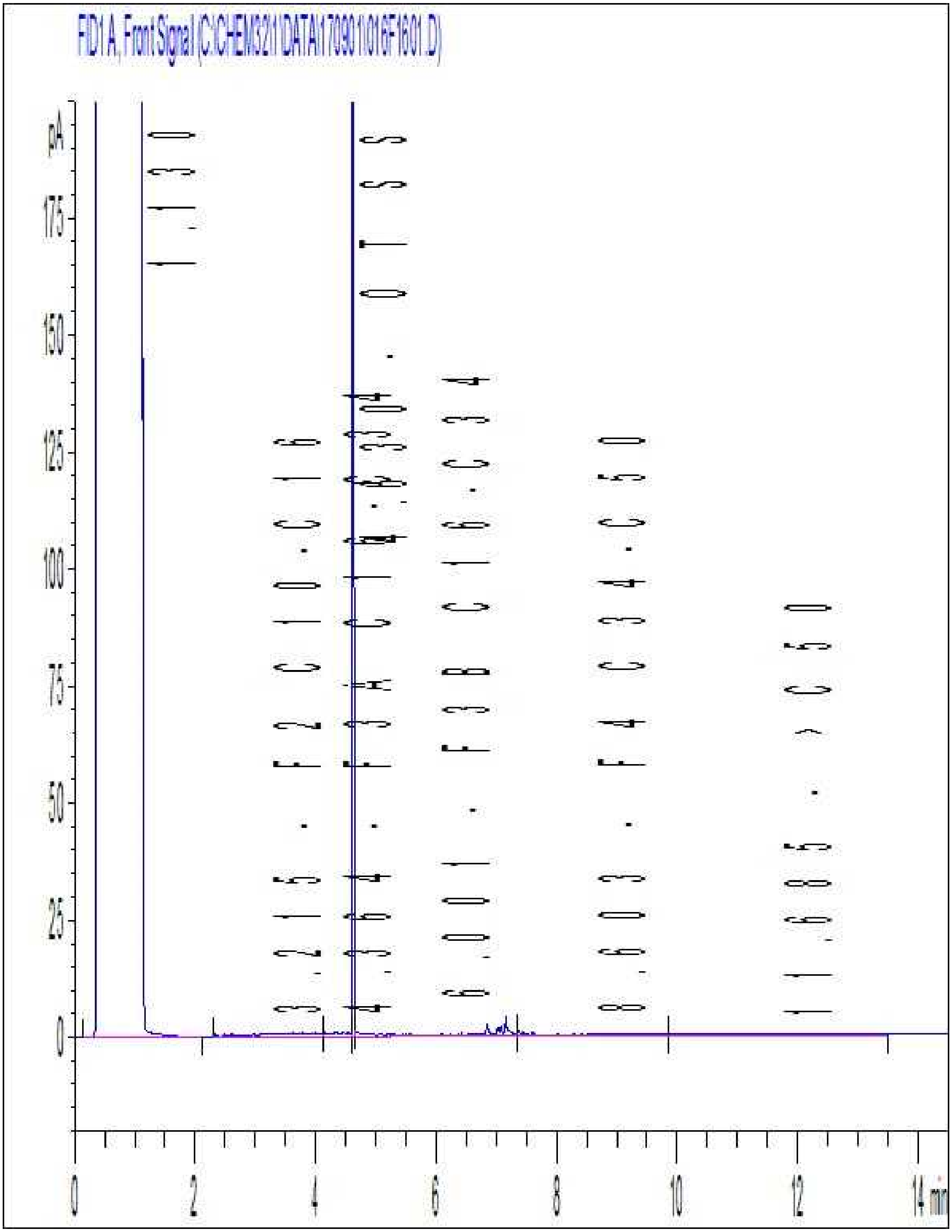


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8095
Report Date: 2017/09/06
Maxxam Sample: FAO978

AEL Environment
Client Project #: 10888
Client ID: A0198

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

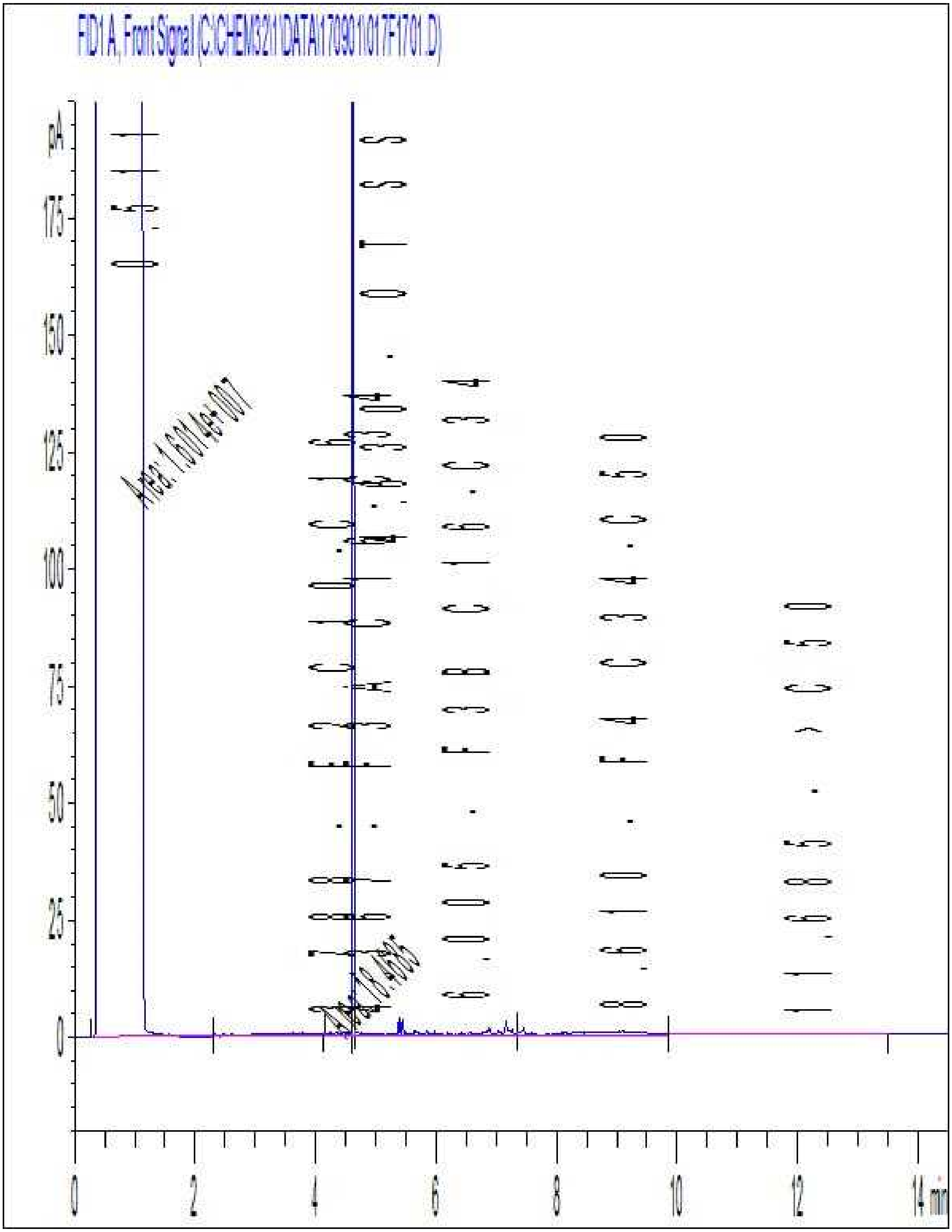


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8095
Report Date: 2017/09/06
Maxxam Sample: FAO979

AEL Environment
Client Project #: 10888
Client ID: A0200

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

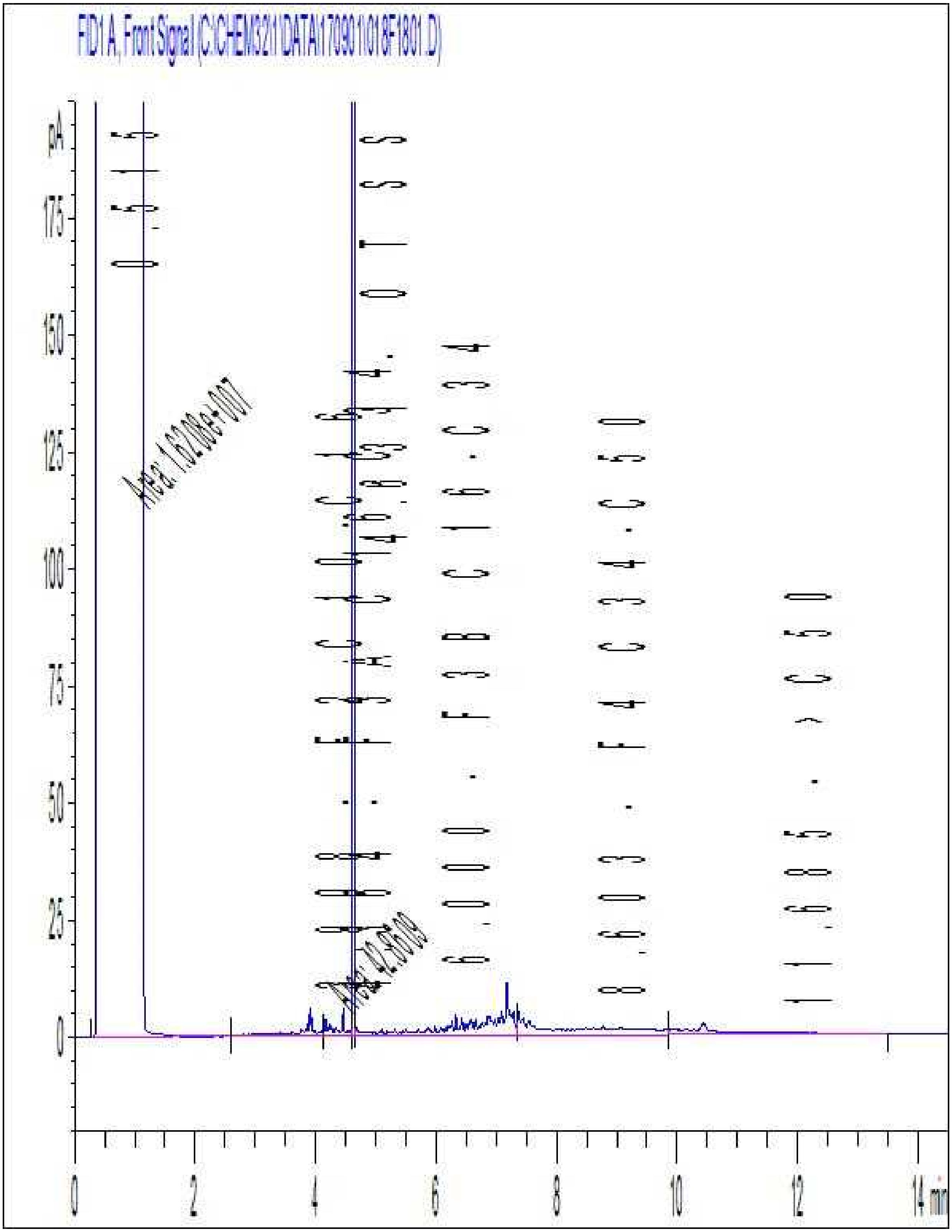


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8095
Report Date: 2017/09/06
Maxxam Sample: FAO980

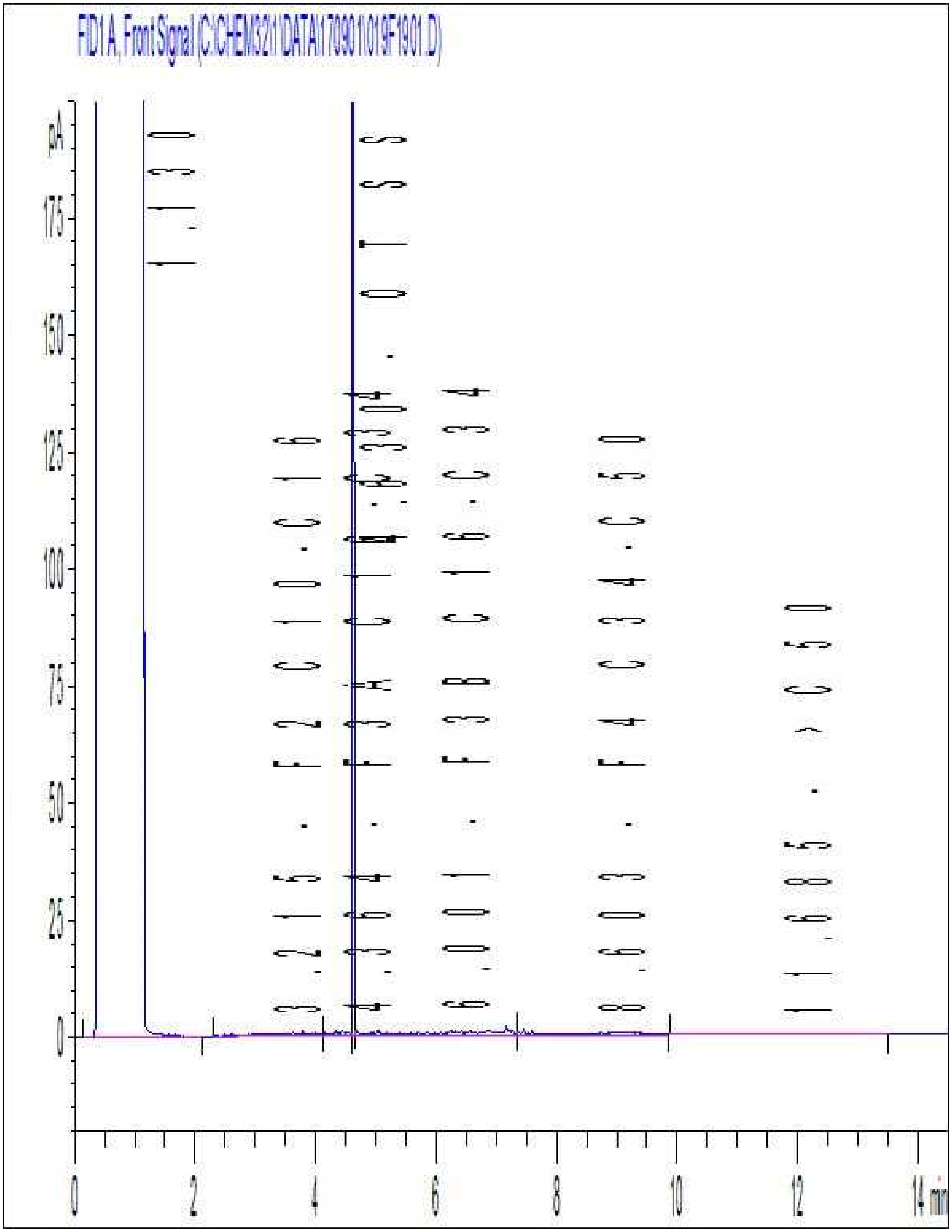
AEL Environment
Client Project #: 10888
Client ID: A0202

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

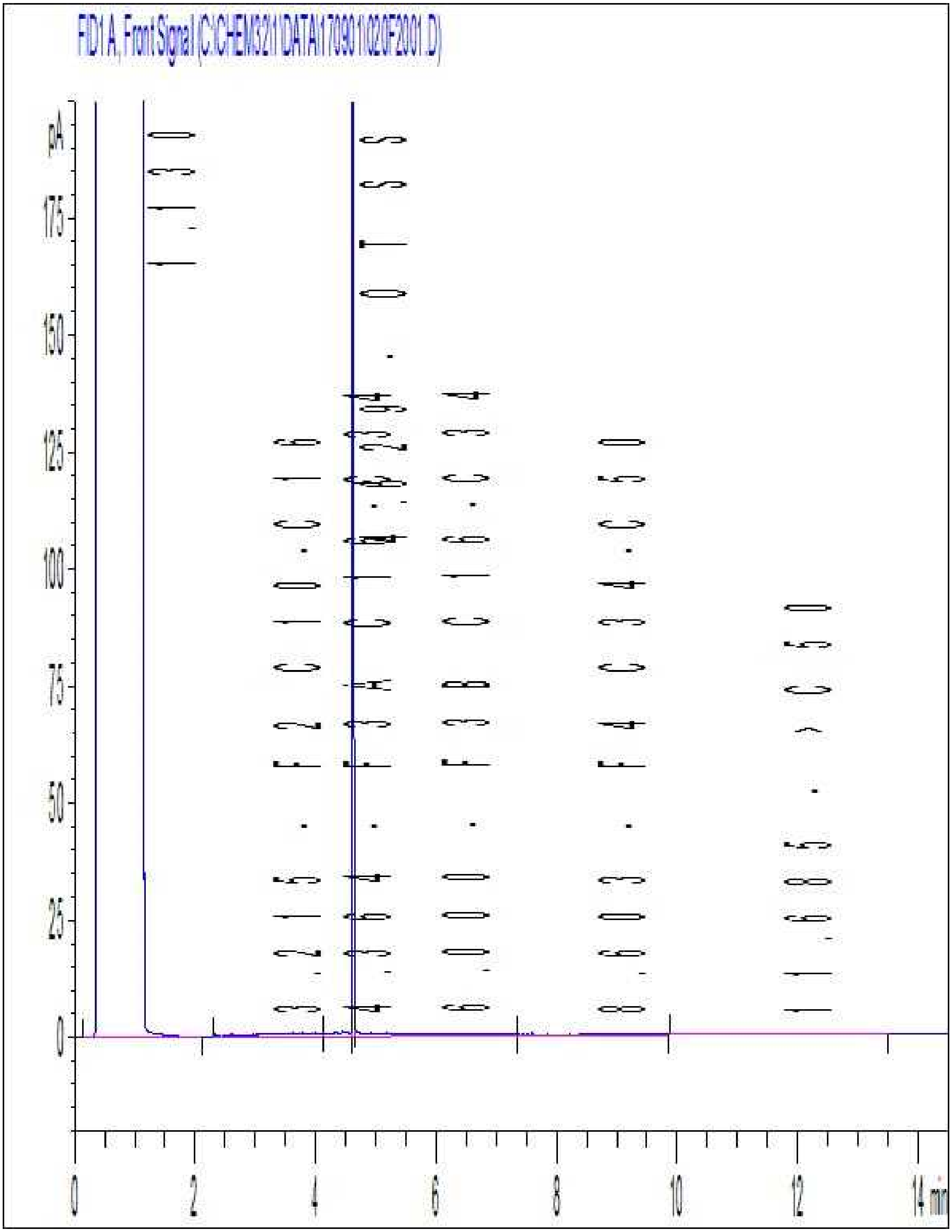


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8095
Report Date: 2017/09/06
Maxxam Sample: FAO982

AEL Environment
Client Project #: 10888
Client ID: A0206

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

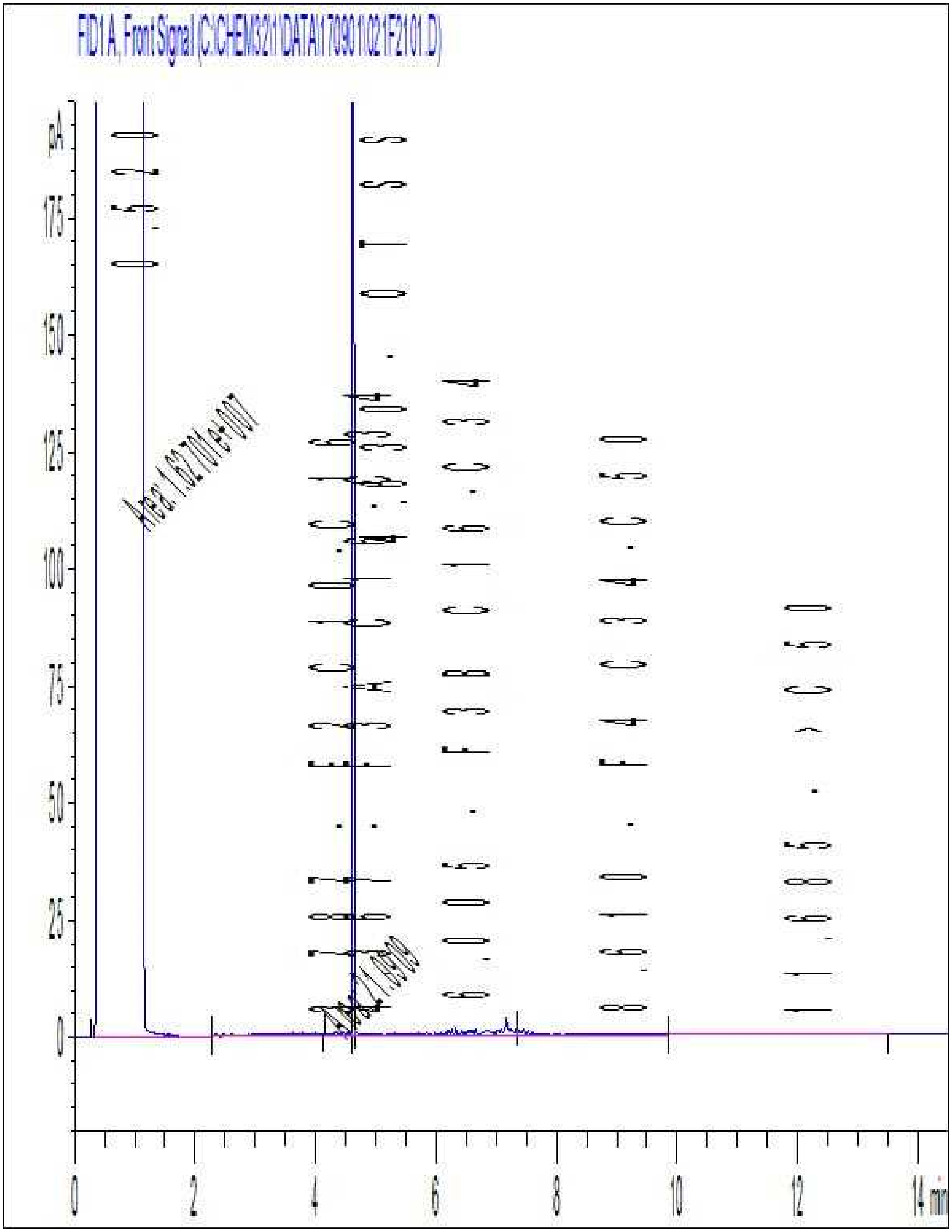


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7I8095
Report Date: 2017/09/06
Maxxam Sample: FAO983

AEL Environment
Client Project #: 10888
Client ID: A0213

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.

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Your Project #: 10888
Your C.O.C. #: 625117-01-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/07
Report #: R4690396
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8519
Received: 2017/08/29, 17:25

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dissolved Aluminum (0.2 u, clay free) (1)	8	N/A	2017/09/05	CAM SOP-00447	EPA 6020B m
Alkalinity (1)	3	N/A	2017/08/31	CAM SOP-00448	SM 22 2320 B m
Alkalinity (1)	5	N/A	2017/09/01	CAM SOP-00448	SM 22 2320 B m
Chromium (VI) in Water (1)	8	N/A	2017/09/01	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide (1)	8	N/A	2017/09/01	CAM SOP-00457	OMOE E3015 m
Dissolved Oxygen (1)	8	2017/08/30	2017/08/30	CAM SOP-00427	SM 22 4500 O G m
Hardness (calculated as CaCO3) (1)	7	N/A	2017/09/05	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3) (1)	1	N/A	2017/09/06	CAM SOP 00102/00408/00447	SM 2340 B
Mercury (1)	1	2017/08/31	2017/09/01	CAM SOP-00453	EPA 7470A m
Mercury (1)	7	2017/08/31	2017/09/05	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS (1)	8	N/A	2017/08/31	CAM SOP-00447	EPA 6020B m
Total Ammonia-N (1)	8	N/A	2017/09/01	CAM SOP-00441	EPA GS I-2522-90 m
pH (1)	3	N/A	2017/08/31	CAM SOP-00413	SM 4500H+ B m
pH (1)	5	N/A	2017/09/01	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP) (1)	5	N/A	2017/08/31	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP) (1)	3	N/A	2017/09/05	CAM SOP-00444	OMOE E3179 m
Field pH (1, 2)	8	N/A	2017/09/01		Field pH Meter
Sulphide (1)	8	N/A	2017/09/01	CAM SOP-00455	SM 22 4500-S G m
Field Temperature (1, 2)	8	N/A	2017/09/01		Field Thermometer
Total Phosphorus (Colourimetric) (1)	8	2017/08/31	2017/09/01	CAM SOP-00407	SM 22 4500 P B H m
Turbidity (1)	8	N/A	2017/08/31	CAM SOP-00417	SM 22 2130 B m
Un-ionized Ammonia (1)	8	2017/08/30	2017/09/07		
Volatile Organic Compounds in Water (1)	8	N/A	2017/09/01	CAM SOP-00226	EPA 8260C m
Non-Routine Volatile Organic Compounds (1)	8	N/A	2017/09/05	CAM SOP-00226	EPA 8260 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.

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Your Project #: 10888
Your C.O.C. #: 625117-01-01

Attention:Reporting Group
AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/07
Report #: R4690396
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7I8519
Received: 2017/08/29, 17:25

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Analytics Mississauga
(2) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ916	FAQ916			FAQ917	FAQ917		
Sampling Date		2017/08/29 09:00	2017/08/29 09:00			2017/08/29 10:00	2017/08/29 10:00		
COC Number		625117-01-01	625117-01-01			625117-01-01	625117-01-01		
	UNITS	**A0196 RR2**	**A0196 RR2 Lab-Dup**	**RDL**	**QC Batch**	**A0199 SW10**	**A0199 SW10 Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Hardness (CaCO3)	mg/L	96		1.0	5142464	97		1.0	5142464
Total Un-ionized Ammonia	mg/L	0.0020		0.0005	5143055	0.0042		0.0041	5143055
Field Measurements									
Field Temperature	Celcius	21.08		N/A	ONSITE	21.27		N/A	ONSITE
Field pH	pH	7.2			ONSITE	8.22			ONSITE
Inorganics									
Total Ammonia-N	mg/L	0.25		0.050	5145881	0.051		0.050	5145881
Dissolved Oxygen	mg/L	8.63	8.70		5144212	8.85			5144212
pH	pH	8.01			5144642	8.01			5144642
Phenols-4AAP	mg/L	0.0025		0.0010	5144786	0.0021		0.0010	5144786
Total Phosphorus	mg/L	0.011		0.004	5144836	0.013		0.004	5144836
Sulphide	mg/L	ND		0.020	5147077	ND		0.020	5147077
Turbidity	NTU	0.4		0.1	5144606	0.7		0.1	5144606
WAD Cyanide (Free)	ug/L	ND	ND	1	5145356	ND		1	5145356
Alkalinity (Total as CaCO3)	mg/L	92		1.0	5144635	93		1.0	5144635
Metals									
Dissolved (0.2u) Aluminum (Al)	ug/L	ND		5	5145294	ND	ND	5	5145294
Chromium (VI)	ug/L	ND		0.50	5143285	ND		0.50	5143285
Mercury (Hg)	ug/L	ND		0.1	5144772	ND		0.1	5145164
Total Antimony (Sb)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Arsenic (As)	ug/L	ND	ND	1.0	5145102	ND		1.0	5145102
Total Beryllium (Be)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Boron (B)	ug/L	13	13	10	5145102	14		10	5145102
Total Cadmium (Cd)	ug/L	ND	ND	0.10	5145102	ND		0.10	5145102
Total Chromium (Cr)	ug/L	ND	ND	5.0	5145102	ND		5.0	5145102
Total Cobalt (Co)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Copper (Cu)	ug/L	ND	ND	1.0	5145102	ND		1.0	5145102
Total Iron (Fe)	ug/L	ND	ND	100	5145102	220		100	5145102
Total Lead (Pb)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Molybdenum (Mo)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Nickel (Ni)	ug/L	ND	ND	1.0	5145102	ND		1.0	5145102
Total Selenium (Se)	ug/L	ND	ND	2.0	5145102	ND		2.0	5145102
Total Silver (Ag)	ug/L	ND	ND	0.10	5145102	ND		0.10	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ916	FAQ916			FAQ917	FAQ917		
Sampling Date		2017/08/29 09:00	2017/08/29 09:00			2017/08/29 10:00	2017/08/29 10:00		
COC Number		625117-01-01	625117-01-01			625117-01-01	625117-01-01		
	UNITS	**A0196 RR2**	**A0196 RR2 Lab-Dup**	**RDL**	**QC Batch**	**A0199 SW10**	**A0199 SW10 Lab-Dup**	**RDL**	**QC Batch**
Total Thallium (Tl)	ug/L	ND	ND	0.050	5145102	ND		0.050	5145102
Total Tungsten (W)	ug/L	ND	ND	1.0	5145102	ND		1.0	5145102
Total Uranium (U)	ug/L	0.12	0.11	0.10	5145102	0.12		0.10	5145102
Total Vanadium (V)	ug/L	ND	ND	0.50	5145102	ND		0.50	5145102
Total Zinc (Zn)	ug/L	ND	ND	5.0	5145102	ND		5.0	5145102
Total Zirconium (Zr)	ug/L	ND	ND	1.0	5145102	ND		1.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ918	FAQ918			FAQ919		
Sampling Date		2017/08/29 10:40	2017/08/29 10:40			2017/08/29 11:10		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	**A0201 SW8**	**A0201 SW8 Lab-Dup**	**RDL**	**QC Batch**	**A0203 SW9**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	120		1.0	5142464	96	1.0	5142464
Total Un-ionized Ammonia	mg/L	0.026		0.0047	5143055	0.034	0.0055	5143055
Field Measurements								
Field Temperature	Celcius	21.0		N/A	ONSITE	21.28	N/A	ONSITE
Field pH	pH	8.29			ONSITE	8.36		ONSITE
Inorganics								
Total Ammonia-N	mg/L	0.28		0.050	5145881	0.31	0.050	5145881
Dissolved Oxygen	mg/L	9.07			5144212	9.36		5144212
pH	pH	8.03			5144642	8.07		5144642
Phenols-4AAP	mg/L	0.0022		0.0010	5144786	0.0027	0.0010	5144786
Total Phosphorus	mg/L	0.015		0.004	5144836	0.021	0.004	5144836
Sulphide	mg/L	ND		0.020	5147077	ND	0.020	5147077
Turbidity	NTU	0.6		0.1	5144606	1.2	0.1	5144606
WAD Cyanide (Free)	ug/L	ND		1	5145356	ND	1	5145356
Alkalinity (Total as CaCO3)	mg/L	100		1.0	5144635	93	1.0	5144635
Metals								
Dissolved (0.2u) Aluminum (Al)	ug/L	8	6	5	5148683	7	5	5145294
Chromium (VI)	ug/L	ND		0.50	5143285	ND	0.50	5143285
Mercury (Hg)	ug/L	ND		0.1	5145164	ND	0.1	5145164
Total Antimony (Sb)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Arsenic (As)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Beryllium (Be)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Boron (B)	ug/L	15		10	5145102	13	10	5145102
Total Cadmium (Cd)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Chromium (Cr)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Cobalt (Co)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Copper (Cu)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Iron (Fe)	ug/L	160		100	5145102	110	100	5145102
Total Lead (Pb)	ug/L	ND		0.50	5145102	1.4	0.50	5145102
Total Molybdenum (Mo)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Nickel (Ni)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Selenium (Se)	ug/L	ND		2.0	5145102	ND	2.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ918	FAQ918			FAQ919		
Sampling Date		2017/08/29 10:40	2017/08/29 10:40			2017/08/29 11:10		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	**A0201 SW8**	**A0201 SW8 Lab-Dup**	**RDL**	**QC Batch**	**A0203 SW9**	**RDL**	**QC Batch**
Total Silver (Ag)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Thallium (Tl)	ug/L	ND		0.050	5145102	ND	0.050	5145102
Total Tungsten (W)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Uranium (U)	ug/L	0.18		0.10	5145102	0.13	0.10	5145102
Total Vanadium (V)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Zinc (Zn)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Zirconium (Zr)	ug/L	ND		1.0	5145102	ND	1.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ920	FAQ920			FAQ921		
Sampling Date		2017/08/29 12:00	2017/08/29 12:00			2017/08/29 12:40		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	**A0205 SW7**	**A0205 SW7 Lab-Dup**	**RDL**	**QC Batch**	**A0207 RR3**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	100		1.0	5142464	97	1.0	5142464
Total Un-ionized Ammonia	mg/L	ND		0.0049	5143055	0.030	0.0055	5143055
Field Measurements								
Field Temperature	Celcius	21.3		N/A	ONSITE	21.41	N/A	ONSITE
Field pH	pH	8.3			ONSITE	8.35		ONSITE
Inorganics								
Total Ammonia-N	mg/L	ND		0.050	5145881	0.28	0.050	5145881
Dissolved Oxygen	mg/L	8.97			5144212	9.00		5144212
pH	pH	7.90	7.92		5145435	8.06		5144642
Phenols-4AAP	mg/L	ND		0.0010	5149312	ND	0.0010	5149312
Total Phosphorus	mg/L	0.017		0.004	5144836	0.016	0.004	5144836
Sulphide	mg/L	ND	ND	0.020	5147108	ND	0.020	5147077
Turbidity	NTU	0.4	0.4	0.1	5144953	1.2	0.1	5144606
WAD Cyanide (Free)	ug/L	ND		1	5145356	ND	1	5145356
Alkalinity (Total as CaCO3)	mg/L	94	95	1.0	5145431	92	1.0	5144635
Metals								
Dissolved (0.2u) Aluminum (Al)	ug/L	5		5	5145294	7	5	5145294
Chromium (VI)	ug/L	ND		0.50	5143285	ND	0.50	5143285
Mercury (Hg)	ug/L	ND		0.1	5145164	ND	0.1	5145164
Total Antimony (Sb)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Arsenic (As)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Beryllium (Be)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Boron (B)	ug/L	14		10	5145102	13	10	5145102
Total Cadmium (Cd)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Chromium (Cr)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Cobalt (Co)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Copper (Cu)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Iron (Fe)	ug/L	130		100	5145102	ND	100	5145102
Total Lead (Pb)	ug/L	1.5		0.50	5145102	ND	0.50	5145102
Total Molybdenum (Mo)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Nickel (Ni)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Selenium (Se)	ug/L	ND		2.0	5145102	ND	2.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected
N/A = Not Applicable

