ARCADIS Design & Consultancy for natural and built assets

Public Services and Procurement Canada

on behalf of

Department of National Defence

LONG-TERM LANDFILL MONITORING AT THE FORMER CAM-4 DEW LINE SITE

Pelly Bay, Nunavut

March 31, 2017

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APPENDICES

Appendix A Range of the Report and Limitation of Responsibilities

Appendix B Laboratory QA/QC Reports and Certificates of Analysis

Appendix C Field Notes

Appendix D QA/QC Discussion of Results

Appendix E Soil Trend Analysis Graphs

Appendix F Groundwater Trend Analysis Graphs

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
DEW	Distant Early Warning
DGPS	Differential Global Positioning System
DND	Department of National Defence
GPS	Global Positioning System
HDPE	High Density Polyethylene
m.a.s.l.	Meters Above Sea Level
MDL	Method Detection Limit
MW	Monitoring Well
NWS	North Warning System
PCB	Polychlorinated Biphenyl
PHC	Petroleum Hydrocarbon
PSPC	Public Services and Procurement Canada
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SRR	Short Range Radar
TOR	Terms of Reference
TPH	Total Petroleum Hydrocarbons

EXECUTIVE SUMMARY

Public Services and Procurement Canada (PSPC) was engaged by the Department of National Defence (DND) to procure environmental services for the monitoring of Distant Early Warning (DEW) Line sites in Canada. PSPC acquired the services of Arcadis Canada Inc. (Arcadis) to perform the work and the management of such monitoring of DND DEW Line Sites (PIN-2, PIN-3, CAM-1, CAM-2, CAM-3, CAM-4, and CAM-M) in the Kitikmeot Region, Nunavut Settlement Area, for the years 2016 to 2020. The present report documents the findings of the field program for the 2016 monitoring year conducted at the former CAM-4 Pelly Bay DEW Line Site, on the Simpson Peninsula, Nunavut.

The 2016 monitoring program at CAM-4 took place between August 18 and 22, 2016. Five landfills were monitored, comprising i) the Station Area Non-Hazardous Waste Landfill; ii) Tier II Disposal Facility; iii) Upper Site Landfill; iv) Lower Site Non-Hazardous Waste Landfill; and v) Lower Site Landfill.

The landfill monitoring program was intended to assess the performance of these landfills from an environmental and geotechnical perspective, and consisted of a visual inspection, soil sampling, groundwater sampling, and thermal monitoring (downloading data from thermistors installed at the Tier II Disposal Facility, Upper Site Landfill, and Lower Site Landfill).

The main observations and required actions for future monitoring events are shown below:

Landfill	Main Observations and Conclusions	Required Action for Future Monitoring Events
Station Area Non-Hazardous Waste Landfill	Minor settlement, cracking and staining features are present but are not affecting landfill stability. Landfill performance is acceptable. Copper, nickel, cadmium, zinc, chromium, arsenic, and modified TPH concentrations in soil were anomalously elevated; however, no major trends were identified. No major trends were identified for the groundwater parameters analyzed. Free product was observed in monitoring well BMW-1.	Continued environmental and geotechnical monitoring as per monitoring schedule. Well casings of MW7A and MW7B are tilted away from vertical. No maintenance or repairs are recommended at this time however future monitoring should assess whether these wells are tilting further. Other monitoring wells are in good condition.

Landfill	Main Observations and Conclusions	Required Action for Future Monitoring Events
Tier II Disposal Facility	Minor settlement, erosion, staining and seepage features are present but are not affecting landfill stability. The newly observed presence of cracks on the northeast side of the Tier II Disposal Facility may represent a potential stability concern in the future. Landfill performance is acceptable. No major trends were identified for the soil parameters analyzed. Anomalously elevated modified TPH concentrations were reported in soil samples from MW-8B, MW-16A, and MW-16B. No major trends were identified for the groundwater parameters analyzed.	Continued environmental monitoring as per monitoring schedule – Frequency of geotechnical monitoring of this landfill should be increased to annually. Monitoring wells and thermistors are in good condition.
Upper Site Landfill	Minor settlement, cracking and exposed debris features are present but are not affecting landfill stability. Landfill performance is acceptable. No major trends were identified for the soil parameters analyzed with the exception of upward trends identified for zinc and chromium. No major trends were identified for the groundwater parameters analyzed.	Continued environmental and geotechnical monitoring as per monitoring schedule. No datalogger was present within thermistor VT-1. This datalogger should be replaced so data can be collected at this location. Monitoring wells and thermistors are in good condition.
Lower Site Non-Hazardous Waste Landfill	Minor settlement features are present at the landfill but are not affecting landfill stability. Landfill performance is acceptable. No major trends were identified for the soil parameters analyzed. Anomalously elevated nickel and arsenic concentrations were reported in soil samples from MW23-B and MW22-B, respectively, No major trends were identified for the groundwater parameters analyzed.	Continued environmental and geotechnical monitoring as per monitoring schedule. Monitoring wells are in good condition.

Landfill	Main Observations and Conclusions	Required Action for Future Monitoring Events
Lower Site Landfill	Minor settlement, erosion, cracking, seepage, and exposed debris features are present but are not affecting landfill stability. Erosion features on the East Lobe are increasing in quantity and size over time. Repairs may be required in the future. Landfill performance is acceptable. No major trends were identified for the soil parameters analyzed. Anomalously elevated nickel, cobalt, and chromium concentrations were reported in soil from C4-3. No major trends were identified for the groundwater parameters analyzed.	Continued environmental and geotechnical monitoring as per monitoring schedule. Riser cap for MW-17 no longer fits in casing due to well heaving. Repair is recommended to maintain integrity of well and groundwater samples. Remaining three wells and thermistors are in good condition.
Background Samples	In general, reported concentrations of parameters analyzed in soil and groundwater were below average background concentrations.	Background monitoring wells are in good condition, no repairs or maintenance are required.

The results of the 2016 monitoring program indicate that the performance of all five landfills at CAM-4 is acceptable. No remedial work is recommended at this time although the currently proposed monitoring schedule should be modified to allow for annual inspections of the Tier II Disposal Facility due to concerns with slope movement and cracking, and East Lobe of the Lower Site Landfill due to erosion concerns. No other deviations to the proposed monitoring plan have been recommended.

1 BACKGROUND

1.1 Context and Mandate

Public Services and Procurement Canada (PSPC) was engaged by the Department of National Defence (DND) to procure environmental services for the monitoring of Distant Early Warning (DEW) Line sites in Canada. PSPC acquired the services of Arcadis Canada Inc. (Arcadis) to perform the work and the management of such monitoring of DND DEW Line Sites (PIN-2, PIN-3, CAM-1, CAM-2, CAM-3, CAM-4, and CAM-M) in the Kitikmeot Region, Nunavut Settlement Area, for the years 2016 to 2020. The present report documents the findings of the field program for the 2016 monitoring year conducted at the former CAM-4 Pelly Bay DEW Line Site, on the Simpson Peninsula, Nunavut.

1.2 Location, Background and Site Features

1.2.1 Site Location

The CAM-4 site is located on the west side of the Simpson Peninsula in Nunavut at 68º 27ônorth latitude and 89º 45ôwest longitude. The site is approximately 11 km southeast of the community of Kugaaruk and approximately 340 kilometers west of the community of Hall Beach.

The CAM-4 site was accessed by truck via the road that runs from the community of Kugaaruk to the site. At the time of the 2016 site visit, this access road was in passible condition. There are no on-site accommodation facilities at CAM-4. The condition of the on-site airstrip and helipad present along the west edge of Barrow Lake near the Lower Site Area was not assessed. The site location is shown on the inset Key Plan on Figure CAM-4.1.

1.2.2 Background

The CAM-4 site was converted to a North Warning System Short Range Radar (NWS SSR) in the early 1990s. The environmental cleanup and demolition of CAM-4 facilities (for those facilities not required for the operation of the NWS SRR site) commenced in 2001 and was completed in 2006. The cleanup included the closure and remediation of existing landfills as well as the construction of three new landfills. Two of the landfills were constructed for the disposal of non-hazardous wastes generated from demolition and collection of site debris at the upper and lower sites. The third landfill was constructed for the disposal of Tier II contaminated soil (i.e., at the Tier II Disposal Facility).

1.2.3 Site Description and Site Features

The terrain in the area of CAM-4 consists of frost shattered gneisses and granites. In low-lying areas, spaces between boulders are filled with silty gravel and organic material. Elongated, unconnected ponds are present on the uplands. Streams typically drain to the east towards Barrow Lake. A thick veneer of sand till is present over bedrock at the lower site.

Site characteristics and features (such as settlement; erosion; lateral movement; sloughing of slopes; cracks; presence of animal burrows, etc.) were evaluated at each of the following five landfills: Station Area Non-Hazardous Waste Landfill; Tier II Disposal Facility; Upper Site Landfill; Lower Site Non-Hazardous Waste Landfill; and the Lower Site Landfill.

Figure CAM-4.1, located at the end of this report, shows the overall site plan and illustrates the landfill locations and other notable site features.

1.3 Study Objectives

The objective of the DEW Line landfill monitoring program is to collect sufficient information to assess the performance, integrity, and stability of the landfills from a geotechnical and environmental perspective for the protection of human health and the environment. In addition, the work program objective is to collect the monitoring data required, as outlined below in Section 1.4, in an extremely thorough and consistent manner for each monitoring event.

PSPC has specified the requirements for the Landfill Monitoring Program in the document *Terms of Reference – Dew Line Landfill Monitoring Program – PIN-2 Cape Young, PIN-3 Lady Franklin Point, PIN-4 Byron Bay, CAM-M Cambridge Bay, CAM-1 Jenny Lind Island, CAM-2 Gladman Point, CAM-3 Shepherd Bay, and CAM-4 Pelly Bay – DEW Line Sites, Kitikmeot Region, Nunavut, DND Project # KITIK 16, November 2015.* Specifically, Section 3 of the Terms of Reference (TOR) outlined the study objectives in detail.

The following Table 1-1 is the proposed monitoring schedule for CAM-4.

Table 1-1: Monitoring Schedule ï CAM-4 Pelly Bay

Monitoring Schedule ï CAM-4 Pelly Bay		
No. of Years After Construction	**Monitoring Event No.**	**Year of Monitoring Event**
7	6	2013
10	7	2016
15	8	2021
25	9	2031

1.4 Scope of Work

The scope of work for the Landfill Monitoring Program at CAM-4 is defined in the TOR (reference A) and in the accepted Arcadis proposal Number P-6298 (reference B), as submitted to PSPC. The scope of work generally includes the following activities summarized in Table 1-2 and outlined in detail within Section 5 of the TOR.

Table 1-2: CAM-4 Pelly Bay Scope of Work ï Site Background

Landfill	Type	Visual Inspection (Y/N)	Soil Sampling (# of locations and depths)	Groundwater Sampling (# of MWs)	Thermal Monitoring (# of Thermistors)
Station Area Non-Hazardous Waste Landfill	NHWL	Y	7 X 2	10	-
Tier II Disposal Facility	Tier II	Y	6 X 2	7	4*
Upper Site Landfill	Leachate Contained	Y	4 X 2	4	4*
Lower Site Non-Hazardous Waste Landfill	NHWL	Y	3 X 2	3	-
Lower Site Landfill	Leachate Contained (Main Lobe)	Y	4 X 2	4	4*
	Regraded (East Lobe)		3 X 2	-	-

*2016 (year 10) ï Replace ULB15 and ULB1 batteries and reprogram dataloggers

1.5 Site Geology, Hydrogeology and Hydrology

The Simpson Peninsula is located in the Arctic Platform geological province, with bedrock geology characterized granite monzonite syenite and/or undivided gneiss (Canada-Nunavut Geoscience Office, 2006). It is situated in an area of continuous permafrost with low ground ice content (Natural Resources Canada, 1995).

The terrain around CAM-4 consists of frost shattered gneisses and granites. In low-lying areas, spaces between boulders are filled with silty gravel and organic material. Elongated, unconnected ponds are present on the uplands. A thick veneer of sand till is present over bedrock at the lower site. Observations of the local surficial geologic conditions made during the monitoring program were similar to these general conditions.

Groundwater flow is seasonal, occurring mainly in the late summer period when the permafrost active layer is at its thickest. Groundwater is located at shallow depths and is highly affected by local permafrost

conditions. Surface water in the vicinity of CAM-4 generally drains to the east towards Barrow Lake; however, the numerous surface water bodies present across the site locally influence drainage.

1.6 Site Land-use Description

The CAM-4 site is uninhabited; however, it still has an active Short Range Radar station operated as part of the North Warning System, located approximately 0.5 km southwest of the Tier II Disposal Facility located in the Upper Site Area. The community of Kugaaruk is located approximately 11 km northwest of the site. The 2016 Census by Statistic Canada indicates Kugaaruk has a population of 933.

The site is known to be a habitat for caribou, muskox, arctic fox, ptarmigan, and seabirds according to the Ecosystems Science Directorate of Environment Canada.

1.7 Field Program Staff and Field Schedule

The 2016 CAM-4 DEW Line monitoring event was conducted by Arcadis qualified personnel with extensive experience working in remote northern environments including other DEW line monitoring sites. The assignment team comprised the following individuals:

Arcadis Canada Field Team and Roles

- Stephen Borcsok, P.Eng. (SB) ï Geotechnical Field Staff Lead
- Keith Coulthart, (KC) ï Environmental Field Staff Lead

Inuit Support Team and Roles

- Wildlife Monitors (Cedrik Anguti, Rick Anguti)
- Environmental Field Staff Assistants (Lindsay Anaija, Marty Anaittuq)

The following Arcadis Canada staff were not present on site but provided support to the field team during the field program:

- Charles Gravelle, P.Eng. (CG) ï Project Director
- Troy Austrins, P.Eng. (TA) ï Project Manager

The on-site field work for the 2016 monitoring event at CAM-4 took place between August 18 and 22, 2016.

1.8 Weather Conditions

An outline of historical recorded weather conditions encountered is presented on Table 1-3, as identified for the CAM-4 site. The 1961-1990 Climate Normals and averages (temperature and precipitation totals) prepared by Environment Canada for Pelly Bay (Kugaaruk) are listed. Note that Climate Normals for the 1971 to 2000 period is not available.

Table 1-3: Summary of Historical Temperature and Precipitation Conditions (Pelly Bay, NU)

Climate Normals (1981- 2010)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Daily Maximum Temp. (ºC)	-29.9	-29.6	-24.0	-14.3	-4.0	+6.1	+13.9	+10.1	+2.7	-6.0	-17.4	-24.6
Daily Average Temp. (ºC)	-33.5	-33.5	-28.5	-19.4	-7.9	+2.9	+9.3	+6.5	+0.4	-9.1	-28.3	-13.5
Daily Minimum Temp. (ºC)	-37.1	-37.3	-33.0	-24.5	-11.7	-0.4	+4.6	+2.9	-2.0	-12.1	-24.9	-32.0
Precipitation (mm)	9.0	8.1	14.1	20.0	18.6	22.1	36.5	44.8	28.7	28.4	17.7	13.5

Note: as interpreted from Environment Canada graphing (Climate Normals)
NA ï not available

An outline of weather conditions encountered during the 2016 field work conducted by Arcadis is provided in Section 2.1.

1.9 Project References

Project references include:

A Dew Line Landfill Monitoring Program ï PIN-2 Cape Young, PIN-3 Lady Franklin Point, PIN-4 Byron Bay, CAM-M Cambridge Bay, CAM-1 Jenny Lind Island, CAM-2 Gladman Point, CAM-3 Shepherd Bay, and CAM-4 Pelly Bay ï DEW Line Sites, Kitikmeot Region, Nunavut, DND Project # KITIK 16, November 2015 (Specifically Annex D and Annex S).

B Arcadis Canada Inc., Proposal for Kitik 16 DEW Line Sites Monitoring, Response to Solicitation No. W6837-151003/B, March 8, 2016.

C Arcadis Canada Inc., Meeting Minutes, Kitikmeot DEW Line Sites Monitoring Kickoff Meeting, May 25, 2016.

D Biogenie, The Collection of Landfill Monitoring Data at the Former CAM-4 DEW Line Site, Pelly Bay, Nunavut, Final Report, 2013, January 2014.

E Biogenie, The Collection of Landfill Monitoring Data at the Former CAM-4 DEW Line Site, Kugaaruk, Nunavut, Final Report, 2011 Season, March 2012.

F Biogenie, The Collection of Landfill Monitoring Data at the Former CAM-4 DEW Line Site, Kugaaruk, Nunavut, Final Report, 2010 Season, February 2011.

G Biogenie, The Collection of Landfill Monitoring Data at the Former CAM-4 DEW Line Site, Kugaaruk, Nunavut, Final Report, 2009 Season, February 2010.

H AECOM, The Collection of Landfill Monitoring Data at the Former CAM-4 Kugaaruk Site, 2008 Final Report, November 2008.

I Environmental Sciences Group, CAM-4 Kugaaruk, Nunavut, Landfill Monitoring Program, 2007, December 2007

J Activity Summary Report, Installation of 4 Dataloggers at Cam-4 in Summer 2014.

K Canada-Nunavut Geoscience Office, Geology of Nunavut Map, 2006.

L Natural Resources Canada, Canada Permafrost Map, 1995.

M National Ecological Framework for Canada, Ecosystems Science Directorate of Environment Canada, Center for Land and Biological Resources Research of Agriculture and Agri-Food Canada, www.ecozones.ca, 1991-1999,

1.10 Report Structure

This report describes the work completed in August 2016 at the CAM-4. The report has been organized such that the results for the Station Area Non-Hazardous Waste Landfill, Tier II Disposal Facility, Upper Site Landfill, Lower Site Non-Hazardous Waste Landfill, and Lower Site Landfill are each presented in separate standalone sections. Each section contains all relevant information for the respective landfill as part of the 2016 Landfill Monitoring Program.

Each of the individual landfill sections include:

- A brief description of the landfill;
- Completed Visual Inspection Checklist;
- Preliminary Stability Assessment;
- A discussion of all the visual inspection issues assessed;
- The overall performance rating of the landfill;
- A photograph log;
- Annotated drawings of each landfill;
- Soil sample analytical data;
- Monitoring well sampling logs and analytical data (where applicable);
- A discussion and comparison of chemical data to background and previous yearsô monitoring events;
- Completed thermistor inspection forms (where applicable); and,
- Analysis of overall performance of the landfill; and any recommendations for further action and conclusions.

For the photographic record, the printed copy of the report only includes an index of photos for the landfill as well as photo sheets for key landfill features. The original photos are included in electronic format (jpg) in the Addendum CD-ROM of the report. An electronic version of the report and its component tables, figures and data files is included in an Addendum CD-ROM, which is appended to this report.

Laboratory Certificates of Analysis, QA/QC results and discussion, copies of field notes, and graphed trends of soil and groundwater results are attached as appendices at the rear of this report.

2 APPROACH AND METHODOLOGY

2.1 Summary of Work

2.1.1 Health and Safety

Prior to mobilization to the site, a site-specific health and safety plan was submitted and approved by DND. The plan outlined the general safety rules and procedures that were adhered to while working at the subject site. It also presented additional precautions and procedures in the event of an emergency situation. Prior to the commencement of field work, all project staff participating in the monitoring and assessment activities were required to familiarize themselves with the contents of the Health and Safety Plan and sign the Statement of Compliance.

Field crews carried appropriate emergency gear and took every precaution to keep the crew out of danger. This included undertaking the following, where appropriate:

- Obtaining maps to assist in identifying/characterizing the dominant physical features in the vicinity of the site (e.g., topographic maps and aerial photographs);
- Carrying and knowing how to use emergency communication devices such as satellite phones, to be tested for functionality;
- A weather check to be conducted prior to transporting to the field;
- Compilation of a site-specific Emergency Contact List providing numbers for emergency services, office contacts, and individual emergency contacts;
- Carrying a Global Positioning System (GPS) unit for navigation as well as for relaying accurate location coordinates in case of emergency;
- Use of hand-held radios (if within suitable range) for communication between field teams;
- Possession of a Level 1 First Aid kit appropriate to the scope of work and number of personnel;
- Knowing how to use all emergency equipment and testing it prior to mobilization to the field.

Due to the close proximity of the CAM-4 Pelly Bay site to the community of Kugaaruk, two pickup trucks were used to mobilize to the site each day to ensure that in the event of a mechanical breakdown, the field team could safely return to Kugaaruk.

Arcadis staff received all relevant health and safety training in preparation for undertaking the work activities on-site prior to mobilization to the sites. Arcadis ensured that all staff on site received a site safety orientation and field-specific training on contaminated sites issues on day one of the field program. The site safety orientation included specific details of the health and safety plan that were relevant for each job, and relevant training for each position.

2.1.2 Field Program

Arcadis staff mobilized to Kugaaruk from Cambridge Bay via a combination of chartered Dornier 328 aircraft from Adlair Aviation in Cambridge Bay, NU and scheduled air travel through Canadian North. Transportation to and from the DEW line site, as well as on site was via two rented pick-up trucks. Pick-up truck rental was arranged through the Kugaaruk Kurairojuark Hunters and Trappers Association. Accommodations while in Kugaaruk were through the Kugaaruk Inns North Inushuk Inn. The following Table 2-1 outlines the field schedule for CAM-4.

Table 2-1: 2016 Field Schedule for CAM-4 Pelly Bay

August 2016						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
14	15	16	17	18	19	20
			Mobilized from Cambridge Bay to Kugaaruk	CAM-4 preparation	CAM-4	CAM-4
21	22	23	24	25	26	
CAM-4	CAM-4	Demobilized from Kugaaruk to Cambridge Bay	Demobilized from Cambridge Bay to Yellowknife	Demobilized from Yellowknife		

Weather during the field inspection and monitoring event consisted of a mixture of sun and cloud, light to moderate winds, with temperatures ranging between 5 to 15 degrees Celsius.

2.1.3 Visual Inspection

Visual inspection of each landfill was conducted by Mr. Stephen Borcsok, P.Eng. based on guidelines presented in section 5.2 of the TOR. A visual inspection checklist (provided in Annex J1 of the TOR and reproduced herein in each individual landfill chapter) was completed for each landfill site inspected. Inspection information including landfill designation, landfill type, date, monitoring event number, weather conditions, and the name of the inspector was recorded for each landfill. Observations of the landfill related to the following conditions was recorded:

- settlement;
- erosion;

- lateral movement;
- sloughing of slopes;
- cracks;
- frost action;
- animal burrows;
- vegetation re-establishment on surface;
- vegetation stress;
- staining;
- seepage points or ponded water;
- debris or liner exposure;
- condition of monitoring points; and
- other relevant observations.

The presence of the above conditions was recorded on field notes as well as electronic DGPS coordinates for purposes of evaluating their location, dimensions, extent, and description.

Photographic records were taken to document the general condition of the landfill. All photographs were taken to substantiate recorded observations including where no concerns have been identified. All photographs were referenced to existing monuments when at all possible. Photographs have generally been taken with a 35 mm equivalent focal length of 24.0 mm.

Historical features and conditions have been noted from previous monitoring events. Existing features were compared to these features noted in previous monitoring reports and comparative analysis is included in each landfills Section within this report.

All monitoring equipment (monitoring wells and thermistors) was visually inspected, with any damage noted along with any other repair requirements. Photographic records were also collected of each monitoring station and are included within each landfill-specific Section of this report.

2.1.4 Soil Sampling

Soil sampling at each landfill site was completed concurrently with the other monitoring requirements. A Soil Sampling Log (provided in Annex J2 of the TOR) was completed at each soil sampling location.

Where possible, two samples were collected at each sampling location: one sample from 0-15 cm depth, and one sample from 40-50 cm depth. Samples were collected from test pits manually excavated with hand tools (pick/shovel) which were decontaminated between locations using Alconox and distilled water. Each soil sample was collected in one laboratory supplied zip-top plastic bag and three 125 mL glass jars, which were filled with soil such that no headspace remained in the jars.

All soil sampling locations were backfilled after the collection of soil samples. All locations were photographed during sampling and after backfilling was completed, these photographs are included in the photographic records in each individual landfill section within this report.

Soil samples were collected at a number of locations, as specified in the TOR. The number of locations at each landfill is shown below in Table 2-2:

Table 2-2: Summary of Soil Sampling Locations at CAM-4

DEW Line Site	Landfill	Proposed # of Soil Sampling Locations	Actual # of Soil Sampling Locations	Total # of Samples Submitted for Analysis (1)
CAM-4 Pelly Bay	Station Area Non-Hazardous Waste Landfill	7	7	14
	Tier II Disposal Facility	6	6	12
	Upper Site Landfill	4	4	8
	Lower Site Non-Hazardous Waste Landfill	3	3	6
	Lower Site Landfill	7	7	14
	Background Locations	2	2	4
CAM-4 Total		**27**	**27**	**54**

(1) ï Total # of samples does not include duplicates

Soil samples were analyzed for the following parameters.

- Petroleum Hydrocarbons (PHCs): F1-F4 fractions. (F1-F3 fractions were summed to obtain an analogous total petroleum hydrocarbons (TPH) concentration);
- Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, mercury; and
- Polychlorinated Biphenyls (PCBs ï Total Aroclors).

Soil analyses was carried out by Maxxam Analytics at either Edmonton, AB, or Mississauga, Ontario, facilities- both ISO 17025 certified laboratories. Full analytical results are presented in Appendix B.

QA/QC protocols were implemented for the soil sampling program. Blind duplicate samples and quality control and assurance measures were applied as appropriate. Blind duplicates were collected for approximately 10% of the soil samples collected. An additional 10% of soil samples were submitted to a second laboratory, ALS Laboratories, an ISO 17025 certified laboratory, for inter-laboratory comparison of results. The specific locations where blind duplicates were collected were determined in the field and recorded in the field notes and are also presented in the analytical tables, as well as within the QA/QC section for each individual landfill.

2.1.5 Groundwater Sampling

Groundwater sampling at each landfill site was completed concurrently with the other monitoring requirements. A Monitoring Well Sampling Report (provided in Annex J3 of the TOR) was completed at each groundwater sampling location. These sampling reports note:

- Condition of the well;
- Any ponded water at the well location;
- Water elevation;
- Colour, odour, presence and thickness of free product if applicable;
- Depth to bottom of well;
- Height of well stick-up;
- Purge volume and purging equipment used; and
- pH, electrical conductivity and in-situ temperature after each purged volume and before sampling.

In order to ensure that the final groundwater analytical results are representative of actual in-situ ground water quality, and to reduce the risk of false positives due to sediment entrainment in collected ground water samples, Arcadis employed low-flow sampling techniques using a peristaltic pump.

During purging, field parameters were measured and recorded in the groundwater monitoring logs. Parameters were obtained via a (calibrated) multi-meter unit with a flow through cell. Field parameters were collected on a five-minute interval until stabilization was achieved. Stabilization was considered to be achieved when three consecutive stable readings for each parameter were documented. The following parameters were monitored in the field: pH, temperature, conductivity, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity. The peristaltic pump was set to its lowest possible setting to still maintain flow in order to ensure the least chance of ñdrying outò the well.

After stabilization was achieved, the pump discharge line was disconnected from the flow- through cell so that samples could be collected. Wells were purged and sampled using dedicated sampling equipment consisting of 6 mm diameter high density polyethylene (HDPE) tubing. Dedicated tubing was used at each monitoring well location, and was removed following sampling to prevent damage due to freezing. Once collected, all samples were stored in a cooler packed with ice, until such time the samples could be delivered to the laboratory. Each sample was collected in the appropriate sample containers supplied by the testing laboratory.

Other sampling equipment such as interface meters, pH meters, conductivity meters, and temperature meters were decontaminated between monitoring well sampling events using Alconox and distilled water. Groundwater samples were collected at a number of locations as specified in the TOR. The number of locations at each landfill is shown below in Table 2-3:

Table 2-3: Summary of Groundwater Sampling Locations at CAM-4

Monitoring Well ID	Observations	# of Groundwater Samples Collected
Station Area Non-Hazardous Waste Landfill		
BMW-1	Good Condition - Free Product	0
MW-1	Good Condition - Dry	0
MW-2	Good Condition - Dry	0
MW-3	Good Condition - Dry	0
MW-4A	Good Condition - Dry	0
MW-4B	Good Condition - Dry - Sandy	0
MW-6A	Good Condition - Dry	0
MW-6B	Good Condition - No Ponding	1
MW-7A	Good Condition, some tilting, possible heaving - Dry	0
MW-7B	Good Condition, some tilting, possible heaving - No Ponding	1
Tier II Disposal Facility		
MW-5	Good Condition - No Ponding	1
MW-8	Good Condition - Ponding	1
MW-9	Good Condition - Some Ponding	1
MW-14A	Good Condition - No Ponding	1
MW-14B	Good Condition - Dry	0
MW-15	Good Condition - Ponding	1
MW-16	Good Condition - Dry	0
Upper Site Landfill		
MW-10	Good Condition - Dry	0
MW-11	Good Condition - No Ponding	1
MW-12	Good Condition - No Ponding	1
MW-13	Good Condition - Sandy - No Recharge	0
Lower Site Non-Hazardous Waste Landfill		
MW-21	Good Condition - Dry	0
MW-22	Good Condition - No Ponding	1
MW-23	Good Condition - No Ponding	1
Lower Site Landfill		
MW-17	Heaved Well (riser cap no longer fits) - No Ponding	1
MW-18	Good Condition - Some Ponding	1
MW-19	Good Condition - Ponding	1
MW-20	Good Condition - No Ponding	1
Site Background		
BMW-3	Good Condition - No Ponding	1
BMW-4	Good Condition ï No Ponding	1

Groundwater samples were analyzed for the following parameters. Analyses were prioritized in the following order:

- Petroleum Hydrocarbons (PHCs): F1 fraction;
- Inorganic elements ï total concentrations: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, mercury. (Samples will not be filtered or preserved);
- Petroleum Hydrocarbons (PHCs): F2-F4 fractions. (F1-F3 fractions were summed to obtain an analogous total petroleum hydrocarbons (TPH) concentration); and
- Polychlorinated Biphenyls (PCBs ï Total Aroclors).

Groundwater analyses were carried out by Maxxam Analytics; at either Edmonton, AB, or Mississauga, Ontario, facilities- both ISO 17025 certified laboratories. Full analytical results are presented in Appendix B.