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Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ920	FAQ920			FAQ921		
Sampling Date		2017/08/29 12:00	2017/08/29 12:00			2017/08/29 12:40		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	A0205 SW7	A0205 SW7 Lab-Dup	RDL	QC Batch	A0207 RR3	RDL	QC Batch
Total Silver (Ag)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Thallium (Tl)	ug/L	ND		0.050	5145102	ND	0.050	5145102
Total Tungsten (W)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Uranium (U)	ug/L	0.13		0.10	5145102	0.11	0.10	5145102
Total Vanadium (V)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Zinc (Zn)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Zirconium (Zr)	ug/L	ND		1.0	5145102	ND	1.0	5145102

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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Report Date: 2017/09/07

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PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ924	FAQ924			FAQ925		
Sampling Date		2017/08/29 09:10	2017/08/29 09:10			2017/08/29 14:30		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	**A0210 RR2**	**A0210 RR2 Lab-Dup**	**RDL**	**QC Batch**	**A0211 SW1**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	97		1.0	5142464	96	1.0	5142464
Total Un-ionized Ammonia	mg/L	0.0032		0.0005	5143055	0.020	0.0069	5143055
Field Measurements								
Field Temperature	Celcius	21.08		N/A	ONSITE	22.44	N/A	ONSITE
Field pH	pH	7.2			ONSITE	8.43		ONSITE
Inorganics								
Total Ammonia-N	mg/L	0.38		0.050	5145881	0.15	0.050	5145881
Dissolved Oxygen	mg/L	9.22			5144212	9.45		5144212
pH	pH	8.07			5144642	8.11		5144642
Phenols-4AAP	mg/L	0.0020	0.0019	0.0010	5149581	0.0023	0.0010	5144786
Total Phosphorus	mg/L	0.015		0.004	5144836	0.011	0.004	5144836
Sulphide	mg/L	ND		0.020	5147077	ND	0.020	5147108
Turbidity	NTU	0.5		0.1	5144953	0.7	0.1	5144606
WAD Cyanide (Free)	ug/L	ND		1	5145356	6	1	5145356
Alkalinity (Total as CaCO3)	mg/L	92		1.0	5144635	92	1.0	5144635
Metals								
Dissolved (0.2u) Aluminum (Al)	ug/L	6		5	5145294	5	5	5145294
Chromium (VI)	ug/L	ND		0.50	5143285	ND	0.50	5143285
Mercury (Hg)	ug/L	ND		0.1	5145164	ND	0.1	5145164
Total Antimony (Sb)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Arsenic (As)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Beryllium (Be)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Boron (B)	ug/L	17		10	5145102	13	10	5145102
Total Cadmium (Cd)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Chromium (Cr)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Cobalt (Co)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Copper (Cu)	ug/L	ND		1.0	5145102	1.4	1.0	5145102
Total Iron (Fe)	ug/L	ND		100	5145102	ND	100	5145102
Total Lead (Pb)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Molybdenum (Mo)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Nickel (Ni)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Selenium (Se)	ug/L	ND		2.0	5145102	ND	2.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID		FAQ924	FAQ924			FAQ925		
Sampling Date		2017/08/29 09:10	2017/08/29 09:10			2017/08/29 14:30		
COC Number		625117-01-01	625117-01-01			625117-01-01		
	UNITS	**A0210 RR2**	**A0210 RR2 Lab-Dup**	**RDL**	**QC Batch**	**A0211 SW1**	**RDL**	**QC Batch**
Total Silver (Ag)	ug/L	ND		0.10	5145102	ND	0.10	5145102
Total Thallium (Tl)	ug/L	ND		0.050	5145102	ND	0.050	5145102
Total Tungsten (W)	ug/L	ND		1.0	5145102	ND	1.0	5145102
Total Uranium (U)	ug/L	0.11		0.10	5145102	0.10	0.10	5145102
Total Vanadium (V)	ug/L	ND		0.50	5145102	ND	0.50	5145102
Total Zinc (Zn)	ug/L	ND		5.0	5145102	ND	5.0	5145102
Total Zirconium (Zr)	ug/L	ND		1.0	5145102	ND	1.0	5145102

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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PWQO VOCS (WATER)

Maxxam ID		FAQ916	FAQ917	FAQ917	FAQ918	FAQ919		
Sampling Date		2017/08/29 09:00	2017/08/29 10:00	2017/08/29 10:00	2017/08/29 10:40	2017/08/29 11:10		
COC Number		625117-01-01	625117-01-01	625117-01-01	625117-01-01	625117-01-01		
	UNITS	**A0196 RR2**	**A0199 SW10**	**A0199 SW10 Lab-Dup**	**A0201 SW8**	**A0203 SW9**	**RDL**	**QC Batch**
Volatile Organics								
Benzene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Bromodichloromethane	ug/L	ND	ND	ND	0.12	ND	0.10	5142779
Acrolein	ug/L	ND	ND	ND	ND	ND	10	5142771
Bromoform	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Bromomethane	ug/L	ND	ND	ND	ND	ND	0.50	5142779
Chlorobenzene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Chloromethane	ug/L	ND	ND	ND	ND	ND	0.50	5142779
Dibromochloromethane	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,1-Dichloroethane	ug/L	ND	ND	ND	ND	ND	0.10	5142779
1,2-Dichloroethane	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,1-Dichloroethylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
1,2-Dichloropropane	ug/L	ND	ND	ND	ND	ND	0.10	5142779
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Ethylbenzene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Ethylene Dibromide	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	ND	ND	0.50	5142779
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	ND	ND	ND	5.0	5142779
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Styrene	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	ND	0.20	5142779
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Tetrachloroethylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Toluene	ug/L	0.22	ND	ND	ND	ND	0.20	5142779
1,1,1-Trichloroethane	ug/L	ND	ND	ND	ND	ND	0.10	5142779
1,1,2-Trichloroethane	ug/L	ND	ND	ND	ND	ND	0.20	5142779
Trichloroethylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Vinyl Chloride	ug/L	ND	ND	ND	ND	ND	0.20	5142779
p+m-Xylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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PWQO VOCS (WATER)

Maxxam ID		FAQ916	FAQ917	FAQ917	FAQ918	FAQ919		
Sampling Date		2017/08/29 09:00	2017/08/29 10:00	2017/08/29 10:00	2017/08/29 10:40	2017/08/29 11:10		
COC Number		625117-01-01	625117-01-01	625117-01-01	625117-01-01	625117-01-01		
	UNITS	A0196 RR2	A0199 SW10	A0199 SW10 Lab-Dup	A0201 SW8	A0203 SW9	RDL	QC Batch
o-Xylene	ug/L	ND	ND	ND	ND	ND	0.10	5142779
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	98	97	97	99	99		5142779
D4-1,2-Dichloroethane	%	102	101	102	103	103		5142779
D8-Toluene	%	98	99	97	97	97		5142779

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

Maxxam Job #: B7I8519
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PWQO VOCS (WATER)

Maxxam ID		FAQ920	FAQ921	FAQ924	FAQ925		
Sampling Date		2017/08/29 12:00	2017/08/29 12:40	2017/08/29 09:10	2017/08/29 14:30		
COC Number		625117-01-01	625117-01-01	625117-01-01	625117-01-01		
	UNITS	**A0205 SW7**	**A0207 RR3**	**A0210 RR2**	**A0211 SW1**	**RDL**	**QC Batch**
Volatile Organics							
Benzene	ug/L	ND	ND	ND	ND	0.10	5142779
Bromodichloromethane	ug/L	ND	ND	ND	ND	0.10	5142779
Acrolein	ug/L	ND	ND	ND	ND	10	5142771
Bromoform	ug/L	ND	ND	ND	ND	0.20	5142779
Bromomethane	ug/L	ND	ND	ND	ND	0.50	5142779
Chlorobenzene	ug/L	ND	ND	ND	ND	0.10	5142779
Chloromethane	ug/L	ND	ND	ND	ND	0.50	5142779
Dibromochloromethane	ug/L	ND	ND	ND	ND	0.20	5142779
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.20	5142779
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.20	5142779
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	0.20	5142779
1,1-Dichloroethane	ug/L	ND	ND	ND	ND	0.10	5142779
1,2-Dichloroethane	ug/L	ND	ND	ND	ND	0.20	5142779
1,1-Dichloroethylene	ug/L	ND	ND	ND	ND	0.10	5142779
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.10	5142779
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	ND	0.10	5142779
1,2-Dichloropropane	ug/L	ND	ND	ND	ND	0.10	5142779
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	0.20	5142779
Ethylbenzene	ug/L	ND	ND	ND	ND	0.10	5142779
Ethylene Dibromide	ug/L	ND	ND	ND	ND	0.20	5142779
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	ND	0.50	5142779
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	ND	ND	5.0	5142779
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	ND	0.20	5142779
Styrene	ug/L	ND	ND	ND	ND	0.20	5142779
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	0.20	5142779
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	0.20	5142779
Tetrachloroethylene	ug/L	ND	ND	ND	ND	0.10	5142779
Toluene	ug/L	ND	ND	ND	ND	0.20	5142779
1,1,1-Trichloroethane	ug/L	ND	ND	ND	ND	0.10	5142779
1,1,2-Trichloroethane	ug/L	ND	ND	ND	ND	0.20	5142779
Trichloroethylene	ug/L	ND	ND	ND	ND	0.10	5142779
Vinyl Chloride	ug/L	ND	ND	ND	ND	0.20	5142779
p+m-Xylene	ug/L	ND	ND	ND	ND	0.10	5142779

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ND = Not detected

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PWQO VOCS (WATER)

Maxxam ID		FAQ920	FAQ921	FAQ924	FAQ925		
Sampling Date		2017/08/29 12:00	2017/08/29 12:40	2017/08/29 09:10	2017/08/29 14:30		
COC Number		625117-01-01	625117-01-01	625117-01-01	625117-01-01		
	UNITS	A0205 SW7	A0207 RR3	A0210 RR2	A0211 SW1	RDL	QC Batch
o-Xylene	ug/L	ND	ND	ND	ND	0.10	5142779
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	98	98	98	98		5142779
D4-1,2-Dichloroethane	%	103	103	104	103		5142779
D8-Toluene	%	98	98	97	98		5142779

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAQ916
Sample ID: A0196 RR2
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/08/31	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5144772	2017/08/31	2017/09/01	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/08/31	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5144786	N/A	2017/08/31	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ916 Dup
Sample ID: A0196 RR2
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti

Maxxam ID: FAQ917
Sample ID: A0199 SW10
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/08/31	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/08/31	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5144786	N/A	2017/08/31	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil

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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAQ917
Sample ID: A0199 SW10
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ917 Dup
Sample ID: A0199 SW10
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ918
Sample ID: A0201 SW8
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5148683	N/A	2017/09/05	Prempal Bhatti
Alkalinity	AT	5144635	N/A	2017/08/31	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/06	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/08/31	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5144786	N/A	2017/08/31	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

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TEST SUMMARY

Maxxam ID: FAQ918 Dup
Sample ID: A0201 SW8
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5148683	N/A	2017/09/05	Prempal Bhatti

Maxxam ID: FAQ919
Sample ID: A0203 SW9
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/09/01	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/09/01	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5144786	N/A	2017/08/31	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ920
Sample ID: A0205 SW7
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5145431	N/A	2017/09/01	Neil Dassanayake
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5145435	N/A	2017/09/01	Neil Dassanayake
Phenols (4AAP)	TECH/PHEN	5149312	N/A	2017/09/05	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147108	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil

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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

TEST SUMMARY

Maxxam ID: FAQ920
Sample ID: A0205 SW7
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144953	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ920 Dup
Sample ID: A0205 SW7
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	5145431	N/A	2017/09/01	Neil Dassanayake
pH	AT	5145435	N/A	2017/09/01	Neil Dassanayake
Sulphide	ISE/S	5147108	N/A	2017/09/01	Tahir Anwar
Turbidity	AT	5144953	N/A	2017/09/01	Neil Dassanayake

Maxxam ID: FAQ921
Sample ID: A0207 RR3
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/09/01	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/09/01	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5149312	N/A	2017/09/05	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

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TEST SUMMARY

Maxxam ID: FAQ924
Sample ID: A0210 RR2
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/09/01	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/09/01	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5149581	N/A	2017/09/05	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147077	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144953	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

Maxxam ID: FAQ924 Dup
Sample ID: A0210 RR2
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	5149581	N/A	2017/09/05	Zahid Soikot

Maxxam ID: FAQ925
Sample ID: A0211 SW1
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5145294	N/A	2017/09/05	Thao Nguyen
Alkalinity	AT	5144635	N/A	2017/09/01	Yogesh Patel
Chromium (VI) in Water	IC	5143285	N/A	2017/09/01	Lang Le
Free (WAD) Cyanide	SKAL/CN	5145356	N/A	2017/09/01	Xuanhong Qiu
Dissolved Oxygen	DO	5144212	2017/08/30	2017/08/30	Frank Zhang
Hardness (calculated as CaCO3)		5142464	N/A	2017/09/05	Automated Statchk
Mercury	CV/AA	5145164	2017/08/31	2017/09/05	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5145102	N/A	2017/08/31	Prempal Bhatti
Total Ammonia-N	LACH/NH4	5145881	N/A	2017/09/01	Charles Opoku-Ware
pH	AT	5144642	N/A	2017/09/01	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5144786	N/A	2017/08/31	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil
Sulphide	ISE/S	5147108	N/A	2017/09/01	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/29	Antonella Brasil

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TEST SUMMARY

Maxxam ID: FAQ925
Sample ID: A0211 SW1
Matrix: Water

Collected: 2017/08/29
Shipped:
Received: 2017/08/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	5144836	2017/08/31	2017/09/01	Amanpreet Sappal
Turbidity	AT	5144606	N/A	2017/08/31	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5143055	2017/09/07	2017/09/07	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5142779	N/A	2017/09/01	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5142771	N/A	2017/09/05	Juan Pangilinan

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GENERAL COMMENTS

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

Package 1	18.3°C
Package 2	6.0°C
Package 3	19.0°C

Cooler custody seal was present and intact.

Results relate only to the items tested.

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Maxxam Job #: B7I8519
Report Date: 2017/09/07

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5142771	JPN	Matrix Spike [FAQ916-10]	Acrolein	2017/09/05		89	%	60 - 140
5142771	JPN	Spiked Blank	Acrolein	2017/09/05		96	%	60 - 140
5142771	JPN	Method Blank	Acrolein	2017/09/05	ND, RDL=10		ug/L	
5142771	JPN	RPD [FAQ917-10]	Acrolein	2017/09/05	NC		%	30
5142779	JPN	Matrix Spike [FAQ916-10]	4-Bromofluorobenzene	2017/09/01		100	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/01		95	%	70 - 130
			D8-Toluene	2017/09/01		101	%	70 - 130
			Benzene	2017/09/01		103	%	70 - 130
			Bromodichloromethane	2017/09/01		100	%	70 - 130
			Bromoform	2017/09/01		113	%	70 - 130
			Bromomethane	2017/09/01		91	%	60 - 140
			Chlorobenzene	2017/09/01		100	%	70 - 130
			Chloromethane	2017/09/01		96	%	60 - 140
			Dibromochloromethane	2017/09/01		109	%	70 - 130
			1,2-Dichlorobenzene	2017/09/01		100	%	70 - 130
			1,3-Dichlorobenzene	2017/09/01		106	%	70 - 130
			1,4-Dichlorobenzene	2017/09/01		106	%	70 - 130
			1,1-Dichloroethane	2017/09/01		102	%	70 - 130
			1,2-Dichloroethane	2017/09/01		98	%	70 - 130
			1,1-Dichloroethylene	2017/09/01		110	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/01		99	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/01		104	%	70 - 130
			1,2-Dichloropropane	2017/09/01		94	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/01		109	%	70 - 130
			Ethylbenzene	2017/09/01		102	%	70 - 130
			Ethylene Dibromide	2017/09/01		105	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/01		92	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01		91	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/01		95	%	70 - 130
			Styrene	2017/09/01		106	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/01		111	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/01		103	%	70 - 130
			Tetrachloroethylene	2017/09/01		98	%	70 - 130
			Toluene	2017/09/01		100	%	70 - 130
			1,1,1-Trichloroethane	2017/09/01		100	%	70 - 130
			1,1,2-Trichloroethane	2017/09/01		99	%	70 - 130
			Trichloroethylene	2017/09/01		100	%	70 - 130
			Vinyl Chloride	2017/09/01		101	%	70 - 130
			p+m-Xylene	2017/09/01		107	%	70 - 130
			o-Xylene	2017/09/01		105	%	70 - 130
5142779	JPN	Spiked Blank	4-Bromofluorobenzene	2017/09/01		101	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/01		100	%	70 - 130
			D8-Toluene	2017/09/01		99	%	70 - 130
			Benzene	2017/09/01		106	%	70 - 130
			Bromodichloromethane	2017/09/01		105	%	70 - 130
			Bromoform	2017/09/01		119	%	70 - 130
			Bromomethane	2017/09/01		86	%	60 - 140
			Chlorobenzene	2017/09/01		102	%	70 - 130
			Chloromethane	2017/09/01		100	%	60 - 140
			Dibromochloromethane	2017/09/01		114	%	70 - 130
			1,2-Dichlorobenzene	2017/09/01		103	%	70 - 130
			1,3-Dichlorobenzene	2017/09/01		106	%	70 - 130
			1,4-Dichlorobenzene	2017/09/01		106	%	70 - 130
			1,1-Dichloroethane	2017/09/01		106	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichloroethane	2017/09/01		104	%	70 - 130
			1,1-Dichloroethylene	2017/09/01		111	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/01		102	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/01		105	%	70 - 130
			1,2-Dichloropropane	2017/09/01		99	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/01		114	%	70 - 130
			Ethylbenzene	2017/09/01		104	%	70 - 130
			Ethylene Dibromide	2017/09/01		112	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/01		96	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01		102	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/01		106	%	70 - 130
			Styrene	2017/09/01		109	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/01		115	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/01		110	%	70 - 130
			Tetrachloroethylene	2017/09/01		99	%	70 - 130
			Toluene	2017/09/01		101	%	70 - 130
			1,1,1-Trichloroethane	2017/09/01		103	%	70 - 130
			1,1,2-Trichloroethane	2017/09/01		104	%	70 - 130
			Trichloroethylene	2017/09/01		102	%	70 - 130
			Vinyl Chloride	2017/09/01		101	%	70 - 130
			p+m-Xylene	2017/09/01		110	%	70 - 130
			o-Xylene	2017/09/01		108	%	70 - 130
5142779	JPN	Method Blank	4-Bromofluorobenzene	2017/09/01		98	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/01		101	%	70 - 130
			D8-Toluene	2017/09/01		98	%	70 - 130
			Benzene	2017/09/01	ND, RDL=0.10		ug/L	
			Bromodichloromethane	2017/09/01	ND, RDL=0.10		ug/L	
			Bromoform	2017/09/01	ND, RDL=0.20		ug/L	
			Bromomethane	2017/09/01	ND, RDL=0.50		ug/L	
			Chlorobenzene	2017/09/01	ND, RDL=0.10		ug/L	
			Chloromethane	2017/09/01	ND, RDL=0.50		ug/L	
			Dibromochloromethane	2017/09/01	ND, RDL=0.20		ug/L	
			1,2-Dichlorobenzene	2017/09/01	ND, RDL=0.20		ug/L	
			1,3-Dichlorobenzene	2017/09/01	ND, RDL=0.20		ug/L	
			1,4-Dichlorobenzene	2017/09/01	ND, RDL=0.20		ug/L	
			1,1-Dichloroethane	2017/09/01	ND, RDL=0.10		ug/L	
			1,2-Dichloroethane	2017/09/01	ND, RDL=0.20		ug/L	
			1,1-Dichloroethylene	2017/09/01	ND, RDL=0.10		ug/L	
			cis-1,2-Dichloroethylene	2017/09/01	ND, RDL=0.10		ug/L	
			trans-1,2-Dichloroethylene	2017/09/01	ND, RDL=0.10		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichloropropane	2017/09/01	ND, RDL=0.10		ug/L	
			trans-1,3-Dichloropropene	2017/09/01	ND, RDL=0.20		ug/L	
			Ethylbenzene	2017/09/01	ND, RDL=0.10		ug/L	
			Ethylene Dibromide	2017/09/01	ND, RDL=0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2017/09/01	ND, RDL=0.50		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01	ND, RDL=5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/09/01	ND, RDL=0.20		ug/L	
			Styrene	2017/09/01	ND, RDL=0.20		ug/L	
			1,1,1,2-Tetrachloroethane	2017/09/01	ND, RDL=0.20		ug/L	
			1,1,2,2-Tetrachloroethane	2017/09/01	ND, RDL=0.20		ug/L	
			Tetrachloroethylene	2017/09/01	ND, RDL=0.10		ug/L	
			Toluene	2017/09/01	ND, RDL=0.20		ug/L	
			1,1,1-Trichloroethane	2017/09/01	ND, RDL=0.10		ug/L	
			1,1,2-Trichloroethane	2017/09/01	ND, RDL=0.20		ug/L	
			Trichloroethylene	2017/09/01	ND, RDL=0.10		ug/L	
			Vinyl Chloride	2017/09/01	ND, RDL=0.20		ug/L	
			p+m-Xylene	2017/09/01	ND, RDL=0.10		ug/L	
			o-Xylene	2017/09/01	ND, RDL=0.10		ug/L	
5142779	JPN	RPD [FAQ917-10]	Benzene	2017/09/01	NC		%	30
			Bromodichloromethane	2017/09/01	NC		%	30
			Bromoform	2017/09/01	NC		%	30
			Bromomethane	2017/09/01	NC		%	30
			Chlorobenzene	2017/09/01	NC		%	30
			Chloromethane	2017/09/01	NC		%	30
			Dibromochloromethane	2017/09/01	NC		%	30
			1,2-Dichlorobenzene	2017/09/01	NC		%	30
			1,3-Dichlorobenzene	2017/09/01	NC		%	30
			1,4-Dichlorobenzene	2017/09/01	NC		%	30
			1,1-Dichloroethane	2017/09/01	NC		%	30
			1,2-Dichloroethane	2017/09/01	NC		%	30
			1,1-Dichloroethylene	2017/09/01	NC		%	30
			cis-1,2-Dichloroethylene	2017/09/01	NC		%	30
			trans-1,2-Dichloroethylene	2017/09/01	NC		%	30
			1,2-Dichloropropane	2017/09/01	NC		%	30
			trans-1,3-Dichloropropene	2017/09/01	NC		%	30
			Ethylbenzene	2017/09/01	NC		%	30
			Ethylene Dibromide	2017/09/01	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methylene Chloride(Dichloromethane)	2017/09/01	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/09/01	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/09/01	NC		%	30
			Styrene	2017/09/01	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/09/01	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/09/01	NC		%	30
			Tetrachloroethylene	2017/09/01	NC		%	30
			Toluene	2017/09/01	NC		%	30
			1,1,1-Trichloroethane	2017/09/01	NC		%	30
			1,1,2-Trichloroethane	2017/09/01	NC		%	30
			Trichloroethylene	2017/09/01	NC		%	30
			Vinyl Chloride	2017/09/01	NC		%	30
			p+m-Xylene	2017/09/01	NC		%	30
			o-Xylene	2017/09/01	NC		%	30
5143285	LLE	Matrix Spike	Chromium (VI)	2017/09/01		103	%	80 - 120
5143285	LLE	Spiked Blank	Chromium (VI)	2017/09/01		102	%	80 - 120
5143285	LLE	Method Blank	Chromium (VI)	2017/09/01	ND, RDL=0.50		ug/L	
5143285	LLE	RPD	Chromium (VI)	2017/09/01	NC		%	20
5144606	NYS	Spiked Blank	Turbidity	2017/08/31		100	%	85 - 115
5144606	NYS	Method Blank	Turbidity	2017/08/31	ND, RDL=0.1		NTU	
5144606	NYS	RPD	Turbidity	2017/08/31	2.4		%	20
5144635	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2017/08/31		94	%	85 - 115
5144635	YPA	Method Blank	Alkalinity (Total as CaCO3)	2017/08/31	ND, RDL=1.0		mg/L	
5144635	YPA	RPD	Alkalinity (Total as CaCO3)	2017/08/31	0.078		%	20
5144642	YPA	Spiked Blank	pH	2017/08/31		101	%	98 - 103
5144642	YPA	RPD	pH	2017/08/31	0.027		%	N/A
5144772	RON	Matrix Spike	Mercury (Hg)	2017/09/01		107	%	75 - 125
5144772	RON	Spiked Blank	Mercury (Hg)	2017/09/01		101	%	80 - 120
5144772	RON	Method Blank	Mercury (Hg)	2017/09/01	ND, RDL=0.1		ug/L	
5144772	RON	RPD	Mercury (Hg)	2017/09/01	NC		%	20
5144786	ZSK	Matrix Spike	Phenols-4AAP	2017/08/31		99	%	80 - 120
5144786	ZSK	Spiked Blank	Phenols-4AAP	2017/08/31		100	%	85 - 115
5144786	ZSK	Method Blank	Phenols-4AAP	2017/08/31	ND, RDL=0.0010		mg/L	
5144786	ZSK	RPD	Phenols-4AAP	2017/08/31	13		%	20
5144836	ASP	Matrix Spike	Total Phosphorus	2017/09/01		NC	%	80 - 120
5144836	ASP	QC Standard	Total Phosphorus	2017/09/01		94	%	80 - 120
5144836	ASP	Spiked Blank	Total Phosphorus	2017/09/01		94	%	80 - 120
5144836	ASP	Method Blank	Total Phosphorus	2017/09/01	ND, RDL=0.004		mg/L	
5144836	ASP	RPD	Total Phosphorus	2017/09/01	0.24		%	20
5144953	NYS	Spiked Blank	Turbidity	2017/08/31		101	%	85 - 115
5144953	NYS	Method Blank	Turbidity	2017/08/31	ND, RDL=0.1		NTU	
5144953	NYS	RPD [FAQ920-01]	Turbidity	2017/09/01	2.3		%	20
5145102	PBA	Matrix Spike [FAQ916-08]	Total Antimony (Sb)	2017/08/31		99	%	80 - 120
			Total Arsenic (As)	2017/08/31		103	%	80 - 120
			Total Beryllium (Be)	2017/08/31		98	%	80 - 120
			Total Boron (B)	2017/08/31		91	%	80 - 120
			Total Cadmium (Cd)	2017/08/31		101	%	80 - 120
			Total Chromium (Cr)	2017/08/31		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cobalt (Co)	2017/08/31		107	%	80 - 120
			Total Copper (Cu)	2017/08/31		96	%	80 - 120
			Total Iron (Fe)	2017/08/31		103	%	80 - 120
			Total Lead (Pb)	2017/08/31		100	%	80 - 120
			Total Molybdenum (Mo)	2017/08/31		98	%	80 - 120
			Total Nickel (Ni)	2017/08/31		102	%	80 - 120
			Total Selenium (Se)	2017/08/31		108	%	80 - 120
			Total Silver (Ag)	2017/08/31		97	%	80 - 120
			Total Thallium (Tl)	2017/08/31		101	%	80 - 120
			Total Tungsten (W)	2017/08/31		105	%	80 - 120
			Total Uranium (U)	2017/08/31		100	%	80 - 120
			Total Vanadium (V)	2017/08/31		97	%	80 - 120
			Total Zinc (Zn)	2017/08/31		104	%	80 - 120
			Total Zirconium (Zr)	2017/08/31		99	%	80 - 120
5145102	PBA	Spiked Blank	Total Antimony (Sb)	2017/08/31		100	%	80 - 120
			Total Arsenic (As)	2017/08/31		102	%	80 - 120
			Total Beryllium (Be)	2017/08/31		98	%	80 - 120
			Total Boron (B)	2017/08/31		91	%	80 - 120
			Total Cadmium (Cd)	2017/08/31		101	%	80 - 120
			Total Chromium (Cr)	2017/08/31		98	%	80 - 120
			Total Cobalt (Co)	2017/08/31		105	%	80 - 120
			Total Copper (Cu)	2017/08/31		100	%	80 - 120
			Total Iron (Fe)	2017/08/31		103	%	80 - 120
			Total Lead (Pb)	2017/08/31		102	%	80 - 120
			Total Molybdenum (Mo)	2017/08/31		98	%	80 - 120
			Total Nickel (Ni)	2017/08/31		101	%	80 - 120
			Total Selenium (Se)	2017/08/31		107	%	80 - 120
			Total Silver (Ag)	2017/08/31		98	%	80 - 120
			Total Thallium (Tl)	2017/08/31		102	%	80 - 120
			Total Tungsten (W)	2017/08/31		103	%	80 - 120
			Total Uranium (U)	2017/08/31		102	%	80 - 120
			Total Vanadium (V)	2017/08/31		96	%	80 - 120
			Total Zinc (Zn)	2017/08/31		104	%	80 - 120
			Total Zirconium (Zr)	2017/08/31		99	%	80 - 120
5145102	PBA	Method Blank	Total Antimony (Sb)	2017/08/31	ND, RDL=0.50		ug/L	
			Total Arsenic (As)	2017/08/31	ND, RDL=1.0		ug/L	
			Total Beryllium (Be)	2017/08/31	ND, RDL=0.50		ug/L	
			Total Boron (B)	2017/08/31	ND, RDL=10		ug/L	
			Total Cadmium (Cd)	2017/08/31	ND, RDL=0.10		ug/L	
			Total Chromium (Cr)	2017/08/31	ND, RDL=5.0		ug/L	
			Total Cobalt (Co)	2017/08/31	ND, RDL=0.50		ug/L	
			Total Copper (Cu)	2017/08/31	ND, RDL=1.0		ug/L	
			Total Iron (Fe)	2017/08/31	ND, RDL=100		ug/L	
			Total Lead (Pb)	2017/08/31	ND, RDL=0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Molybdenum (Mo)	2017/08/31	ND, RDL=0.50		ug/L	
			Total Nickel (Ni)	2017/08/31	ND, RDL=1.0		ug/L	
			Total Selenium (Se)	2017/08/31	ND, RDL=2.0		ug/L	
			Total Silver (Ag)	2017/08/31	ND, RDL=0.10		ug/L	
			Total Thallium (Tl)	2017/08/31	ND, RDL=0.050		ug/L	
			Total Tungsten (W)	2017/08/31	ND, RDL=1.0		ug/L	
			Total Uranium (U)	2017/08/31	ND, RDL=0.10		ug/L	
			Total Vanadium (V)	2017/08/31	ND, RDL=0.50		ug/L	
			Total Zinc (Zn)	2017/08/31	ND, RDL=5.0		ug/L	
			Total Zirconium (Zr)	2017/08/31	ND, RDL=1.0		ug/L	
5145102	PBA	RPD [FAQ916-08]	Total Antimony (Sb)	2017/08/31	NC		%	20
			Total Arsenic (As)	2017/08/31	NC		%	20
			Total Beryllium (Be)	2017/08/31	NC		%	20
			Total Boron (B)	2017/08/31	0.23		%	20
			Total Cadmium (Cd)	2017/08/31	NC		%	20
			Total Chromium (Cr)	2017/08/31	NC		%	20
			Total Cobalt (Co)	2017/08/31	NC		%	20
			Total Copper (Cu)	2017/08/31	NC		%	20
			Total Iron (Fe)	2017/08/31	NC		%	20
			Total Lead (Pb)	2017/08/31	NC		%	20
			Total Molybdenum (Mo)	2017/08/31	NC		%	20
			Total Nickel (Ni)	2017/08/31	NC		%	20
			Total Selenium (Se)	2017/08/31	NC		%	20
			Total Silver (Ag)	2017/08/31	NC		%	20
			Total Thallium (Tl)	2017/08/31	NC		%	20
			Total Tungsten (W)	2017/08/31	NC		%	20
			Total Uranium (U)	2017/08/31	5.1		%	20
			Total Vanadium (V)	2017/08/31	NC		%	20
			Total Zinc (Zn)	2017/08/31	NC		%	20
			Total Zirconium (Zr)	2017/08/31	NC		%	20
5145164	RON	Matrix Spike	Mercury (Hg)	2017/09/05		99	%	75 - 125
5145164	RON	Spiked Blank	Mercury (Hg)	2017/09/05		109	%	80 - 120
5145164	RON	Method Blank	Mercury (Hg)	2017/09/05	ND, RDL=0.1		ug/L	
5145164	RON	RPD	Mercury (Hg)	2017/09/05	NC		%	20
5145294	TNG	Matrix Spike [FAQ917-01]	Dissolved (0.2u) Aluminum (Al)	2017/09/05		101	%	80 - 120
5145294	TNG	Spiked Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/01		96	%	80 - 120
5145294	TNG	Method Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/05	ND,RDL=5		ug/L	
5145294	TNG	RPD [FAQ917-01]	Dissolved (0.2u) Aluminum (Al)	2017/09/05	NC		%	20
5145356	XQI	Matrix Spike [FAQ916-07]	WAD Cyanide (Free)	2017/09/01		104	%	80 - 120
5145356	XQI	Spiked Blank	WAD Cyanide (Free)	2017/09/01		101	%	80 - 120
5145356	XQI	Method Blank	WAD Cyanide (Free)	2017/09/01	ND,RDL=1		ug/L	
5145356	XQI	RPD [FAQ916-07]	WAD Cyanide (Free)	2017/09/01	NC		%	20
5145431	NYS	Spiked Blank	Alkalinity (Total as CaCO3)	2017/09/01		95	%	85 - 115