QA/QC protocols were implemented for the groundwater sampling program. Blind duplicate samples and quality control and assurance measures were applied as appropriate. Blind duplicates were collected for approximately 10% of the groundwater samples collected. An additional 10% of groundwater samples were submitted to a second laboratory, ALS Laboratories, an ISO 17025 certified laboratory, for inter-laboratory comparison of results. The specific locations where blind duplicates were collected were determined in the field and recorded in the field notes and are also presented in the analytical tables, as well as within the QA/QC section. Travel blanks were also included as part of the sampling program. Groundwater samples were collected unpreserved and unfiltered, according to protocols specified in the TOR.

2.1.6 Thermal Monitoring

Thermal monitoring at the CAM-4 site was completed concurrently with the other monitoring requirements. At each thermistor installation location, a Thermistor Annual Maintenance Report was completed (provided in Annex M of the TOR). Monitoring consisted of the following steps:

- Inspection of the condition of thermistor installations, noting their condition, damage if applicable, and any specific repair requirements;
- Retrieval of ground temperature data from the thermistor installations. A personal computer equipped with the appropriate software and datalogger programming files to retrieve the data was used.
- Collection of real-time manual readings of each individual thermistor bead using a digital readout provided by the datalogger software;
- Measurement of the distance of each thermistor cable above the ground; and
- Resetting datalogger memory to zero and restarting readings. The system was monitored using the personal computer to ensure that the dataloggers were functioning and temperatures were being recorded.

Thermal monitoring data was retrieved from a number of thermistor installations as specified in the TOR and shown below in Table 2-4:

Table 2-4: Summary of Thermal Monitoring at CAM-4

DEW Line Site	Landfill	Thermistor ID	Observations
CAM-4 Pelly Bay	Tier II Disposal Facility	VT-5	No issues observed.
		VT-6	Datalogger was within the datalogger casing but was not connected to the string of thermistor beads. No temperature data was available to be downloaded.
		VT-7	No issues observed.
		VT-8	Datalogger was not properly connected to the string of thermistor beads, no temperature data was available to be downloaded. Thermistor bead 9 was not functioning correctly during manual readings. No desiccant was present within the datalogger.
	Upper Site Landfill	VT-1	No datalogger was present at this location.
		VT-2	No issues observed.
		VT-3	Error messages were displayed when datalogger download was attempted (see Thermistor Inspection Log). No temperature data was available to be downloaded. Beads could be manually read indicating issue may have been with datalogger programming. Datalogger appears to be functioning correctly following re-programing.
		VT-4	No issues observed.
	Lower Site Landfill	VT-9	Only four of ten beads functioned properly during manual readings. An additional four beads appeared to have stopped working sometime during the previous recording period.
		VT-10	No issues observed.
		VT-11	No cover was present on the external COM port of the datalogger.
		VT-12	Two of eleven beads were not functioning properly.

2.2 Field Notes and Data Collection

2.2.1 Field Notes

Field notes were collected utilizing the field forms provided in the TOR, namely the Soil Sampling Log and Monitoring Well Sampling Log (TOR annexes J2 and J3). In addition, field notes regarding thermistor inspections were recorded on the field form (as was provided as TOR Annex M ï Thermistor Inspection Template). A copy of the field notes is provided in Appendix C.

2.2.2 Data Collection

The visual inspection was conducted with the aid of a Trimble Pro XRT Differential Global Positioning System (DGPS) unit to locate features of note and to collect GIS information to be used in report preparation. The horizontal accuracy of the measurements taken with the DGPS unit ranged between 0.2 and 1.2 m, with most results between 0.2 and 0.5 m accuracy. A detailed data dictionary (Trimble file) was created prior to the site visit to capture all required information as outlined in the long-term monitoring plan. An SSF file and the data dictionary (Trimble files) is included on the appended CD/DVD ROM to be used in future site investigations.

Placement of features of note on the figures for each landfill was completed using the DGPS information, supplemented by visual observations. During the previous monitoring event in 2014, placement of features of note on figures was done through visual observations only. Given the use of the DGPS unit, the locations of features reported in this 2016 monitoring report are considered to be more accurate than those reported using visual observations only in 2014. Small differences in feature locations are, unless otherwise noted, a result of the use of the more accurate DGPS data.

Thermistor data was downloaded onto a personal computer from dedicated dataloggers on the site. Raw thermistor data is provided in Excel format on the appended CD/DVD ROM.

2.3 Quality Assurance and Quality Control

Field personnel employed ArcadisôQuality Assurance/Quality Control (QA/QC) protocols, including appropriate techniques for soil sampling, sample storage, shipping and handling, as well as collection of duplicates.

2.3.1 Field

Soil samples collected for potential laboratory analysis were placed in polyethylene bags and laboratory prepared 125 mL glass jars fitted with screw-tight Teflon-lined lids. Groundwater samples were collected from monitoring wells and placed in a variety of appropriately sized and prepared laboratory vessels. Sample numbers were clearly marked on the containers. The soil jars and water bottles were filled to capacity with minimum headspace and stored in coolers with cold packs to moderate temperature fluctuations during transport to the laboratory. To prevent cross contamination, samples were collected with fresh nitrile gloves. Where soil samples were impossible to obtain by hand, a stainless-steel trowel or shovel was used and decontaminated between samples. The samples were transported to the project laboratory accompanied by a Chain of Custody form.

Quality assurance and quality control (QA/QC) was carried out in accordance to the procedures outlined in Annex K of the TOR.

2.3.2 Laboratory

Field (i.e., blind) duplicate samples and quality control and assurance measures were applied as appropriate. Blind duplicates were collected at approximately 10% of the locations. An additional 10% blind duplicates were also collected and submitted to a secondary laboratory, ALS Laboratory Group, for inter-laboratory QA/QC comparison.

The specific locations where blind duplicates were collected was determined in the field, as it was dependent on the amount of water and/or soil available at each location. Travel blanks were also part of the sampling program. Laboratory prepared travel blanks were included in the sample bottle shipment and remained in the cooler with the collected groundwater samples throughout the duration of the project.

A discussion and analysis of QA/QC results is presented in Appendix D.

3 CAM-4: STATION AREA NON-HAZARDOUS WASTE LANDFILL

3.1 Landfill Description

The Station Area Non-Hazardous Waste Landfill was constructed for the disposal of non-hazardous wastes and debris generated and collected during the cleanup from the upper site area. The landfill site is located northeast of the Station Area, along the west side of the main access road.

The design of the landfill included compacted perimeter berms, and placement of a cover of compacted granular fill over the landfilled material. Seven groundwater monitoring wells were installed at the landfill perimeter, three of which are multi-level wells (two screened intervals).

The long-term monitoring plan for this landfill consists of visual monitoring and periodic collection of soil and groundwater samples.

3.2 Summary of Work Conducted

3.2.1 Visual Inspection

A visual inspection was completed on the Station Area Non-Hazardous Waste Landfill on August 20, 2016. The visual inspection of the landfill was completed with no deviations from the visual inspection work plan.

3.2.2 Soil Sampling

Soil sampling at the Upper Site Station Area Non-Hazardous Waste Landfill was conducted on August 21 and 22, 2016 and consisted of the collection of 14 soil samples from seven soil sample stations (BMW-1, MW-1, MW-2, MW-3, MW4-A, MW6-A, and MW-7A). Depth limitations were encountered at soil sampling station BMW-1, with the sampling reaching a maximum depth of 0.4 m bgs.

The following Table 3-1 outlines the soil sampling activities conducted at the Station Area Non-Hazardous Waste Landfill.

Table 3-1: Summary of Work Conducted by Soil Sampling Location

Station Area Non-Hazardous Waste Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
BMW-1	MW-1A	0 - 0.15	Silty Topsoil, dark brown, damp, trace rootlets, sand and gravel
	MW-1B	0.3 ï 0.4	Silty Sand, dark brown, damp, trace rootlets, gravel
MW-1	MW-1A	0 - 0.15	Sand, brown, damp medium grain
	MW-1B	0.4 ï 0.5	Sand, brown, moist, some gravel, medium grain

Station Area Non-Hazardous Waste Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-2	MW-2A	0 - 0.15	Sand, dark brown, damp, trace gravel
	MW-2B	0.4 ï 0.5	Sand dark brown, damp, trace gravel
MW-3	MW-3A	0 - 0.15	Sand, brown, damp, trace gravel, trace topsoil
	MW-3B	0.4 ï 0.5	Sand, brown, damp, trace gravel, medium grain
MW-4A	MW-4A	0 - 0.15	Sand, brown and grey, damp, medium grain
	MW-4B	0.4 ï 0.5	Sand, brown, damp, medium, trace gravel
MW-6A	MW-6A	0 - 0.15	Sand, brown, damp, medium grain
	MW-6B	0.4 ï 0.5	Sand, brown, damp, medium grain
MW-7A	MW-7A	0 - 0.15	Sand, dark brown, moist, trace gravel, silt, rootlets
	MW-7B	0.4 ï 0.5	Sand and Gravel, dark brown, wet, trace silt

3.2.1 Groundwater Sampling

Groundwater monitoring at the Upper Site Non-Hazardous Waste Landfill was conducted on August 21, 2016 and consisted of the inspection and groundwater monitoring of ten monitoring wells (BMW-1, MW-1, MW-2, MW-3, MW-4A, MW-4B, MW-6A, MW-6B, MW-7A, and MW-7B). Monitoring well sampling logs are presented in Section 3.3.3.1.

The following Table 3-2 outlines the groundwater sampling activities conducted at the Upper Site Non-Hazardous Waste Landfill.

Table 3-2: Summary of Work Conducted by Monitoring Well

Station Area Non-Hazardous Waste Landfill		
BMW-1	Good Condition - Free Product	0
MW-1	Good Condition - Dry	0
MW-2	Good Condition - Dry	0
MW-3	Good Condition - Dry	0
MW-4A	Good Condition - Dry	0
MW-4B	Good Condition - Dry - Sandy	0
MW-6A	Good Condition - Dry	0
MW-6B	Good Condition - No Ponding of water around base of well	1
MW-7A	Good Condition - Dry	0
MW-7B	Good Condition - No Ponding of water around base of well	1

3.2.2 Thermal Monitoring

No thermistors are present at the Station Area Non-Hazardous Waste Landfill.

3.3 Results of the Monitoring Program

The following Sections 3.3.1 through 3.3.4 summarize the results of the CAM-4 Monitoring program at the Station Area Non-Hazardous Waste Landfill.

3.3.1 Visual Inspection

The visual inspection of the Station Area Non-Hazardous Waste Landfill was conducted on August 20, 2016. The visual inspection was conducted in compliance with Section 5.2 of the Terms of Reference and details are provided below in the following Sections 3.3.1.1 through 3.3.1.5. Figure CAM-4.2A presents the visual inspection findings and photographic locations.

3.3.1.1 Inspection Checklist

The visual inspection was completed as per the Terms of Reference and the visual inspection checklist is included as Table 3-3 of this report below.

Table 3-3: Visual Inspection Checklist ï Station Area Non-Hazardous Waste Landfill

SITE NAME: **CAM-4 Pelly Bay**

LANDFILL DESIGNATION: Station Area Non-Hazardous Waste Landfill
LANDFILL TYPE: Non-Hazardous Waste Landfill
DATE OF INSPECTION: August 20, 2016
WEATHER CONDITIONS: 8ºC, partly cloudy
DATE OF PREVIOUS INSPECTION: September 2-3, 2013
INSPECTED BY: Stephen Borcsok
REPORT PREPARED BY: Stephen Borcsok

The preparer represents to the best of the preparerôs knowledge, the following statements and observations are true and correct and to the best of the preparerôs actual knowledge, no material facts have been suppressed or misstated.

Visual Inspection Checklist: Station Area Non-Hazardous Waste Landfill												
Checklist Item	Present (Yes/No)	Feature Number	Feature Location	GPS Coordinates Easting/Northing/Zone	Length (m)	Width (m)	Depth (m)	Extent Relative to Landfill Surface	Description	Comparison with Historical Observations	Additional Comments / Severity Rating	Photographic Records (photo reference, location, view point & direction, feature of note, scale)
Settlement	Yes	A	Southwest side slope	388733.617 / 7594476.699 388719.383 / 7594487.587	16	0.5-1.0	0.5	0.2	<1%	Two minor linear depressions	Decrease in length from 1.0-2.0 to 0.5-1.0 m, width from 0.4-1.0 to 0.5 between 2013 and 2016.	Severity Rating ï Acceptable (features are minor and not affecting landfill stability)	CAM-4 STN 45, 46, 47, 48
Settlement	Yes	E	Northeast side slope	388733.933 / 7594546.213	16	0.2	0.2	0.1	<1%	Minor pothole depression	Increase in depth from 0.05 to 0.1 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 STN 58, 59
Settlement	Yes	F	Northeast side slope	388735.802 / 7594541.208	16	0.75	0.2	0.1	<1%	Minor linear depression	Increase in depth from 0.05 to 0.1 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 STN 60, 61
Settlement	Yes	G	Northeast side slope	388764.67 / 7594536.102	16	0.5	0.4	0.1	<1%	Minor pothole depression	No significant change from 2013 to 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 STN 64, 65
Settlement	Yes	H	Northeast side slope	388767.782 / 7594530.923	16	2.5	0.2	0.1	<1%	Minor linear depression	No significant change from 2013 to 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 STN 66, 67
Erosion	No	C	Northeast side slope/toe		4	0.5	0.05-0.1	<1%	Minor erosion associated with rust-coloured staining	Erosion not observed in 2016. Feature was identified as Feature C in 2011 but was included in Feature B in 2013, erosion was noted on 2013 Figure but not in 2013 Visual Inspection Checklist..	Severity Rating ï Acceptable (feature was not observed)	N/A
Lateral Movement	No											
Frost Action	No											
Sloughing	No											
Cracking	Yes	I	Northeast side slope	388756.794 / 7594538.401	16	10	0.1	0.05	<1%	Continuous tension crack	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 STN 75, 76, 77
Animal Burrows	No											
Vegetation Establishment	No											

Visual Inspection Checklist: Station Area Non-Hazardous Waste Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Staining	Yes	B	Northeast side slope	388736.344 / 7594544.549 388735.704 / 7594550.467 388736.367 / 7594554.857	16	1.0	0.5-1.0	N/A	<1%	Discontinuous areas of rust-coloured staining	Stained areas were much smaller in 2016 than 2013. Length decreased from 5.0-10.0 to 1.0 m, width from 4.0-5.0 to 0.5-1.0 m.	Severity Rating ï Acceptable (staining believed to be related to landfill cover material and not related to underlying waste)	CAM-4 STN 56, 57
Staining	Yes	J	South of landfill (not on landfill)	388743.292 / 7594444.103	16	5.0	0.1-0.5	N/A	<1%	Reddish staining along erosion channel	New observation in 2016.	Severity Rating ï Acceptable (staining is not in contact with landfill)	CAM-4 STN 43
Vegetation Stress	No												
Seepage Points (or) Ponded Water	No												
Debris and/or Liner Exposed	No												
Presence & Condition of Monitoring Instruments	Yes	N/A	Outside of landfill cover		N/A	N/A	N/A	N/A	BMW1, MW1, MW2, MW3, MW4A/B, MW6A/B, MW7A/B	Monitoring wells are in similar condition to 2013. Monitoring wells MW7A/B are tilted away from vertical in 2016 but 2013 condition is not known.	Paint on exterior of monitoring wells is flaking.	CAM-4 STN 3, 4, 7, 8, 11, 12, 15, 16, 19, 20, 23, 24, 27, 28, 31, 32, 39, 40
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	Yes	D	Along access road southeast of landfill (not in contact with landfill)	388830.499 / 7594510.715 (start of erosion channel) 388744.191 / 7594447.242 (end of erosion channel)	16	113	1.0-1.5	0.05-0.2	0%	Erosion channel along access road southeast of landfill	Erosion channel has lengthened from 100 to 113 m from 2013 to 2016.	Severity Rating ï Acceptable (erosion channel is not in contact with landfill)	CAM-4 STN 42, 43, 70

3.3.1.2 Stability Assessment

The Preliminary Stability Assessment for the Station Area Non-Hazardous Waste Landfill was conducted on August 20, 2016 as per the Terms of Reference and the results are provided below in Table 3-4.

Table 3-4: Preliminary Stability Assessment ï Station Area Non-Hazardous Waste Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Acceptable	Isolated
Animal Burrows	Not Observed	None
Vegetation Establishment	Not Observed	None
Staining	Acceptable	Occasional
Vegetation Stress	Not Observed	None
Seepage / Ponded Water	Not Observed	None
Debris and/or Liner Exposure	Not Observed	None
Other	Acceptable (Erosion channel outside landfill)	Isolated
Overall Landfill Performance	**Acceptable**	

Station Area Non-Hazardous Waste Landfill	
Performance / Severity Rating	**Description**
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.

Station Area Non-Hazardous Waste Landfill	
Performance / Severity Rating	**Description**
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

3.3.1.3 Photographic Records

The photographic record for the Station Area Non-Hazardous Waste Landfill has been completed as per Section 5.5 of the Terms of Reference and is included in the following pages as Table 3-5. The Photographic Record only contains an index of photographs collected; full sized photographs are contained in the Appended CD/DVD-ROM. Selected photographs are presented in Table 3-6. Figure CAM-4.2A presents the photograph locations and directions.

Table 3-5: Photographic Records ï Station Area Non-Hazardous Waste Landfill

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-BMW1-1	SB1	W	Sample station BMW-1	BMW-1 soil	BMW-1	Test pit location
C4-BMW1-2	SB1	N/A	Sample station BMW-1	BMW-1 soil	BMW-1	Test pit close-up
C4-BMW1-3	SB1	N/A	Sample station BMW-1	BMW-1 soil	BMW-1	Test pit backfilled
C4-MW1-1	SM1	SE	Sample station MW-1	MW-1 soil	MW-1	Test pit location

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
C4-MW1-2	SM1	N/A	Sample station MW-1	MW-1 soil	MW-1	Test pit close-up
C4-MW1-3	SM1	N/A	Sample station MW-1	MW-1 soil	MW-1	Test pit backfilled
C4-MW2-1	SM2	SW	Sample station MW-2	MW-2 soil	MW-2	Test pit location
C4-MW2-2	SM2	N/A	Sample station MW-2	MW-2 soil	MW-2	Test pit close-up
C4-MW2-3	SM2	N/A	Sample station MW-2	MW-2 soil	MW-2	Test pit backfilled
C4-MW3-1	SM3	NW	Sample station MW-3	MW-3 soil	MW-3	Test pit location
C4-MW3-2	SM3	N/A	Sample station MW-3	MW-3 soil	MW-3	Test pit close-up
C4-MW3-3	SM3	N/A	Sample station MW-3	MW-3 soil	MW-3	Test pit backfilled
C4-MW4A-1	SM4	SW	Sample station MW-4A	MW-4A soil	MW-4A/B	Test pit location
C4-MW4A-2	SM4	N/A	Sample station MW-4A	MW-4A soil	MW-4A/B	Test pit close-up
C4-MW4A-3	SM4	N/A	Sample station MW-4A	MW-4A soil	MW-4A/B	Test pit backfilled
C4-MW6A-1	SM6	NE	Sample station MW-6A	MW-6A soil	MW-6A/B	Test pit location
C4-MW6A-2	SM6	N/A	Sample station MW-6A	MW-6A soil	MW-6A/B	Test pit close-up
C4-MW6A-3	SM6	N/A	Sample station MW-6A	MW-6A soil	MW-6A/B	Test pit backfilled
C4-MW7A-1	SM7	SE	Sample station MW-7A	MW-7A soil	MW-7A/B	Test pit location
C4-MW7A-2	SM7	N/A	Sample station MW-7A	MW-7A soil	MW-7A/B	Test pit close-up
C4-MW7A-3	SM7	N/A	Sample station MW-7A	MW-7A soil	MW-7A/B	Test pit backfilled
Visual Inspection Photographs						
CAM-4 STN 3	3	W	Monitoring well BMW1, MW16 in background	Monitoring wells	BMW1, MW16	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 STN 4	4	E	Monitoring well BMW1	Monitoring well	BMW1	
CAM-4 STN 7	7	E	Monitoring wells MW7A/B	Monitoring wells	MW7A/B	
CAM-4 STN 8	8	S	Monitoring wells MW7A/B	Monitoring wells	MW7A/B	
CAM-4 STN 11	11	W	Monitoring wells MW7A/B	Monitoring wells	MW7A/B	
CAM-4 STN 12	12	NE	Monitoring well MW1	Monitoring well	MW1	
CAM-4 STN 15	15	NW	Monitoring well MW1	Monitoring well	MW1	
CAM-4 STN 16	16	SE	Monitoring well MW1	Monitoring well	MW1	
CAM-4 STN 19	19	N	Monitoring wells MW6A/B	Monitoring wells	MW6A/B	
CAM-4 STN 20	20	NW	Monitoring wells MW6A/B	Monitoring wells	MW6A/B	
CAM-4 STN 23	23	SW	Monitoring wells MW6A/B	Monitoring wells	MW6A/B	
CAM-4 STN 24	24	NW	Monitoring wells MW6A/B	Monitoring wells	MW6A/B	
CAM-4 STN 27	27	E	Monitoring well MW2	Monitoring well	MW2	
CAM-4 STN 28	28	NW	Monitoring well MW2	Monitoring well	MW2	
CAM-4 STN 31	31	SE	Monitoring wells MW4A/B	Monitoring wells	MW4A/B	
CAM-4 STN 32	32	SW	Monitoring wells MW4A/B	Monitoring wells	MW4A/B	
CAM-4 STN 39	39	S	Monitoring well MW3	Monitoring well	MW3	
CAM-4 STN 40	40	SW	Monitoring well MW3	Monitoring well	MW3	
CAM-4 STN 41	41	NW	Southwest side slope from south corner of landfill			
CAM-4 STN 42	42	NE	Southeast side slope from south corner of landfill			

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 STN 43	43	NE	Beginning of erosion channel along access road, reddish staining along channel	Other Features Staining	D J	
CAM-4 STN 44	44	N	South corner of landfill			
CAM-4 STN 45	45	NW	Minor depression (1 of 2) on southwest landfill slope	Settlement	A	
CAM-4 STN 46	46	SW	Minor depression (1 of 2) on southwest landfill slope	Settlement	A	
CAM-4 STN 47	47	N	Minor depression (2 of 2) on southwest landfill slope	Settlement	A	
CAM-4 STN 48	48	SW	Minor depression (2 of 2) on southwest landfill slope	Settlement	A	
CAM-4 STN 49	49	E	Landfill cover from west corner			
CAM-4 STN 50	50	N	Northwest landfill side slope from west corner			
CAM-4 STN 51	51	SE	Southwest landfill side slope from west corner			
CAM-4 STN 52	52	E	Northeast landfill side slope from north corner			
CAM-4 STN 53	53	SW	Northwest landfill side slope from north corner			

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 STN 54	54	SE	Landfill cover from north corner			
CAM-4 STN 55	55	S	View up northeast landfill slope			
CAM-4 STN 56	56	W	Rust-coloured staining on northeast toe	Staining	B	
CAM-4 STN 57	57	N	Rust-coloured staining on northeast side slope	Staining	B	
CAM-4 STN 58	58	SW	Minor settlement on northeast side slope	Settlement	E	
CAM-4 STN 59	59	E	Minor settlement on northeast side slope	Settlement	E	
CAM-4 STN 60	60	NE	Minor settlement on northeast side slope	Settlement	F	
CAM-4 STN 61	61	E	Minor settlement on northeast side slope	Settlement	F	
CAM-4 STN 62	62	SE	Northeast landfill cover and side slope			
CAM-4 STN 63	63	SE	Northeast landfill side slope			
CAM-4 STN 64	64	S	Minor settlement on northeast side slope	Settlement	G	
CAM-4 STN 65	65	SE	Minor settlement on northeast side slope	Settlement	G	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 STN 66	66	SE	Minor settlement on northeast side slope	Settlement	H	
CAM-4 STN 67	67	E	Minor settlement on northeast side slope	Settlement	H	
CAM-4 STN 68	68	W	Landfill cover from east corner			
CAM-4 STN 69	69	NW	Northeast landfill side slope from east corner			
CAM-4 STN 70	70	SW	Southeast landfill side slope from east corner			
CAM-4 STN 71	71	NW	Landfill cover from middle of landfill			
CAM-4 STN 72	72	NE	Landfill cover from middle of landfill			
CAM-4 STN 73	73	SE	Landfill cover from middle of landfill			
CAM-4 STN 74	74	SW	Landfill cover from middle of landfill			
CAM-4 STN 75	75	NE	Close-up of crack on northeast landfill side slope	Cracking	I	
CAM-4 STN 76	76	SE	Crack on northeast side slope	Cracking	I	
CAM-4 STN 77	77	NW	Crack on northeast side slope	Cracking	I	
CAM-4 STN 78	78	N	View of landfill from Tier II Disposal Facility			

Table 3-6: Selected Photographs ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill
Photograph CAM-4 STN 43: Beginning of erosion channel (Feature D) along access road, reddish staining (Feature J) along channel.
Photograph CAM-4 STN 57: Rust-coloured staining (Feature B) on northeast side slope.

Station Area Non-Hazardous Waste Landfill

Photograph CAM-4 STN 65: Minor settlement (Feature G) on northeast side slope.

Photograph CAM-4 STN 75: Close-up of crack (Feature I) on northeast landfill side slope.

Station Area Non-Hazardous Waste Landfill

Photograph CAM-4 STN 76: Crack (Feature I) on northeast side slope.

Photograph CAM-4 STN 78: View of Station Area Non-Hazardous Waste Landfill from Tier II Disposal Facility

3.3.1.4 Trend Analysis

A trend analysis was conducted with regards to observations made during the visual inspection of the Station Area Non-Hazardous Waste Landfill. The following Table 3-7 outlines the results of the visual trend analysis.

Table 3-7: Visual Inspection Trends - Station Area Non-Hazardous Waste Landfill

Checklist Item	Feature Number	Comparison with Historical Observations
Settlement	A E F G H	Decrease in length from 1.0-2.0 to 0.5-1.0 m, width from 0.4-1.0 to 0.5 between 2013 and 2016. Increase in depth from 0.05 to 0.1 m between 2013 and 2016. Increase in depth from 0.05 to 0.1 m between 2013 and 2016. No significant change from 2013 to 2016. No significant change from 2013 to 2016.
Cracking	I	New observation in 2016.
Staining	B J	Decrease in observed areas of staining between 2013 and 2016. Length of features decreased from 5.0-10.0 to 1.0 m, and width from 4.0-5.0 to 0.5-1.0 m. New observation in 2016.
Other Features	D	Erosion channel increase in length from 100 to 113 m between 2013 and 2016.

3.3.1.5 Discussion of Results/Trends

A comparison of the visual inspection results of the 2013 and 2016 monitoring events at the Station Area Non-Hazardous Waste Landfill indicates that previously observed settlement features have exhibited decreased size, small increases in depth, or no change between these two monitoring events. One new cracking feature and one new area of staining are present, though the area of staining is not connected to the landfill. The erosion channel (also not connected to the landfill) southeast of the landfill along the access road has slightly increased in length. The staining features on the northeast side slope of the landfill have decreased in size. The results of the visual inspection and the observed trends indicate that the performance of the landfill is acceptable.

3.3.2 Soil Sampling

Soil sampling of the Station Area Non-Hazardous Waste Landfill was conducted on August 21, and 22 2016. The soil sampling was conducted in compliance with Section 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections 3.3.2.1 through 3.3.2.3.

3.3.2.1 Laboratory Analytical Results

A total of 14 soil samples were analysed from seven soil sample locations at the Station Area Non-Hazardous Waste Landfill. Table 3-8 and Table 3- present the soil analytical results. Figure CAM-4.2B presents a summary of significant soil analytical results.

Table 3-8: Soil Chemical Analysis Results ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill																	
Sample ID	**Sampling Station**	**Monitoring Year**	**Depth**	**Cu**	**Ni**	**Co**	**Cd**	**Pb**	**Zn**	**Cr**	**As**	**Hg**	**Total PCB**	**F1 C6-C10**	**F2 C10-C16**	**F3 C16-C34**	**Modified TPH Total C6-C34**
Comparison Values																	
Background				14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012				38
Baseline				**10**	**10**	**4.9**	**1.00**	**10**	**39**	**20**	**1.3**	**0.100**	**0.003**				**495**
Baseline +3 Standard Deviations				26	24	14	1.00	108	107	52	3.6	0.100	0.67				5605
Upgradient																	
BMW-1 Surface																	
24848/49	BMW-1	2007	0	**13**	**17**	**11**	<1.0	<10	**47**	**34**	**2.9**	<0.10	<0.0030	<10	<4.0	11	18
C409-B1MWA	BMW-1	2009	0-15	8.0	**24**	**5.0**	<0.10	5.0	31	**50**	1.0	<0.050	**<0.010**	<12	11	38	55
C4 11-BMW1A	BMW-1	2011	0-15	6.0	10	**5.0**	<0.10	4.0	31	18	**2.0**	<0.050	**<0.010**	<12	<10	<10	16
2013-C4-BMW-1-A	BMW-1	2013	0-15	8.2	9.6	**5.9**	<0.10	5.9	37	17	**1.8**	<0.050	**<0.010**	<12	<10	56	67
16-C4-BMW1A	BMW-1	2016	0-15	**31**	**41**	**19**	0.092	**14**	**110**	**69.0**	**7.7**	<0.050	**<0.020**	<12	120	310	436
BMW-1 Depth																	
24850/51	BMW-1	2007	30	6.3	9.7	**6.9**	<1.0	<10	29	<20	**1.4**	<0.10	**0.0053**	<10	4.3	100	109
C409-B1MWB	BMW-1	2009	40-50	8.0	**15**	**5.0**	<0.10	5.0	30	**31**	1.0	<0.050	**<0.010**	<12	<10	17	28
C4 11-BMW1B	BMW-1	2011	40-50	**13**	**20**	**8.0**	<0.10	8.0	**46**	**46**	**3.0**	<0.050	**<0.010**	<12	<10	<10	16
2013-C4-BMW-1-B	BMW-1	2013	40-50	8.0	**12**	**5.9**	<0.10	5.7	35	**22**	**1.8**	<0.050	**<0.010**	<12	<10	<50	36
16-C4-BMW-1B	BMW-1	2016	30-40	**19**	**27**	**11**	0.062	9.2	**64**	**50.0**	**3.4**	<0.050	**<0.010**	<12	66	120	192
Downgradient																	
MW-1 Surface																	
24868/69	MW-1	2007	0	5.7	9.2	**6.3**	<1.0	<10	27	**22**	<1.0	<0.10	<0.0030	<10	4.7	25	35
C409-1WA	MW-1	2009	0-15	7.0	**12**	**5.0**	<0.10	4.0	25	**24**	<1.0	<0.050	**<0.010**	<12	<10	<10	16
C4 11-1WA	MW-1	2011	0-15	8.0	**20**	**6.0**	0.30	5.0	31	**41**	**2.0**	0.050	**<0.010**	<12	<10	<10	16
2013-C4-MW-1-A	MW-1	2013	0-15	<5.0	8.2	4.0	<0.10	3.5	20	12	<1.0	<0.050	**<0.010**	<12	<10	<50	36
16-C4-MW1A	MW-1	2016	0-15	4.2	8.7	4.4	<0.050	3.5	20	18.0	<1.0	<0.050	**<0.010**	<12	<10	<50	36
MW-1 Depth																	
24870/71	MW-1	2007	30	5.9	8.9	**6.3**	<1.0	<10	28	**20**	<1.0	<0.10	<0.0030	<10	<4.0	28	35