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5145431	NYS	Method Blank	Alkalinity (Total as CaCO3)	2017/09/01	ND, RDL=1.0		mg/L	
5145431	NYS	RPD [FAQ920-01]	Alkalinity (Total as CaCO3)	2017/09/01	0.65		%	20
5145435	NYS	Spiked Blank	pH	2017/09/01		102	%	98 - 103
5145435	NYS	RPD [FAQ920-01]	pH	2017/09/01	0.16		%	N/A
5145881	COP	Matrix Spike	Total Ammonia-N	2017/09/01		85	%	80 - 120
5145881	COP	Spiked Blank	Total Ammonia-N	2017/09/01		103	%	85 - 115
5145881	COP	Method Blank	Total Ammonia-N	2017/09/01	ND, RDL=0.050		mg/L	
5145881	COP	RPD	Total Ammonia-N	2017/09/01	0.65		%	20
5147077	TA1	Matrix Spike	Sulphide	2017/09/01		91	%	80 - 120
5147077	TA1	Spiked Blank	Sulphide	2017/09/01		92	%	80 - 120
5147077	TA1	Method Blank	Sulphide	2017/09/01	ND, RDL=0.020		mg/L	
5147077	TA1	RPD	Sulphide	2017/09/01	3.6		%	20
5147108	TA1	Matrix Spike [FAQ920-05]	Sulphide	2017/09/01		92	%	80 - 120
5147108	TA1	Spiked Blank	Sulphide	2017/09/01		92	%	80 - 120
5147108	TA1	Method Blank	Sulphide	2017/09/01	ND, RDL=0.020		mg/L	
5147108	TA1	RPD [FAQ920-05]	Sulphide	2017/09/01	NC		%	20
5148683	PBA	Matrix Spike [FAQ918-01]	Dissolved (0.2u) Aluminum (Al)	2017/09/05		101	%	80 - 120
5148683	PBA	Spiked Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/05		101	%	80 - 120
5148683	PBA	Method Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/05	ND,RDL=5		ug/L	
5148683	PBA	RPD [FAQ918-01]	Dissolved (0.2u) Aluminum (Al)	2017/09/05	20		%	20
5149312	ZSK	Matrix Spike	Phenols-4AAP	2017/09/05		104	%	80 - 120
5149312	ZSK	Spiked Blank	Phenols-4AAP	2017/09/05		103	%	85 - 115
5149312	ZSK	Method Blank	Phenols-4AAP	2017/09/05	ND, RDL=0.0010		mg/L	
5149312	ZSK	RPD	Phenols-4AAP	2017/09/05	NC		%	20
5149581	ZSK	Matrix Spike [FAQ924-03]	Phenols-4AAP	2017/09/05		100	%	80 - 120
5149581	ZSK	Spiked Blank	Phenols-4AAP	2017/09/05		100	%	85 - 115
5149581	ZSK	Method Blank	Phenols-4AAP	2017/09/05	ND, RDL=0.0010		mg/L	
5149581	ZSK	RPD [FAQ924-03]	Phenols-4AAP	2017/09/05	5.1		%	20

N/A = Not Applicable

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

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

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

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

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

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

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

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

VALIDATION SIGNATURE PAGE

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

Cristina Carriere, Scientific Service Specialist

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Maxxam
A Bureau Veritas Group Company

Your Project #: 10888
Your C.O.C. #: 625117-02-01

Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
Mississauga, ON
CANADA L5N 3A9

Report Date: 2017/09/12
Report #: R4695495
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J0329
Received: 2017/08/31, 16:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dissolved Aluminum (0.2 u, clay free)	3	N/A	2017/09/06	CAM SOP-00447	EPA 6020B m
Alkalinity	1	N/A	2017/09/05	CAM SOP-00448	SM 22 2320 B m
Alkalinity	2	N/A	2017/09/06	CAM SOP-00448	SM 22 2320 B m
Chromium (VI) in Water	3	N/A	2017/09/07	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	3	N/A	2017/09/06	CAM SOP-00457	OMOE E3015 m
Dissolved Oxygen	3	2017/09/01	2017/09/01	CAM SOP-00427	SM 22 4500 O G m
Hardness (calculated as CaCO3)	3	N/A	2017/09/06	CAM SOP 00102/00408/00447	SM 2340 B
Mercury	3	2017/09/06	2017/09/07	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by ICPMS	3	N/A	2017/09/06	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	1	N/A	2017/09/06	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N	2	N/A	2017/09/07	CAM SOP-00441	EPA GS I-2522-90 m
pH	1	N/A	2017/09/05	CAM SOP-00413	SM 4500H+ B m
pH	2	N/A	2017/09/06	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	3	N/A	2017/09/06	CAM SOP-00444	OMOE E3179 m
Field pH (1)	3	N/A	2017/09/01		Field pH Meter
Sulphide	3	N/A	2017/09/02	CAM SOP-00455	SM 22 4500-S G m
Field Temperature (1)	3	N/A	2017/09/01		Field Thermometer
Total Phosphorus (Colourimetric)	3	2017/09/05	2017/09/05	CAM SOP-00407	SM 22 4500 P B H m
Turbidity	3	N/A	2017/09/01	CAM SOP-00417	SM 22 2130 B m
Un-ionized Ammonia	3	2017/09/01	2017/09/12		
Volatile Organic Compounds in Water	3	N/A	2017/09/06	CAM SOP-00226	EPA 8260C m
Non-Routine Volatile Organic Compounds	3	N/A	2017/09/06	CAM SOP-00226	EPA 8260 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

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Your Project #: 10888
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Attention:Reporting Group

AEL Environment
1705 Argentia Rd
Unit 3
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Report Date: 2017/09/12
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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7J0329
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indicated otherwise, associated sample data are not blank corrected.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This is a field test, therefore, the results relate to items that were not analysed at Maxxam Analytics Inc.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Antonella Brasil, Senior Project Manager
Email: ABrasil@maxxam.ca
Phone# (905)817-5817
==
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Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID			FAZ340	FAZ340			FAZ341			
Sampling Date			2017/08/31 07:30	2017/08/31 07:30			2017/08/31 13:10			
COC Number			625117-02-01	625117-02-01			625117-02-01			
	UNITS	Criteria	A0237-SW3	A0237-SW3 Lab-Dup	RDL	QC Batch	A0239-LOCK 1	RDL	MDL	QC Batch
Calculated Parameters										
Hardness (CaCO3)	mg/L	-	180		1.0	5146840	110	1.0	1.0	5146840
Total Un-ionized Ammonia	mg/L	-	0.046		0.0053	5146841	0.014	0.0051	N/A	5146841
Field Measurements										
Field Temperature	Celcius	-	20.57		N/A	ONSITE	21.94	N/A	N/A	ONSITE
Field pH	pH	6.5:8.5	8.36			ONSITE	8.30			ONSITE
Inorganics										
Total Ammonia-N	mg/L	-	0.44		0.050	5148602	0.14	0.050	0.0080	5148225
Dissolved Oxygen	mg/L	-	4.57			5147470	8.44			5147470
pH	pH	6.5:8.5	7.81			5148269	8.04			5148269
Phenols-4AAP	mg/L	0.001	ND	ND	0.0010	5151964	0.0024	0.0010	0.00060	5151964
Total Phosphorus	mg/L	0.01	0.025		0.004	5149317	0.013	0.004	0.002	5149317
Sulphide	mg/L	0.02	ND		0.020	5148084	ND	0.020	0.010	5148084
Turbidity	NTU	-	8.4		0.1	5147493	0.6	0.1	0.1	5147493
WAD Cyanide (Free)	ug/L	5	ND		1	5150275	ND	1	0.4	5150275
Alkalinity (Total as CaCO3)	mg/L	-	160		1.0	5148260	92	1.0	0.20	5148260
Metals										
Dissolved (0.2u) Aluminum (Al)	ug/L	15	ND		5	5150227	7	5	N/A	5150227
Chromium (VI)	ug/L	1	ND		0.50	5152223	ND	0.50	0.30	5152223
Mercury (Hg)	ug/L	0.2	ND		0.1	5151311	ND	0.1	0.02	5151311
Total Antimony (Sb)	ug/L	20	ND		0.50	5149536	ND	0.50	0.30	5149536
Total Arsenic (As)	ug/L	100	ND		1.0	5149536	ND	1.0	0.50	5149536
Total Beryllium (Be)	ug/L	11	ND		0.50	5149536	ND	0.50	0.10	5149536
Total Boron (B)	ug/L	200	20		10	5149536	13	10	0.30	5149536
Total Cadmium (Cd)	ug/L	0.2	ND		0.10	5149536	ND	0.10	0.090	5149536
Total Chromium (Cr)	ug/L	-	ND		5.0	5149536	ND	5.0	5.0	5149536
Total Cobalt (Co)	ug/L	0.9	0.51		0.50	5149536	ND	0.50	0.10	5149536
Total Copper (Cu)	ug/L	5	ND		1.0	5149536	ND	1.0	0.50	5149536
Total Iron (Fe)	ug/L	300	2800		100	5149536	150	100	10	5149536
Total Lead (Pb)	ug/L	5	ND		0.50	5149536	ND	0.50	0.10	5149536
Total Molybdenum (Mo)	ug/L	40	ND		0.50	5149536	ND	0.50	0.20	5149536

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
N/A = Not Applicable
ND = Not detected

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID			FAZ340	FAZ340			FAZ341			
Sampling Date			2017/08/31 07:30	2017/08/31 07:30			2017/08/31 13:10			
COC Number			625117-02-01	625117-02-01			625117-02-01			
	UNITS	**Criteria**	**A0237-SW3**	**A0237-SW3 Lab-Dup**	**RDL**	**QC Batch**	**A0239-LOCK 1**	**RDL**	**MDL**	**QC Batch**
Total Nickel (Ni)	ug/L	25	1.6		1.0	5149536	ND	1.0	0.50	5149536
Total Selenium (Se)	ug/L	100	ND		2.0	5149536	ND	2.0	0.50	5149536
Total Silver (Ag)	ug/L	0.1	ND		0.10	5149536	ND	0.10	0.070	5149536
Total Thallium (Tl)	ug/L	0.3	ND		0.050	5149536	ND	0.050	0.020	5149536
Total Tungsten (W)	ug/L	30	ND		1.0	5149536	ND	1.0	0.50	5149536
Total Uranium (U)	ug/L	5	ND		0.10	5149536	0.11	0.10	0.050	5149536
Total Vanadium (V)	ug/L	6	0.64		0.50	5149536	0.78	0.50	0.40	5149536
Total Zinc (Zn)	ug/L	30	5.5		5.0	5149536	ND	5.0	3.0	5149536
Total Zirconium (Zr)	ug/L	4	ND		1.0	5149536	ND	1.0	0.50	5149536

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
ND = Not detected

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Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

PWQO METALS AND INORGANICS (WATER)

Maxxam ID			FAZ341		FAZ342			
Sampling Date			2017/08/31 13:10		2017/08/31 13:12			
COC Number			625117-02-01		625117-02-01			
	UNITS	**Criteria**	**A0239-LOCK 1 Lab-Dup**	**QC Batch**	**A0249-LOCK 1**	**RDL**	**MDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	-		5146840	110	1.0	1.0	5146840
Total Un-ionized Ammonia	mg/L	-		5146841	ND	0.0051	N/A	5146841
Field Measurements								
Field Temperature	Celcius	-		ONSITE	21.94	N/A	N/A	ONSITE
Field pH	pH	6.5:8.5		ONSITE	8.30			ONSITE
Inorganics								
Total Ammonia-N	mg/L	-		5148225	ND	0.050	0.0080	5148602
Dissolved Oxygen	mg/L	-	8.45	5147470	8.52			5147470
pH	pH	6.5:8.5		5148269	8.04			5149933
Phenols-4AAP	mg/L	0.001		5151964	0.0021	0.0010	0.00060	5151964
Total Phosphorus	mg/L	0.01		5149317	0.019	0.004	0.002	5149317
Sulphide	mg/L	0.02		5148084	ND	0.020	0.010	5148084
Turbidity	NTU	-		5147493	0.5	0.1	0.1	5147493
WAD Cyanide (Free)	ug/L	5		5150275	ND	1	0.4	5150275
Alkalinity (Total as CaCO3)	mg/L	-		5148260	92	1.0	0.20	5149870
Metals								
Dissolved (0.2u) Aluminum (Al)	ug/L	15		5150227	7	5	N/A	5150227
Chromium (VI)	ug/L	1		5152223	ND	0.50	0.30	5152223
Mercury (Hg)	ug/L	0.2		5151311	ND	0.1	0.02	5151311
Total Antimony (Sb)	ug/L	20		5149536	ND	0.50	0.30	5149536
Total Arsenic (As)	ug/L	100		5149536	ND	1.0	0.50	5149536
Total Beryllium (Be)	ug/L	11		5149536	ND	0.50	0.10	5149536
Total Boron (B)	ug/L	200		5149536	13	10	0.30	5149536
Total Cadmium (Cd)	ug/L	0.2		5149536	ND	0.10	0.090	5149536
Total Chromium (Cr)	ug/L	-		5149536	ND	5.0	5.0	5149536
Total Cobalt (Co)	ug/L	0.9		5149536	ND	0.50	0.10	5149536
Total Copper (Cu)	ug/L	5		5149536	ND	1.0	0.50	5149536
Total Iron (Fe)	ug/L	300		5149536	140	100	10	5149536
Total Lead (Pb)	ug/L	5		5149536	ND	0.50	0.10	5149536
Total Molybdenum (Mo)	ug/L	40		5149536	ND	0.50	0.20	5149536

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
ND = Not detected
N/A = Not Applicable

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PWQO METALS AND INORGANICS (WATER)

Maxxam ID			FAZ341		FAZ342			
Sampling Date			2017/08/31 13:10		2017/08/31 13:12			
COC Number			625117-02-01		625117-02-01			
	UNITS	**Criteria**	**A0239-LOCK 1 Lab-Dup**	**QC Batch**	**A0249-LOCK 1**	**RDL**	**MDL**	**QC Batch**
Total Nickel (Ni)	ug/L	25		5149536	ND	1.0	0.50	5149536
Total Selenium (Se)	ug/L	100		5149536	ND	2.0	0.50	5149536
Total Silver (Ag)	ug/L	0.1		5149536	ND	0.10	0.070	5149536
Total Thallium (Tl)	ug/L	0.3		5149536	ND	0.050	0.020	5149536
Total Tungsten (W)	ug/L	30		5149536	ND	1.0	0.50	5149536
Total Uranium (U)	ug/L	5		5149536	0.11	0.10	0.050	5149536
Total Vanadium (V)	ug/L	6		5149536	0.88	0.50	0.40	5149536
Total Zinc (Zn)	ug/L	30		5149536	ND	5.0	3.0	5149536
Total Zirconium (Zr)	ug/L	4		5149536	ND	1.0	0.50	5149536

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999
ND = Not detected

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Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

PWQO VOCS (WATER)

Maxxam ID			FAZ340	FAZ341	FAZ341	FAZ342			
Sampling Date			2017/08/31 07:30	2017/08/31 13:10	2017/08/31 13:10	2017/08/31 13:12			
COC Number			625117-02-01	625117-02-01	625117-02-01	625117-02-01			
	UNITS	**Criteria**	**A0237-SW3**	**A0239-LOCK 1**	**A0239-LOCK 1 Lab-Dup**	**A0249-LOCK 1**	**RDL**	**MDL**	**QC Batch**
Volatile Organics									
Benzene	ug/L	100	ND	ND	ND	ND	0.10	0.020	5148484
Bromodichloromethane	ug/L	200	ND	ND	ND	ND	0.10	0.050	5148484
Acrolein	ug/L	0.03	**ND (1)**	**ND (1)**	**ND (1)**	**ND (1)**	10	N/A	5148486
Bromoform	ug/L	60	ND	ND	ND	ND	0.20	0.10	5148484
Bromomethane	ug/L	0.9	ND	ND	ND	ND	0.50	0.10	5148484
Chlorobenzene	ug/L	15	ND	ND	ND	ND	0.10	0.010	5148484
Chloromethane	ug/L	700	ND	ND	ND	ND	0.50	0.050	5148484
Dibromochloromethane	ug/L	40	ND	ND	ND	ND	0.20	0.050	5148484
1,2-Dichlorobenzene	ug/L	2.5	ND	ND	ND	ND	0.20	0.050	5148484
1,3-Dichlorobenzene	ug/L	2.5	ND	ND	ND	ND	0.20	0.050	5148484
1,4-Dichlorobenzene	ug/L	4	ND	ND	ND	ND	0.20	0.050	5148484
1,1-Dichloroethane	ug/L	200	ND	ND	ND	ND	0.10	0.050	5148484
1,2-Dichloroethane	ug/L	100	ND	ND	ND	ND	0.20	0.050	5148484
1,1-Dichloroethylene	ug/L	40	ND	ND	ND	ND	0.10	0.050	5148484
cis-1,2-Dichloroethylene	ug/L	200	ND	ND	ND	ND	0.10	0.050	5148484
trans-1,2-Dichloroethylene	ug/L	200	ND	ND	ND	ND	0.10	0.050	5148484
1,2-Dichloropropane	ug/L	0.7	ND	ND	ND	ND	0.10	0.050	5148484
trans-1,3-Dichloropropene	ug/L	7	ND	ND	ND	ND	0.20	0.050	5148484
Ethylbenzene	ug/L	8	ND	ND	ND	ND	0.10	0.010	5148484
Ethylene Dibromide	ug/L	5	ND	ND	ND	ND	0.20	0.050	5148484
Methylene Chloride(Dichloromethane)	ug/L	100	ND	ND	ND	ND	0.50	0.10	5148484
Methyl Ethyl Ketone (2-Butanone)	ug/L	400	ND	ND	ND	ND	5.0	0.50	5148484
Methyl t-butyl ether (MTBE)	ug/L	200	ND	ND	ND	ND	0.20	0.050	5148484
Styrene	ug/L	4	ND	ND	ND	ND	0.20	0.050	5148484
1,1,1,2-Tetrachloroethane	ug/L	20	ND	ND	ND	ND	0.20	0.050	5148484
1,1,2,2-Tetrachloroethane	ug/L	70	ND	ND	ND	ND	0.20	0.050	5148484
Tetrachloroethylene	ug/L	50	ND	ND	ND	ND	0.10	0.050	5148484
Toluene	ug/L	0.8	0.30	ND	ND	ND	0.20	0.010	5148484
1,1,1-Trichloroethane	ug/L	10	ND	ND	ND	ND	0.10	0.050	5148484

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QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
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ND = Not detected
N/A = Not Applicable
(1) RDL exceeds criteria

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PWQO VOCS (WATER)

Maxxam ID			FAZ340	FAZ341	FAZ341	FAZ342			
Sampling Date			2017/08/31 07:30	2017/08/31 13:10	2017/08/31 13:10	2017/08/31 13:12			
COC Number			625117-02-01	625117-02-01	625117-02-01	625117-02-01			
	UNITS	**Criteria**	**A0237-SW3**	**A0239-LOCK 1**	**A0239-LOCK 1 Lab-Dup**	**A0249-LOCK 1**	**RDL**	**MDL**	**QC Batch**
1,1,2-Trichloroethane	ug/L	800	ND	ND	ND	ND	0.20	0.050	5148484
Trichloroethylene	ug/L	20	ND	ND	ND	ND	0.10	0.050	5148484
Vinyl Chloride	ug/L	600	ND	ND	ND	ND	0.20	0.050	5148484
p+m-Xylene	ug/L	-	ND	ND	ND	ND	0.10	0.010	5148484
o-Xylene	ug/L	40	ND	ND	ND	ND	0.10	0.010	5148484
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	-	98	99	99	100			5148484
D4-1,2-Dichloroethane	%	-	102	104	105	104			5148484
D8-Toluene	%	-	98	97	98	97			5148484

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Criteria: Ontario Provincial Water Quality Objectives
Ref. to MOEE Water Management document dated Feb.1999

ND = Not detected

TEST SUMMARY

Maxxam ID: FAZ340
Sample ID: A0237-SW3
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5150227	N/A	2017/09/06	Arefa Dabhad
Alkalinity	AT	5148260	N/A	2017/09/06	Yogesh Patel
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5150275	N/A	2017/09/06	Louise Harding
Dissolved Oxygen	DO	5147470	2017/09/01	2017/09/01	Prakash Piya
Hardness (calculated as CaCO3)		5146840	N/A	2017/09/06	Automated Statchk
Mercury	CV/AA	5151311	2017/09/06	2017/09/07	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5149536	N/A	2017/09/06	Arefa Dabhad
Total Ammonia-N	LACH/NH4	5148602	N/A	2017/09/07	Charles Opoku-Ware
pH	AT	5148269	N/A	2017/09/06	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5151964	N/A	2017/09/06	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/31	Antonella Brasil
Sulphide	ISE/S	5148084	N/A	2017/09/02	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/31	Antonella Brasil
Total Phosphorus (Colourimetric)	LACH/P	5149317	2017/09/05	2017/09/05	Amanpreet Sappal
Turbidity	AT	5147493	N/A	2017/09/01	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5146841	2017/09/12	2017/09/12	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5148484	N/A	2017/09/06	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5148486	N/A	2017/09/06	Juan Pangilinan

Maxxam ID: FAZ340 Dup
Sample ID: A0237-SW3
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Phenols (4AAP)	TECH/PHEN	5151964	N/A	2017/09/06	Zahid Soikot

Maxxam ID: FAZ341
Sample ID: A0239-LOCK 1
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5150227	N/A	2017/09/06	Arefa Dabhad
Alkalinity	AT	5148260	N/A	2017/09/06	Yogesh Patel
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5150275	N/A	2017/09/06	Louise Harding
Dissolved Oxygen	DO	5147470	2017/09/01	2017/09/01	Prakash Piya
Hardness (calculated as CaCO3)		5146840	N/A	2017/09/06	Automated Statchk
Mercury	CV/AA	5151311	2017/09/06	2017/09/07	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5149536	N/A	2017/09/06	Arefa Dabhad
Total Ammonia-N	LACH/NH4	5148225	N/A	2017/09/06	Charles Opoku-Ware
pH	AT	5148269	N/A	2017/09/06	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5151964	N/A	2017/09/06	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/31	Antonella Brasil
Sulphide	ISE/S	5148084	N/A	2017/09/02	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/31	Antonella Brasil

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TEST SUMMARY

Maxxam ID: FAZ341
Sample ID: A0239-LOCK 1
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	LACH/P	5149317	2017/09/05	2017/09/05	Amanpreet Sappal
Turbidity	AT	5147493	N/A	2017/09/01	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5146841	2017/09/12	2017/09/12	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5148484	N/A	2017/09/06	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5148486	N/A	2017/09/06	Juan Pangilinan

Maxxam ID: FAZ341 Dup
Sample ID: A0239-LOCK 1
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Oxygen	DO	5147470	2017/09/01	2017/09/01	Prakash Piya
Volatile Organic Compounds in Water	P&T/MS	5148484	N/A	2017/09/06	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5148486	N/A	2017/09/06	Juan Pangilinan

Maxxam ID: FAZ342
Sample ID: A0249-LOCK 1
Matrix: Water

Collected: 2017/08/31
Shipped:
Received: 2017/08/31

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Aluminum (0.2 u, clay free)	ICP/MS	5150227	N/A	2017/09/06	Arefa Dabhad
Alkalinity	AT	5149870	N/A	2017/09/05	Yogesh Patel
Chromium (VI) in Water	IC	5152223	N/A	2017/09/07	Lang Le
Free (WAD) Cyanide	SKAL/CN	5150275	N/A	2017/09/06	Louise Harding
Dissolved Oxygen	DO	5147470	2017/09/01	2017/09/01	Prakash Piya
Hardness (calculated as CaCO3)		5146840	N/A	2017/09/06	Automated Statchk
Mercury	CV/AA	5151311	2017/09/06	2017/09/07	Ron Morrison
Total Metals Analysis by ICPMS	ICP/MS	5149536	N/A	2017/09/06	Arefa Dabhad
Total Ammonia-N	LACH/NH4	5148602	N/A	2017/09/07	Charles Opoku-Ware
pH	AT	5149933	N/A	2017/09/05	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	5151964	N/A	2017/09/06	Zahid Soikot
Field pH	PH	ONSITE	N/A	2017/08/31	Automated Statchk
Sulphide	ISE/S	5148084	N/A	2017/09/02	Tahir Anwar
Field pH	PH	ONSITE	N/A	2017/08/31	Automated Statchk
Total Phosphorus (Colourimetric)	LACH/P	5149317	2017/09/05	2017/09/05	Amanpreet Sappal
Turbidity	AT	5147493	N/A	2017/09/01	Neil Dassanayake
Un-ionized Ammonia	CALC/NH3	5146841	2017/09/12	2017/09/12	Automated Statchk
Volatile Organic Compounds in Water	P&T/MS	5148484	N/A	2017/09/06	Juan Pangilinan
Non-Routine Volatile Organic Compounds	P&T/MS	5148486	N/A	2017/09/06	Juan Pangilinan

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GENERAL COMMENTS

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

Package 1	7.0°C

Custody Seal Present but not Intact

Results relate only to the items tested.

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Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5147493	NYS	Spiked Blank	Turbidity	2017/09/01		100	%	85 - 115
5147493	NYS	Method Blank	Turbidity	2017/09/01	ND, RDL=0.1		NTU	
5147493	NYS	RPD	Turbidity	2017/09/01	2.2		%	20
5148084	TA1	Matrix Spike	Sulphide	2017/09/01		86	%	80 - 120
5148084	TA1	Spiked Blank	Sulphide	2017/09/01		96	%	80 - 120
5148084	TA1	Method Blank	Sulphide	2017/09/01	ND, RDL=0.020		mg/L	
5148084	TA1	RPD	Sulphide	2017/09/01	NC		%	20
5148225	COP	Matrix Spike	Total Ammonia-N	2017/09/06		98	%	80 - 120
5148225	COP	Spiked Blank	Total Ammonia-N	2017/09/06		97	%	85 - 115
5148225	COP	Method Blank	Total Ammonia-N	2017/09/06	ND, RDL=0.050		mg/L	
5148225	COP	RPD	Total Ammonia-N	2017/09/06	0.89		%	20
5148260	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2017/09/06		95	%	85 - 115
5148260	YPA	Method Blank	Alkalinity (Total as CaCO3)	2017/09/06	ND, RDL=1.0		mg/L	
5148260	YPA	RPD	Alkalinity (Total as CaCO3)	2017/09/06	1.2		%	20
5148269	YPA	Spiked Blank	pH	2017/09/06		101	%	98 - 103
5148269	YPA	RPD	pH	2017/09/06	0.26		%	N/A
5148484	JPN	Matrix Spike [FAZ340-10]	4-Bromofluorobenzene	2017/09/06		100	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/06		98	%	70 - 130
			D8-Toluene	2017/09/06		100	%	70 - 130
			Benzene	2017/09/06		103	%	70 - 130
			Bromodichloromethane	2017/09/06		102	%	70 - 130
			Bromoform	2017/09/06		117	%	70 - 130
			Bromomethane	2017/09/06		82	%	60 - 140
			Chlorobenzene	2017/09/06		102	%	70 - 130
			Chloromethane	2017/09/06		91	%	60 - 140
			Dibromochloromethane	2017/09/06		112	%	70 - 130
			1,2-Dichlorobenzene	2017/09/06		101	%	70 - 130
			1,3-Dichlorobenzene	2017/09/06		107	%	70 - 130
			1,4-Dichlorobenzene	2017/09/06		107	%	70 - 130
			1,1-Dichloroethane	2017/09/06		101	%	70 - 130
			1,2-Dichloroethane	2017/09/06		101	%	70 - 130
			1,1-Dichloroethylene	2017/09/06		105	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/06		99	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/06		102	%	70 - 130
			1,2-Dichloropropane	2017/09/06		97	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/06		111	%	70 - 130
			Ethylbenzene	2017/09/06		102	%	70 - 130
			Ethylene Dibromide	2017/09/06		109	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/06		91	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/06		96	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/06		97	%	70 - 130
			Styrene	2017/09/06		107	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/06		114	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/06		106	%	70 - 130
			Tetrachloroethylene	2017/09/06		96	%	70 - 130
			Toluene	2017/09/06		98	%	70 - 130
			1,1,1-Trichloroethane	2017/09/06		99	%	70 - 130
			1,1,2-Trichloroethane	2017/09/06		102	%	70 - 130
			Trichloroethylene	2017/09/06		100	%	70 - 130
			Vinyl Chloride	2017/09/06		92	%	70 - 130
			p+m-Xylene	2017/09/06		108	%	70 - 130

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Maxxam Job #: B7J0329
Report Date: 2017/09/12

AEL Environment
Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			o-Xylene	2017/09/06		105	%	70 - 130
5148484	JPN	Spiked Blank	4-Bromofluorobenzene	2017/09/06		101	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/06		101	%	70 - 130
			D8-Toluene	2017/09/06		99	%	70 - 130
			Benzene	2017/09/06		106	%	70 - 130
			Bromodichloromethane	2017/09/06		107	%	70 - 130
			Bromoform	2017/09/06		122	%	70 - 130
			Bromomethane	2017/09/06		79	%	60 - 140
			Chlorobenzene	2017/09/06		103	%	70 - 130
			Chloromethane	2017/09/06		95	%	60 - 140
			Dibromochloromethane	2017/09/06		117	%	70 - 130
			1,2-Dichlorobenzene	2017/09/06		104	%	70 - 130
			1,3-Dichlorobenzene	2017/09/06		108	%	70 - 130
			1,4-Dichlorobenzene	2017/09/06		108	%	70 - 130
			1,1-Dichloroethane	2017/09/06		104	%	70 - 130
			1,2-Dichloroethane	2017/09/06		105	%	70 - 130
			1,1-Dichloroethylene	2017/09/06		108	%	70 - 130
			cis-1,2-Dichloroethylene	2017/09/06		101	%	70 - 130
			trans-1,2-Dichloroethylene	2017/09/06		103	%	70 - 130
			1,2-Dichloropropane	2017/09/06		100	%	70 - 130
			trans-1,3-Dichloropropene	2017/09/06		116	%	70 - 130
			Ethylbenzene	2017/09/06		105	%	70 - 130
			Ethylene Dibromide	2017/09/06		114	%	70 - 130
			Methylene Chloride(Dichloromethane)	2017/09/06		94	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2017/09/06		102	%	60 - 140
			Methyl t-butyl ether (MTBE)	2017/09/06		103	%	70 - 130
			Styrene	2017/09/06		110	%	70 - 130
			1,1,1,2-Tetrachloroethane	2017/09/06		117	%	70 - 130
			1,1,2,2-Tetrachloroethane	2017/09/06		112	%	70 - 130
			Tetrachloroethylene	2017/09/06		99	%	70 - 130
			Toluene	2017/09/06		101	%	70 - 130
			1,1,1-Trichloroethane	2017/09/06		102	%	70 - 130
			1,1,2-Trichloroethane	2017/09/06		106	%	70 - 130
			Trichloroethylene	2017/09/06		102	%	70 - 130
			Vinyl Chloride	2017/09/06		94	%	70 - 130
			p+m-Xylene	2017/09/06		111	%	70 - 130
			o-Xylene	2017/09/06		109	%	70 - 130
5148484	JPN	Method Blank	4-Bromofluorobenzene	2017/09/06		98	%	70 - 130
			D4-1,2-Dichloroethane	2017/09/06		99	%	70 - 130
			D8-Toluene	2017/09/06		99	%	70 - 130
			Benzene	2017/09/06	ND, RDL=0.10		ug/L	
			Bromodichloromethane	2017/09/06	ND, RDL=0.10		ug/L	
			Bromoform	2017/09/06	ND, RDL=0.20		ug/L	
			Bromomethane	2017/09/06	ND, RDL=0.50		ug/L	
			Chlorobenzene	2017/09/06	ND, RDL=0.10		ug/L	
			Chloromethane	2017/09/06	ND, RDL=0.50		ug/L	
			Dibromochloromethane	2017/09/06	ND, RDL=0.20		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichlorobenzene	2017/09/06	ND, RDL=0.20		ug/L	
			1,3-Dichlorobenzene	2017/09/06	ND, RDL=0.20		ug/L	
			1,4-Dichlorobenzene	2017/09/06	ND, RDL=0.20		ug/L	
			1,1-Dichloroethane	2017/09/06	ND, RDL=0.10		ug/L	
			1,2-Dichloroethane	2017/09/06	ND, RDL=0.20		ug/L	
			1,1-Dichloroethylene	2017/09/06	ND, RDL=0.10		ug/L	
			cis-1,2-Dichloroethylene	2017/09/06	ND, RDL=0.10		ug/L	
			trans-1,2-Dichloroethylene	2017/09/06	ND, RDL=0.10		ug/L	
			1,2-Dichloropropane	2017/09/06	ND, RDL=0.10		ug/L	
			trans-1,3-Dichloropropene	2017/09/06	ND, RDL=0.20		ug/L	
			Ethylbenzene	2017/09/06	ND, RDL=0.10		ug/L	
			Ethylene Dibromide	2017/09/06	ND, RDL=0.20		ug/L	
			Methylene Chloride(Dichloromethane)	2017/09/06	ND, RDL=0.50		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2017/09/06	ND, RDL=5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2017/09/06	ND, RDL=0.20		ug/L	
			Styrene	2017/09/06	ND, RDL=0.20		ug/L	
			1,1,1,2-Tetrachloroethane	2017/09/06	ND, RDL=0.20		ug/L	
			1,1,2,2-Tetrachloroethane	2017/09/06	ND, RDL=0.20		ug/L	
			Tetrachloroethylene	2017/09/06	ND, RDL=0.10		ug/L	
			Toluene	2017/09/06	ND, RDL=0.20		ug/L	
			1,1,1-Trichloroethane	2017/09/06	ND, RDL=0.10		ug/L	
			1,1,2-Trichloroethane	2017/09/06	ND, RDL=0.20		ug/L	
			Trichloroethylene	2017/09/06	ND, RDL=0.10		ug/L	
			Vinyl Chloride	2017/09/06	ND, RDL=0.20		ug/L	
			p+m-Xylene	2017/09/06	ND, RDL=0.10		ug/L	
			o-Xylene	2017/09/06	ND, RDL=0.10		ug/L	
5148484	JPN	RPD [FAZ341-10]	Benzene	2017/09/06	NC		%	30
			Bromodichloromethane	2017/09/06	NC		%	30
			Bromoform	2017/09/06	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromomethane	2017/09/06	NC		%	30
			Chlorobenzene	2017/09/06	NC		%	30
			Chloromethane	2017/09/06	NC		%	30
			Dibromochloromethane	2017/09/06	NC		%	30
			1,2-Dichlorobenzene	2017/09/06	NC		%	30
			1,3-Dichlorobenzene	2017/09/06	NC		%	30
			1,4-Dichlorobenzene	2017/09/06	NC		%	30
			1,1-Dichloroethane	2017/09/06	NC		%	30
			1,2-Dichloroethane	2017/09/06	NC		%	30
			1,1-Dichloroethylene	2017/09/06	NC		%	30
			cis-1,2-Dichloroethylene	2017/09/06	NC		%	30
			trans-1,2-Dichloroethylene	2017/09/06	NC		%	30
			1,2-Dichloropropane	2017/09/06	NC		%	30
			trans-1,3-Dichloropropene	2017/09/06	NC		%	30
			Ethylbenzene	2017/09/06	NC		%	30
			Ethylene Dibromide	2017/09/06	NC		%	30
			Methylene Chloride(Dichloromethane)	2017/09/06	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2017/09/06	NC		%	30
			Methyl t-butyl ether (MTBE)	2017/09/06	NC		%	30
			Styrene	2017/09/06	NC		%	30
			1,1,1,2-Tetrachloroethane	2017/09/06	NC		%	30
			1,1,2,2-Tetrachloroethane	2017/09/06	NC		%	30
			Tetrachloroethylene	2017/09/06	NC		%	30
			Toluene	2017/09/06	NC		%	30
			1,1,1-Trichloroethane	2017/09/06	NC		%	30
			1,1,2-Trichloroethane	2017/09/06	NC		%	30
			Trichloroethylene	2017/09/06	NC		%	30
			Vinyl Chloride	2017/09/06	NC		%	30
			p+m-Xylene	2017/09/06	NC		%	30
			o-Xylene	2017/09/06	NC		%	30
5148486	JPN	Matrix Spike [FAZ340-10]	Acrolein	2017/09/06		91	%	60 - 140
5148486	JPN	Spiked Blank	Acrolein	2017/09/06		96	%	60 - 140
5148486	JPN	Method Blank	Acrolein	2017/09/06	ND, RDL=10		ug/L	
5148486	JPN	RPD [FAZ341-10]	Acrolein	2017/09/06	NC		%	30
5148602	COP	Matrix Spike	Total Ammonia-N	2017/09/07		100	%	80 - 120
5148602	COP	Spiked Blank	Total Ammonia-N	2017/09/07		99	%	85 - 115
5148602	COP	Method Blank	Total Ammonia-N	2017/09/07	ND, RDL=0.050		mg/L	
5148602	COP	RPD	Total Ammonia-N	2017/09/07	NC		%	20
5149317	ASP	Matrix Spike	Total Phosphorus	2017/09/05		97	%	80 - 120
5149317	ASP	QC Standard	Total Phosphorus	2017/09/05		93	%	80 - 120
5149317	ASP	Spiked Blank	Total Phosphorus	2017/09/05		96	%	80 - 120
5149317	ASP	Method Blank	Total Phosphorus	2017/09/05	ND, RDL=0.004		mg/L	
5149317	ASP	RPD	Total Phosphorus	2017/09/05	NC		%	20
5149536	ADA	Matrix Spike	Total Antimony (Sb)	2017/09/07		103	%	80 - 120
			Total Arsenic (As)	2017/09/07		102	%	80 - 120
			Total Beryllium (Be)	2017/09/07		99	%	80 - 120
			Total Boron (B)	2017/09/07		NC	%	80 - 120
			Total Cadmium (Cd)	2017/09/07		99	%	80 - 120
			Total Chromium (Cr)	2017/09/07		100	%	80 - 120
			Total Cobalt (Co)	2017/09/07		99	%	80 - 120
			Total Copper (Cu)	2017/09/07		99	%	80 - 120
			Total Iron (Fe)	2017/09/07		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Lead (Pb)	2017/09/07		98	%	80 - 120
			Total Molybdenum (Mo)	2017/09/07		106	%	80 - 120
			Total Nickel (Ni)	2017/09/07		97	%	80 - 120
			Total Selenium (Se)	2017/09/07		106	%	80 - 120
			Total Silver (Ag)	2017/09/07		96	%	80 - 120
			Total Thallium (Tl)	2017/09/07		95	%	80 - 120
			Total Tungsten (W)	2017/09/07		103	%	80 - 120
			Total Uranium (U)	2017/09/07		100	%	80 - 120
			Total Vanadium (V)	2017/09/07		101	%	80 - 120
			Total Zinc (Zn)	2017/09/07		100	%	80 - 120
			Total Zirconium (Zr)	2017/09/07		105	%	80 - 120
5149536	ADA	Spiked Blank	Total Antimony (Sb)	2017/09/06		103	%	80 - 120
			Total Arsenic (As)	2017/09/06		101	%	80 - 120
			Total Beryllium (Be)	2017/09/06		102	%	80 - 120
			Total Boron (B)	2017/09/06		98	%	80 - 120
			Total Cadmium (Cd)	2017/09/06		101	%	80 - 120
			Total Chromium (Cr)	2017/09/06		100	%	80 - 120
			Total Cobalt (Co)	2017/09/06		100	%	80 - 120
			Total Copper (Cu)	2017/09/06		103	%	80 - 120
			Total Iron (Fe)	2017/09/06		100	%	80 - 120
			Total Lead (Pb)	2017/09/06		99	%	80 - 120
			Total Molybdenum (Mo)	2017/09/06		106	%	80 - 120
			Total Nickel (Ni)	2017/09/06		101	%	80 - 120
			Total Selenium (Se)	2017/09/06		105	%	80 - 120
			Total Silver (Ag)	2017/09/06		100	%	80 - 120
			Total Thallium (Tl)	2017/09/06		95	%	80 - 120
			Total Tungsten (W)	2017/09/06		101	%	80 - 120
			Total Uranium (U)	2017/09/06		99	%	80 - 120
			Total Vanadium (V)	2017/09/06		100	%	80 - 120
			Total Zinc (Zn)	2017/09/06		102	%	80 - 120
			Total Zirconium (Zr)	2017/09/06		105	%	80 - 120
5149536	ADA	Method Blank	Total Antimony (Sb)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Arsenic (As)	2017/09/06	ND, RDL=1.0		ug/L	
			Total Beryllium (Be)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Boron (B)	2017/09/06	ND, RDL=10		ug/L	
			Total Cadmium (Cd)	2017/09/06	ND, RDL=0.10		ug/L	
			Total Chromium (Cr)	2017/09/06	ND, RDL=5.0		ug/L	
			Total Cobalt (Co)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Copper (Cu)	2017/09/06	ND, RDL=1.0		ug/L	
			Total Iron (Fe)	2017/09/06	ND, RDL=100		ug/L	
			Total Lead (Pb)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Molybdenum (Mo)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Nickel (Ni)	2017/09/06	ND, RDL=1.0		ug/L	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Selenium (Se)	2017/09/06	ND, RDL=2.0		ug/L	
			Total Silver (Ag)	2017/09/06	ND, RDL=0.10		ug/L	
			Total Thallium (Tl)	2017/09/06	ND, RDL=0.050		ug/L	
			Total Tungsten (W)	2017/09/06	ND, RDL=1.0		ug/L	
			Total Uranium (U)	2017/09/06	ND, RDL=0.10		ug/L	
			Total Vanadium (V)	2017/09/06	ND, RDL=0.50		ug/L	
			Total Zinc (Zn)	2017/09/06	ND, RDL=5.0		ug/L	
			Total Zirconium (Zr)	2017/09/06	ND, RDL=1.0		ug/L	
5149536	ADA	RPD	Total Antimony (Sb)	2017/09/06	2.0		%	20
			Total Arsenic (As)	2017/09/06	0.19		%	20
			Total Cadmium (Cd)	2017/09/06	NC		%	20
			Total Chromium (Cr)	2017/09/06	NC		%	20
			Total Cobalt (Co)	2017/09/06	0.59		%	20
			Total Copper (Cu)	2017/09/06	NC		%	20
			Total Iron (Fe)	2017/09/06	0.86		%	20
			Total Lead (Pb)	2017/09/06	NC		%	20
			Total Molybdenum (Mo)	2017/09/06	0.088		%	20
			Total Nickel (Ni)	2017/09/06	13		%	20
			Total Selenium (Se)	2017/09/06	NC		%	20
			Total Silver (Ag)	2017/09/06	NC		%	20
			Total Zinc (Zn)	2017/09/06	NC		%	20
5149870	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2017/09/05		95	%	85 - 115
5149870	YPA	Method Blank	Alkalinity (Total as CaCO3)	2017/09/05	ND, RDL=1.0		mg/L	
5149870	YPA	RPD	Alkalinity (Total as CaCO3)	2017/09/05	1.3		%	20
5149933	YPA	Spiked Blank	pH	2017/09/05		102	%	98 - 103
5149933	YPA	RPD	pH	2017/09/05	0.62		%	N/A
5150227	ADA	Matrix Spike	Dissolved (0.2u) Aluminum (Al)	2017/09/06		113	%	80 - 120
5150227	ADA	Spiked Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/06		104	%	80 - 120
5150227	ADA	Method Blank	Dissolved (0.2u) Aluminum (Al)	2017/09/06	ND,RDL=5		ug/L	
5150227	ADA	RPD	Dissolved (0.2u) Aluminum (Al)	2017/09/06	6.1		%	20
5150275	LHA	Matrix Spike	WAD Cyanide (Free)	2017/09/06		95	%	80 - 120
5150275	LHA	Spiked Blank	WAD Cyanide (Free)	2017/09/06		95	%	80 - 120
5150275	LHA	Method Blank	WAD Cyanide (Free)	2017/09/06	ND,RDL=1		ug/L	
5150275	LHA	RPD	WAD Cyanide (Free)	2017/09/06	NC		%	20
5151311	RON	Matrix Spike	Mercury (Hg)	2017/09/07		105	%	75 - 125
5151311	RON	Spiked Blank	Mercury (Hg)	2017/09/07		96	%	80 - 120
5151311	RON	Method Blank	Mercury (Hg)	2017/09/07	ND, RDL=0.1		ug/L	
5151311	RON	RPD	Mercury (Hg)	2017/09/07	NC		%	20
5151964	ZSK	Matrix Spike [FAZ340-09]	Phenols-4AAP	2017/09/06		97	%	80 - 120
5151964	ZSK	Spiked Blank	Phenols-4AAP	2017/09/06		97	%	85 - 115
5151964	ZSK	Method Blank	Phenols-4AAP	2017/09/06	ND, RDL=0.0010		mg/L	
5151964	ZSK	RPD [FAZ340-09]	Phenols-4AAP	2017/09/06	NC		%	20
5152223	LLE	Matrix Spike	Chromium (VI)	2017/09/07		93	%	80 - 120
5152223	LLE	Spiked Blank	Chromium (VI)	2017/09/07		102	%	80 - 120

Maxxam Job #: B7J0329
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Client Project #: 10888

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5152223	LLE	Method Blank	Chromium (VI)	2017/09/07	ND, RDL=0.50		ug/L	
5152223	LLE	RPD	Chromium (VI)	2017/09/07	NC		%	20

N/A = Not Applicable

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

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

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

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

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

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

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

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

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

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VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

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

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1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367| Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

APPENDIX 4
Benthic Invertebrate Assessment

Old Sly Locks: Rideau River Benthic Invertebrate Assessment

Report prepared for:

AEL Environment
1705 Argentia Road, Unit 3
Mississauga, ON
L5N 3A9

Report prepared by:

ECOMETRIX INCORPORATED
6800 Campobello Road
Mississauga, Ontario
L5N 2L8

Ref : 17-2409
Date: January 2018.

Old Sly Locks: Rideau River
Benthic Invertebrate Assessment

Mike White, Ph.D.
EcoMetrix Incorporated
Aquatic Scientist

Brian Fraser, M.Sc.
EcoMetrix Incorporated
Senior Aquatic Ecologist, Reviewer

EXECUTIVE SUMMARY

Old Sly Locks is located in Smiths Falls, Ontario, and is part of the Rideau Canal system that connects the St. Lawrence River with the Ottawa River. The area adjacent to the lock is a former landfill site and has been monitored since 1994 due to concern that leachate associated with the waste from the landfill may be draining into the aquatic environment.

A benthic invertebrate survey was conducted to evaluate the possible influence of the historic landfill on the benthic invertebrate community. A total of five stations were sampled: one 'least-impacted' upstream lentic station; two canal exposed stations; and, two lotic exposed stations.

Comparison of the exposed lotic stations to a CABIN reference model was not possible as no suitable model existed. Evaluation of biotic endpoints indicated that the benthic invertebrate community at one of the lotic exposed stations may experience anthropogenic impacts as it had very low composition of EPT (Ephemeroptera + Plecoptera + Trichoptera) taxa and a Hilsenhoff BI (Biotic Index) value that indicates 'fairly poor' water quality. The cause of the impact to the benthic invertebrate community may not be due to the historic landfill as many anthropogenic disturbances likely affect this area. No biotic endpoints suggested the benthic community at the second lotic exposed station had appreciable anthropogenic impacts.

Richness and abundance was as high, or higher, at the canal exposed stations than at the upstream 'least-impacted' lentic station. Diversity measures and FFG's (Functional Feeding Groups) were also similar between the upstream station and both canal stations. The community structure at the upstream station was different than that of the two canal stations but such a difference is expected as the upstream station is truly lentic, whereas the canal stations would experience flow in the summer months during canal operation. Hilsenhoff BI values indicated that the upstream lentic station and the canal stations have benthic invertebrate communities that are representative of 'good' to 'fair' water quality conditions.

Based on the evaluation of the biotic endpoints presented in this report it is unlikely that the historical landfill has impacted the benthic invertebrate community of the Old Sly Locks area.

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1.0 INTRODUCTION

Old Sly Locks is located in Smiths Falls, Ontario, and is part of the Rideau Canal system that connects the St. Lawrence River with the Ottawa River. The area adjacent to the lock is a former landfill site and has been monitored since 1994 due to concern that leachate associated with the waste from the landfill may be draining into the aquatic environment.

Sediment monitoring has demonstrated exceedances for various parameters based on Canadian Council of Ministers of the Environment (CCME) and Ministry of the Environment and Climate Change (MOECC) sediment guidelines at a number of locations (Figure 1-1). The sediment exceedances suggest that benthic communities may be influenced by leachate from the historical landfill. Therefore, a benthic community survey was conducted to support a site assessment being conducted by AEL environment.

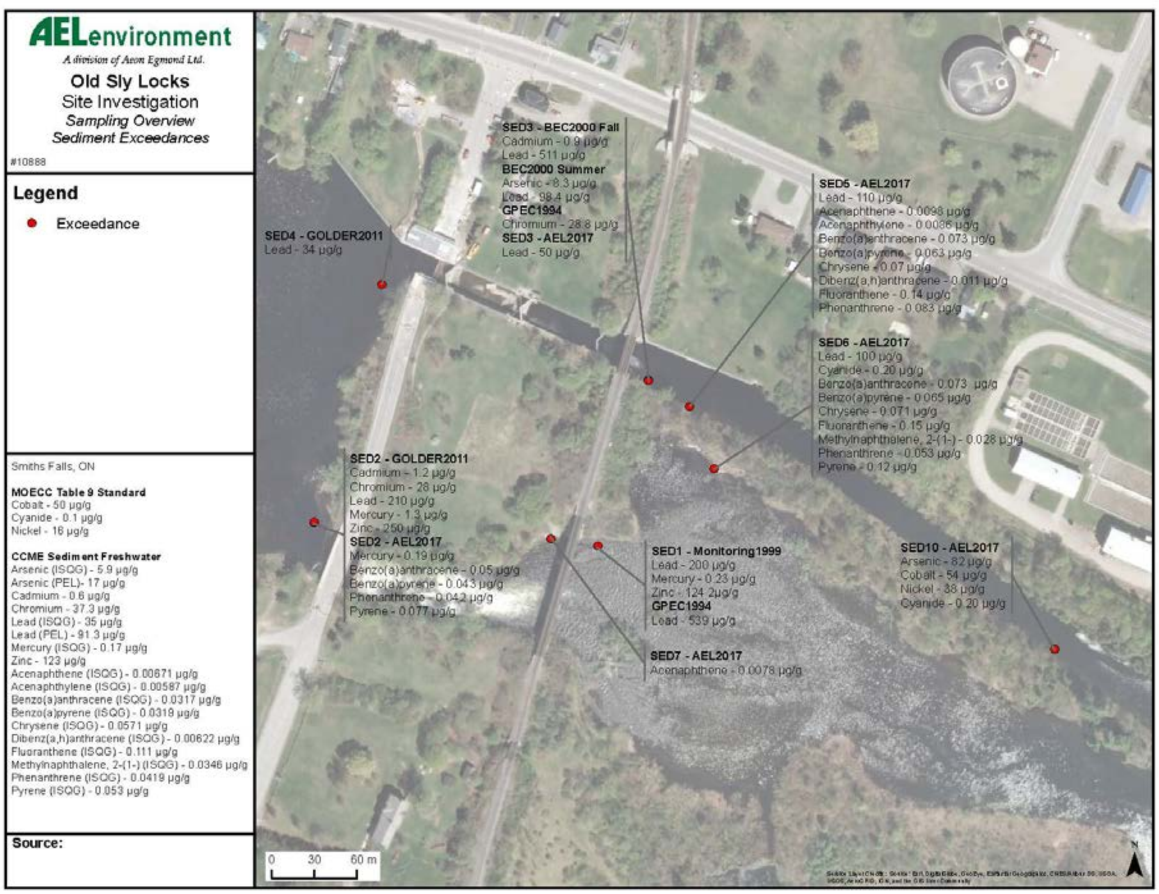


Figure 1-1: Historical sediment monitoring locations, Old Sly Locks, November 2017.

2.0 Methods

2.1 Sampling Locations

Sampling locations were determined based on existing information on sediment quality. A total of five locations were selected for benthic community sampling: SED4 upstream least impacted; SED3, SED5 and SED10 canal exposed; and SED6 lotic exposed (Figure 1-1). At the time of sampling, station SED10 could not be sampled as the water at that location was frozen over; therefore, an additional station was selected for sampling. The additional station was chosen from the three other stations where sediment had previously been sampled. Station SED7 was chosen as the additional station as the flow was typical of that sampled in CABIN reference datasets – SED1 had water too deep and current too fast to properly sample and SED2 is a lentic station.

The final stations sampled represent three area types: an upstream least-impacted lentic station (SED4); two exposed canal stations (SED3 and 5); and, two exposed lotic stations (SED6 and 7).

2.2 Benthic Sampling Procedure

Benthic invertebrate sampling followed the Canadian Aquatic Biomonitoring Network (CABIN) protocol (Environment Canada, 2010), which involves a 3-minute travelling kick into a net with a triangular aperture measuring 36 cm per side and mesh having 400 µm openings. During sampling, the field technician moved across the stream channel (from bank to bank, dependent on stream depth and width) in an upstream direction. With the net being held immediately downstream of the technician's feet, the detritus and invertebrates disturbed from the substrate were passively collected in the kick-net by the stream current. After three minutes of sampling time, the sampler stopped and returned to the stream bank with the sample. The kick-net was rinsed with water to move all debris and invertebrates into the collection cup at the bottom of the net. The collection cup was then removed so the contents could be poured into a labelled plastic jar and preserved in a 10% buffered formalin solution. A single sample was collected at each station. Consistent with the requirements of the CABIN sampling protocol, supporting information was collected concurrent with benthic sampling (Appendix B).

At three of the sampling locations the stream sampling protocol was modified as the area was either lentic (SED4) or had insufficient flow (SED3 and 5) to sequester organisms in the kick-net. At these three stations a lentic sampling procedure was used whereby debris was kicked and collected as the technician conducts 'figure 8 sweeps' to collect dislodged organisms. A timed 3-minute travelling kick sample was collected.

2.3 Laboratory Processing Procedure

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Sue Salter), in Summerland BC, for sorting and taxonomic identification. Taxonomists at Cordillera have achieved certification for Group 1 (general Arthropods West), 2 (EPT East and West), and 3 (Chironomids West) benthic organisms in the

Taxonomic Certification Program (http://nabstcp.atlanticwebfitters.ca/) of the Society for Freshwater Science (formerly the North American Benthological Society). Organisms were identified to the lowest practical level (LPL) (typically genus or species) using up-to-date taxonomic keys.

At the beginning of the sorting process, each sample was examined to estimate total invertebrate numbers. If the total number was estimated to be greater than 600, then the CABIN sub-sampling protocol was followed. The CABIN subsampling procedure requires that a sufficient number of sub-samples be analyzed to result in the sorting of at least 300 organisms (Environment Canada, 2012). Sorting efficiency was calculated for one of the five samples (Environment Canada, 2012).

2.4 Habitat

Water velocity and depth were measured at each station at multiple equidistantly-spaced points along the kick-net transect. Pebble count and other habitat measurements were also taken at each benthic invertebrate sampling location according to CABIN protocols (Environment Canada, 2010). All sampling locations were recorded using a hand-held global positioning system (GPS) unit.

2.5 Water Quality

Field-based water quality measurements were collected at all five benthic invertebrate community stations. Measurements included pH, temperature, dissolved oxygen, conductivity and specific conductance, which were measured using a YSI hand held water quality meter and sonde.

2.6 Biological Endpoints

Benthic invertebrate communities were evaluated using summary metrics calculated at the lowest practical level and family level of taxonomic identifications for the following: mean invertebrate abundance (number of organisms per 3-min kick); mean taxon richness; Simpson's Diversity; and, Evenness. Metric calculation at the lowest practical level, excluded any life stages that could not be conclusively identified as separate taxa. In some instances, for the purposes of data analysis, invertebrate taxa were combined at a generic taxonomic level in order to incorporate abundance associated with indeterminate taxa. This was only done when there were few species in the genus and indeterminates made up a significant proportion of generic abundance. Simpson's diversity and evenness indices were computed from custom MS Excel spreadsheets following the formulae presented by Smith and Wilson (1996) and Environment Canada (2012). These indices take into account both the relative abundance of taxa and the number of taxa.

The relative proportions of the most abundant taxa were also computed (calculated as the abundance of each respective dominant taxon relative to the total number of organisms in the sample). Dominant taxon groups were defined as those groups representing greater than 5% of total organism abundance.

The percent composition of each functional feeding group (FFG) was calculated at the genus level using ‘An Introduction to the Aquatic Insects of North America’ (Merritt *et al*., 2008).

Hilsenhoff’s biotic index (BI) was calculated at the genus level using genus specific tolerance values derived by its prevalence in organically polluted waters (Hilsenhoff, 1987). The BI value for a community is derived using the following calculation:

$BI = \sum(x_i \times t_i)/(n)$

Where:

x_i = number of individuals within a taxon

t_i = tolerance value of a taxon

n = total number of organisms in the sample

The site BI value is then evaluated against the following table:

Table 2-1: Hilsenhoff biotic index values and their relationship with water quality (Hilsenhoff, 1987).

Biotic Index	Water Quality	Degree of Organic Pollution
0.00 - 3.50	Excellent	No apparent organic pollution
3.51 - 4.50	Very good	Possible slight organic pollution
4.51 - 5.50	Good	Some organic pollution
5.51 - 6.50	Fair	Fairly substantial organic pollution
6.51 - 7.50	Fairly poor	Substantial organic pollution
7.51 - 8.50	Poor	Very substantial organic pollution
8.51 - 10.00	Very poor	Severe organic pollution

2.7 Site Assessment Against CABIN RCA Model

The data collected from the Old Sly Locks was input into the CABIN database by Cordillera Consulting. The reference condition approach (RCA) models available on the CABIN database were considered for comparison with the two lotic exposed stations (SED6 and 7) of the Old Sly Locks project.

2.8 Site Assessment Using Biological Endpoints

A descriptive assessment using biological endpoints was provided to allow for inference of possible effects on the benthic invertebrate community due to leachate from the historical landfill. It is expected that the exposed canal stations should demonstrate similarity among endpoint values due to there close proximity and similar habitat. While all calculated endpoints are considered, the Hilsenhoff BI values were used to infer potential community impairment as this organic pollution index performs well in indicating many types of anthropogenic disturbance.

3.0 Results

3.1 Habitat and Water Quality

The habitat of the upstream station (SED4) and the canal stations (SED3 and 5) was similar. All three had rocky substrate with sparse (less than 25%) *Myriophyllum sp.* present. All three stations had no flow (mean water velocity measurement at each area was 0.00 m/s) and mean depths of 43, 50, and 40 cm at stations SED4, SED3, and SED5, respectively (Appendix A). The lotic exposed stations had much different water velocities with mean water velocity for SED6 and SED7 of 0.05 and 0.67 m/s, respectively (Appendix A).

Water temperature was higher at stations SED3 and 5 compared to the other station. This difference may be due to ground water inputs (Table 3-1). Date and time of day are unlikely to explain the difference in temperature as the upstream lentic station (SED4) was sampled on the same day but later in the morning but it's temperature was lower than that of SED3 and 5. The lower dissolved oxygen values at stations SED3 and 5 are explained by the higher water temperature found at these stations, as dissolved oxygen decreases with increasing water temperature. Increased conductivity values were found at stations SED3 and 5, suggesting solute inputs not found at the other stations (Table 3-1).

Table 3-1: Water quality readings taken at time of benthic invertebrate sampling, Old Sly Locks, November 2017.

Area Type	Area ID	Water Temperature (°C)	Dissolved oxygen (mg/L)	Dissolved oxygen (%)	Conductivity (µs/cm)	Specific Conductivity (µs/cm)	pH
Upstream (Lentic)	**SED4**	1.91	15.64	112.8	128	229	8.14
Exposed (Canal)	**SED3**	5.57	10.61	84.3	355	565	7.48
	SED5	5.86	10.66	85	376	593	7.41
Exposed (Lotic)	**SED6**	1.52	14.25	101.7	123	224	7.23
	SED7	1.4	15.01	106.6	122	222	7.95

3.2 CABIN RCA Model

The project "Old Slys" was created and benthic invertebrate community data were entered into the CABIN database by Cordillera Consulting. A total of fifteen RCA models were available; however, no southeastern Ontario model exists. Evaluation of the RCA models available on the CABIN database revealed that none were suitable for evaluation with the lotic exposed stations (SED6 and 7) of the Old Sly Locks project as none included reference stations south of the 46th parallel (in Ontario this is approximately Lake Nipissing).