Station Area Non-Hazardous Waste Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C409-1WB	MW-1	2009	40-50	6.0	12	5.0	<0.10	4.0	23	25	<1.0	<0.050	<0.010	<12	<10	<10	16
C4 11-1WB	MW-1	2011	40-50	9.0	14	6.0	0.20	6.0	36	28	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-1-A	MW-1	2013	40-50	7.0	12	5.0	<0.10	4.3	30	17	1.1	<0.050	<0.010	<12	<10	<50	36
16-C4-MW1B	MW-1	2016	40-50	6.1	16	4.4	<0.050	4.4	24	34.0	1.1	<0.050	<0.010	<12	<10	<50	36
MW-2 Surface																	
24860/61	MW-2	2007	0	4.2	7.7	<5.0	<1.0	<10	22	<20	1.8	<0.10	<0.0030	<10	6.2	<9.0	16
C409-2WA	MW-2	2009	0-15	8.0	16	5.0	<0.10	5.0	29	33	1.0	<0.050	<0.010	<12	<10	15	26
C4 11-2WA	MW-2	2011	0-15	7.0	12	5.0	0.20	5.0	31	21	1.0	<0.050	<0.010	<12	<10	23	34
2013-C4-MW-2-A	MW-2	2013	0-15	8.2	9.6	5.8	<0.10	5.1	35	17	1.3	<0.050	<0.010	<12	<10	<50	36
16-C4-MW2A	MW-2	2016	0-15	4.7	7.8	3.4	<0.050	3.4	18	14.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-2 Depth																	
24862/63	MW-2	2007	30	3.1	6.2	<5.0	<1.0	<10	16	<20	1.2	<0.10	<0.0030	<10	6.2	15	26
C409-2WB	MW-2	2009	40-50	<5.0	12	4.0	<0.10	3.0	17	23	<1.0	<0.050	<0.010	<12	<10	<10	16
C4 11-2WB	MW-2	2011	40-50	8.0	13	6.0	0.20	6.0	33	25	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-2-B	MW-2	2013	40-50	8.1	9.4	5.5	<0.10	5.4	33	16	1.4	<0.050	<0.010	<12	<10	<50	36
16-C4-MW2B	MW-2	2016	40-50	3	7.1	3	<0.050	3.2	16	14.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-3 Surface																	
24852/53	MW-3	2007	0	10	13	8.3	<1.0	<10	40	26	1.5	<0.10	<0.0030	<10	4.3	99	108
C409-3WA	MW-3	2009	0-15	11	18	6.0	<0.10	7.0	40	36	2.0	<0.050	<0.010	<12	<10	59	70
C4 11-3WA	MW-3	2011	0-15	7.0	12	5.0	0.20	8.0	33	23	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-3-A	MW-3	2013	0-15	20	17	9.6	0.24	21	76	29	2.9	<0.050	<0.010	<12	<10	500	511
16-C4-MW3A	MW-3	2016	0-15	14	20	7.7	<0.050	7.9	48	38.0	2.1	<0.050	0.013	<12	<10	<50	36
16-C4-DUP2	MW-3	2016	0-15	14	15	7.7	0.072	10	49	29	2.2	<0.050	<0.010	<12	<10	100	111
16-C4 MW3A ALS	MW-3	2016	0-15	9.63	12.0	6.06	0.028	6.14	37.0	22.0	1.73	0.0345	<0.050	<10	<20	36	51
MW-3 Depth																	
24854/55	MW-3	2007	30	10	14	7.5	<1.0	<10	39	27	1.7	<0.10	0.0056	<10	4.5	36	46
C409-3WB	MW-3	2009	40-50	9.0	15	5.0	<0.10	5.0	30	30	1.0	<0.050	<0.010	<12	<10	21	32
C4 11-3WB	MW-3	2011	40-50	9.0	12	6.0	0.20	6.0	31	24	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-3-B	MW-3	2013	40-50	15	15	7.3	<0.10	10	49	26	2.2	<0.050	<0.010	<12	<10	120	131

Station Area Non-Hazardous Waste Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
16-C4-MW3B	MW-3	2016	40-50	8.3	14	4.9	<0.050	5.2	30	27.0	1.5	<0.050	<0.010	<12	<10	<50	36
MW-4A Surface																	
24856/57	MW-4	2007	0	4.1	6.8	<5.0	<1.0	<10	24	<20	1.4	<0.10	<0.0030	<10	4.0	<9.0	14
C409-4WA	MW-4	2009	0-15	<5.0	7.0	3.0	<0.10	3.0	17	13	<1.0	<0.050	<0.010	<12	<10	20	31
C4 11-4WA	MW-4	2011	0-15	<5.0	8.0	4.0	0.20	5.0	22	14	1.0	<0.050	<0.010	<12	<10	20	31
2013-C4-MW-4-A	MW-4	2013	0-15	4.1	6.9	3.7	<0.10	4.1	22	13	<1.0	<0.050	<0.010	<12	<10	57	68
16-C4-MW4AA	MW-4	2016	0-15	2.7	5.3	2.8	<0.050	2.6	13	10.0	<1.0	<0.050	<0.010	<12	<10	<50	36
16-C4-DUP3	MW-4	2016	0-15	3.9	6.4	3.6	<0.050	3.2	17	12	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-4AA ALS	MW-4	2016	0-15	3.42	4.68	2.69	0.024	3.32	17.5	8.57	0.78	0.0256	<0.05	<12	<10	<20	25
MW-4A Depth																	
24858/59	MW-4	2007	30	3.9	7.6	<5.0	<1.0	<10	20	<20	1.1	<0.10	<0.0030	<10	4.6	<9.0	14
C409-4WB	MW-4	2009	40-50	5.0	11	3.0	<0.10	4.0	18	21	<1.0	<0.050	<0.010	<12	<10	<10	16
C4 11-4WB	MW-4	2011	40-50	<5.0	17	4.0	<0.10	4.0	20	38	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-4-B	MW-4	2013	40-50	3.9	6.4	3.5	<0.10	3.9	22	12	<1.0	<0.050	<0.010	<12	<10	42	53
16-C4-MW4AB	MW-4	2016	40-50	4.4	7.7	3.3	<0.050	3	15	16.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-6A Surface																	
24864/65	MW-6	2007	0	7.1	7.9	5.2	<1.0	<10	21	<20	1.4	<0.10	<0.0030	<10	4.5	21	31
C409-6WA	MW-6	2009	0-15	7.0	8.0	3.0	<0.10	3.0	14	15	<1.0	<0.050	<0.010	<12	<10	26	37
C4 11-6WA	MW-6	2011	0-15	8.0	12	4.0	<0.10	4.0	29	20	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-6-A	MW-6	2013	0-15	7.0	9.5	4.6	<0.10	4.5	31	16	<1.0	<0.050	<0.010	<12	<10	131	142
16-C4-MW6AA	MW-6	2016	0-15	3.5	9.8	3	<0.050	2.9	15	20.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-6A Depth																	
24866/67	MW-6	2007	30	3.7	7.5	<5.0	<1.0	<10	20	<20	<1.0	<0.10	<0.0030	<10	6.4	15	26
C409-6WB	MW-6	2009	40-50	8.0	13	4.0	<0.10	3.0	17	28	<1.0	<0.050	<0.010	<12	<10	29	40
C4 11-6WB	MW-6	2011	40-50	<5.0	9.0	4.0	<0.10	3.0	22	20	<1.0	<0.050	<0.010	<12	78	30	114
2013-C4-MW-6-B	MW-6	2013	40-50	4.2	8.3	4.2	<0.10	4.0	24	16	<1.0	<0.050	<0.010	<12	<10	<50	36
16-C4-MW6AB	MW-6	2016	40-50	3.2	6.8	2.9	<0.050	3.2	15	15.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-7A Surface																	

Station Area Non-Hazardous Waste Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
24872/73	MW-7	2007	0	8.9	13	7.9	<1.0	<10	40	25	1.5	<0.10	<0.0030	<10	5.1	26	36
C409-7WA	MW-7	2009	0-15	9.0	12	5.0	<0.10	5.0	33	22	1.0	<0.050	<0.010	<12	<10	52	63
C4 11-7WA	MW-7	2011	0-15	8.0	13	6.0	<0.10	5.0	31	25	1.0	<0.050	<0.010	<12	11	72	89
2013-C4-MW-7-A	MW-7	2013	0-15	11	13	6.9	<0.10	6.3	47	20	1.6	<0.050	<0.010	<12	<10	<50	36
16-C4-MW7AA	MW-7	2016	0-15	12	25	7.8	<0.050	6.8	47	53.0	1.7	<0.050	<0.010	<12	<10	<50	36
MW-7 Depth																	
24874/75	MW-7	2007	30	4.8	8.9	5.7	<1.0	<10	25	<20	1.3	<0.10	<0.0030	<10	4.7	<9.0	14
C409-7WB	MW-7	2009	40-50	6.0	9.0	4.0	<0.10	4.0	21	16	<1.0	<0.050	<0.010	<12	<10	<10	16
C4 11-7WB	MW-7	2011	40-50	<5.0	14	5.0	<0.10	4.0	22	29	<1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-7-B	MW-7	2013	40-50	10	12	7.2	<0.10	6.1	40	22	1.7	<0.050	<0.010	<12	<10	<50	36
16-C4-MW7AB	MW-7	2016	40-50	8	30	5.5	<0.050	4.2	29	64.0	1.0	<0.050	<0.010	<12	<10	<50	36

Notes:

XX sample exceeds background

XX **sample exceeds baseline**

XX *sample exceeds baseline +3 standard deviations*

**** All units in mg/kg**

Table 3-9: PHC F4 Soil Chemical Analysis Results ï Station Area Non-Hazardous Waste Landfill

Area Non-Hazardous Waste Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**PHC F4 (mg/kg)**
BMW-1	MW-1A	0 - 0.15	68
	MW-1B	0.3 ï 0.4	< 50
MW-1	MW-1A	0 - 0.15	< 50
	MW-1B	0.4 ï 0.5	< 50
MW-2	MW-2A	0 - 0.15	< 50
	MW-2B	0.4 ï 0.5	< 50
MW-3	MW-3A	0 - 0.15	< 50
	MW-3B	0.4 ï 0.5	< 50
MW-4A	MW-4AA	0 - 0.15	< 50
	MW-4AB	0.4 ï 0.5	< 50
MW-6A	MW-6AA	0 - 0.15	< 50
	MW-6AB	0.4 ï 0.5	< 50
MW-7A	MW-7AA	0 - 0.15	< 50
	MW-7AB	0.4 ï 0.5	< 50

3.3.2.2 Discussion of Results ï Comparison to Baseline/Background

Analytical results were compared against baseline data, and background concentrations. The following 10 summarizes the comparison of results.

Table 3-10: Evaluation of Results by Parameter ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	Copper was reported to exceed the baseline and background concentration of 10 and 14 mg/kg respectively in four samples as follows; BMW-1A at 31 mg/kg, BMW-1B at 19 mg/kg, and MW-3 at 14 mg/kg. Copper was also reported to exceed baseline in one sample, MW-7AA, with a concentration of 12 mg/kg.
Nickel (Ni)	Nickel was reported to exceed baseline concentrations of 10 mg/kg in seven sampling locations, five of which, BMW-1A at 41 mg/kg, BMW-1B at 27 mg/kg, MW-3A at 20 mg/kg, MW-7AA at 25 mg/kg, and MW-7AB at 30 mg/kg, were reported to exceed the background concentration of 16 mg/kg.
Cobalt (Co)	Cobalt was reported to exceed baseline concentrations of 4.9 mg/kg in six sampling locations: BMW1-A, BMW-1B, MW-3A, MW-3B, MW7A, and MW7B. Two of these locations BMW1A, BMW1B, exceeded the background concentration of 8.3 mg/kg.
Cadmium (Cd)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cd.

Station Area Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Lead (Pb)	Lead was reported to exceed the background concentration of 6.4 mg/kg in four samples as follows; BMW-1A at 14 mg/kg, BMW-1B at 9.2 mg/kg, MW-3A at 7.9 mg/kg and MW-7AA at 6.8 mg/kg. One of these samples BMW-1A was also reported to exceed the Baseline concentration of 10 mg/kg.
Zinc (Zn)	Zinc was reported to exceed the baseline concentration of 39 mg/kg in four sample locations as follows: BMW1A at 110 mg/kg, BMW1B at 64 mg/kg, MW3A at 48 mg/kg, and MW7AA at 47 mg/kg. Two of these samples, BMW1A and BMW1B were also reported to exceed the background concentration of 50 mg/kg.
Chromium (Cr)	Chromium was reported to exceed baseline concentrations of 20 mg/kg in eight sampling locations, six of which, BMW1A, BMW1B, MW-1B, MW3A, MW7A, and MW7B exceeded the background concentration of 32 mg/kg.
Arsenic (As)	Arsenic was reported to exceed the baseline concentration of 1.3 mg/kg in five sampling locations, as follows; BMW-1A at 7.7 mg/kg, BMW-1B at 3.4 mg/kg, MW3A at 2.1 mg/kg, MW-3B at 1.5 mg/kg, and MW-7AA at 1.7 mg/kg. Two of these samples BMW1A and BMW1B also was reported to exceed the background concentration of 2.4 mg/kg.
Mercury (Hg)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Hg.
PCBs (Total)	Total PCBs was reported to exceed the baseline and background concentrations of 0.003 mg/kg and 0.012 mg/kg respectively at one sampling location, MW-3A reported at a concentration of 0.013 mg/kg. In one sampling location BMW-1A the reported lab detection limit of < 0.002 mg/kg exceeded both baseline and background concentrations.
F1 (C_6-C_{10})	All soil samples reported non-detect concentrations for F1
F2 (C_{10}-C_{16})	All soil samples reported non-detect concentrations for F2, with the exception of BMW-1A, MW-3A and MW-3B. No background or baseline comparison values exist for F2 PHC.
F3 (C_{16}-C_{34})	All soil samples reported non-detect concentrations for F3, with the exception of BMW-1A, MW-3A and MW-3B . No background or baseline comparison values exist for F3 PHC.
F4 (C_{34}-C_{50})	All soil samples reported non-detect concentrations for F4 PHCs with the exception of BMW1. No background ore baseline comparison values exist for F4 PHC.
Modified TPH (C_6-C_{34})	Total Modified TPH was reported to exceed the baseline concentration of 38 mg/kg in two sampling locations, as follows; BMW-1A at 436 mg/kg, and BMW-1B at 192 mg/kg.