3.3 Biological Endpoints

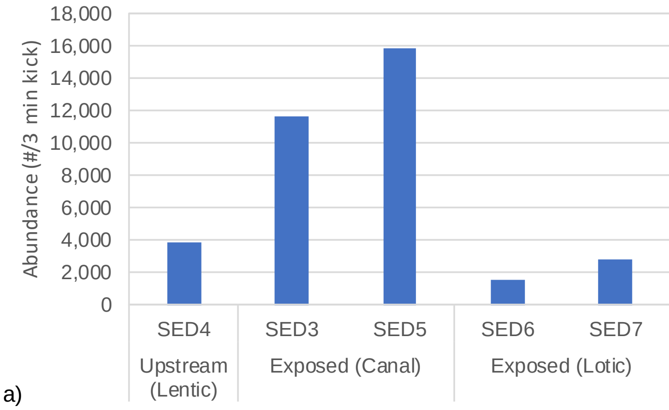
Total abundance was greater at stations SED3 and 5 than the other stations (Figure 3-1 a). Abundance estimates resulting from the use of a kick-net must be interpreted with caution as a kick-net samples semi-quantitatively (Merritt *et al*., 2008). A similar pattern among stations was found for family richness, with stations SED3 and 5 having higher values than the other three stations (Figure 3-1 c). Richness at the LPL level demonstrated more variability between the canal stations, however all stations had similar LPL richness (Figure 3-1 b).

Simpson's diversity was similar across all stations, regardless of taxonomic resolution (Figure 3-2 a and c). Simpson's evenness calculated at LPL suggested that the lentic upstream station (SED4) had similar values to that of both exposed canal stations (SED3 and 5), with all three having slightly lower evenness values than the exposed lotic stations (SED6 and 7; Figure 3-2 b). At the family level of taxonomic resolution, the two canal exposed stations (SED3 and 5) had slightly lower evenness than the upstream lentic station, which was similar to that of the two lotic exposed stations (SED6 and 7; Figure 3-1 d).

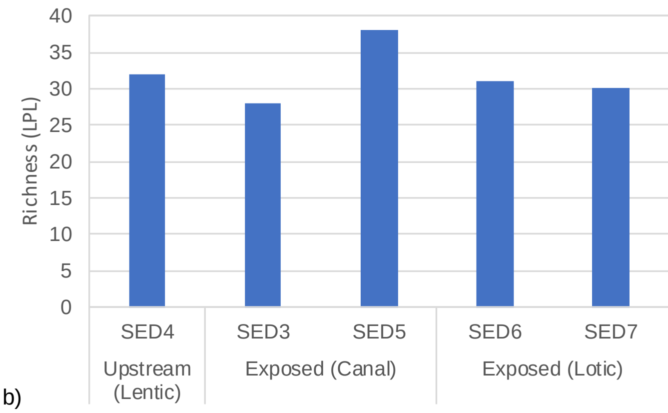
Community composition of the major taxonomic groups indicated that the two exposed canal stations (SED3 and 5) and lotic exposed station SED6 had similar community composition (Figure 3-3 a). All three of these stations were dominated by Ephemeroptera (mean = 48% mayflies), followed by Amphipoda (mean = 34% freshwater shrimp). Community proportion of the upstream lentic station (SED4) was dominated by Amphipoda (67%), followed by Oligocheata (11% worms) and Chironomidae (9% midges). The exposed station SED7 was proportionally dominated by Oligocheata (29%) and Chironomidae (24%). Generally, healthy lotic environments are proportionally dominated by Ephemeroptera, Plecoptera, and Trichoptera taxa (Merritt *et al.*, 2008); therefore, the community composition at station SED7 may be indicative of impaired conditions.

The most dominant FFG among all stations was collector-gatherers (mean = 65%; Figure 3-3 b). Though all stations had similar proportions of FFGs, exposed lotic station SED7 had notably higher proportion of collector-filterer and lower proportion of scrapers. The difference in FFG is attributable to the swift water velocity present at station SED7, which is preferable for most filter feeders (Merrritt *et al*., 2008).

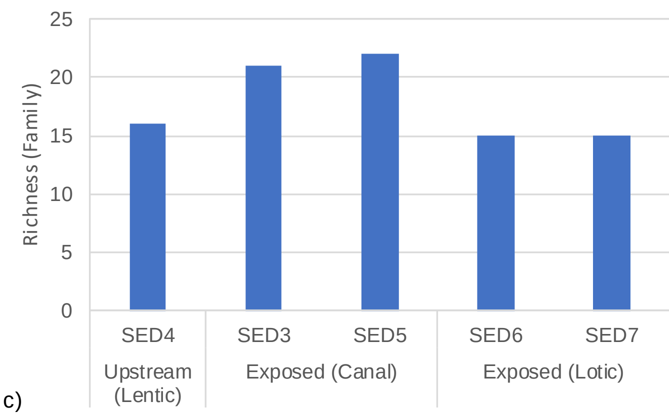
Hilsenhoff biotic index values indicated that the benthic communities present at four of the five stations (SED3, 4, 5, and 6) are composed of taxa that are indicative of 'good' to 'fair' water quality (Tables 2-1 and 3-2). The benthic invertebrate community present at station SED7 resulted in the water quality there to be characterized as 'fairly poor' (Table 3-2).



a)



b)



c)

Figure 3-1: Benthic invertebrate a) abundance, b) lowest practical level (LPL) richness, and c) family level richness, Old Sly Locks, November 2017.

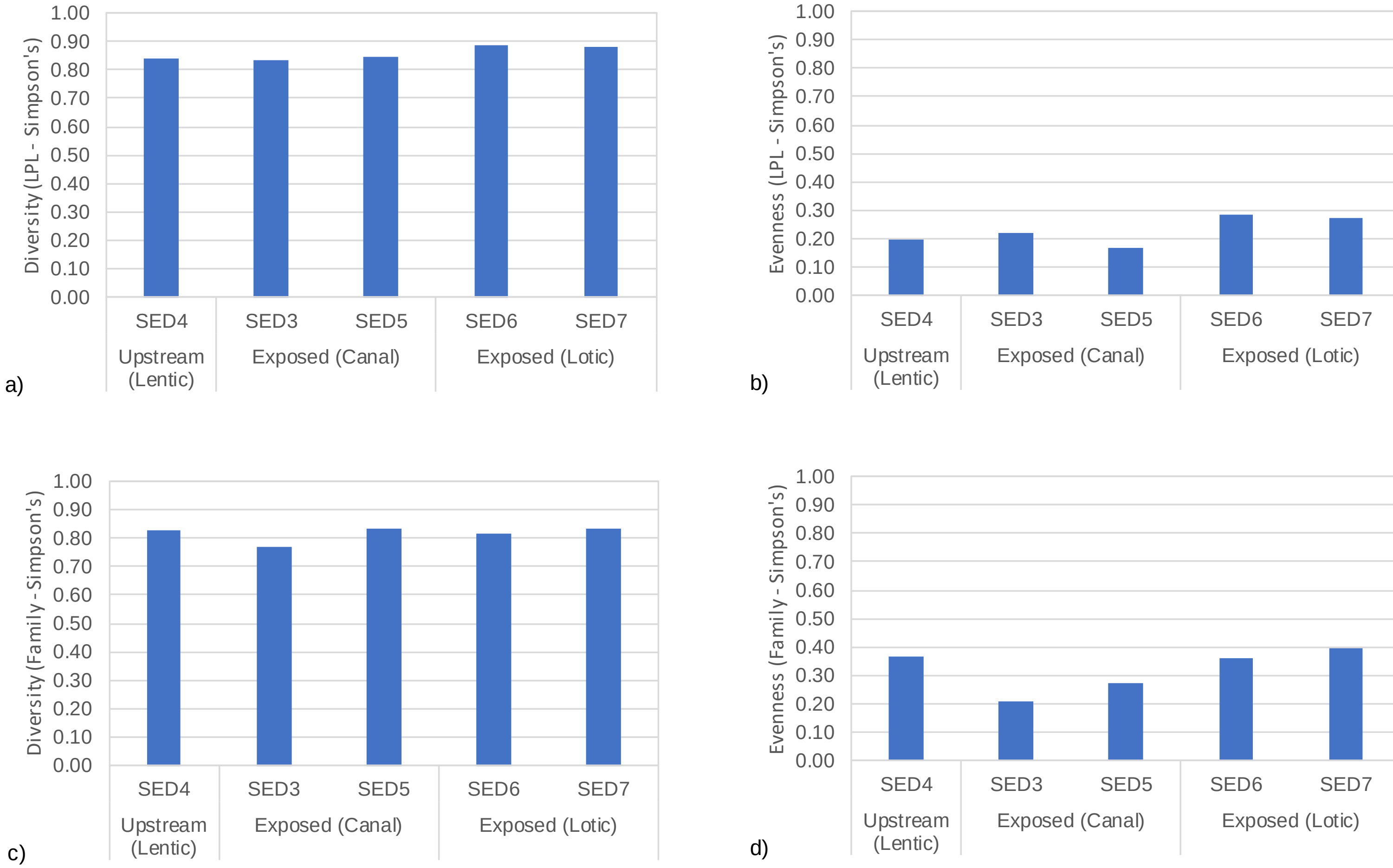
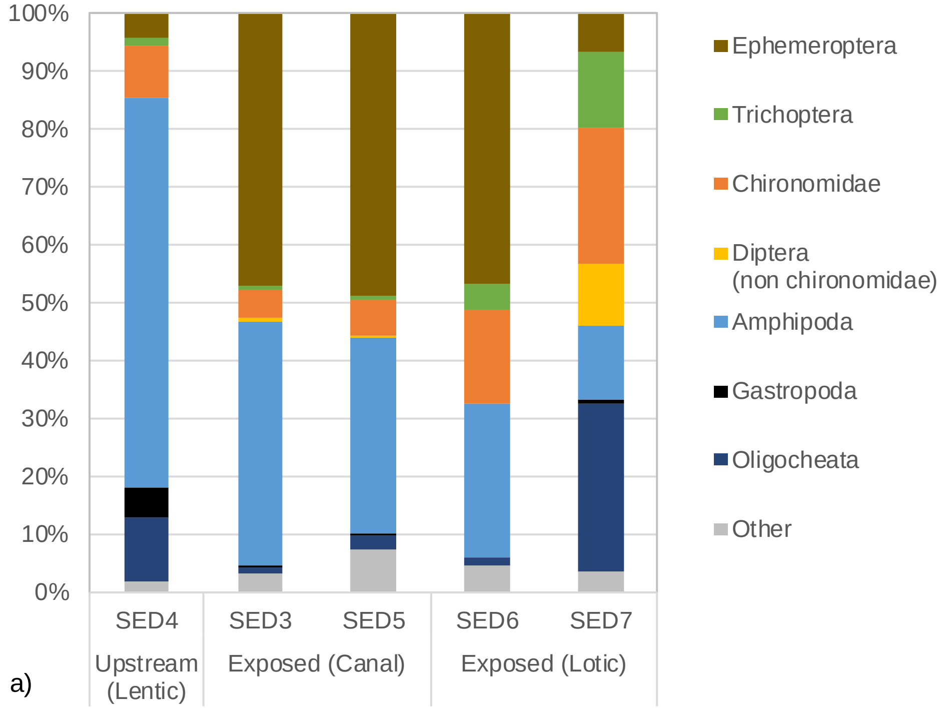


Figure 3-2: Simpson's diversity and evenness values calculated at the lowest practical level (LPL, a and b) and family level (c and d) of taxonomy. Both indices (diversity and evenness) range from 0 to 1, higher diversity values indicate that more taxa are present, while higher evenness values indicate that each taxon has increasingly similar relative abundances (i.e. less dominated by a few taxa), Old Sly Locks, November 2017.



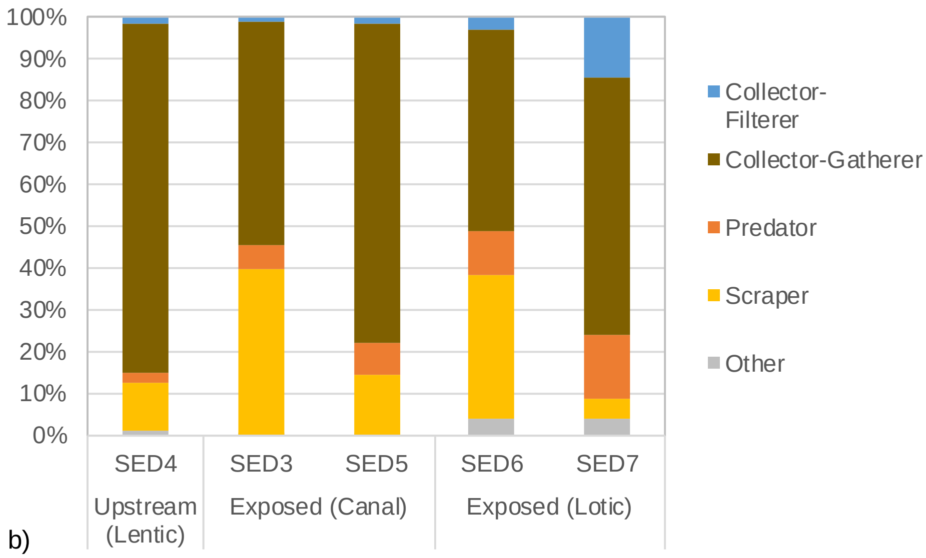


Figure 3-3: Benthic invertebrate a) major group community composition, and b) functional feeding group composition, Old Sly Locks, November 2017. Major groups and functional groups displayed are those that comprise at least 5% of the total community composition at a station.

Table 3-2: Hilsenhoff biotic index values for five benthic invertebrate study locations, Old Sly Locks, November 2017.

Area Type	Area ID	Hilsenhoff Biotic Index	Water Quality
Upstream (Lentic)	SED4	5.29	Good
Exposed (Canal)	SED3	5.03	Good
	SED5	5.91	Fair
Exposed (Lotic)	SED6	5.23	Good
	SED7	6.69	Fairly Poor

Note: Shading is defined in Table 2-1.

4.0 Conclusions and Recommendations

Based on the evaluation of the biotic endpoints presented in this report it is unlikely that the historical landfill has impacted the benthic invertebrate community of the Old Sly Locks area.

Richness and abundance was as high, or higher, at the canal exposed stations than at the upstream 'least-impacted' lentic station. Diversity measures and FFG's were also similar between the upstream station (SED4) and the canal stations (SED3 and 5). The community structure at the upstream station was different than that of the two canal stations (SED3 and 5) but such a difference is expected as the upstream station is truly lentic, whereas the canal stations would experience flow in the summer months during canal operation. Hilsenhoff BI values indicate that the upstream lentic station (SED4) and both exposed canal stations (SED3 and 5) have benthic invertebrate communities that are representative of 'good' to 'fair' water quality conditions.

Comparison of the exposed lotic stations to a CABIN reference model was not possible as no suitable model existed. Evaluation of biotic endpoints indicated that the benthic invertebrate community at station SED7 may experience anthropogenic impacts as it had very low composition of EPT taxa and a Hilsenhoff BI value that indicates 'fairly poor' water quality. The cause of the impact to the benthic invertebrate community may not be due to the historic landfill as many anthropogenic disturbances likely affect this area. No biotic endpoints suggested the benthic community at station SED6 had appreciable anthropogenic impacts.

Recommendations

- To better understand the impact that the historical landfill may be having on the benthic invertebrate community of Old Sly Locks a comparison could be made to a similar lock that is not subjected to historical landfill influence. This would help account for other anthropogenic factors (boating in canal, municipal waste, zebra mussels) which cannot be accounted for in a CABIN reference model. Such a study could include replication (within a habitat type) to allow statistical inference of biological endpoint differences between locks.

5.0 References

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Appendix A Benthic Data

Table A-1: GPS locations of benthic invertebrate community samples, Old Sly Locks, November 2017.

Area Type	Area ID	UTM	Easting	Northing
Upstream (Lentic)	**SED4**	18	420645	4971575
Exposed (Canal)	**SED3**	18	420767	4971531
	SED5	18	420783	4971520
Exposed (Lotic)	**SED6**	18	420803	4971483
	SED7	18	420727	4971415

Table A-2: Depth and velocity taken at time of benthic invertebrate sampling, Old Sly Locks, November 2017.

Area Type	Area ID	Parameter	1	2	3	4	5	6	7	8	9	10	Mean
Upstream (Lentic)	SED4	Depth (cm)	48	50	22	39	41	55	-	-	-	-	43
		Velocity (m/s)	0	0	0	0	0	0	-	-	-	-	0.00
Exposed (Canal)	SED3	Depth (cm)	29	40	28	49	60	71	62	66	48	42	50
		Velocity (m/s)	0	0.02	0	0	0.01	0	0	0	0	0	0.00
	SED5	Depth (cm)	25	41	58	46	25	43	41	-	-	-	40
		Velocity (m/s)	0	0	0	0	0	0	0	-	-	-	0.00
Exposed (Lotic)	SED6	Depth (cm)	50	51	45	67	60	41	33	-	-	-	50
		Velocity (m/s)	0.12	0.09	0.03	0.04	0.01	0.05	0.02	-	-	-	0.05
	SED7	Depth (cm)	35	28	42	37	33	41	52	-	-	-	38
		Velocity (m/s)	0.75	1.02	0.82	0.63	0.38	0.57	0.55	-	-	-	0.67

Table A-3: Benthic invertebrate abundance, richness, diversity, and evenness calcualted at lowest practical level (LPL) and family level of taxonomic resolution, Old Sly Locks, November 2017.

Endpoint \ Area	Upstream (Lentic)	Exposed (Canal)		Exposed (Lotic)	
	SED4	SED3	SED5	SED6	SED7
Abundance (Relative)	3885	11680	15880	1570	2816
Richness (LPL)	32	28	38	31	30
Richness (Family)	16	21	22	15	15
Diversity (LPL - Simpson's)	0.84	0.84	0.84	0.89	0.88
Evenness (LPL - Simpson's)	0.20	0.22	0.17	0.29	0.28
Diversity (Family - Simpson's)	0.83	0.77	0.83	0.81	0.83
Evenness (Family - Simpson's)	0.37	0.21	0.27	0.36	0.40

Table A-4: Proportion of major group benthic invertebrate community composition, Old Sly Locks, November 2017.

Endpoint / Area	Upstream (Lentic)	Exposed (Canal)		Exposed (Lotic)	
	SED4	SED3	SED5	SED6	SED7
Ephemeroptera	4.20	47.09	48.87	46.82	6.75
Trichoptera	1.34	0.68	0.50	4.46	12.89
Chironomidae	9.09	4.97	6.30	16.24	23.54
Diptera (no chiro)	0.00	0.51	0.38	0.00	10.97
Amphipoda	67.28	42.29	33.75	26.43	12.61
Gastropoda	5.15	0.17	0.38	0.00	0.64
Oligocheata	10.99	1.20	2.52	1.59	29.05
Coleoptera	0.00	0.68	0.00	0.00	0.00
Hemiptera	0.33	1.54	4.91	0.32	0.00
Megaloptera	0.33	0.00	0.00	0.00	0.00
Odonata	0.64	0.00	0.25	0.00	0.00
Hydracarina	0.00	0.34	1.13	0.32	2.27
Decapoda	0.00	0.34	0.13	0.32	0.00
Isopoda	0.64	0.17	0.50	3.50	1.28
Bivalvia	0.00	0.00	0.38	0.00	0.00

- indicates community proportion greater than 5%.

Table A-5: Proportion of functional feeding group composition of benthic invertebrate community, Old Sly Locks, November 2017.

FFG \ Area	Upstream (Lentic)	Exposed (Canal)		Exposed (Lotic)	
	SED4	SED3	SED5	SED6	SED7
Collector-Filterer	1.62	1.03	1.64	3.18	14.52
Collector-Gatherer	83.45	53.60	76.32	48.09	61.29
Predator	2.32	5.48	7.81	10.51	15.52
Scraper	11.61	39.55	13.98	34.08	4.83
Piercer-Herbivore	0.33	0.00	0.13	3.50	2.24
Omnivore	0.00	0.00	0.00	0.00	0.32
Shredder-Herbivore	0.67	0.34	0.13	0.64	0.00
Not designated	0.00	0.00	0.00	0.00	1.28

- indicates community proportion greater than 5%.

Table A-6: Benthic invertebrate community data (# per 3-min kick), Old Sly Locks, November 2017.

Taxon	SED3	SED4	SED5	SED6	SED7	Functional Feeding Groups	Hilsenhoff Value
Phylum: Arthropoda	0	0	0	0	0	Unclassified	
Subphylum: Hexapoda	0	0	0	0	0	Unclassified	
| Class: Insecta	0	0	0	0	0	Unclassified	
| Order: Ephemeroptera	0	0	0	0	0	Collector-Gatherer	
| Family: Baetidae	80	0	0	0	18	Collector-Gatherer	4
Neocloeon	0	0	660	0	9	Collector-Gatherer	4
| Family: Caenidae	280	0	480	45	9	Collector-Gatherer	7
Caenis	0	0	1200	0	0	Collector-Gatherer	7
Caenis latipennis	560	0	3260	145	36	Collector-Gatherer	7
| Family: Ephemerellidae	40	0	0	0	0	Collector-Gatherer	1
Eurylophella	20	0	20	10	0	Collector-Gatherer	1
| Family: Heptageniidae	960	75	900	185	55	Scraper	4
Stenacron interpunctatum	1000	13	80	90	27	Scraper	7
Stenonema femoratum	2560	75	1160	260	36	Scraper	2
| Order: Trichoptera	0	0	0	0	36	Unclassified	
| Family: Hydropsychidae	0	0	0	0	0	Collector-Filterer	4
Cheumatopsyche	0	0	0	0	36	Collector-Filterer	5
Hydropsyche	0	0	0	0	64	Collector-Filterer	4
| Family: Hydroptilidae	0	0	0	0	9	Unclassified	4
Hydroptila	0	0	0	0	27	Piercer-Herbivore	6
Oxyethira	0	13	20	55	27	Piercer-Herbivore	3
| Family: Leptoceridae	0	0	0	0	0	Collector-Gatherer	4
Leptocerus	0	13	0	0	0	Shredder-Herbivore	
Triaenodes	0	13	0	0	0	Shredder-Herbivore	6
| Family: Philopotamidae	0	0	0	0	0	Collector-Filterer	3
Chimarra	0	0	0	0	164	Collector-Filterer	4
| Family: Polycentropodidae	0	0	20	0	0	Predator	6
Nyctiophylax	0	0	0	5	0	Predator	5
Polycentropus	80	13	40	10	0	Predator	6
| Order: Coleoptera	0	0	0	0	0	Predator	
| Family: Elmidae	20	0	0	0	0	Collector-Gatherer	4
Stenelmis	40	0	0	0	0	Scraper	7
| Family: Psephenidae	0	0	0	0	0	Unclassified	4
Ectopria	20	0	0	0	0	Scraper	5
| Order: Diptera	0	0	0	0	0	Unclassified	
| Family: Ceratopogonidae	0	0	0	0	0	Predator	6
Bezzia/ Palpomyia	20	0	60	0	0	Predator	6
| Family: Chironomidae	0	0	0	0	0	Unclassified	6
| Subfamily: Chironominae	0	0	0	0	0	Collector-Gatherer	6
| Tribe: Chironomini	0	0	0	0	0	Collector-Gatherer	6
Chironomus	0	25	0	0	0	Collector-Gatherer	10
Cryptochironomus	0	0	0	5	0	Predator	8
Dicrotendipes	100	75	0	25	18	Collector-Gatherer	8
Microtendipes	0	25	20	5	0	Collector-Filterer	6
Parachironomus	0	13	0	0	0	Predator	10
Paratendipes	0	0	220	5	0	Collector-Gatherer	8
Phaenopsectra	20	88	20	0	0	Scraper	7
Polypedilum	0	13	60	0	82	Collector-Gatherer	6
Stenochironomus	0	13	0	0	0	Collector-Gatherer	5
Stictochironomus	0	0	0	0	9	Collector-Gatherer	9
Xenochironomus	0	0	0	5	0	Predator	
| Tribe: Tanytarsini	20	0	120	0	9	Collector-Gatherer	6
Micropsectra	40	50	260	10	9	Collector-Gatherer	7
Paratanytarsus	60	13	60	0	0	Collector-Filterer	6
Rheotanytarsus	60	25	120	20	127	Collector-Filterer	6
Tanytarsus	0	0	0	25	0	Collector-Filterer	6
| Subfamily: Orthocladiinae	0	0	0	0	0	Collector-Gatherer	5
Cardiocladius	0	0	0	0	9	Predator	5
Cricotopus (Nostococladius)	0	0	0	5	0	Shredder-Herbivore	7
Eukiefferiella	0	0	0	0	9	Omnivore	8
Heterotrissocladius	0	0	0	0	9	Collector-Gatherer	
Nanocladius	0	0	0	0	9	Collector-Gatherer	3
Orthocladius complex	0	0	0	15	218	Collector-Gatherer	6
Synorthocladius	0	0	0	5	0	Collector-Gatherer	2
Tvetenia	0	0	0	0	82	Collector-Gatherer	5
| Subfamily: Tanypodinae	0	0	0	0	0	Predator	7
Labrundinia	0	0	0	15	0	Predator	6
Paramerina	0	0	60	0	0	Predator	6
| Tribe: Pentaneurini	0	0	0	0	0	Predator	6
Pentaneura	0	13	0	0	18	Predator	6
Thienemannimyia group	280	0	40	115	55	Predator	6
| Tribe: Procladiini	0	0	0	0	0	Predator	9
Procladius	0	0	20	0	0	Predator	9
| Family: Empididae	0	0	0	0	155	Predator	6
Hemerodromia	40	0	0	0	136	Predator	6
| Family: Simuliidae	0	0	0	0	18	Collector-Filterer	6

Table A-6: Benthic invertebrate community data (# per 3-min kick), Old Sly Locks, November 2017.

Taxon	SED3	SED4	SED5	SED6	SED7	Functional Feeding Groups	Hilsenhoff Value
| Order: Hemiptera	0	0	0	0	0	Unclassified	
| Family: Belostomatidae	0	0	0	0	0	Predator	8
Belostoma	40	0	0	5	0	Predator	8
| Family: Corixidae	0	0	100	0	0	Predator	8
Callicorixa	0	0	220	0	0	Predator	8
Sigara	140	13	460	0	0	Predator	8
| Order: Megaloptera	0	0	0	0	0	Unclassified	
| Family: Sialidae	0	0	0	0	0	Unclassified	4
Sialis	0	13	0	0	0	Predator	4
| Order: Odonata	0	0	20	0	0	Unclassified	
| Family: Coenagrionidae	0	25	20	0	0	Predator	9
Subphylum: Chelicerata	0	0	0	0	0	Unclassified	
| Class: Arachnida	0	0	0	0	0	Predator	5
| Order: Trombidiformes	0	0	0	0	0	Predator	5
| Family: Hygrobatidae	0	0	0	0	0	Predator	8
Hygrobates	20	0	140	0	64	Predator	8
| Family: Lebertiidae	0	0	0	0	0	Predator	5
Lebertia	20	0	20	5	0	Predator	8
| Family: Mideopsidae	0	0	0	0	0	Predator	5
Mideopsis	0	0	20	0	0	Predator	5
| Class: Malacostraca	0	0	0	0	0	Unclassified	
| Order: Amphipoda	2600	2188	2980	125	145	Collector-Gatherer	4
| Family: Crangonyctidae	0	0	0	0	0	Collector-Gatherer	8
Crangonyx	200	163	200	85	55	Collector-Gatherer	4
| Family: Gammaridae	0	0	0	0	0	Collector-Gatherer	4
Gammarus	260	113	400	50	155	Collector-Gatherer	6
| Family: Hyalellidae	0	0	0	0	0	Unclassified	
Hyalella	1880	150	1780	155	0	Collector-Gatherer	8
| Order: Decapoda	0	0	0	0	0	Shredder-Herbivore	8
| Family: Cambaridae	0	0	0	0	0	Collector-Gatherer	6
Orconectes	40	0	20	5	0	Shredder-Herbivore	6
| Order: Isopoda	0	0	0	10	0	Collector-Gatherer	8
| Family: Asellidae	0	0	0	0	0	Collector-Gatherer	8
Caecidotea	20	25	80	45	36	Collector-Gatherer	8
Phylum: Mollusca	0	0	0	0	0	Unclassified	
| Class: Bivalvia	0	0	0	0	0	Collector-Filterer	8
| Order: Veneroida	0	0	0	0	0	Unclassified	
| Family: Pisidiidae	0	0	40	0	0	Collector-Filterer	8
Pisidium	0	0	20	0	0	Collector-Filterer	8
| Class: Gastropoda	20	50	0	0	0	Scraper	7
| Order: Basommatophora	0	0	0	0	0	Unclassified	
| Family: Ancylidae	0	0	0	0	0	Scraper	6
Ferrissia	0	100	20	0	18	Scraper	6
| Family: Planorbidae	0	50	40	0	0	Scraper	7
Phylum: Annelida	0	0	0	0	0	Unclassified	
Subphylum: Clitellata	0	0	0	0	0	Unclassified	
| Class: Oligochaeta	0	0	0	0	0	Collector-Gatherer	5
| Order: Lumbriculida	0	0	0	0	0	Collector-Gatherer	7.3
| Family: Lumbriculidae	0	88	0	5	0	Collector-Gatherer	8
| Order: Tubificida	0	0	0	0	0	Unclassified	
| Family: Naididae	0	0	0	0	36	Collector-Gatherer	10
Dero	0	13	20	0	0	Collector-Gatherer	10
Nais	40	50	20	10	782	Collector-Gatherer	10
Pristina	0	38	0	5	0	Collector-Gatherer	10
Ripistes parasita	0	0	20	0	0	Collector-Gatherer	10
| Subfamily: Tubificinae	0	0	0	0	0	Collector-Gatherer	10
Branchiura sowerby	0	0	20	0	0	Collector-Gatherer	
| Subfamily: Tubificinae with hair chaetae	0	88	140	0	0	Collector-Gatherer	10
| Subfamily: Tubificinae without hair chaetae	100	150	180	5	0	Collector-Gatherer	10
Total Abundance	11680	3885	15880	1570	2816		

Table A-7: Material resorted to determine sorting efficiency, Old Sly Locks, November 2017.

		SED6
Taxa found in Resort	Chironomidae	2
	Ephemeroptera	5
	Bivalvia	1
Total Missed		8
Total counted		314
Efficiency		97.5

Table A-8: Percent of sample sorted, Old Sly Locks, November 2017.

	SED3	SED4	SED5	SED6	SED7
Percent of total sample sorted	5%	8%	5%	20%	11%

Appendix B Field Sheets

Stream Habitat Characterization
(And CABIN Samples) 1 of 3

Client/Project:	AEL (Parks Canada)	Area ID:	SED 3	Ref / Exp:	Exp.
Project #:	17-2409	Waterbody:	Rideau River		
Date / Time:	24 NOV 2017 10:30	Coordinates:	420 767	Elevation:	
Field Crew:	M. White, N. Wiemann		497 1531 18		
Weather, air temp:	4°C, partly cloudy	Map Datum: NAD 83 or other:			
Site Access:	Slys Lock				

Surrounding Land Use (check all that apply)

- ☐ Forest ☐ Field Crops ☐ Logging ☐ Commercial
- ☐ Livestock ☒ Residential ☐ Mining ☒ Other: landfill

Anthropogenic Influences: rail bridge u/s; lock channel, park

Reach Assessed (consider ~6 X wetted width): ☐ 10m ☐ 30m ☒ 50m ☐ 100m

Habitat (percentage of assessed reach)

riffle — rapids —
straight run — pool/back eddy 100 (lentic)

Substrate (percentage of assessed reach)

bedrock — cobble 50 gravel 10 organic —
boulder 20 pebble 20 sand/finer —

Substrate Size Class	
organic cover	
<0.1 cm	sand/silt/clay
0.1-0.2 cm	sand
0.2-1.6 cm	gravel
1.6-6.4 cm	pebble
6.4-25.6 cm	cobble
>25.6 cm	boulder
bedrock	

Streamside Vegetation (check all that apply, circle dominant)

☒ ferns/grass ☒ shrubs ☒ deciduous trees ☐ coniferous trees

Canopy Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

Macrophyte Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

List dominant macrophyte type(s): Myriophyllum, bryophytes (?)

Periphyton Coverage

- ☐ 1 - Rocks not slippery, no obvious colour (<0.5mm thick)
- ☐ 2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
- ☒ 3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
- ☐ 4 - Rocks are very slippery, numerous clumps (5-20mm thick)
- ☐ 5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Bank Stability

- ☐ stable, no erosion
- ☒ moderate
- ☐ unstable, substantial erosion

Water Appearance

colour: clear
clarity: cloudy

Photos (take all in order) yes

1. field sheet
2. upstream
3. downstream
4. across
5. substrate
6. other:

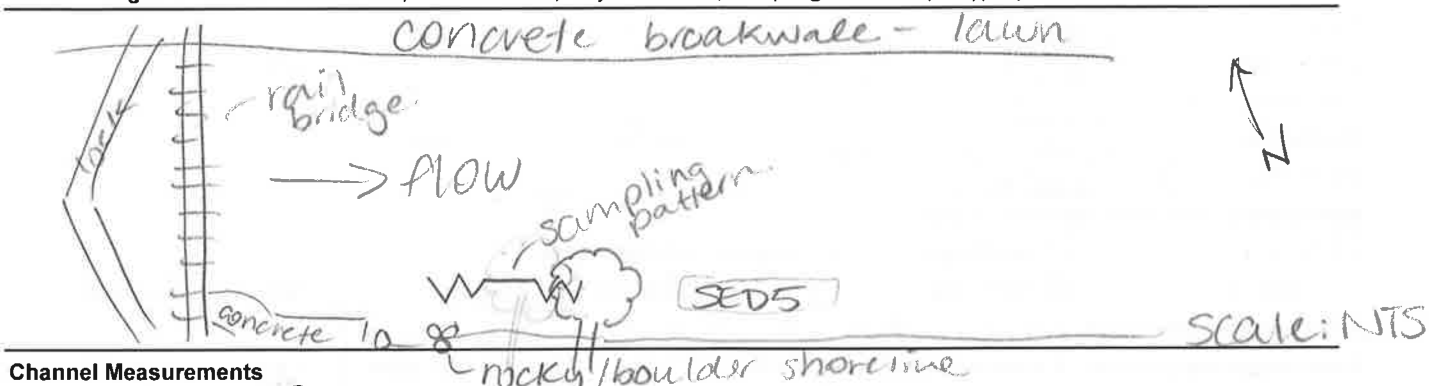
Comments:

visible hydrocarbon patches on surface (see photos)
all rocks from concrete pillar with orange (iron) deposit
lots of leaf litter

Signature: Nichole

Stream Habitat Characterization
(And CABIN Samples) 2 of 3

Station Diagram include: North arrow, flow direction, major features, sampling locations (all types)



Channel Measurements

Bankfull Width: 23 m   Bankfull - Wetted Depth: 25 cm

Wetted Width: 21 m   Gradient (%): 0   ☒ clinometer   ☐ other:

Interval:	1	2	3	4	5	6	7	8	9
Distance from shore (m)	N/A								
Depth (cm)	29	40	28	49	60	71	62	66	48
Velocity (m/s)	0	0.02	0	0	0.01	0	0	0	0
depth	42								
velocity	0								

Water Quality

Temperature (°C): 5.57   Specific Conductance (uS/cm): 565

Dissolved Oxygen - mg/L: 10.61   Conductivity (uS/cm): 355

% Sat: 84.3   pH (pH units): 7.48

Water sample collected? Yes / No   Sediment collected? Yes / No

Duplicate water sample? Yes / No   ID: ______   Dup. sed. sample? Yes / No   ID: ______

CABIN Invertebrate Community Samples

Equipment:

☒ triangle net   ☐ D-net   ☐ other: ______

Sieve Size (um)

☐ 500   ☒ 400   ☐ 250

sampling time (min): 3   sampler initials: MW

total kick distance (m): 14   number of jars: 2

full transects?: Yes / No

OR   # of transects: N/A

distance from shore (m): N/A

Stream Habitat Characterization
(And CABIN Samples) 3 of 3

Client: AEL (Parks Canada)
Date/Time: 24Nov2017 10:30
Waterbody: Rideau River

Project Name/Number: 17:2409
Field Crew: M.White, N.Wiemann
Area ID: SED3

METHOD DESCRIPTION

CABIN protocol - zigzag through sampling area, stopping every 2 steps. Touch the rock nearest to your toe without looking. Pull out the piece of substrate the tip of finger is touching (try not to bias by size). Measure the intermediate axis (perpendicular to the longest axis). For every 10th rock, estimate the amount of the rock embedded in the surrounding material (in 1/4 fractions).

DATA

Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)
1	10.5		26	7		51			76		
2	10		27	8		52			77		
3	7		28	8.5		53			78		
4	21		29	8		54			79		
5	9.5		30	10	1/4	55			80		
6	10		31	7		56			81		
7	4		32	8.5		57			82		
8	8		33	3.5		58			83		
9	7.5		34	10		59			84		
10	3.5	1/2	35	3.5		60			85		
11	15		36	6.5		61			86		
12	11.5		37	5.5		62			87		
13	22		38	6		63			88		
14	10.5		39	4		64			89		
15	4.5		40	10	1/2	65			90		
16	13.5		41	5.5		66			91		
17	14		42	5		67			92		
18	15.5		43	11		68			93		
19	6.5		44	6.5		69			94		
20	4.5	1/4	45	3.5		70			95		
21	17		46	4		71			96		
22	14		47	11		72			97		
23	13		48	5		73			98		
24	27		49	5.5		74			99		
25	13		50	6	1/4	75			100		

Description of Interstitial material: sand.

Stream Habitat Characterization
(And CABIN Samples) 1 of 3

Client/Project: AEL (Parks Canada) Area ID: SED4 Ref / Exp: ref (for study)
Project #: 17-2409 Waterbody: Rideau River
Date / Time: 24 NOV 2017 11:50 Coordinates: 420645 Elevation:
Field Crew: M. White, N. Wiemann 4971575 18
Weather, air temp: 6° partly cloudy Map Datum: NAD 83 or other:
Site Access: Slys Lock - access from bridge/roadway

Surrounding Land Use (check all that apply)

☐ Forest ☐ Field Crops ☐ Logging ☐ Commercial
☐ Livestock ☒ Residential ☐ Mining ☐ Other:

Anthropogenic Influences: road + bridge

Reach Assessed (consider ~6 X wetted width): ☐ 10m ☐ 30m ☒ 50m ☐ 100m

Habitat (percentage of assessed reach)

riffle — rapids —
straight run — pool/back eddy 100 (lentic)

Substrate (percentage of assessed reach)

bedrock — cobble 50 gravel — organic —
boulder 30 pebble 20 sand/finer —

Substrate Size Class	
organic cover	
<0.1 cm	sand/silt/clay
0.1-0.2 cm	sand
0.2-1.6 cm	gravel
1.6-6.4 cm	pebble
6.4-25.6 cm	cobble
>25.6 cm	boulder
bedrock	

Streamside Vegetation (check all that apply, circle dominant)

☒ ferns/grass ☒ shrubs ☒ deciduous trees ☐ coniferous trees

Canopy Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

Macrophyte Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

List dominant macrophyte type(s): Myriophyllum.

Periphyton Coverage

☐ 1 - Rocks not slippery, no obvious colour (<0.5mm thick)
☒ 2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
☐ 3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
☐ 4 - Rocks are very slippery, numerous clumps (5-20mm thick)
☐ 5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Bank Stability

☐ stable, no erosion
☒ moderate
☐ unstable, substantial erosion

Water Appearance

colour none
clarity slight cloudy/ ~~clear~~

Photos (take all in order)

1. field sheet
2. upstream
3. downstream
4. across
5. substrate
6. other:

yes

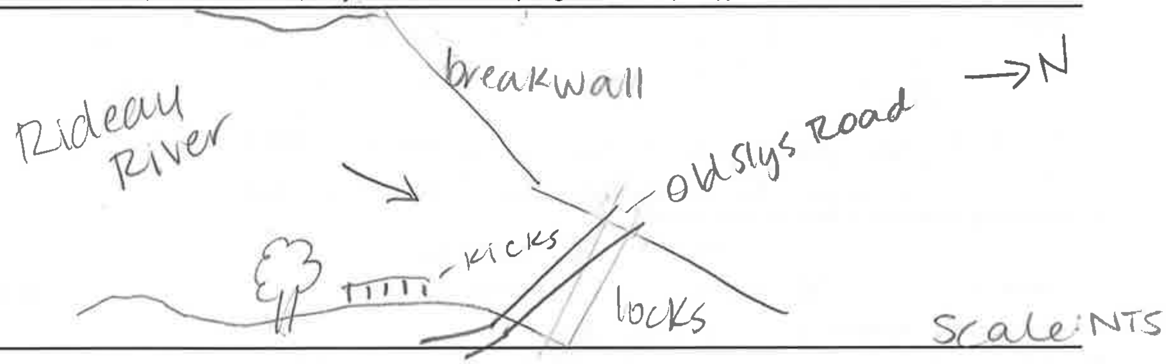
Comments:

Opposed lake shoreline (beyond range of rangefinder, approx 400m)
leaf litter

Signature: NCWhite

Stream Habitat Characterization
(And CABIN Samples) 2 of 3

Station Diagram include: North arrow, flow direction, major features, sampling locations (all types)



Channel Measurements

Bankfull Width: N/A   Bankfull - Wetted Depth: N/A

Wetted Width: N/A   Gradient (%): N/A   ☐ clinometer   ☐ other:

Interval:	1	2	3	4	5	6	7	8
Distance from shore (m)	N/A							
Depth (cm)	48	50	22	39	41	55		
Velocity (m/s)	N/A	N/A	N/A	N/A	N/A	N/A		

Water Quality

Temperature (°C): 1.91   Specific Conductance (uS/cm): 229

Dissolved Oxygen - mg/L: 15.64   Conductivity (uS/cm): 128

% Sat: 112.8   pH (pH units): 8.14

Water sample collected? Yes / No   Sediment collected? Yes / No

Duplicate water sample? Yes / No ID: Dup. sed. sample? Yes / No ID:

CABIN Invertebrate Community Samples

Equipment:

☒ triangle net   ☐ D-net   ☐ other:

Sieve Size (um)

☐ 500   ☒ 400   ☐ 250

sampling time (min): 3   sampler initials: MW

total kick distance (m) 12   number of jars: 3

full transects?: Yes / No

OR   # of transects:

distance from shore (m):

Stream Habitat Characterization
(And CABIN Samples) 3 of 3

Client: AEL (Parks Canada)
Date/Time: 24NOV2017 11:50
Waterbody: Rideau River

Project Name/Number: 17:2409
Field Crew: M.White, N.Wiemann
Area ID: SED4

METHOD DESCRIPTION

CABIN protocol - zigzag through sampling area, stopping every 2 steps. Touch the rock nearest to your toe without looking. Pull out the piece of substrate the tip of finger is touching (try not to bias by size). Measure the intermediate axis (perpendicular to the longest axis). For every 10th rock, estimate the amount of the rock embedded in the surrounding material (in 1/4 fractions).

DATA

Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)
1	17		26	30		51			76		
2	5		27	16		52			77		
3	4		28	9.5		53			78		
4	6.5		29	10		54			79		
5	5.5		30	12	1/4	55			80		
6	17		31	18		56			81		
7	12		32	13.5		57			82		
8	26		33	12		58			83		
9	33		34	6		59			84		
10	9	1/2	35	65		60			85		
11	12		36	13.5		61			86		
12	18		37	5		62			87		
13	11		38	10.5		63			88		
14	4.5		39	10		64			89		
15	17.5		40	18	1/2	65			90		
16	12.5		41	14.5		66			91		
17	24		42	40		67			92		
18	4		43	4.5		68			93		
19	4.5		44	10		69			94		
20	5	1/4	45	12		70			95		
21	8		46	8		71			96		
22	13.5		47	6.5		72			97		
23	7		48	10		73			98		
24	29		49	10		74			99		
25	34		50	15	1/4	75			100		

Description of Interstitial material: Sand.

Stream Habitat Characterization
(And CABIN Samples) 1 of 3

Client/Project: AEL (Parks Canada) Area ID: SED 5 Ref / Exp: exp.

Project #: 17-2409 Waterbody: Rideau River

Date / Time: 24 NOV 2017 9:30 Coordinates: 420783 Elevation:

Field Crew: M. White; N. Wiemann 4971520 18

Weather, air temp: 2°C, partly cloudy Map Datum: NAD 83 or other:

Site Access: Slys Lock

Surrounding Land Use (check all that apply)

- ☐ Forest ☐ Field Crops ☐ Logging ☐ Commercial
- ☐ Livestock ☒ Residential ☐ Mining ☒ Other: landfill

Anthropogenic Influences: rail bridge u/s; in lock channel, park

Reach Assessed (consider ~6 X wetted width): ☐ 10m ☐ 30m ☒ 50m ☐ 100m

Habitat (percentage of assessed reach)

riffle — rapids —

straight run — pool/back eddy 100 (lentic habitat)

Substrate (percentage of assessed reach)

bedrock 10 cobble 50 gravel 10 organic —

boulder 10 pebble 20 sand/finer —

Substrate Size Class	
organic cover	
<0.1 cm	sand/silt/clay
0.1-0.2 cm	sand
0.2-1.6 cm	gravel
1.6-6.4 cm	pebble
6.4-25.6 cm	cobble
>25.6 cm	boulder
bedrock	

Streamside Vegetation (check all that apply, circle dominant)

☐ ferns/grass ☒ shrubs ☒ deciduous trees ☐ coniferous trees

Canopy Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

Macrophyte Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

List dominant macrophyte type(s): Myrophylum.; bryophyte?

Periphyton Coverage

- ☐ 1 - Rocks not slippery, no obvious colour (<0.5mm thick)
- ☐ 2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
- ☒ 3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
- ☐ 4 - Rocks are very slippery, numerous clumps (5-20mm thick)
- ☐ 5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Bank Stability

- ☐ stable, no erosion
- ☒ moderate
- ☐ unstable, substantial erosion

Water Appearance

colour: clear

clarity: cloudy

Photos (take all in order) yes

1. field sheet
2. upstream
3. downstream
4. across
5. substrate
6. other:

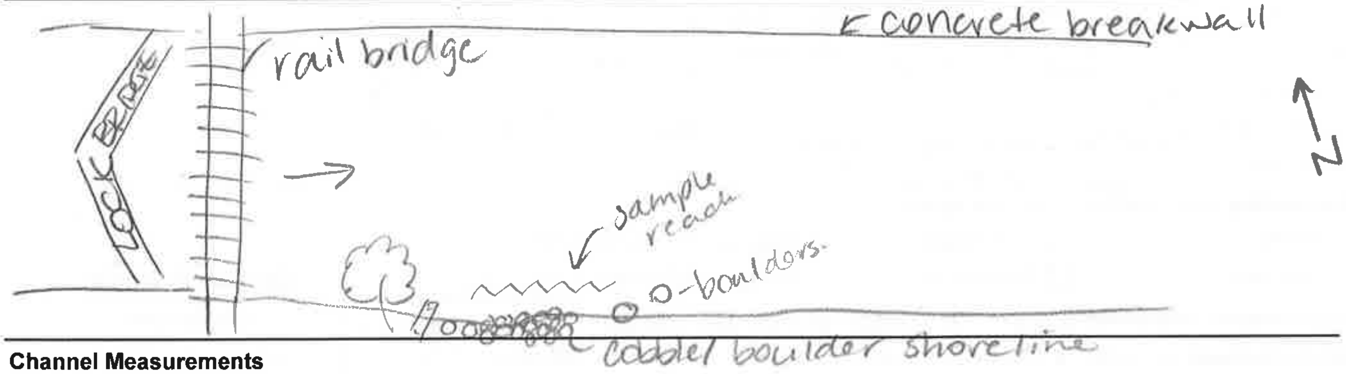
Comments:

lots of leaf litter in stream

Signature: MWhite

Stream Habitat Characterization
(And CABIN Samples) 2 of 3

Station Diagram include: North arrow, flow direction, major features, sampling locations (all types)



Channel Measurements

Bankfull Width: 25 m   Bankfull - Wetted Depth: 25 cm

Wetted Width: 22 m   Gradient (%): 0   ☒ clinometer   ☐ other:

Interval:	1	2	3	4	5	6	7	8
Distance from shore (m)	N/A							
Depth (cm)	~~10~~ 25	~~16~~ 41	~~23~~ 58	~~18~~ 46	~~10~~ 25	~~17~~ 43	~~16~~ 41	
Velocity (m/s)	0	0	0	0	0	0	0	

Water Quality

Temperature (°C): ~~5.96~~ 5.86   Specific Conductance (uS/cm): ~~400~~ 593

Dissolved Oxygen - mg/L: ~~9.84~~ 10.66   Conductivity (uS/cm): ~~254~~ 376

% Sat: ~~79.0~~ 85.0   pH (pH units): ~~7.50~~ 7.41

Water sample collected? Yes / No   Sediment collected? Yes / No

Duplicate water sample? Yes / No   ID: Dup. sed. sample? Yes / No   ID:

CABIN Invertebrate Community Samples

Equipment:

☒ triangle net   ☐ D-net   ☐ other:

Sieve Size (um)

☐ 500   ☒ 400   ☐ 250

sampling time (min): 3   sampler initials: MW

total kick distance (m) 12   number of jars: 1

full transects?: Yes / No

OR   # of transects:

distance from shore (m): N/A

Stream Habitat Characterization
(And CABIN Samples) 3 of 3

Client: AEL (Parks Canada)
Date/Time: 24 NOV 2017 9:30
Waterbody: Rideau River

Project Name/Number: 17-2409
Field Crew: M. White; N. Wickmann
Area ID: SED 5

METHOD DESCRIPTION

CABIN protocol - zigzag through sampling area, stopping every 2 steps. Touch the rock nearest to your toe without looking. Pull out the piece of substrate the tip of finger is touching (try not to bias by size). Measure the intermediate axis (perpendicular to the longest axis). For every 10th rock, estimate the amount of the rock embedded in the surrounding material (in 1/4 fractions).

DATA

Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)
1	13		26	12		51			76		
2	11		27	28		52			77		
3	13		28	12		53			78		
4	10.5		29	18		54			79		
5	10		30	9.5	1/4	55			80		
6	9		31	6		56			81		
7	5.5		32	7.5		57			82		
8	7		33	3		58			83		
9	15		34	4.5		59			84		
10	5	1/4	35	8.5		60			85		
11	3.5		36	16		61			86		
12	3.5		37	8		62			87		
13	4		38	7.5		63			88		
14	9		39	7.5		64			89		
15	11		40	11.5	1/2	65			90		
16	8		41	11		66			91		
17	14		42	7.5		67			92		
18	4		43	11		68			93		
19	7.5		44	8		69			94		
20	5	1/4	45	15		70			95		
21	20		46	10		71			96		
22	4.5		47	14.5		72			97		
23	4.5		48	19		73			98		
24	12		49	6		74			99		
25	10		50	4.5	1/4	75			100		

Description of Interstitial material: sand.

Stream Habitat Characterization
(And CABIN Samples) 1 of 3

Client/Project: AEL (Parks Canada) Area ID: SED 6 Ref / Exp: EXP.
Project #: 17-2409 Waterbody: Rideau River
Date / Time: 23NOV2017 15:30 Coordinates: 420 803 Elevation: ______
Field Crew: M.White N.Wiemann 4971483 18
Weather, air temp: 0°C, cloudy Map Datum: NAD 83 or other: ______
Site Access: Slys Locks property.

Surrounding Land Use (check all that apply)
☐ Forest ☐ Field Crops ☐ Logging ☐ Commercial
☐ Livestock ☒ Residential ☐ Mining ☑ Other: landfill

Anthropogenic Influences: rail bridge u/s; path along shore

Reach Assessed (consider ~6 X wetted width): ☐ 10m ☐ 30m ☒ 50m ☐ 100m

Habitat (percentage of assessed reach) * See photos
riffle — rapids —
straight run 70 pool/back eddy 30

Substrate (percentage of assessed reach)
bedrock — cobble 60 gravel 20 organic —
boulder 20 pebble — sand/finer —

Substrate Size Class	
organic cover	
<0.1 cm	sand/silt/clay
0.1-0.2 cm	sand
0.2-1.6 cm	gravel
1.6-6.4 cm	pebble
6.4-25.6 cm	cobble
>25.6 cm	boulder
bedrock	

Streamside Vegetation (check all that apply, circle dominant)
☒ ferns/grass ☑ shrubs ☒ deciduous trees ☑ coniferous trees

Canopy Coverage
☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

Macrophyte Coverage
☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

List dominant macrophyte type(s): Typha sp.; Myriophyllum;

Periphyton Coverage
☐ 1 - Rocks not slippery, no obvious colour (<0.5mm thick)
☒ 2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
☐ 3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
☐ 4 - Rocks are very slippery, numerous clumps (5-20mm thick)
☐ 5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Bank Stability
☒ stable, no erosion
☐ moderate
☐ unstable, substantial erosion

Water Appearance
colour none
clarity clear

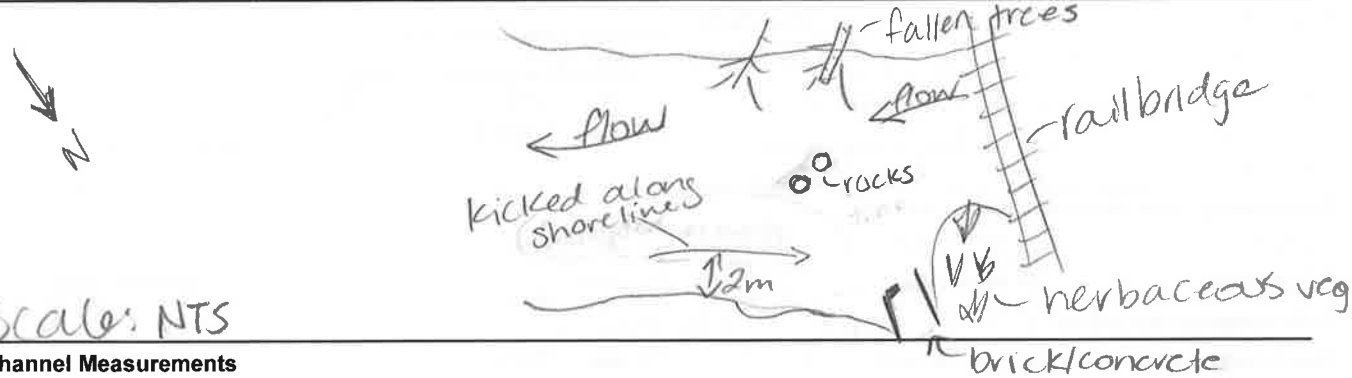
Photos (take all in order) yes.
1. field sheet
2. upstream
3. downstream
4. across
5. substrate
6. other: ______

Comments:

Signature: [signature]

Stream Habitat Characterization
(And CABIN Samples) 2 of 3

Station Diagram include: North arrow, flow direction, major features, sampling locations (all types)



Scale: NTS

Channel Measurements

Bankfull Width: N/A   Bankfull - Wetted Depth: N/A

Wetted Width: 120 m   Gradient (%): N/A   ☐ clinometer   ☐ other:

Interval:	1	2	3	4	5	6	7	8
Distance from shore (m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Depth (cm)	~~18~~	~~24~~	~~25~~	~~24~~	~~20~~			
Velocity (m/s)	~~0.34~~	~~0.36~~	~~0.35~~	~~0.36~~	~~0.35~~			
	50	51	45	67	60	41	33	
	0.12	0.09	0.03	0.04	0.01	0.05	0.02	

Water Quality

Temperature (°C): 1.52   Specific Conductance (uS/cm): 224

Dissolved Oxygen - mg/L: 14.25   Conductivity (uS/cm): 123

% Sat: 101.7   pH (pH units): 7.23

Water sample collected? Yes / No   Sediment collected? Yes / No

Duplicate water sample? Yes / No   ID: Dup. sed. sample? Yes / No   ID:

CABIN Invertebrate Community Samples

Equipment:

☒ triangle net   ☐ D-net   ☑ other: kick net

Sieve Size (um)

☐ 500   ☒ 400   ☐ 250

sampling time (min): 3   sampler initials: MW

total kick distance (m): 10   number of jars: 1

full transects?: Yes / No   # of transects: Ø

OR

distance from shore (m): ~~2~~ N/A

Stream Habitat Characterization
(And CABIN Samples) 3 of 3

Client: AEL (Parks Canada)
Date/Time: 23 NOV 2017 15:30
Waterbody: Rideau River

Project Name/Number: 17-2409
Field Crew: M. White N. Niemann
Area ID: SED6

METHOD DESCRIPTION

CABIN protocol - zigzag through sampling area, stopping every 2 steps. Touch the rock nearest to your toe without looking. Pull out the piece of substrate the tip of finger is touching (try not to bias by size). Measure the intermediate axis (perpendicular to the longest axis). For every 10th rock, estimate the amount of the rock embedded in the surrounding material (in 1/4 fractions).

DATA

Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)
1	13		26	11		51			76		
2	18		27	16		52			77		
3	8.5		28	11.5		53			78		
4	7		29	8.5		54			79		
5	9		30	6.5	1/4	55			80		
6	1		31	4		56			81		
7	26		32	1		57			82		
8	13		33	4		58			83		
9	5.5		34	27		59			84		
10	14	1/4	35	7		60			85		
11	9.5		36	12		61			86		
12	9		37	10		62			87		
13	6		38	16		63			88		
14	10.5		39	10		64			89		
15	19		40	18	1/4	65			90		
16	15		41	12		66			91		
17	18		42	8		67			92		
18	24		43	12		68			93		
19	25		44	7.5		69			94		
20	25	1/4	45	11.5		70			95		
21	26		46	10		71			96		
22	16		47	7		72			97		
23	15		48	7.5		73			98		
24	11		49	14		74			99		
25	2		50	9.5	1/4	75			100		

Description of Interstitial material: Sand and gravel

Stream Habitat Characterization
(And CABIN Samples) 1 of 3

Client/Project: AEL (Parks Canada) Area ID: SED7 Ref / Exp: exp.
Project #: 17-2409 Waterbody: Rideau River
Date / Time: 23NOV2017 16:30 Coordinates: 420727 Elevation:
Field Crew: M.White, N. Wiemann 4971451 18
Weather, air temp: 0°C, Cloudy Map Datum: NAD 83 or other:
Site Access: Slys Lock Park.

Surrounding Land Use (check all that apply)

☐ Forest ☐ Field Crops ☐ Logging ☐ Commercial
☐ Livestock ☒ Residential ☐ Mining ☒ Other: landfill

Anthropogenic Influences: under rail bridge, nearby park.

Reach Assessed (consider ~6 X wetted width): ☐ 10m ☐ 30m ☒ 50m ☐ 100m

Habitat (percentage of assessed reach)

riffle 40 rapids —
straight run 40 pool/back eddy 20

Substrate (percentage of assessed reach)

bedrock — cobble 60 gravel — organic —
boulder 10 pebble 30 sand/finer —

Substrate Size Class	
organic cover	
<0.1 cm	sand/silt/clay
0.1-0.2 cm	sand
0.2-1.6 cm	gravel
1.6-6.4 cm	pebble
6.4-25.6 cm	cobble
>25.6 cm	boulder
bedrock	

Streamside Vegetation (check all that apply, circle dominant)

☐ ferns/grass ☒ shrubs ☒ deciduous trees ☐ coniferous trees

Canopy Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

Macrophyte Coverage

☐ 0% ☒ 1 - 25% ☐ 26 - 50% ☐ 51 - 75% ☐ 76% - 100%

List dominant macrophyte type(s): Typha sp; small patch of grass (2-3) aquatic

Periphyton Coverage

☐ 1 - Rocks not slippery, no obvious colour (<0.5mm thick)
☐ 2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)
☒ 3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)
☐ 4 - Rocks are very slippery, numerous clumps (5-20mm thick)
☐ 5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Bank Stability

☐ stable, no erosion
☒ moderate
☐ unstable, substantial erosion

Water Appearance

colour none.
clarity transparent

Photos (take all in order)

1. field sheet
2. upstream
3. downstream
4. across
5. substrate
6. other:

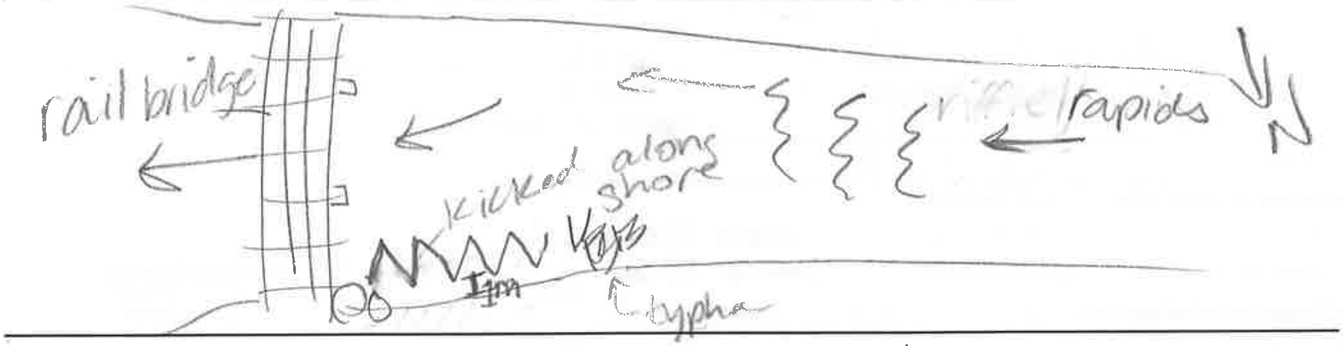
yes

Comments:
near fast rapids (hydrolic)

Signature: Nicholas

Stream Habitat Characterization
(And CABIN Samples) 2 of 3

Station Diagram include: North arrow, flow direction, major features, sampling locations (all types)



Channel Measurements

Bankfull Width: 55 m   Bankfull - Wetted Depth: ~~24~~ 51 cm
Wetted Width: 50 m   Gradient (%): 1   ☒ clinometer   ☐ other:

Interval:	1	2	3	4	5	6	7	8
Distance from shore (m)	N/A	→						
Depth (cm)	35	28	42	37	33	41	52	
Velocity (m/s)	0.75	1.02	0.82	0.63	0.38	0.57	0.55	

Water Quality

Temperature (°C): 1.40   Specific Conductance (uS/cm): 222
Dissolved Oxygen - mg/L: 15.01   Conductivity (uS/cm): 122
% Sat: 106.6   pH (pH units): 7.95
Water sample collected? Yes / No (No circled)   Sediment collected? Yes / No (No circled)
Duplicate water sample? Yes / No (No circled) ID: –   Dup. sed. sample? Yes / No (No circled) ID: –

CABIN Invertebrate Community Samples

Equipment:
☒ triangle net   ☐ D-net   ☐ other:

Sieve Size (um)
☐ 500   ☒ 400   ☐ 250

sampling time (min): 3   sampler initials: MW
total kick distance (m): 12   number of jars: 1
full transects?: Yes / No (No circled)
OR   # of transects:
distance from shore (m): N/A

Stream Habitat Characterization
(And CABIN Samples) 3 of 3

Client: AEL (Parks Canada)
Date/Time: 23 NOV 2017 16:30
Waterbody: Rideau River

Project Name/Number: 17-2409
Field Crew: MW NW
Area ID: SED 7

METHOD DESCRIPTION

CABIN protocol - zigzag through sampling area, stopping every 2 steps. Touch the rock nearest to your toe without looking. Pull out the piece of substrate the tip of finger is touching (try not to bias by size). Measure the intermediate axis (perpendicular to the longest axis). For every 10th rock, estimate the amount of the rock embedded in the surrounding material (in 1/4 fractions).