3.3.2.3 Soil Trend Analysis by Parameter & Discussion of Trends

A soil chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to background, baseline and historical concentrations using differentiating colours (See Appendix E1). The following Table 3- provides a summary of soil trend analysis findings and presents a discussion of the observed trends by parameter.

Table 3-1: Discussion of Trends ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill	
Parameter	Discussion of Trends
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend. This yearôs reported concentrations in BMW-1A and BMW-1B were anomalously high as compared with previous years, as 2013 had seen a drop in copper concentrations in comparison to prior yearsôdata.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. This yearôs reported concentrations in BMW-1A, BMW-1B, MW7A, and MW7B exceeded the baseline plus three standard deviation comparison concentration for Ni of 24 mg/kg, which was considered anomalously high as compared with previous yearsôdata.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend or may potentially be trending slightly downward. Further data points are required to confirm any observable trends.
Cadmium (Cd)	Based on mostly non-detect concentrations, Cd has no observable trend. This yearôs reported concentrations in BMW-1A and BMW-1B were anomalously high as compared with previous years, though were not reported to exceed baseline or background concentrations.
Lead (Pb)	Based on current and historical results, it appears that Pb has no overall observable trend; however, a slight downward trend is potentially present based on review of most recent data. Further data points are required to confirm any observable trends.
Zinc (Zn)	Based on mostly non-detect concentrations, Zn has no observable trend. This yearôs reported concentrations in BMW-1A and BMW-1B are anomalously high as compared with previous years.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend. This yearôs reported concentrations in BMW-1A,BMW-7A, and BMW-7B exceeded baseline plus three standard deviation comparison concentration for Cr of 52 mg/kg, which was considered anomalously high as compared with previous yearsôdata. Further data points are required to confirm any observable trends.
Arsenic (As)	Based on current and historical results, As generally has no observable trend. This yearôs reported concentrations in BMW-1A and BMW-1B are anomalously high as compared with previous years.
Mercury (Hg)	Based on mostly non-detect concentrations, Hg has no observable trend.
PCBs (Total)	Based on mostly non-detect concentrations, PCBs has no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, Modified TPH concentrations has no observable trend. This yearôs reported concentrations in BMW-1A and BMW-1B are anomalously high as compared with previous years.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

3.3.3 Groundwater Sampling

Ten groundwater monitoring wells (BMW-1, MW-1, MW-2 MW-3, MW-4A, MW-4B, MW-6A, MW-6B, MW-7A, and MW-7B) are present at the Station Area Non-Hazardous Waste Landfill. Groundwater sampling of the Station Area Non-Hazardous Waste Landfill was conducted on August 21 and 22, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following 3.3.3.1 to 3.3.3.5.

3.3.3.1 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

Table 3-12: CAM-4 Monitoring Well Log for BMW-1

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-Hazardous Waste Landfill
Monitoring Well ID:	BMW-1	UTM Coordinates:	10161.0 North 10020.8 East
Sample Number(s) (include dups.):	CAM4-BMW-1		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 22/16	Time:	N/A
Weather:	Cloudy 14 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	446	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	147	Length screened section (cm)=	203

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=		63	
Static water level (cm) from top of pipe =		212.2 ï PHC product encountered	
Static water level (cm) (below ground surface) calculated =		159.2	
Measured well refusal depth (cm) (measure after sampling) =		260.0	
Thickness of water column (cm)=	47.8	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	500	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Teflon Bailer T		
Well purged (Y/N):	N/A	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	2 Litres		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	Product Encountered ï no measurements taken			
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): Strong PHC odour ï observable free product

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	2	Number rinses:	2

Other Relevant Comments:

Table 3-13: CAM-4 Monitoring Well Log for MW-1

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-Hazardous Waste Landfill
Monitoring Well ID:	MW-1	UTM Coordinates:	10271.7 North 10025.7 East
Sample Number(s) (include dups.):	16-C4-MW-1		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 21/16	Time:	N/A
Weather:	Clear, 15 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	450	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	150	Length screened section (cm)=	203

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	54		
Static water level (cm) from top of pipe =	Dry		
Static water level (cm) (below ground surface) calculated =	Dry		
Measured well refusal depth (cm) (measure after sampling) =	215.2		
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled ï Dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-14: CAM-4 Monitoring Well Log for MW-2

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill
Monitoring Well ID:	MW-2	UTM Coordinates:	10256.6 North 10086.9 East
Sample Number(s) (include dups.):	16-C4-MW-2		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 21/16	Time:	N/A
Weather:	Clear, 14 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	450	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	150	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	59		
Static water level (cm) from top of pipe =	Dry		
Static water level (cm) (below ground surface) calculated =	Dry		
Measured well refusal depth (cm) (measure after sampling) =	213.0		
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-15: CAM-4 Monitoring Well Log for MW-3

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill
Monitoring Well ID:	MW-3	UTM Coordinates:	10217.0 North 10133.3 East
Sample Number(s) (include dups.):	16-C4-MW-3		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 21/16	Time:	N/A
Weather:	Clear, 14 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	450	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	150	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	65		
Static water level (cm) from top of pipe =	Dry		
Static water level (cm) (below ground surface) calculated =	Dry		
Measured well refusal depth (cm) (measure after sampling) =	194.8		
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-16: CAM-4 Monitoring Well Log for MW-4A

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill	
Monitoring Well ID:	MW-4A	UTM Coordinates:	10228.7 North	10121.7 East
Sample Number(s) (include dups.):	16-C4-MW-4A			
Bottles filled (by parameter type):				
Date of Sampling Event:	Aug 21/16	Time:	N/A	
Weather:	Clear, 14 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	400	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	138	Length screened section (cm)=	138

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		51	
Static water level (cm) from top of pipe =		Dry	
Static water level (cm) (below ground surface) calculated =		Dry	
Measured well refusal depth (cm) (measure after sampling) =		406	
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-17: CAM-4 Monitoring Well Log for MW-4B

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill
Monitoring Well ID:	MW-4B	UTM Coordinates:	10228.7 North 10121.7 East
Sample Number(s) (include dups.):	16-C4-MW-4B		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 21/16	Time:	N/A
Weather:	Clear, 14 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	280	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	480	Length screened section (cm)=	228

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		56	
Static water level (cm) from top of pipe =		199.2	
Static water level (cm) (below ground surface) calculated =		143.2	
Measured well refusal depth (cm) (measure after sampling) =		214.8	
Thickness of water column (cm)=	15.6	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	0.25 to 0.5 Litres to Dry		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-18: CAM-4 Monitoring Well Log for MW-6A

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill	
Monitoring Well ID:	MW-6A	UTM Coordinates:	10266.2 North	10072.3 East
Sample Number(s) (include dups.):	16-C4-MW-6A			
Bottles filled (by parameter type):	Not Sampled			
Date of Sampling Event:	Aug 21/16	Time:	N/A	
Weather:	Clear, 14 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	280	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	50	Length screened section (cm)=	6

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	52		
Static water level (cm) from top of pipe =	Dry		
Static water level (cm) (below ground surface) calculated =	Dry		
Measured well refusal depth (cm) (measure after sampling) =	194.2		
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-19: CAM-4 Monitoring Well Log for MW-6B

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill	
Monitoring Well ID:	MW-6B	UTM Coordinates:	10266.2 North	10072.3 East
Sample Number(s) (include dups.):	16-C4-MW-6B			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)			
Date of Sampling Event:	Aug 21/16	Time:	13:45	
Weather:	Clear, 16 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	430	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	50	Length screened section (cm)=	230

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		70	
Static water level (cm) from top of pipe =		141.6	
Static water level (cm) (below ground surface) calculated =		71.6	
Measured well refusal depth (cm) (measure after sampling) =		228	
Thickness of water column (cm)=	87.6	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	4.5 L over 30 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 3-22	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé):	cloudy, sandy
Decontamination of sampling equipment Type of decontamination fluid (s):	Alconox and distilled water
Number washes: 1	Number rinses: 1
Other Relevant Comments:	

Table 3-20: CAM-4 Monitoring Well Log for MW-7A

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill	
Monitoring Well ID:	MW-7A	UTM Coordinates:	10253.7 North	10018.5 East
Sample Number(s) (include dups.):	16-C4-MW-7A			
Bottles filled (by parameter type):	Not Sampled			
Date of Sampling Event:	Aug 21/16	Time:	N/A	
Weather:	Clear, 14 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	457	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	345	Length screened section (cm)=	100

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		49	
Static water level (cm) from top of pipe =		Dry	
Static water level (cm) (below ground surface) calculated =		Dry	
Measured well refusal depth (cm) (measure after sampling) =		386.5	
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Not Sampled		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):			

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not Sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): N/A

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-21: CAM-4 Monitoring Well Log for MW-7B

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area Non-hazardous Waste Landfill
Monitoring Well ID:	MW-7B	UTM Coordinates:	10253.7 North 10018.5 East
Sample Number(s) (include dups.):	16-C4-MW-7B		
Bottles filled (by parameter type):	Not Sampled		
Date of Sampling Event:	Aug 21/16	Time:	14:45
Weather:	Clear, 17 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	270	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	71	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		60	
Static water level (cm) from top of pipe =		62.2	
Static water level (cm) (below ground surface) calculated =		2.2	
Measured well refusal depth (cm) (measure after sampling) =		196.8	
Thickness of water column (cm)=	134.6	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	5 Litres over 25 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 3-22	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): Cloudy, Some Sand

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 3-22: Summary of Groundwater Field Chemistry ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill						
	Time (min)	Temperature (°C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
Downgradient						
MW-6B						
	5	3.03	288	25.0	7.42	85.7
	10	3.00	260	15.00	7.30	77.1
	15	2.65	261	11.60	7.25	68.5
	20	2.24	298	9.42	7.21	64.3
	25	2.10	317	8.16	7.19	63.6
	30	2.20	315	7.95	7.18	63.0
	35	Sampled				
MW-7B						
	5	3.97	483	14.00	7.61	46.1
	10	4.55	457	7.45	7.67	43.4
	15	5.00	446	5.88	7.73	42.1
	20	5.10	433	4.74	7.79	41.4
	25	5.20	434	4.65	7.79	41.5
	30	Sampled				

3.3.3.2 Water Levels/Groundwater Flow

Groundwater levels were collected and are presented below in Table 3-23.

Table 3-23: Summary of Groundwater Levels ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill				
Monitoring Well ID	Water Level (TOC) (m)	Water Level (from ground surface) (m)	Water Elevation (masl)	Comments
BMW-1	N/A	N/A	N/A	Free Product Encountered ï Not Sampled
MW-1	N/A	N/A	N/A	Dry ï not sampled
MW-2	N/A	N/A	N/A	Dry ï not sampled
MW-3	N/A	N/A	N/A	Dry ï not sampled
MW-4A	N/A	N/A	N/A	Dry ï not sampled
MW-4B	N/A	N/A	N/A	Dry ï not sampled
MW-6A	N/A	N/A	N/A	Dry ï not sampled
MW-6B	1.416	0.716	300.284	Sufficient recharge ï sample collected
MW-7A	N/A	N/A	N/A	Dry ï not sampled
MW-7B	0.622	0.022	302.478	Sufficient recharge ï sample collected

Insufficient information was available to ascertain a groundwater flow direction.

3.3.3.3 Groundwater Laboratory Analytical Results

Two groundwater samples were collected and analysed from the Station Area Non-Hazardous Waste Landfill. Table 3-24 and Table 3-25 presents the groundwater analytical results. Figure CAM-4.2C presents a summary of significant groundwater analytical results.

Table 3-24: Groundwater Chemical Analysis Results ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																
Background			0.43	0.50	0.14	0.11	5.66	0.94	0.98	0.02	0.00066	0.11				43.81
Baseline			**0.20**	**0.31**	**0.15**	**0.0033**	**0.13**	**1.04**	**0.55**	**0.02**	**0.00071**	**0.000010**				**100**
Baseline +3 Standard Deviations			1.38	1.98	1.20	0.03	1.02	6.55	3.78	0.15	0.0033	0.0				958
Upgradient																
BMW-1																
24943	BMW-1	2007	0.016	0.029	0.0056	<0.0010	<0.010	0.14	0.017	<0.0030	<0.00040	<0.000020	20	340	32	**392**
C409-BMW1	BMW-1	2009	0.0042	0.020	0.0062	0.0013	0.00080	0.084	0.0050	0.00060	0.000009	<0.000050	3.5	57	4.7	65
C4 11-BMW1	BMW-1	2011	0.054	0.110	0.010	<0.0020	0.0080	0.11	0.13	<0.010	0.000016	<0.0017	-	-	-	-
2013-C4-BMW-1	BMW-1	2013	0.0017	0.015	0.0076	0.000099	<0.00020	0.20	<0.0010	0.00055	<0.0000020	<0.000050	190	810	69	**1069**
16-C4-BMW1	BMW-1	2016	-	-	-	-	-	-	-	-	-	-	34	1800	160	**1994**
Downgradient																
MW-1																
insufficient water	MW-1	2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-
insufficient water	MW-1	2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C4 11-1W	MW-1	2011	0.15	0.72	0.012	0.00030	0.0086	0.13	**0.70**	0.0030	0.00001	-	-	-	-	-
insufficient water	MW-1	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
insufficient water	MW-1	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-2																
Product – no sample	MW-2	2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-2W	MW-2	2009	0.0097	0.073	0.0011	0.0002	0.00060	0.027	0.0040	0.00080	0.000007	-	-	-	-	-
C4 11-2W	MW-2	2011	0.023	0.093	0.0024	0.00020	0.0020	0.093	0.068	<0.0010	0.000012	-	-	-	-	-
insufficient water	MW-2	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
no sample ï well dry	MW-2	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-3																
insufficient water	MW-3	2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Station Area Non-Hazardous Waste Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
insufficient water	MW-3	2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Product – not	MW-3	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-c4-MW-3 free product	MW-3	2013	-	-	-	-	-	-	-	-	-	-	260000	790000	56000	1106000
insufficient water	MW-3	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-6B																
24932	MW-6 B	2007	0.036	0.026	0.0045	<0.0010	0.021	0.84	0.025	0.0056	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
C409-6BW	MW-6 B	2009	0.0099	0.011	0.0025	0.00024	0.0068	0.047	0.010	0.0020	0.000012	<0.000050	0.85	0.90	0.30	2.05
C4 11-6W	MW-6	2011	0.026	0.028	0.0040	<0.00020	0.020	0.24	0.021	0.0050	0.000029	<0.000050	-	-	-	17
2013-C4-MW-6	MW-6	2013	0.0021	0.0019	<0.00030	0.0011	<0.00020	0.096	<0.0010	0.00039	<0.0000020	<0.000050	<0.1	11	<0.2	11
16-C4-MW6B	MW-6	2016	0.013	0.0460	0.0059	0.00012	0.0068	0.096	0.057	0.0022	0.0000022	<0.000050	0.69	7.1	0.42	8.21
MW-7B																
24928	MW-7 B	2007	0.098	0.12	0.040	0.0011	0.071	11	0.16	0.020	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
C409-7BW	MW-7	2009	0.069	0.14	0.044	<0.000050	0.22	42	0.12	0.057	0.00097	<0.000050	<0.1	<0.1	0.2	0.30
C4 11-7W	MW-7	2011	0.045	0.047	0.017	0.00040	0.056	27	0.023	0.0040	0.000072	<0.000050	-	-	-	<2
insufficient water	MW-7	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16-C4-MW7B	MW-7	2016	0.0092	0.0170	0.0054	0.000073	0.0065	2.1	0.017	0.0017	<0.000020	<0.000050	<0.1	<0.10	<0.20	0.20

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline + 3 standard deviations*

**** All units in mg/L**

Table 3-25: PHC F4 Groundwater Chemical Analysis Results ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill	
Sample ID	**PHC F4 (mg/kg)**
BMW-1	16
MW-6B	< 0.20
MW-7B	< 0.20

Analytical results were compared against background and baseline data. The following Table 3-26 summarizes the comparison of results.

3.3.3.4 Discussion of Groundwater Results by Parameter

Analytical results were compared against background and baseline data. The following Table 3- summarizes the comparison of results.

Table 3-26: Evaluation of Groundwater Analytical Results ï Station Area Non-Hazardous Waste Landfill

Station Area Non-Hazardous Waste Landfill	
Parameter	**Discussion of 2016 Results**
Copper (Cu)	Cu was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Nickel (Ni)	Ni was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cobalt (Co)	Co was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cadmium (Cd)	Cd was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Lead (Pb)	Pb reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Zinc (Zn)	Zn was reported to exceed background and baseline concentrations of 0.94 and 1.04 mg/L respectively in one sampling location, MW-7B with a reported concentration of 2.1 mg/L in 2016.
Chromium (Cr)	Cr was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Arsenic (As)	As was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Mercury (Hg)	Hg was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
PCBs (Total)	PCBs was reported at non-detect concentrations for all 2016 site-specific groundwater samples.

Station Area Non-Hazardous Waste Landfill	
Parameter	**Discussion of 2016 Results**
F1 (C_6-C_{10})	F1 was reported at non-detect concentrations for all 2016 site-specific groundwater samples, with the exception of BMW-1 and MW6B
F2 (C_{10}-C_{16})	F2 was reported at non-detect concentrations for all 2016 site-specific groundwater samples. with the exception of BMW-1 and MW6B.
F3 (C_{16}-C_{34})	F3 was reported at non-detect concentrations for all 2016 site-specific groundwater samples. with the exception of BMW-1 and MW6B.
F4 (C_{34}-C_{50})	F3 was reported at non-detect concentrations for all 2016 site-specific groundwater samples. with the exception of BMW-1. No background or baseline comparison values exist for F4 PHC
Modified TPH (C_6-C_{34})	Modified TPH was reported to exceed baseline and background concentrations of 100 and 43.81 mg/kg respectively at the BMW-1 location. This exceedance was expected due to visual observation of free product within the BMW-1 location in 2016 and in previous yearsô monitoring events. Concentrations of Modified TPH in BMW6B did not exceed background or baseline concentrations.

3.3.3.5 Free Product in BMW-1 Background Well

Field measurements using a gas water interface probe indicated free product in background well BMW-1 on 19 August 2016 at a depth of 1.59 mbgs. An assessment of the BMW-1 well was conducted on 22 August 2016 for the purposes of determining if the presence of the amount of free product in monitoring well BMW-1 was indicative of typical water table conditions in the surrounding area, or if the PHC product had accumulated in the well over time between monitoring events. Arcadis staff purged approximately 2 litres of well contents into two PVC Eco Bailers. A visual estimate of approximately 0.75 L of free product contents in the two bailers was observed. Contents of the bailers were submitted for laboratory analysis. A rising head test was conducted to determine whether free product would recover in the well following drawdown. Approximately ten seconds after bailing, the water level recorded was at 1.89 mbgs with no detection of PHC by the interface probe. After 40 seconds, and at a level of 1.855 mbgs the interface probe indicated that it was again encountering PHC and this indication continued for the remainder of the rising head test. Rising head test field notes are provided in Appendix C.

The rapid recharge of the free product into the well after 40 seconds and the visually estimated thickness of the column of free product in the bailed well contents, suggests that the free product encountered in the well is indicative of free product in the surrounding water table. Due to the fact that no free product was encountered in this location in 2013 and the lack of data other than the 2016 bailing and recharge information collected, a similar purge and recharge analysis during the next monitoring event would better confirm the above assumption. It is suggested that the bailing and rising head test be repeated, with a next day follow up bailing conducted, emphasising visual observations of the thickness of the free product contents.

BMW-1 is located up-gradient of the Station Area Non Hazardous Waste Landfill, and therefore free product observed and reported in the groundwater at this location is not expected to be a result of the landfill.

3.3.3.6 Groundwater Trend Analysis by Parameter and Discussion of Trends

A groundwater chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to baseline and historical concentrations using differentiating colours (See Appendix F). The following Table 3-9 provides a summary of groundwater trend analysis findings and presents a discussion of the observed trends by parameter.

Table 3-9: Evaluation of Groundwater Chemistry Trends

Station Area Non-Hazardous Waste Landfill	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Cu concentrations.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Ni concentrations.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Co concentrations.
Cadmium (Cd)	Based on current and historical results, it appears that Cd has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Cd concentrations.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Pb concentrations.
Zinc (Zn)	Based on current and historical results, it appears that Zn has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Zn concentrations.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend.
Arsenic (As)	Based on current and historical results, it appears that As has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in As concentrations.
Mercury (Hg)	Based on current and historical results, it appears that Hg has no observable trend.
PCBs (Total)	Based on current and historical results, it appears that PCBs have no observable trend. Most reported results reported as being below detection
Modified TPH (C_6-C_{34})	Based on current and historical results, it appears that Modified TPH has no observable trend. Recent results in upgradient background BMW-1 have increased. Further data points are required to confirm any trends in Modified TPH concentrations.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

3.3.4 Thermal Monitoring

No thermistors are present at the Station Area Non-Hazardous Waste Landfill; therefore, no thermal monitoring was conducted.

3.4 Conclusions and Overall Landfill Performance

Based on the results of the 2016 monitoring program, the overall performance of the Station Area Non-Hazardous Waste Landfill is acceptable.

3.5 Recommendations and Conclusions

Based on review and analysis of chemical data, it appears that the soil concentrations for the parameters tested appear to have no observable trend with no obvious soil concentration increases over time. Based on this review, it is recommended to continue the long-term monitoring of soils as planned.

Based on the results of the visual inspection, the landfill performance is acceptable. No remedial work or deviations from the proposed monitoring plan are recommended at this time.

4 CAM-4: TIER II DISPOSAL FACILITY

4.1 Landfill Description

The Tier II Soil Disposal Facility has been constructed at the CAM-4 site for the disposal of Tier II soil excavated during site cleanup. The Tier II Soil Disposal Facility is located in the Station Area, west of the Upper Site Landfill.

The design of this landfill includes a double containment system consisting of a liner system and the construction of saturated, low-permeability berms, followed by the placement of sufficient surface fill to promote freezing of landfill contents and containment berms. A liner was placed along the bottom of the landfill, along the berms and over the top of the landfill contents. Monitoring wells were installed along the landfill perimeter, and thermistors were installed within the landfill in the berms and the main body of the landfill.

Monitoring of the Tier II Soil Disposal facility consists of visual monitoring, collection of soil and groundwater samples and monitoring of subsurface ground temperatures in the berms and in the main body of the disposal facility. Locations for the collection of soil and groundwater samples and thermistor installations are identified on Figure CAM-4.3.

4.2 Summary of Work Conducted

4.2.1 Visual Inspection

A visual inspection was completed at the Tier II Disposal Facility on August 20, 2016. The visual inspection of the landfill was completed with no deviations from the visual inspection work plan.

4.2.2 Soil Sampling

Soil sampling at the Tier II Disposal Facility was conducted on August 20-22, 2016 and consisted of the collection of twelve soil samples from six soil sample stations (MW-5, MW-8, MW-9, MW-14, MW-15, MW-16).

The following Table 4-1 outlines the soil sampling activities conducted at the Tier II Disposal Facility.

Table 4-1: Summary of Work Conducted by Soil Sampling Location

Tier II Disposal Facility			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-14	16-C4-MW14AA	0 - 0.15	SILTY SAND, brown, moist, trace gravel, rootlets
	16-C4-MW14AB	0.4 ï 0.5	SAND, dark brown, some silt, trace gravel, rootlets
MW-15	16-C4-MW15A	0 - 0.15	GRAVEL, red and brown, moist, some sand
	16-C4-MW15B	0.4 ï 0.5	SAND and GRAVEL, red and brown, wet

Tier II Disposal Facility			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-16	16-C4-MW16A	0 - 0.15	SAND, grey, moist, trace gravel, rootlets, peat, PHC odour
	16-C4-MW16B	0.4 ï 0.5	SAND, grey, wet, some gravel, medium/coarse, PHC odour
MW-5	16-C4-5A	0 - 0.15	SAND and GRAVEL - red and brown, wet, coarse
	16-C4-5B	0.4 ï 0.5	GRAVEL - brown and red, wet, some sand, coarse
MW-8	16-C4-8A	0 - 0.15	SAND, dark brown, wet, some gravel, medium, trace PHC odour
	16-C4-8B	0.4 ï 0.5	SAND and GRAVEL, dark brown, wet, trace silt, trace PHC odour, sheen in infiltrating surface water
MW-9	16-C4-9A	0 - 0.15	SAND and GRAVEL, dark brown, wet, some silt, trace clay, rootlets
	16-C4-9B	0.4 ï 0.5	SANDY SILT, dark brown, moist, some gravel, trace clay

4.2.3 Groundwater Sampling

Groundwater monitoring at the Tier II Disposal Facility was conducted on August 20, 2016 and consisted of the inspection and groundwater monitoring of seven monitoring wells (MW-5, MW-8, MW-9, MW-14A/B, MW-15, MW-16). Two monitoring wells, MW-14B and 16, were observed to be dry. The other monitoring wells contained water and a groundwater samples were collected for analysis. Monitoring well sampling logs are presented in Section 4.3.3.1.

The following Table 4-2 outlines the groundwater sampling activities conducted at the Tier II Disposal Facility.

Table 4-2: Summary of Work Conducted by Monitoring Well

Tier II Disposal Facility		
Monitoring Well ID	**Observations**	**# of Groundwater Samples Collected**
MW-5	Good condition, no surface water around well	1
MW-8	Good condition, water surrounding area	1
MW-9	Good condition, some water/ponding surrounding area	1
MW-14A	Good condition, no surface water around well	1
MW-14B	Good condition, missing well cap, no surface water around well	1
MW-15	Good condition, no surface water around well	1

Tier II Disposal Facility		
Monitoring Well ID	**Observations**	**# of Groundwater Samples Collected**
MW-16	Good condition, well was dry	0

4.2.4 Thermal Monitoring

Four thermistors (VT-5, VT-6, VT-7, and VT-8) are present at the Tier II Disposal Facility. Each of the thermistor installations was inspected and data downloaded from the data loggers as per Section 5.4 of the Terms of Reference. Thermistor inspection reports were filled out for each of the installations and further details are provided in Section 7.3.4.1.

4.3 Results of the Monitoring Program

The following Sections 4.3.1 through 4.3.4 summarize the results of the CAM-4 monitoring program at the Tier II Disposal Facility.

4.3.1 Visual Inspection

The visual inspection of the Tier II Disposal Facility was conducted on August 20, 2016. The visual inspection was conducted in compliance with Section 5.2 of the Terms of Reference and details are provided below in the following Sections 4.3.1.1 through 4.3.1.5. Figure CAM-4.3A presents the visual inspection findings and photographic locations.

4.3.1.1 Inspection Checklist

The visual inspection was completed as per the Terms of Reference and the visual inspection checklist is included as Table 4-3 of this report below.

Table 4-3: Visual Inspection Checklist ï Tier II Disposal Facility

SITE NAME: **CAM-4 Pelly Bay**

LANDFILL DESIGNATION: Tier II Disposal Facility
LANDFILL TYPE: Tier II
DATE OF INSPECTION: August 20, 2016
WEATHER CONDITIONS: 10ºC, sunny
DATE OF PREVIOUS INSPECTION: September 4, 2013
INSPECTED BY: Stephen Borcsok
REPORT PREPARED BY: Stephen Borcsok

The preparer represents to the best of the preparerôs knowledge, the following statements and observations are true and correct and to the best of the preparerôs actual knowledge, no material facts have been suppressed or misstated.

Visual Inspection Checklist: Tier II Disposal Facility												
Checklist Item	Present (Yes/No)	Feature Number	Feature Location	GPS Coordinates Easting/Northing/Zone		Length (m)	Width (m)	Depth (m)	Extent Relative to Landfill Surface	Description	Comparison with Historical Observations	Additional Comments / Severity Rating	Photographic Records (photo reference, location, view point & direction, feature of note, scale)
Settlement	Yes	A	Northeast landfill crest	388791.919 / 7594382.491	16	0.2-2.0	0.2-0.3	0.05	<1%	Five minor depressions on landfill crest.	Length increased from 1.0 to 0.2-2.0, width from 0.2 to 0.2-0.3.	Severity Rating ï Acceptable (features are minor and are not affecting landfill stability)	CAM-4 TII 58, 59
Settlement	Yes	G	Northeast side slope	388784.146 / 7594399.107	16	1.5	0.4	0.1	<1%	Minor linear depression.	Length increased from 0.6 to 1.5 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 TII 60, 61
Settlement	Yes	H	Northeast side slope	388768.263 / 7594428.053	16	3.0-8.0	0.1-0.2	0.05-0.1	<1%	Three linear depressions.	Depressions have increased in length from 1.0 to 3.0-8.0 m between 2013 and 2016.	Severity Rating ï Acceptable (features are minor and are not affecting landfill stability)	CAM-4 TII 63, 64
Settlement	Yes	I	Side slope at west corner	388686.479 / 7594361.456 388687.289 / 7594361.941	16 16	0.2	0.2	0.1	<1%	Two minor depressions.	No significant change between 2013 and 2016.	Severity Rating ï Acceptable (features are minor and are not affecting landfill stability)	CAM-4 TII 65, 66
Settlement	Yes	J	Northeast landfill crest	388797.238 / 7594376.187	16	6.0	0.2	0.1	<1%	One linear depression.	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 TII 59
Settlement	Yes	L	Northeast side slope	388795.313 / 7594397.872	16	1.0	0.3	0.1	<1%	One minor depression.	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 TII 68
Settlement	Yes	M	Northeast side slope	388806.75 / 7594394.057	16	0.2	0.2	0.05	<1%	Minor settlement at end of tension crack (Feature K)	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 TII 73, 74
Erosion	Yes	B	Along southwest toe	388742.569 / 7594281.258	16	40.0	1.0-3.0	0.05-1	<1%	Minor erosion channel along southwest toe.	Not observed in 2013 due to snow cover. No significant change from 2011 to 2016.	Severity Rating ï Acceptable (erosion is not contact with landfill)	CAM-4 TII 40
Erosion	No	C	Along northwest toe			50	0.5-1.0	0.02-0.05	<1%	Minor erosion along northwest toe, not in contact with landfill	Observed in 2010 and 2011, not observed in 2013 due to snow cover. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Erosion	No	D	Northeast side slope			25	0.1-0.15	0.02-0.05	<1%	Minor erosion on northeast side slope, two locations, self armouring	Minor erosion was noted in 2011. Erosion not observed in 2013 or 2016. In 2013, Feature D was reported as minor rust-coloured staining associated with a seepage point along the northwest toe that was not observed due to snow cover.	Severity Rating ï Acceptable (feature not observed)	N/A
Lateral Movement	No												
Frost Action	No												