DATA

Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)	Rock #	Intermediate Axis Length (cm)	Embed (as 1/4 fractions)
1	6		26	10		51			76		
2	8		27	6		52			77		
3	13		28	6.5		53			78		
4	13.5		29	5		54			79		
5	6		30	7	1/4	55			80		
6	22		31	11		56			81		
7	11		32	12		57			82		
8	7.5		33	23		58			83		
9	9		34	19		59			84		
10	8	1/2	35	16		60			85		
11	7.5		36	20		61			86		
12	6		37	12.5		62			87		
13	7.5		38	4.5		63			88		
14	6		39	5.5		64			89		
15	5.5		40	13.5	1/2	65			90		
16	7		41	8.5		66			91		
17	6.5		42	5.5		67			92		
18	5		43	8.5		68			93		
19	23		44	10.5		69			94		
20	20	1/4	45	4.5		70			95		
21	8		46	18		71			96		
22	10		47	10		72			97		
23	16		48	26		73			98		
24	22		49	14		74			99		
25	15		50	15.5	1/2	75			100		

Description of Interstitial material: Sand and gravel.

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info@aelenv.com | www.aelenv.com

APPENDIX 5
Equations for Human Health Exposure Assessment

APPENDIX 4: Equations for Human Health Exposure Assessment

The equations used to calculate the dose of each COC, to each receptor, are shown below.

Incidental Ingestion of Soil

The dose of each COC, via incidental ingestion of soil, is calculated from the following equation:

$$Dose_{Ing} = C_S \; x \; SIR \; x \; AF_{git} \; x \; EF_1 \; x \; EF_{out} \; x \; ED \; /(BW \; x \; AT \; x \; 365 \; d/y \; x \; 1000 \; \mu g/mg)$$

where:

$Dose_{Ing}$	=	Dose due to ingestion of soil (mg/kg/d)
C_S	=	Concentration in soil (μg/g)
SIR	=	Soil ingestion rate (g/day)
AF_{git}	=	Absorption factor from the gastrointestinal tract (unitless)
EF_1	=	Exposure frequency (days per week exposed)
EF_{out}	=	Exposure frequency (weeks per year exposed)
ED	=	Exposure duration (y)
BW	=	Body weight (kg)
AT	=	Averaging time (y)

Dermal Contact with Soil

The dose of each COC, via dermal contact with soil, is calculated from the following equation:

$$Dose_{Derm\ Soil} = C_S \; x \; SSA \; x \; E \; x \; ADH \; x \; AF_s \; x \; EF_1 \; x \; EF_{out} \; x \; ED/(BW \; x \; AT \; x \; 365 \; d/y \; x \; 1000 \; \mu g/mg)$$

where:

$Dose_{Derm\ Soil}$	=	Dose due to dermal contact with soil (mg/kg/d)
SSA	=	Surface area of skin exposed to soil (cm^2)
E	=	Events of skin exposure per day (events/day)
ADH	=	Adherence of soil to skin (g/cm^2/event)
AF_S	=	Dermal absorption factor (unitless)

Inhalation of Particulate Matter

The dose of chemical, via inhalation of particulate matter, is calculated from the following equation:

$$Dose_{Inh\ PM} = C_S \; x \; INH \; x \; C_{PM10} \; x \; AF_I \; x \; EF_1 \; x \; EF_{out} \; x \; EF \; x \; ED \; /(BW \; x \; AT \; x \; 365 \; d/y \; x \; 10^6 \; \mu g/g \; x \; 10^3 \; \mu g/mg)$$

where:

$Dose_{Inh\ PM}$ = Dose due to inhalation of particulate matter (mg/kg/d)
INH = Inhalation rate (m^3/h)
C_{PM10} = Concentration of particulate matter, 10 µm or less, in air (µg/m^3)
AF_I = Absorption factor for inhalation (unitless)
EF = Exposure frequency (hours per day)

Dermal Contact with Groundwater

The dose of each COC, via dermal contact with groundwater, is calculated from the following equation (USEPA, 2004):

$$Dose_{Derm\ W} = SSA \times DA_{event} \times EV \times EF_1 \times EF_{out} \times ED/(BW \times AT \times 365\ d/y)$$

where:

$Dose_{Derm\ W}$ = Dose due to dermal contact with groundwater (mg/kg/d)
SSA = Skin surface area in contact with groundwater (cm^2)
DA_{event} = Absorbed dose per event (mg/cm^2/event)
EV = Number of times per day groundwater contacted (events/d)

For organic COCs, the absorbed dose per event is calculated from the following equation:

$$DA_{event} = 2 \times FA \times PC \times C_{GW} \times (6 \times LT \times ET / 3.14159)^{0.5} / (1000\ cm^3/L \times 1000\ ug/mg)$$

where:

FA = Fraction absorbed from water (no units)
PC = Dermal permeability constant (cm/h)
C_{GW} = Concentration of COC in groundwater (ug/L)
LT = Lag time (h)
ET = Exposure time for contact with groundwater (h)

Ingestion of Groundwater

The dose of each COC via incidental ingestion of groundwater is calculated from the following equation:

$$Dose_{Ing\ W} = C_{GW} \times IR_{GW} \times AF_{git} \times EF_1 \times EF_{out} \times ED/(BW \times AT \times 365\ d/y \times 1000\ ug/mg)$$

where:

$Dose_{Ing\ W}$ = Dose due to ingestion of groundwater (mg/kg/d)
IR_{GW} = Ingestion rate of groundwater (L/d)

AF_{git} = Absorption factor from the gastrointestinal tract (unitless)

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APPENDIX 6
Species At Risk Evaluation

MEMORANDUM

To: Charna Kozole **From: Sarah Mainguy**

Re: Potential for SAR on the Old Sly Lockstation site **Date: 25 August 2017**

I have reviewed existing information on Species at Risk (SAR) in the vicinity of the Old Sly Lockstation site. Sources used were the Ministry of Natural Resources and Forestry Natural Heritage Information Centre (NHIC) interactive mapping site that shows species that are provincially tracked, and the Department of Fisheries and Oceans SAR mapping website. I am also providing additional observations of species in my experience that are very widespread and would be expected to be in the vicinity of Smiths Falls.

I have scrutinized the aerial photos obtained for the site, in order to cross-reference the SAR for which the range overlaps with the site with the habitat that persists on the site.

Provincially Tracked Species on NHIC Database
Table 1 provides a list of provincially tracked species that have been recorded within approximately 1 km of the Old Sly site, species mapped within the range of the site by the Ontario Herpetofaunal Summary or federal Critical Habitat mapping, species that are mapped by the Department of Fisheries and Oceans near the site, as well as other species that would be highly likely to be on the site, based on the habitat. All are considered federal Species at Risk. Habitat for all these species occurs within the study area, and is present on the site or within approximately 500 m of the site.

Table 1. Potential Species at Risk and provincially rare species on the site

Common Name	**Scientific Name**	**Federal Status**	**Habitat Elements on Site**
Butternut	*Juglans cinerea*	END, Schedule 1	open woodlands
Little Brown Myotis	*Myotis lucifugus*	END, Schedule 1	Roosts in buildings and tree cavities; likely forage on aerial insects over the site
Northern Myotis	*Myotis septentrionalis*	END, Schedule 1	Roosts in tree cavities; likely forage on aerial insects over the site
Gray Ratsnake (Frontenac Axis population)	*Pantherophis spiloides pop. 1*	THR, Schedule 1	mosaic of forest and open habitat (fields; bedrock outcrops) with a high amount of edge; potential to hibernate in building foundations

Common Name	Scientific Name	Federal Status	Habitat Elements on Site
Barn Swallow	*Hirundo rustica*	THR, Schedule 1	Nests on human buildings and bridges; likely forage over the site
Eastern Wood-pewee	*Contopus virens*	SC, Schedule 1	Nests in trees in a variety of woodland habitats
Eastern Whip-poor-will	*Antrostomus vociferus*	THR, Schedule 1	Nests on the ground in woodland openings, generally associated with large forested areas and not found in highly disturbed areas; would not nest in parkland on the site but potentially nests along the river downstream
Western Chorus Frog	*Pseudacris triseriata*	THR, Schedule 1	Breeds in shallow flooded areas of thickets and thicket swamps; no suitable habitat on site but may breed in areas along the river downstream
Eastern Musk Turtle	*Sternotherus odoratus*	SC, Schedule 1	Forages and overwinters in well-vegetated calm waters and nests in close proximity to this habitat; suitable habitat not present on site but potentially present approximately 500 m downstream
Northern Map Turtle	*Graptemys geographica*	SC, Schedule 1	Forages and overwinters in well-vegetated calm waters and nests in close proximity to this habitat; suitable habitat not present on site but potentially present approximately 500 m downstream
Bridle Shiner	*Notropis bifrenatus*	SC, Schedule 1	quiet areas of streams and occasionally in lakes. It is usually found where there is an abundance of aquatic vegetation, where it feeds and spawns

Common Name	Scientific Name	Federal Status	Habitat Elements on Site
Grass Pickerel	*Esox americanus vermiculatus*	SC, Schedule 1	warm, slow moving streams, isolated pools of such streams, and shallow bays of lakes.

Aquatic Species at Risk mapping
Aquatic Species at Risk mapping indicates two aquatic (fish) Species at Risk, with a status of Special Concern, in the Rideau River upstream and downstream of the site, as shown in Figure 1. However, neither of these species is known to occur within the site.

Common Name*	Scientific Name	Taxon	Species at Risk Status
Bridle Shiner	*Notropis bifrenatus*	Fishes	Special Concern
Grass Pickerel	*Esox americanus vermiculatus*	Fishes	Special Concern

Tasks to be Completed on Site
Parks Canada has indicated the following tasks to be conducted on the site:

- Construction of upstream and downstream cofferdams
- Dewatering of work areas
- Removal of algae, debris and zebra mussels
- Sawcutting and raking mortar joints
- Removal of deteriorated stones/materials
- Potential for excavation behind lock/approach walls
- Masonry/grouting and
- Landscaping, site reinstatement to previous condition

Table 2 provides a summary of the works that have the potential to disrupt the habitat of Species at Risk on the site.

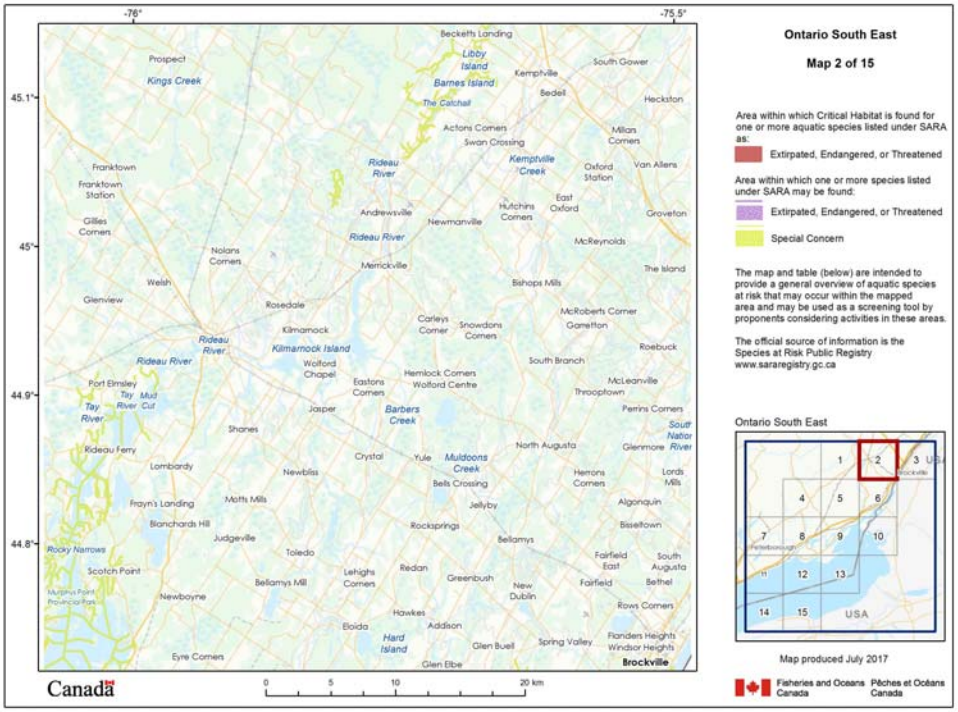

Figure 1. Aquatic Species at Risk mapping within the Smiths Falls area

Table 2. Summary of activities that have the potential to disrupt habitat for Endangered or Threatened Species at Risk with potential to occur at the Old Sly Lockstation site

Common Name	Species at Risk Status	Habitat	Potential Habitat-Disrupting Activities
Butternut	END	open woodlands	tree removal
Little Brown Myotis	END	Roost in buildings and tree cavities	tree removal; potential for impacts to nest site if repair of masonry impacts nest site or if bats' entry and exit holes into buildings are blocked
Northern Myotis	END	Roost in tree cavities	tree removal
Eastern Wood-pewee	SC	open woodlands	tree removal
Gray Ratsnake (Frontenac Axis population)	THR	mosaic of forest and open habitat (fields; bedrock outcrops) with a high amount of edge; potential to hibernate in building foundations	Short-term impacts to foraging areas from construction vehicles; potential harm to snakes from construction vehicles; disruption of hibernation habitat through removal or alteration of rock, foundations, masonry and stone
Barn Swallow	THR	nests on buildings and under bridges	Potential for impacts to habitat if repair of masonry includes nest

Common Name	Species at Risk Status	Habitat	Potential Habitat-Disrupting Activities
			site
Whip-poor-will	Antrostomus vociferus	THR, Schedule 1	none
Western Chorus Frog	Pseudacris triseriata	THR, Schedule 1	none
Eastern Musk Turtle	Sternotherus odoratus	SC, Schedule 1	none
Northern Map Turtle	Graptemys geographica	SC, Schedule 1	none
Bridle Shiner	SC	suitable habitat only in shallow marsh on east side of site	none
Grass Pickerel	SC	Suitable habitat only in shallow marsh on east side of site	none

Discussion and Conclusion

Gray Ratsnake is a Species at Risk potentially on the Old Sly Lockstation site that may use gaps, fissures and animal burrows adjacent to foundations and stone walls to access hibernation sites below the frost line in winter. No critical habitat has been identified to date in Smiths Falls in proposed critical habitat mapping (Environment Canada 2017, proposed). The Recovery Strategy for this species notes that critical habitat includes "*Critical habitat structures and features that extend below the frost line, with sufficient humidity to prevent snakes from drying out, and that provide protection from flooding (e.g., above high water mark) and predators. Such structures and features include crevices, fissures or underground ledges (naturally occurring features), old wells, septic tile beds and building foundations (non-naturally occurring features)*"

This species would likely not be at risk from site works associated with repair of lock walls, as they would be below the high water mark. The potential would be low for a hibernaculum if the soil behind the lock walls were wet, as this species hibernates in dry sites. However, if the environment behind the lock wall were high in humidity but not wet, there is the potential that this species could find a hibernaculum behind the lock wall. This snake needs hibernacula that provide sufficient humidity to protect the snake from dehydration during the winter, so if the site is humid but not wet there could still be the potential for a hibernaculum.

Gray Ratsnake hibernates communally so there is the potential for high impact if a hibernaculum were to be disturbed. This species returns to suitable hibernacula year after year. It is recommended that the environment behind the lock wall be investigated to determine if it is wet. If the habitat appears suitable for Gray Ratsnake, ot if a Gray Ratsnake is found, it is recommended that Environment Canada be contacted immediately.

It is highly unlikely that any of the other Species at Risk would be affected by repair of the lock unless large-scale tree removal takes place, in which case it could affect Species at Risk that nest or roost in trees, such as bats and Eastern Wood-pewee.

Reference: Recovery Strategy for the Gray Ratsnake (*Pantherophis spiloides*), Carolinian and Great Lakes/St. Lawrence Populations, in Canada [Proposed] – 2017. Accessed on-line September 2017 at https://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=C4DC62FD-1&offset=2&toc=show

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APPENDIX 7
Site Closure Tool

FCSAP SCT/TRAV SPREADSHEET
Site Data Sheet

Site Name:	Old Slys Lockstation
FCSI# :	9412002
DFRP#:	5P420-17-5157
Completed By:	AEL environment
Date Completed (mm/dd/yyyy):	06/12/2018
Document #:	10888

	Question	Response	Rationale/Evidence (document any assumptions, reports, or site-specific information; provide references)	Guidance	Instructions	Flag (for review)
Site Data						
1. Sources of Contamination						
A	List main sources of contamination for this site - describe any additional sources in the rationale box:			Based on historical and current property use, areas of environmental concern identified in the Phase II ESA should be considered in the RA and/or remedial action planning. Also, consider that source areas could include off-site sources of contamination. User defined sources and associated COCs can be defined in rows 6 through 9 on the Reference-Contaminant Sources tab. If you wish to define user source / COCs, please do so before selecting the source from the dropdown box on the Site Data tab.		
	Source 1	Landfills				
	Source 2				Define Source 2 (if applicable)	
	Source 3				Define Source 3 (if applicable)	
	Source 4				Define Source 4 (if applicable)	
	Additional sources?					
B	For each source below please indicate if all typical contaminants were assessed in the Phase II ESA. Note that the list of typical contaminants is not exhaustive and professional judgement should be used to determine substances that should be assessed.					
	Source 1: Landfills					
	Typical contaminants: Metals (including iron, mercury, lead, zinc), PHCs, BTEX, PAHs, VOCs, phenols, cyanide, PCBs, PCDDs/DFs, pesticides, gases (including methane, carbon dioxide)					
	Were the typical contaminants listed above considered in the site assessment? If typical contaminants were considered but not assessed, answer 'y' and provide an explanation.	y				
	Source 2:					
	Were the typical contaminants listed above considered in the site assessment? If typical contaminants were considered but not assessed, answer 'y' and provide an explanation.					
	Source 3:					
	Were the typical contaminants listed above considered in the site assessment? If typical contaminants were considered but not assessed, answer 'y' and provide an explanation.					
	Source 4:					
	Were the typical contaminants listed above considered in the site assessment? If typical contaminants were considered but not assessed, answer 'y' and provide an explanation.					
	If Other Sources were listed					
	Were the typical contaminants listed above considered in the site assessment? If typical contaminants were considered but not assessed, answer 'y' and provide an explanation.					

FCSAP SCT/TRAV SPREADSHEET

Site Data Sheet

Site Name:	Old Slys Lockstation
FCSI# :	9412002
DFRP#:	5P420-17-5157
Completed By:	AEL environment
Date Completed (mm/dd/yyyy):	06/12/2018
Document #:	10888

	Question	Response	Rationale/Evidence (document any assumptions, reports, or site-specific information; provide references)	Guidance	Instructions	Flag (for review)
Site Data						
2. Media with COCs						
A	Based on sources of contamination, measured concentrations and contaminant migration, indicate if there are known COCs present above applicable guidelines (or background) in each of the media listed below. Provide rationale if COCs are not present above guidelines in a given					
i	Surface Soil (0 - 1.5 mbgs)	Considered and COCs present		**Considered and COCs present** (e.g., directly measured or calculated) - For this category, medium is known or assumed to be impacted by COCs (above guidelines) based on direct measurements or consideration of contaminant fate and transport mechanisms. **Considered and COCs not present** (e.g., by testing, modeling, barrier to migration, etc.) – If selecting this answer, it is known or assumed that the medium is NOT impacted with COCs based on direct measurements or consideration of contaminant fate and transport mechanisms. Rationale should be provided to explain why COC not present (above guidelines) in a given medium. **Not considered in assessment -** If selecting this answer, the medium was NOT considered or evaluated in the assessment and/or contaminant fate and transport mechanisms were not incorporated into the assessment. Rationale is required to explain why the medium was not considered. **na** - The medium was considered not applicable in the assessment. Rationale is required to explain why the medium was considered not applicable (e.g., sediment not applicable (na) when the site is not near a water body). Ensure that contaminant fate and transport is considered and if not that sufficient rationale is provided. Contaminant transport considerations are based on contaminant properties and site characteristics including physical setting and hydrogeology. For surface water, Expert Support recommends that contaminant See Reference Material Tab for additional information.		
ii	Subsurface Soil (> 1.5 mbgs)	Considered and COCs present				
iii	Groundwater	Considered and COCs present				
iv	Surface Water (including seawater)	Considered and COCs present				
v	Sediment	Considered and COCs present				
vi	Outdoor Air	Not considered	CoCs are not volatile, and will not impact outdoor air		If not considered, then a major deficiency is assigned unless rationale is provided.	
vii	Indoor Air	na	No buildings or structures present on site		If NA, provide rationale.	
viii	Other Media 1					
ix	Other Media 2					
B	Have all potential contaminant release and transport mechanisms been described?	y		Contaminant transport considerations are based on contaminant properties and site characteristics including physical setting and hydrogeology. See Reference Material tab for additional information by clicking the link in cell E45 above.		
C	Have all potentially impacted media been sampled?	y				

FCSAP SCT/TRAV SPREADSHEET
Site Data Sheet

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Completed By:	AEL environment
Date Completed (mm/dd/yyyy):	06/12/2018
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	Question	Response	Rationale/Evidence (document any assumptions, reports, or site-specific information; provide references)	Guidance	Instructions	Flag (for review)
Site Data						
3. Additional Site Data Considerations						
A	Have areas of environmental concern been delineated horizontally and vertically?	y		See CCME 1993. Guidance Manual on sampling, Analysis, and Data Management for Contaminated Sites. Volume I: Main Report.		
B	Were sufficient samples collected from areas of environmental concern to reflect maximum concentrations?	y		Is the sampling density and coverage sufficient with respect to likely maximum concentrations and site delineation? Was the dataset sufficiently large if statistical interpretation of data was conducted? See CCME 1993. Guidance Manual on sampling, Analysis, and Data Management for Contaminated Sites. Volume I: Main Report. Link in Cell E51		
C	Have QA/QC program elements been incorporated to ensure the validity of the data and scientific approach?	y		The report should detail both the sampling and analytical testing quality assurance and quality control measures employed and describe if the laboratory QA/QC program was acceptable. The laboratory analysis should be completed by an accredited laboratory (e.g., CALA). Analytical detection limits should be sufficiently low to achieve the accuracy and precision required by the RA. Additional information can be found at http://www.cala.ca/	If Yes, proceed to 3D	
i	If the answer is No, does the lack of sufficient QA/QC measures compromise the results of the assessment?			See Reference Material for QA/QC considerations.		
D	Is the site assessment testing program described, including methodology used to collect samples, number of testing locations and analytical program?	y		CCME provides guidance on sampling design in CCME (1993) Guidance Manual on sampling, Analysis, and Data Management for Contaminated Sites. Volume I: Main Report. http://www.ccme.ca/ourwork/soil.html?category_id=68 There is also guidance on sampling and analysis plans in the FCSAP ERA Guidance document.		
E	Was rationale provided for the selection of samples for analytical testing?	y				
F	Are all sampling locations identified on site plans and in data tables?	y				

FCSAP SCT/TRAV SPREADSHEET
Site Data Sheet

Site Name:	Old Slys Lockstation
FCSI# :	9412002
DFRP#:	5P420-17-5157
Completed By:	AEL environment
Date Completed (mm/dd/yyyy):	06/12/2018
Document #:	10888

	Question	Response	Rationale/Evidence (document any assumptions, reports, or site-specific information; provide references)	Guidance	Instructions	Flag (for review)
Site Data						
4. Screening COCs (applicable to risk assessments (RA) only)						
A	Was a risk assessment conducted?	y				
B	Were federal guidelines used to screen COCs? If not, provide rationale.	y		Federal guidelines (e.g., CCME, CDWQG) should be used appropriately (e.g., relevant land use). If other guidelines were used, justification should be provided.		
C	Were maximum concentrations used in the screening process?	y		Maximum concentrations should generally be used for screening purposes. The purpose of this screening step is to compile a conservative list of chemicals for further evaluation. In some cases, statistics other than maximum values can be used. Rationale should be provided in these cases.		
D	Were chemicals whose detection limit was greater than the screening guidelines retained as COCs?	y		Chemicals whose detection limits exceed guideline values should be retained for further evaluation.		
E	If chemicals were screened out because their concentrations fell within background levels, were background concentrations determined appropriately and used correctly?	y		Please refer to current guidance for methods related to establishing background or reference conditions (e.g., FCSAP ERA guidance).		
F	Was consideration given to:					
i	Substances for which there are no guidelines?	na	All substances tested for had guidelines	These substances should be retained unless the rationale for their exclusion is recorded so that the decision process is understood, transparent, easily retraced, and verifiable. If exclusion cannot be rationalized during this step, the chemical is regarded as a COC and retained for further assessment.	If NA, provide rationale.	
ii	Persistent, bioaccumulative or biomagnifying substances?	y		See Reference Material for examples of bioaccumulative substances and degradation products. Appropriate food chain considerations should be incorporated into the risk assessment for these substances.		
iii	Degradation products?	y		See Reference Material for examples of bioaccumulative substances and degradation products. Consideration should be given to degradation products when these are more toxic than their parent substances (e.g., tetrachloroethylene and its degradation products).		

FCSAP SCT/TRAV SPREADSHEET
COC Sheet

Site Name:	Old Slys Lockstation
FCSI # :	9412002
DFRP #:	5P420-17-5157
Completed By:	AEL environment
Date Completed:	06/12/2018
Document #:	10888

For each medium with contamination, list COCs. These are the COCs on the site at the time of the risk assessment and/or remedial action planning. There is enough space for 15 COCs. If the site has more than 15 COCs, consider listing the COCs that are the drivers of the risk assessment and remediation, if applicable. Additional COCs can be included in row 32 "others", which is for record keeping purposes only. For example, consider listing benzo(a)pyrene instead of all PAHs if there are more than 15 COCs, if benzo(a)pyrene is a driver for risk and remediation.

In each row of the table, enter the COC in column B. For each medium, indicate if the COC is present by selecting "y", "n" or "na" from the drop down list. In this case "y" means "yes", the parameter has been measured and is a COC; "n" means "no", the parameter has been measured and is not a COC; "na" means that the parameter has not been measured.

COCs and Media

COC #	COC	Surface Soil (0-1.5 mbgs)	Sub-surface Soil (>1.5 mbgs)	Groundwater	Surface Water	Sediment	Outdoor Air	Indoor Air
1	PHCs	y	y	y	na	n		
2	Toluene	n	y	n	n	y		
3	Xylenes	n	y	n	n	n		
4	Trichloroethylene	n	y	n	n	n		
5	PAHs	y	n	y	na	y		
6	DDD	n	y	na	na	na		
7	Metals	y	n	y	n	y		
8	Chloride	na	na	y	na	na		
9	PCBs	n	n	n	n	y		
10	Cyanide (free)	n	n	n	y	y		
11	Ammonia, unionized	na	na	na	y	na		
12	Acetone	n	n	n	na	y		
13								
14								
15								
others								
Notes	CoCs included were drivers for risk assessment							

Site Closure Tool Closure Evaluation Page

Federal Contaminated Sites Action Plan Site Closure Tool (2014)
Site Closure Evaluation Questionnaire

Site Name (per IDEA):	Old Slys Lockstation
FCSI#:	9412002
DFRP#:	5P420-17-5157
Date (MM/DD/YY):	06/12/2018
Document Number:	10888
Completed By:	AEL environment

Steps 1-6 Site Assessment and Step 7 Risk Assessment

Notes:

1. Completion of the Documentation Tab sections indicated in the Instructions column is only mandatory for sections 4.1 and 4.3, other sections are recommended to be completed at the discretion of the department or agency. However, completion of all relevant sections is highly recommended to ensure custodian documentation requirements are met currently and in the future.

2. The questions below are intended to evaluate completion of each of the Steps 1-6, 7, 8, 9 and 10 of the Federal Approach to Contaminated Sites. In general, responding 'No' will result in failure to achieve the minimum requirements for that step. In some cases, the correct response to a particular question may be 'No', but is not considered by the User to be grounds for not meeting minimum requirements. In such cases the user can select N/A and should provide a brief rational.

3. The SCT is intended to be completed for each site with a unique FCSI number. Large sites may be managed as a single project, but encompass several AECs with unique FCSI numbers, in this case the SCT should be completed for each AEC with a unique FCSI number.

4. Whenever not applicable (N/A) is selected, User should provide rationale in User Rationale column.Notes:

	Question	Response	User Rationale	Guidance	Instructions
1	Complete the Site Data and COCs Worksheets. Were any major deficiencies noted?	No		This question ensures that all Areas of Potential Environmental Concern (APECs) were addressed and their Potential Contaminants of Concern (COPCS) were tested in the supporting Environmental Site Assessments.	Automatically scored based on Site Data worksheet. If the automatic response is Yes, there is a major deficiency identified in the Site Data worksheet that needs to be addressed. Check to see that all questions on the Site Data and COC worksheets (particularly Site Data Q1 and Q2B) have been completed. If No, proceed to next question.
2	Based on the Phase II and III ESAs, did any of the COC concentrations exceed Tier 1 (generic) thresholds?	Yes		This question identifies whether the site can be closed based on a Phase II/III ESA only.	If Yes, proceed to next question. If No, SITE IS CLOSED. Complete sections 1 & 2 of Documentation worksheet (optional) to confirm. If this question is not applicable, select N/A and provide a brief explanation in the space provided
3	If following a risk management approach, was a risk assessment completed or is it in the process of being completed?	Yes		Not all risk management (RM) approaches include a risk assessment (RA). This question determines whether a RA is/was part of the RM strategy and allows bypassing of the questions about RA if an RA was not required. User must answer "yes" if a RA was completed and is part of the site closure strategy.	If Yes, proceed to next question. If No, proceed to Q8 and document risk management objectives in section 3.1 of Documentation worksheet (optional) . If N/A, provide rationale.

	Question	Response	User Rationale	Guidance	Instructions
4	If you are still in Step 7 or 8 of the FACS it is recommended that you use TRAV to validate the risk assessment to ensure you are addressing all risks. Will you be using TRAV?	No		Use of the Tool for Risk Assessment Validation (TRAV) is recommended to validate any risk assessment used towards the purposes of site closure: however, it is not mandatory. By clicking on the "Open TRAV" button in the Instructions column, the TRAV worksheets will be opened and displayed.	If Yes, Open TRAV and complete Sheets III to VIII. Proceed to Q5. If No, proceed to Q7. If TRAV not used, provide rationale of how RA was reviewed and validated.
5	Based on the TRAV, were any major deficiencies in the risk assessment noted?	N/A		TRAV asks a series of questions to validate the thoroughness and soundness of a risk assessment. Major deficiencies are defined in TRAV and will be flagged within the TRAV worksheets to allow the deficiencies to be addressed. All deficiencies need to be addressed before the RA results are considered valid.	Automatically scored based on the results of the TRAV. If Yes, the risk assessment should be revised until it is acceptable based on TRAV (see bottom of (VI) Summary sheet for list of deficiencies) If No or N/A, proceed to next question.
6	Did the TRAV validated risk assessment identify any unacceptable risks posed by the site? OR	N/A		This question summarizes whether the TRAV validated risk assessment identified any potentially unacceptable risks. If answered "Yes", remedial action or risk management actions will be required to mitigate these risks. If "No", the site can be closed based on the risk assessment findings.	Automatically scored based on TRAV. If No, the site does not present any unacceptable risk based on assumptions used in risk assessment and site can be closed. Complete Documentation Tab (optional) to summarize findings. If Yes, further work is required. Establish remediation or risk management objectives and proceed to sections below. If you did not use TRAV and you completed a risk assessment, answer the next question.
7	If TRAV was not completed but a risk assessment was conducted, did the risk assessment identify any unacceptable risks posed by the site?	Yes		This question addresses those RAs which are not validated by TRAV and summarizes the RA conclusion as to whether there are any potentially unacceptable risks to be addressed through remediation or risk management. If the RA concludes that there are no unacceptable risks, the site may still remain active if additional work such as LTM is required to ensure the assumptions of the RA which determined that there were no unacceptable risks remain appplicable.	User-defined. If No, the site does not present any unacceptable risk based on assumptions used in risk assessment and site can be closed provided no further work such as LTM is required. Continue on to the next section of the Closure Evaluation. Complete Section 4 (mandatory) and other sections of Documentation Tab to summarize findings. If Yes, further R/RM work is required. Establish remediation or risk management objectives, and document them in Documentation Tab section 3.1(optional) . If a RA was not conducted select N/A
	Summary Evaluation: Do the ESAs and risk assessment meet minimum requirements?	**Minimum Requirements Met Site Active**			If "Revisions Required", revise the ESA and risk assessment until they are acceptable, and re-complete this section of the tool. If "Minimum Requirements Met, Site Closed", complete the closure evaluation tab (with "N/A" where applicable) and complete sections 1,2 (optional) & 4 of Documentation Tab (mandatory), as appropriate. If "Minimum Requirements Met, Site Active", proceed to the next section, describing remedial or risk management planning. Complete sections 1,2 & 4 of Documentation Tab, as appropriate.

	Question	Response	User Rationale	Guidance	Instructions
Step 7 Remediation / Risk Management Plan					
8	Does the R/RM Plan address all unacceptable risks as identified by a risk assessment or exceedances of CCME Tier 1 guidelines?	No		If there are exceedances of generic (Tier 1) criteria and/or a risk assessment indicates potentially unacceptable risk, a remediation (R) or risk management (RM) plan will be required. This question assumes the R/RM plan has already been completed. The R/RM plan must meet a number of minimum requirements as indicated in Questions 8 through 17.	If Yes, proceed to the next question. If No, further work must be completed on the R/RM plan before proceeding with implementation. If N/A, it is assumed R/RM Plan is not required. Rationale should be provided if selecting N/A.
9	Are the R/RM objectives clearly stated for each AEC and/or source area.	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	The R/RM objectives should be clearly stated so that the R/RM approach can be assessed as to whether it will meet each of the objectives.	If Yes or N/A, complete s. 3.1 of Documentation Tab (optional) and proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
10	Have all regulatory requirements been identified (e.g. permitting) and included in the R/RM plan?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	Many R/RM strategies may involve obtaining certificates of approval for remedial technologies, permits to take water, permits to discharge to municipal sewer systems, CEAA Environmental Assessments, provincial regulatory sign off on remedial action plans, etc. These should all be identified in the R/RM Plan	If Yes or N/A, proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
11	Does the plan identify aesthetic objectives (e.g., removal of scattered surface debris) and safety-based objectives (e.g., elimination of potential trip hazards or danger related to slope stability)?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	Some R/RM plan objectives focus on cleaning up to non-numeric targets. These types of objectives need to be identified in the R/RM Plan, if applicable.	If Yes or N/A, proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
12	Have other site-specific objectives identified in a risk assessment or other ESAs been included in the R/RM plan? (e.g., prevention of off-site migration, community concerns)	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	There may be other objectives such as groundwater control in the event of potential off-site migration or meeting community concerns beyond clean up to appropriate generic standards. These should be clearly stated in the R/RM Plan.	If Yes or N/A, proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.

	Question	Response	User Rationale	Guidance	Instructions
13	Are all AECs as confirmed by Environmental Site Assessments addressed by the R/RM Plan?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	All confirmed Areas of Environmental Concern (AECs) should be addressed in the R/RM Plan by having clear objectives (see Question 9) and an appropriate strategy specific to that AEC, which should be documented in the R/RM Plan.	If Yes or N/A, proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
14	Does the R/RM Plan include areal extent of impact, depth interval and volumes of impacts for each AEC and for each medium?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	It is important that the extent of the contamination is known with a reasonable degree of confidence for each impacted media. This information will be required for preparing accurate liability estimates, to develop tender specifications and to limit out of scope costs in implementation.	If Yes or N/A, proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
15	Are all AECs and COCs identified on a site plan?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	Accurate site plans are very important in the R/RM Plan for communicating the location and extent of site impacts. The site plans should identify each AEC, the extent of impact horizontally and vertically, the COCs present and the magnitude of the impacts.	If Yes or N/A, proceed to the next question. If No, further work must be completed on the R/RM plan before proceeding with implementation. If N/A, it is assumed R/RM Plan is not required. Rationale should be provided if selecting N/A.
16	Was a remedial options analysis completed and documented with the preferred option identified?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	A remedial options analysis or ROA should be part of any R/RM plan. It can be a separate document. An ROA is essentially a business case for why the recommended option was selected. The criteria used for screening options and the rationale for selection for the recommended option must be documented.	If Yes or N/A, complete s. 3.2 of Documentation Tab (optional) and proceed to the next question. If No, site cannot be closed and further work must be completed on the R/RM plan. As may be the case for smaller sites, if a ROA was not completed or documented, the user can select N/A and should provide rationale.

	Question	Response	User Rationale	Guidance	Instructions
17	Is the description of the recommended option sufficiently detailed in the R/RM plan? (e.g., system components, disposal routes, facilities, overview of operational procedures, monitoring requirements, timeline for implementation, potential changes in site use, regulatory requirements, performance metrics, long-term monitoring requirements, responsibilities, communication plan, contingency measures)	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	A detailed description of the scope of the recommended option is essential for planning the implementation, costing it accurately and developing a realistic schedule for implementation. The degree of detail is largely left to professional judgement.	If Yes or N/A, complete s. 3.3, 3.4, 3.5, 3.6 of Documentation Tab (optional). If No, site cannot be closed and further work must be completed on the R/RM plan. Rationale should be provided if selecting N/A.
	Summary Evaluation: Does the R/RM Plan content meet minimum requirements as indicated by answering yes to the above questions?	**Revisions Required**			If Minimum Requirements Met, proceed to the next section, describing remedial or risk management activities. If Revisions Required, revise the R/RM plan until it is acceptable, and re-complete this section of the tool. Information regarding the R/RM plan should be included in Section 3 of the Documentation section.

	Question	Response	User Rationale	Guidance	Instructions
Step 7 Long Term Monitoring (LTM) Plan					
18	Does the R/RM Plan require LTM as part of the strategy?	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	The need for LTM should be considered and identified during Step 7. This question asks whether the R/RM plan includes LTM as part of the strategy. If not, this section does not need to be completed. If the R/RM Plan does not/did not explicitly require LTM, but LTM is/was determined to be required at a later date, answer Yes and proceed to the next question.	If Yes, proceed to the next question. If No, LTM is not required. Proceed to next section (Q30). If requirement for LTM is unknown, select N/A, LTM selection is then subject to change in the future. Rationale should be provided if selecting N/A.
19	Is there a LTM plan included in the R/RM Plan?			The R/RM Plan should include details on the LTM requirements, if LTM is part of the R/RM Plan. The LTM plan can be under separate cover as well.	If Yes, summarize the plan in section 6.1 of Documentation tab (optional). Proceed to next question. If No, site cannot be closed and further work must be completed on the R/RM plan to include a LTM plan. Rationale should be provided if selecting N/A.
20	Does the LTM plan identify the location and nature of residual contaminants and physical hazards to be risk managed?			It is important that the LTM requirements are linked to the residual contamination or other hazards that are being addressed by the R/RM plan. This question asks whether that has been done.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
21	Does the LTM plan identify the key organizations or groups involved in LTM activities for the site, including descriptions of their roles and responsibilities.			Clear roles and responsibilities of LTM implementation are one of the keys to the success of risk management. The LTM plan should identify who is responsible for what in the LTM implementation.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
22	Does the LTM plan describe each engineered control that is being implemented, how it is being implemented and maintained as part of LTM?			Engineered controls include barrier walls, landfill caps, fencing, groundwater control pumping, etc.. These will require on-going inspection to ensure they are working as planned. An explanation of the surveillance and maintenance activities by which effectiveness will be monitored, as well as the roles and responsibilities for maintaining the engineered controls, should be included in the discussion on the engineered controls.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.

	Question	Response	User Rationale	Guidance	Instructions
23	If monitoring site media, does the LTM plan specify the media to be monitored along with the frequency, methodology, objectives, reporting requirements, and contingency measures in the event of non-compliance and quality assurance processes?			If monitoring activities are part of LTM at the site, a description of each of the following for each monitoring activity should be included in the LTM Plan: • Medium. Identify the medium that is being monitored (or will be monitored) and the location of the monitoring. • Method. Identify the method to be employed for monitoring activity. • Frequency. Identify the frequency of monitoring. • Objectives of Monitoring Activities. State the objectives of the monitoring activity. • Reporting Requirements. Describe reporting requirements for the results of the monitoring activities. • Emergency Response and Corrective Action. Identify linkage between monitoring and inspection observations and emergency response and/or corrective actions. • Quality Assurance. Describe the quality assurance program under which routine inspections will be conducted.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
24	Are trigger criteria identified that would require implementation of contingencies and are contingency actions specified in the LTM plan?			In some cases risk management measures are not working as per the RM plan as identifed by the LTM. Identify the trigger criteria that would require implementation of an alternate course of action/contingencies. This includes a description of how the data will be interpreted and what the threshold criteria is for determining when contingent actions are warranted and the procedures used to evaluate contingencies including a contingency analysis, showing the possible responses and reporting procedures including public notification requirements. If appropriate, include a discussion of onsite or offsite areas that are subject to a release (failure) and the contingency measures in place. Describe the emergency response and reporting procedures including public notification requirements.	If Yes, summarize this in section 6.1 of Documentation Tab. Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.

	Question	Response	User Rationale	Guidance	Instructions
25	If institutional controls are being implemented, is there a description of how they are being implemented and maintained?			Any institutional controls being implemented should be described in the LTM Plan, including how they are being implemented and maintained. This should include a description of other use/access restrictions required to maintain protectiveness and describe the location of where these controls are in effect at the site. Refer to the FCSAP Long Term Monitoring Guidance	If Yes, summarize this in section 6.1 of Documentation Tab. Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
26	Does the LTM plan identify all of the LTM activities that are specifically required by regulation, orders, directives, policies, permits, licenses or other third party enforceable agreements and the enforcement mechanisms?			The LTM Plan should include the regulatory and institutional framework for the LTM activities. The regulatory compliance requirement(s) should be discussed along with the applicable LTM activity. Identify all of the LTM activities that: - are specifically required by regulation, permits, licenses or other third party enforceable agreements and the enforcement mechanisms. - will be conducted pursuant to regulatory orders, directives, or policies.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
27	Does the LTM plan identify any existing or required agreements with third parties (e.g., land use or access agreements)?			Some LTM plans require access to third party properties. The LTM should indicate what agreements are in place to facilitate this.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
28	Are anticipated costs of the LTM activities provided, including assumptions used to develop the cost estimates, as well as assumptions for determining when sites or portions of a site will start and stop LTM activities? Is there a description of how the LTM activities will be funded?			The LTM Plan should include the rationale for the anticipated costs of the LTM activities based on technical requirements for LTM programs and activities at the site. Include assumptions used to develop the cost estimate, as well as assumptions for determining when sites or portions of a site will start and stop LTM activities. The LTM Plan should indicate how it LTM will be funded.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
29	Does the LTM plan identify the purpose, methods and means by which information will be preserved, stored, maintained, and accessed?			The information documented for LTM should: • Identify information critical to implementing LTM at the site. • Identify the methods and means by which information will be preserved (this includes all types of data deemed necessary (e.g., maps, photos, reports, databases, etc.)). • Describe how and where records will be stored, the length of time they will be stored, and for what purpose the records are being maintained. • Describe how record access will be enabled and the measures necessary to ensure compatibility with information hardware and software at future dates. • Identify the means by which the public will be afforded access to records. • Identify which of the LTM records for the site are anticipated to be requested by the public and which records may be made accessible.	If Yes, summarize this in section 6.1 of Documentation Tab (optional). Proceed to the next question. If No, site cannot be closed and further work must be completed on the LTM plan. Rationale should be provided if selecting N/A.
	Summary Evaluation: Does the LTM Plan meet minimum requirements?	**Not Required**			If Minimum Requirements Met, proceed to the next section. Information regarding the LTM plan must be included in Section 3 of the Documentation section as appropriate. If Revisions Required, revise the LTM plan until it is acceptable, and re-complete this section of the tool.

	Question	Response	User Rationale	Guidance	Instructions
	Approval & Sign Off of R/RM Plan				
30	Was the R/RM Plan signed, by a P.Eng. or P.Geo. or other qualified professional? A "qualified professional" for the purposes of this question, is defined as: (a) the person holds a bachelor's degree in science, engineering or applied technology from a post-secondary institution; and (b) the person has experience in the conduct or supervision of remedial/risk management plans, as follows: (i) if the person holds a doctoral degree in science or engineering from a university, five years' experience, (ii) if the person holds a master's degree in science or engineering from a university, seven years' experience, (iii) in any other case, eight years' experience.	N/A	R/RM Plan has not been undertaken at this time. It is recommended that a R/RM Plan be completed for the Site.	A R/RM plan should be reviewed and signed off by an appropriately experienced individual to ensure sound and proven approaches are being implemented. The qualifications listed in the question are suggested minimum requirements. Ultimately each custodian will determine who is qualified to approve these types of documents.	If Yes, proceed to the next question. If No, R/RM plan should be reviewed and signed by a qualified professional. If the plan was signed off by a person not meeting the definitions of a qualified professional, "Yes" can be selected and rational can be provided. Alternatively, N/A can be selected and a rationale can be provided.
	Summary Evaluation: Was the R/RM Plan (and LTM if applicable) signed, by a P.Eng. or P.Geo. or other qualified professional?	**Not Required**			If Minimum Requirements Met, proceed to the next question. If Revisions Required, R/RM plan should be reviewed and signed by a qualified professional.

	Question	Response	User Rationale	Guidance	Instructions
Step 8 Construction Completion Note: A “construction completion” site is a contaminated site where physical construction of all remedial/risk management actions are complete, all immediate threats have been addressed, and all long-term threats are under control. This typically applies to sites where there has been completion of major capital expenditures (e.g., installation of a barrier treatment wall, construction of land treatment facility or biocell, installation of an in situ ground water treatment system, construction of a water treatment plant, etc.) but where there will be lag time of more than a year between construction completion and achievement of remedial objectives. This applies to sites requiring active operations and maintenance, including performance monitoring. This is also applies to constructed engineered controls as part of a risk management strategy, and which may or may not require long-term monitoring.					
31	Does the remedial or risk management approach include constructed or installed works representing a major capital expenditure?	No		For sites where ground or surface water remedial actions require a lengthy continuous operation phase after the system has been constructed, *construction completion* is accomplished when physical construction of the remedial works (e.g., construction of the ground water treatment plant, installation of pumps and extraction wells) is completed, a final inspection of installed systems has been undertaken, and any future modifications to the system are expected to be minimal (e.g., well replacement). The construction completion designation should also be applicable to the installation of longer term soil remediation methods such as soil vapour extraction (once extraction wells, blowers and collection units have been installed), in-situ bioremediation (after installation of injection wells and surface equipment) and ex-situ bioremediation (e.g., after construction and placement of soils in biopiles or land treatment units, with only tilling activities (O&M) to follow).	If No, this section does not need to be completed. If Yes, inspect constructed works according to requirements (e.g., inspection check list) set out in R/RM Plan and summarized in s. 3.5 of Documentation Tab (optional).
32	Is the physical construction of the remedy complete? (e.g., construction of treatment plant, pumps, extractions wells, containment structure)			The physical construction of the remedy can be considered complete when the custodian or their representative accepts the constructed works. This will typically mean a physical inspection of constructed works is required.	If Yes, proceed to the next question. If No, construction is not complete and further work is required. If N/A, rationale should be provided
33	Have the constructed works / installed system been inspected and inspection results documented, including as-built drawings?			This depends largely on professional judgement and by comparing as-built conditions against the contract requirements. Typically the supervising engineer will undertake this inspection using a checklist developed for the project. As-built drawings should also be provided to the custodian for review and sign off.	If Yes, summarize inspection activities in s. 3.5 of Documentation tab. If No, construction is not complete and further work is required. If N/A, rationale should be provided.
34	Was the inspection completed without noting major deficiencies?			Major deficiencies will typically be defined during the inspection process using a pre-approved inspection checklist.	If Yes, proceed to the next question. If no, construction is not complete and further work is required. If N/A, rationale should be provided.
35	Do constructed / installed works meet R/RM plan requirements?			This is typically accomplished by by comparing the as-built conditions with the specifications and drawings used in the tender process; however the nature of a major deficiency should be defined on a case by case basis and should be beforehand in the contract.	If Yes, proceed to the next question. If no, construction is not complete and further work is required. If N/A, rationale should be provided.
36	Is the remedy operational (e.g., is the treatment system removing/reducing contaminant concentration levels, is barrier system preventing contaminated groundwater migration, has the cap eliminated pathways to receptors) in accordance with the R/RM plan?			The question establishes whether the constructed works are operating as intended, whether it is containment or active clean up, and as per the R/RM plan.	If Yes, proceed to the next question. If no, construction is not complete and further work is required. If N/A, rationale should be provided.

Question		Response	User Rationale	Guidance	Instructions
37	Are any expected future adjustments likely to be minimal in nature? (e.g., well replacement)			Small adjustments are often necessary for constructed works in response to actual remedy performance. This question establishes whether the coststructed works are likely to require significant amendments or adjustments.	If Yes, proceed to next question. If no, construction is not complete and further work is required. If N/A, rationale should be provided
Summary Evaluation: Does the site meet minimum Construction Completion requirements as indicated by answering yes to the above questions.		**Constructed Works Not Required**			If Constructed Works Not Required, proceed to next section. If Minimum Requirements Met - Construction Complete, complete Section 3.5 of the Documentation worksheet (optional) and proceed to the next section. This will demonstrate that while the site is not closed, there has been major progress towards achieving remedial objectives. If Minimum Requirements Not Met - Construction Not Complete, correct deficiencies and re-score.

	Question	Response	User Rationale	Guidance	Instructions
Step 8 Operations and Maintenance					
38	Is/was operations and maintenance (O&M) required for R/RM measures at the site? (e.g., treatment plants, pumping systems, injection programs, performance monitoring of installed systems, tilling and fertilizing land treatment facilities)	N/A		Operation and maintenance (O&M) typically involves the operation of soil, ground water or surface water remediation measures that are meant to reduce contaminant concentrations to pre-established clean up goals within a reasonable time frame (e.g., 10 years). In the Site Closure Tool, O&M is considered to be part of Step 8 (Implement Remediation/Risk Management Strategy) in the Federal Approach to Contaminated Sites (FACS). It can include in-situ soil remediation measures such as soil vapour extraction and in-situ bioremediation, and ex-situ bioremediation. MNA should be considered as a special case of in-situ remediation strategy requiring O&M, provided it is expected to result in contaminant concentrations being reduced to clean up targets.	If Yes, this section must be completed. Summarize O&M requirements in s.3.6 of Documentation Tab (optional). If No, proceed to next section. If N/A, rationale should be provided.
39	Are maximum concentrations in all media less than established R/RM objectives or have termination criteria otherwise been met? (e.g., duration)			Once R/RM targets have been met, e.g., ground water meets pre-established target concentrations based on sampling of key monitoring wells over several events, then the site can be considered ready for closure. Other termination criteria may apply (e.g., X number of years of a stable plume): these should have been identified in the R/RM Plan.	If Yes, proceed to the next question. If No, further system operation or other changes are required to meet objectives. If N/A, rationale should be provided.
40	Have required O&M activities been completed according to the schedule outlined in the R/RM plan?			O&M activities will typically follow a set schedule developed in the R/RM plan. This question asks whether the implemented O&M is/has been following the R/RM plan. If not, user should select "N/A" and provide rationale why not, if there is a rationale.	If Yes, proceed to the next question. If No, further system operation or other changes are required. If N/A, rationale should be provided.
41	Have all O&M activities been documented?			O&M requirements should have been documented in the Consultant's Remedial Action Report and these should also be summarized in the applicable sections of the SCT Documentation tab. In many cases a separate O&M manual will have been produced. These O&M activities should now be carried out as planned until remediation or risk management targets have been met. It is common practice to have the operator of the remedial system report on system performance on a pre-established periodic basis, typically annually, although this may be more frequent in the initial stages of system ramp up.	If Yes, summarize this in s. 3.6 of Documentation Tab. If No, complete documentation to achieve construction completion. If N/A, rationale should be provided.
	Summary Evaluation: Does the site meet minimum O&M requirements as indicated by answering yes to the above questions.	**Not Required**			If Not Required or Minimum Requirements Met, complete Section 3.7 of the Documentation worksheet (optional), as appropriate, and proceed to the next section. If Minimum Requirements Not Met, correct deficiencies and re-score.
Step 9, Confirmatory Sampling and Final Report					
42	Complete Section 4.1 of Documentation (mandatory). Are maximum concentrations in all media below or meet numeric clean up targets (Tier 1 or SSTLs) identified in the R/RM plan?	No		Examples of the content of a confirmatory sampling and final remediation/risk management report, typically prepared by a consultant, should be available in previous reports on similar projects and in successful Statements of Work (available from contaminated site project delivery organizations). The consultant's report should contain final site concentrations in all remediated media and compared to applicable generic guidelines, standards (ofter referred to as Tier 1 guidelines) or site specific target levels (SSTLs).	Automatically completed from Documentation Tab. If Yes, and there are no LTM or RM measures required, site can be closed. Remaining sections do not require completion. If Yes, but LTM or RM measures are required proceed to Q43. If No, more work is required and site cannot be closed. Proceed to Q43.
	Summary Evaluation: Does the site meet minimum requirements for closure as indicated by answering yes to the above question.	**Minimum Requirements Not Met SITE IS ACTIVE**			If Minimum Requirements Met, site is closed. Ensure sections 1, 2, 3 (all optional), and 4 of the Documentation Tab (mandatory) are completed, as appropriate. Completing optional Sections 5, 7, 8 and 9 is also recommended. Skip remaining sections. If Minimum Requirements Not Met, site is active - this may mean that additional work is required at the site or that subsequent sections of the Closure Evaluation should be completed to confirm that LTM requirements have been met.

Question	Response	User Rationale	Guidance	Instructions
Step 10 Long-Term Monitoring to Support Risk Management				
43 Are risk management (RM) measures in place to address all risks resulting from exceedances or is LTM required to confirm risk assessment assumptions?	N/A		This question assumes LTM will automatically be required if risk management (RM) measures are in place and asks whether there are any RM measures implemented to trigger the need for LTM. RM measures are assumed to be required if there any exceedances of Tier 1 and or SSTL levels. This question also allow for the case where a risk assessment might show no unacceptable risk but requires continued monitoring to demonstrate conditions are stable for the foreseeable future.	If No, RM and therefore LTM are deemed not to be required, or a risk assessment does not require confirmation of site conditions. Proceed to Q50 If Yes, summarize RM measures in s.4.2 Documentation Tab (optional). Proceed to next question. If N/A, provide rationale.
44 Based on Section 4.2 of Documentation Tab comparing implemented RM measures vs. planned RM measures (if completed), do all risk management measures implemented comply with goals of risk assessment recommendation?			While not mandatory, s. 4.2 of the Documentation Tab should be completed before answering this question. S. 4.2 identfies the COCs, media, pathways and RM activities to manage risks. Section 4.2 queries whether RM measures comply with goals, and whether LTM is required.	If Yes, Proceed to next question. If No, further work is required to fulfill actions recommended by the R/RM plan. If N/A, rationale should be provided.
45 From Section 4.2 of Documentation, is long-term monitoring required as part of the risk management plan?			In most cases LTM is required as part of risk management. Section 4.2 of the Documentation Tab identifies COCs, affected media, pathways, risk management (RM) measures planned and implemented, and queries whether RM comply with goals and whether LTM is required.	If Yes, proceed to next question. If No or N/A, site should be closed on condition remedial targets have been met. If N/A, rationale should be provided.
46 Are LTM requirements documented (i.e., LTM measures, objectives, description of measures, frequency & duration, responsibilities, etc.)?			The items listed should be standard components of any LTM plan. They should be identified the RM/LTM Plan. It is recommended they also be summarized in Section 6.1.	If Yes, complete Section 6.1 of Documentation Tab (optional). Proceed to next question. If No, document LTM requirements in RM/LTM Plan and then summarize in s. 6.1 of Documentation Tab (optional). If N/A, rationale should be provided.
47 Have you identified applicable LTM planning documents and LTM progress reports?			This question emphasizes the importance for proper documentation of LTM plannig and progress, and any key decisions in the LTM planning process.	If Yes, complete Sections 6.2 and 6.3 of Documentation document (optional). If No, identify applicable LTM planning documents and LTM progress reports and complete Sections 6.2 and 6.3 of Documentation document (optional). If N/A, rationale should be provided.
48 Are all risk management measures operating as intended (as specified in R/RM plan)?			The RM measure should be evaluated at a pre-determined frequency (subject to review of RM measures and LTM requirements) and an assessment made and documented as to whether the RM goals are still being met.	If Yes, log LTM results in Section 6.3 of Documentation worksheet (optional) and proceed to the next question. If No, further work on the remedy will be required. If N/A, rationale should be provided.
49 Is the LTM plan being reviewed and updated as required at least annually to reflect new information obtained?			The LTM plan is a living document, meaning it should be reviewed and revised as appropriate as the RM implementation evolves. If there are changes in actual site conditions or alterations to the risk management measures, these need to be reflected in updates to the LTM plans. In any event the LTM should be reviewed at least annually and updated if necessary.	If Yes, indicate updates to the LTM in Section 6.2 of Documentation Tab (optional). If No, review and update LTM as required, and update Section 6.2 of Documentation Tab (optional). If N/A, rationale should be provided.
Summary Evaluation: Does the site meet minimum requirements for risk management as indicated by answering yes to the above questions.	**Not Required**			If "Not Required", the site is closed. If "Minimum Requirements Met", RM is operating as planned and as demonstrated by LTM. If "Minimum Requirements Not Met", revise RM/LTM plans and implementation. Update Section 6.0 of the Documentation worksheet (optional) as appropriate.

Question	Response	User Rationale	Guidance	Instructions
Risk Managed to Site Closure				
50 Have the LTM termination criteria been met?			This question assumes LTM was/is required as part of a RM strategy or to satisfy a risk assessment recommendation. Termination criteria should have been identified in previous RM or RA documentation. If not applicable the Site should have been closed with question Q42.	If Yes, complete s. 4.2 of Documentation Tab. Site is closed. If No, site is active. Continue LTM activities If N/A, rationale should be provided.
Summary Evaluation: Does the site meet minimum requirements for closure as indicated by answering yes to the above questions.	**Not Required**			If Yes, complete the remaining portions of the Documentation worksheet as required. If No, continue LTM activities until termination criteria are met.

1705 Argentia Road, Unit 3 | Mississauga, Ontario, L5N 3A9
Tel/Fax: 416-657-2367| Toll free: 1-800-267-4797
info@aelenv.com | www.aelenv.com

APPENDIX 8
Authorization and Terms

Terms of Engagement

GENERAL - Aeon Egmond Ltd. (AEL) and the Client (as described in the attached proposal) agree that any professional services, including subsequent services and charges (collectively the Services) to be provided by AEL relating to the Proposal will be subject to the following Terms and Conditions.

STANDARD OF CARE – Services provided by AEL will be conducted with a level of care ordinarily provided by the engineering and geosciences professions under similar site and time constraints. No warranty, express or implied is made. AEL's work may result in damage to surfaces, the restoration of which is not part of this agreement.

SITE ACCESS – The Client provides right of entry to AEL and their subcontractors to carry out the work.

INFORMATION – The Client warrants that it has provided AEL all information known to, or suspected by the Client relating to the past and existing condition of the Site, including but not limited to soil and groundwater data, hazardous materials and buried utilities. AEL may rely on such information.

SAFETY – AEL is responsible only for its activities and that of its employees.

PAYMENT - Charges for the service(s) rendered will be made in accordance with the Consultant's Schedule of Fees and Disbursements as the services are rendered. Invoices will be due and payable on receipt from the date of the invoice without holdback. Interest on overdue accounts is 2% per month, collection fees being extra and payable on collection (where allowed). If the account is not paid within 60 days from the date of the invoice then AEL shall have the right to suspend all work under this agreement without prejudice.

CHANGES IN WORK SCOPE – AEL and the Client agree that it may be necessary to modify the scope of work, schedule and/or cost estimate proposed in the agreement.

INSURANCE – AEL carries $1,000,000 in commercial general liability, professional liability and automobile coverage. Details on our standard coverage is available on request. AEL maintains worker's compensation coverage to statutory amounts.

LIMITATION OF LIABILITY – The Client agrees to limit the liability of AEL, its employees, officers, directors, agents, consultants and subcontractors to matters which arise directly from AEL's acts, errors or omissions and such that the total aggregate liability of AEL, whether arising in contract, tort, or otherwise, shall not exceed the greater of $50,000 or AEL's total fee for services. Any liability shall expire one year after substantial completion of the services. Neither party shall be responsible for lost revenues, profits, cost of capital, claims of customers, or other special, indirect, consequential or punitive damages.

MUTUAL INDEMNITY – AEL agrees to indemnity, defend and save harmless the Client, its officers, directors, employees, subcontractors and agents from and against all claims, damages, losses and expenses (including but not limited to legal fees) arising from personal injury, death or damage to third party property to the extent arising from the negligent acts, errors and omissions of AEL. The Client agrees to indemnity, defend and save harmless AEL, its officers, directors, employees, subcontractors and agents from and against all claims, damages, losses and expenses (including but not limited to legal fees) arising out of or resulting from the Services or work of AEL including but not limited to, claims made by third parties or any claims against AEL arising from the acts, errors, or omissions of the Client or others. To the fullest extent permitted by law, such indemnifications shall apply regardless of breach of contract or strict liability of AEL. Such indemnity shall not apply to the extent that AEL is finally determined to be negligent.

SUBSURFACE RISKS – Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive sampling and testing program may fail to detect certain conditions. The environmental, geological, geotechnical, geochemical and hydrogeological conditions that AEL interprets to exist between sampling points may differ from those that actually exist. The client agrees to waive any claim against AEL and agrees to defend, indemnify and hold AEL harmless from any claim or liability for injury or loss which may arise as a result of any damage and resulting impacts to subterranean structures, utilities or cross-contamination caused by any subsurface investigation.

DISCOVERY OF HAZARDOUS MATERIALS – The Client recognized that hazardous or suspected hazardous substances may be discovered at the site in the course of the work and that the presence of such substances are not the responsibility of AEL. All contaminated samples, materials, and field equipment that cannot be readily cleaned, shall remain the property and responsibility for the Client for proper handling and disposal. The client agrees that the discovery of any such substances shall constitute a changed condition for which AEL shall be fairly compensated. The client agrees to waive any claim against AEL and agree to defend, indemnify and hold AEL harmless from any claim or liability for injury or loss of any type arising from any alleged or actual discovery of hazardous or suspected hazardous substances.

DOCUMENTS – All reports, plans, data, notes, drawings and other documents prepared by AEL are considered its professional work product and shall remain the copyright property of AEL. The services and documents provided by AEL are intended for one time use only. At the request and expense of the Client, AEL shall provide the Client with copies of such documents. The Client acknowledges that electronic media are susceptible to unauthorised modification deterioration and incompatibility and therefore the Client cannot rely upon the electronic media version.

DELAYS – If site conditions prevent or inhibit performance of the work or unrevealed hazardous waste materials or conditions are encountered services under this Agreement may be delayed. The client shall not hold AEL responsible for damages or delays in performance caused by any such delays, or delays caused by the Client, its subcontractors, acts of God, acts and/or omissions of governmental authorities and regulatory agencies or other events which are beyond the reasonable control of AEL.

LITIGATION - The Client shall reimburse AEL for all direct expenses and time in connection with any disputes, litigation or arbitration involving representatives or documents of AEL arising out of the Services in accordance with AEL's prevailing Schedule of Fees.

PROPERTY TRANSACTIONS – In connection with any contemplated or actual purchase or sale of property related to the work, AEL will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions for the Client or others arising out of data which is directly the product of AEL's services.

MISCELLANEOUS – This agreement supersedes all other agreements, oral or written and contains the entire agreement of at the parties concerning its subject matter. No cancellation, modification, amendment, deletion, addition, waiver or other change in the Agreement shall have effect unless specifically set forth in writing singed by the party to be bound thereby. **The Client acknowledges and agrees that if it accepts this engagement letter, or AEL performs the services contemplated therein, then the above Terms of Engagement shall constitute a binding agreement for the sole benefit of the Client and AEL and that no third party beneficiaries are created by this agreement.**

We're growing! Our new address is:
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