Visual Inspection Checklist: Tier II Disposal Facility												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**		**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Sloughing	No												
Cracking	Yes	K	Northeast side slope	388800.515 / 7594399.133 388811.636 / 7594389.279	16 16	9.0-10.0	0.05-0.1	0.05	<1%	Discontinuous tension crack in two sections.	New observation in 2016.	Severity Rating ï Marginal (presence of these cracks indicate a potential issue in the future)	CAM-4 TII 69, 70, 71, 72, 73, 74, 75, 76
Animal Burrows	No												
Vegetation Establishment	No												
Staining	Yes	E	Along northeast toe	388782.715 / 7594430.869	16	5.0	10.0	N/A	<1%	Oxidation staining at toe of landfill	Not observed in 2011 due to snow cover. Staining observed in multiple areas around landfill toe in 2011, but only one location in 2016.	Severity Rating ï Acceptable (oxidation staining has been present since construction of landfill)	CAM-4 TII 8
Vegetation Stress	No												
Seepage Points (or) Ponded Water	Yes	F	Northeast landfill toe.	388776.704 / 7594432.155	16	5.0	0.3	N/A	<1%	One location of seepage at toe of slope	Not observed in 2013 due to snow cover. Observed in nine locations along landfill toe in 2011.	Severity Rating ï Acceptable (seepage is not affecting stability of landfill)	CAM-4 TII 77
Debris and/or Liner Exposed	No												
Presence & Condition of Monitoring Instruments	Yes	N/A	Seven monitoring wells outside landfill, four thermistors on landfill cover		16	N/A	N/A	N/A	N/A	MW5, MW8, MW9, MW15, MW16, MW14A/B VT-5, VT-6, VT-7, VT-8	Locations were in good condition in 2013 and 2016.	Severity Rating - Acceptable	CAM-4 TII 3, 4, 7, 8, 11, 12, 19, 20, 23, 30, 35, 40, 44, 47, 50, 55
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	No												

4.3.1.2 Stability Assessment

The Preliminary Stability Assessment for the Tier II Disposal Facility was conducted on August 20, 2016 as per the Terms of Reference and the results are provided below in Table 4-4.

Table 4-4: Preliminary Stability Assessment ï Tier II Disposal Facility

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Marginal (revised from Acceptable following analysis during reporting phase)	Occasional
Animal Burrows	Not Observed	None
Vegetation Establishment	Not Observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not Observed	None
Seepage / Ponded Water	Acceptable	Isolated
Debris and/or Liner Exposure	Not Observed	None
Other	Not Observed	None
Overall Landfill Performance	**Acceptable**	

Performance / Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note,

Performance / Severity Rating	Description
	such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

4.3.1.3 Photographic Records

The photographic record for the Tier II Disposal Facility has been completed as per Section 5.5 of the Terms of Reference and is included in Table 4-5. The Photographic Record only contains an index of photographs collected; full sized photographs are contained in the Appended CD/DVD-ROM. Selected photographs are presented in Table 4-5. Figure CAM-4.3A presents the photograph locations and directions.

Table 4-5: Photographic Records ï Tier II Disposal Facility

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-MW5-1	SM5	SW	Sample station MW-5	MW-5 soil	MW-5	Test pit location
C4-MW5-2	SM5	N/A	Sample station MW-5	MW-5 soil	MW-5	Test pit close-up
C4-MW5-3	SM5	N/A	Sample station MW-5	MW-5 soil	MW-5	Test pit backfilled

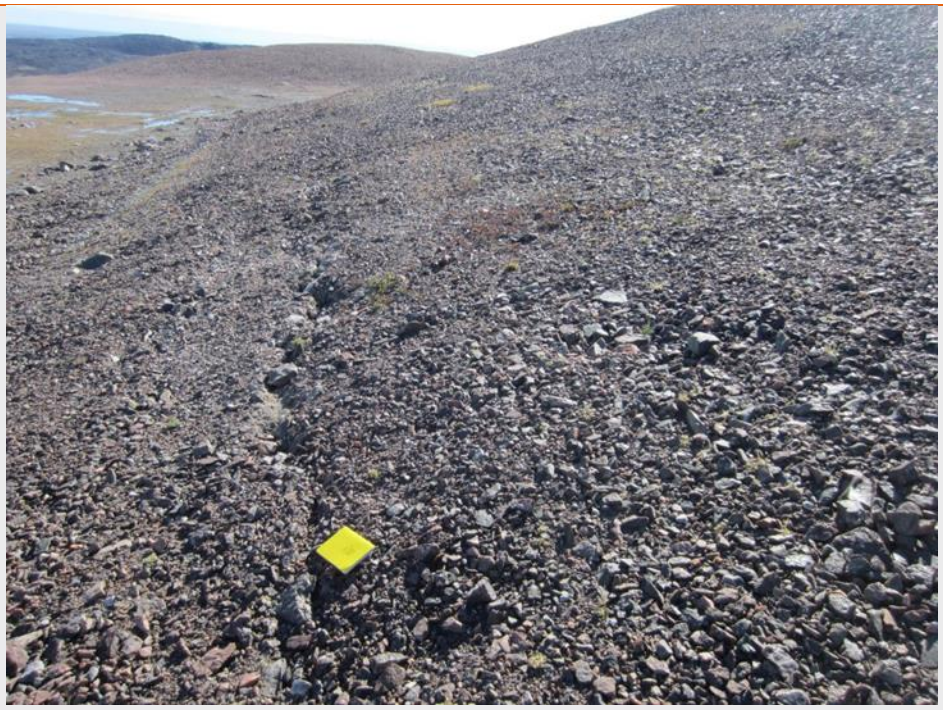
Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
C4-MW8-1	SM8	SW	Sample station MW-8	MW-8 soil	MW-8	Test pit location
C4-MW8-2	SM8	N/A	Sample station MW-8	MW-8 soil	MW-8	Test pit close-up
C4-MW8-3	SM8	N/A	Sample station MW-8	MW-8 soil	MW-8	Test pit backfilled
C4-MW9-1	SM9	SE	Sample station MW-9	MW-9 soil	MW-9	Test pit location
C4-MW9-2	SM9	N/A	Sample station MW-9	MW-9 soil	MW-9	Test pit close-up
C4-MW9-3	SM9	N/A	Sample station MW-9	MW-9 soil	MW-9	Test pit backfilled
C4-MW14A-1	SM14	N	Sample station MW-14A	MW-14A soil	MW-14A/B	Test pit location
C4-MW14A-2	SM14	N/A	Sample station MW-14A	MW-14A soil	MW-14A/B	Test pit close-up
C4-MW14A-3	SM14	N/A	Sample station MW-14A	MW-14A soil	MW-14A/B	Test pit backfilled
C4-MW15-1	SM15	NW	Sample station MW-15	MW-15 soil	MW-15	Test pit location
C4-MW15-2	SM15	N/A	Sample station MW-15	MW-15 soil	MW-15	Test pit close-up
C4-MW15-3	SM15	N/A	Sample station MW-15	MW-15 soil	MW-15	Test pit backfilled
C4-MW16-1	SM16	SE	Sample station MW-16	MW-16 soil	MW-16	Test pit location
C4-MW16-2	SM16	N/A	Sample station MW-16	MW-16 soil	MW-16	Test pit close-up
C4-MW16-3	SM16	N/A	Sample station MW-16	MW-16 soil	MW-16	Test pit backfilled
Visual Inspection Photographs						
CAM-4 TII 3	3	SW	Monitoring well MW16	Monitoring well	MW16	
CAM-4 TII 4	4	NE	Monitoring well MW16	Monitoring well	MW16	Station Area Non-Hazardous Waste Landfill in background of photograph
CAM-4 TII 7	7	NW	Monitoring well MW8	Monitoring well	MW8	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 TII 8	8	NE	Monitoring well MW8 and oxidation staining	Monitoring well Staining	MW8 Feature E	
CAM-4 TII 11	11	SW	Monitoring well MW9	Monitoring well	MW9	
CAM-4 TII 12	12	SW	Monitoring well MW9	Monitoring well	MW9	
CAM-4 TII 19	19	S	Monitoring wells MW14A/B	Monitoring wells	MW14A/B	
CAM-4 TII 20	20	E	Monitoring wells MW14A/B	Monitoring wells	MW14A/B	
CAM-4 TII 23	23	N	Monitoring wells MW14A/B	Monitoring wells	MW14A/B	
CAM-4 TII 30	30	W	Monitoring well MW15	Monitoring well	MW15	
CAM-4 TII 31	31	NE	View of Tier II Disposal Facility from nearby mound			
CAM-4 TII 32	32	SE	Southwest side slope from west corner			
CAM-4 TII 33	33	NE	Northwest side slope from west corner			
CAM-4 TII 34	34	NE	Northwest side slope of DF			
CAM-4 TII 35	35	SE	Northwest side slope of DF and monitoring well MW15	Monitoring well	MW15	
CAM-4 TII 36	36	S	North corner of DF			
CAM-4 TII 37	37	SW	Northeast corner of DF			
CAM-4 TII 38	38	W	East corner of DF			
CAM-4 TII 39	39	W	Southeast side slope of DF			
CAM-4 TII 40	40	NW	Southwest side slope of DF	Erosion	B	
CAM-4 TII 41	41	NE	South corner of DF			
CAM-4 TII 42	42	NW	DF cover from top of south corner			

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 TII 43	43	NE	DF cover from top of south corner			
CAM-4 TII 44	44	NW	Thermistor VT-8	Thermistor	VT-8	
CAM-4 TII 45	45	SW	DF cover from top of east corner			
CAM-4 TII 46	46	NW	DF cover from top of east corner			
CAM-4 TII 47	47	NW	Thermistor VT-7	Thermistor	VT-7	
CAM-4 TII 48	48	SW	DF cover from top of north corner			
CAM-4 TII 49	49	SE	DF cover from top of north corner			
CAM-4 TII 50	50	S	Thermistor VT-6	Thermistor	VT-6	
CAM-4 TII 51	51	N	DF cover from centre of DF			
CAM-4 TII 52	52	E	DF cover from centre of DF			
CAM-4 TII 53	53	S	DF cover from centre of DF			
CAM-4 TII 54	54	W	DF cover from centre of DF			
CAM-4 TII 55	55	SE	Thermistor VT-5	Thermistor	VT-5	
CAM-4 TII 56	56	NE	DF cover from top of west corner			
CAM-4 TII 57	57	SE	DF cover from top of west corner			
CAM-4 TII 58	58	NE	Minor depressions on northeast crest	Settlement	A	
CAM-4 TII 59	59	SE	Minor depressions on northeast crest	Settlement Settlement	A J	
CAM-4 TII 60	60	N	Minor depression on northeast side slope	Settlement	G	
CAM-4 TII 61	61	E	Minor depression on northeast side slope	Settlement	G	
CAM-4 TII 62	62	SE	View of northeast side slope			
CAM-4 TII 63	63	SE	Minor depressions on northeast side slope	Settlement	H	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM-4 TII 64	64	NE	Minor depressions on northeast side slope	Settlement	H	
CAM-4 TII 65	65	SE	Minor depressions on west corner side slope	Settlement	I	
CAM-4 TII 66	66	SE	Minor depressions on west corner side slope	Settlement	I	
CAM-4 TII 67	67	NW	Minor depressions on northeast crest	Settlement	A	
CAM-4 TII 68	68	NW	Minor depression on northeast side slope	Settlement	L	New feature in 2016
CAM-4 TII 69	69	SE	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 70	70	NE	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 71	71	SW	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 72	72	NW	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 73	73	SW	Tension cracking and settlement on northeast side slope	Cracking Settlement	K M	New features in 2016
CAM-4 TII 74	74	SE	Tension cracking and settlement on northeast side slope	Cracking Settlement	K M	New features in 2016
CAM-4 TII 75	75	SW	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 76	76	NW	Tension cracking on northeast side slope	Cracking	K	New feature in 2016
CAM-4 TII 77	77	SW	Seepage at northeast landfill toe	Seepage	F	
CAM-4 TII 78	78	SE	View of Tier II Disposal Facility from nearby mound			
CAM-4 TII 79	79	N	Aerial view of Upper Site			

Table 4-6: Selected Photographs ï Tier II Disposal Facility

Tier II Disposal Facility
Photograph CAM-4 TII 68: New minor settlement (Feature L) on northeast side slope.

Photograph CAM-4 TII 69: New tension cracks (Feature K) on northeast side slope.

Tier II Disposal Facility

Photograph CAM-4 TII 73: New tension cracks (Feature K) and settlement (Feature M) on northeast side slope.

Photograph CAM-4 TII 75: New tension cracks (Feature K) on northeast side slope.

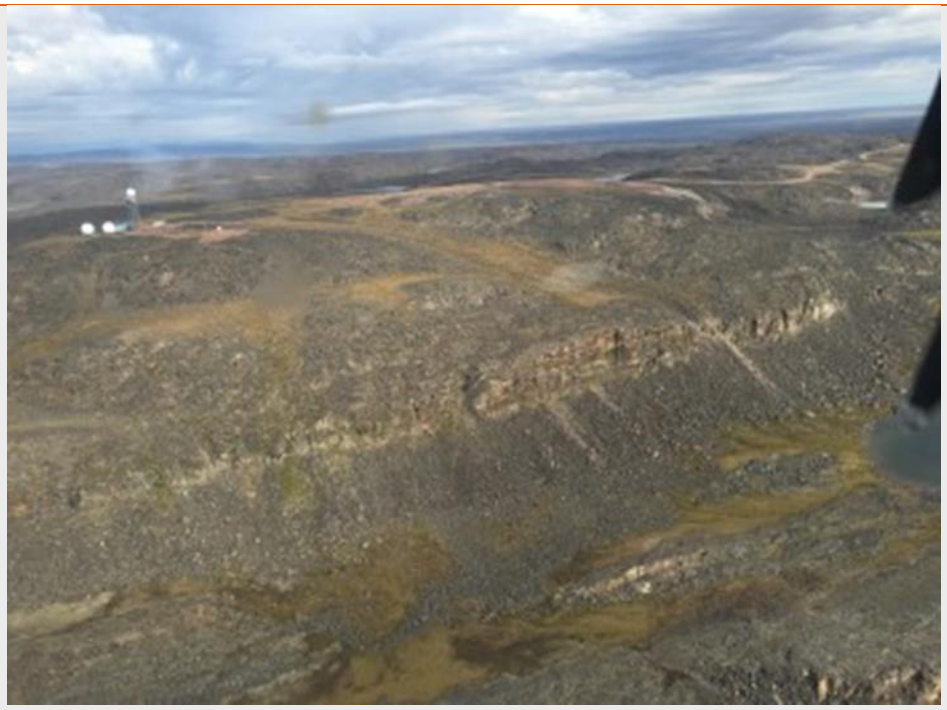
Tier II Disposal Facility

Photograph CAM-4 TII 76: New tension cracks (Feature K) on northeast side slope.

Photograph CAM-4 TII 77: Seepage (Feature F) on northeast toe.

Tier II Disposal Facility

Photograph CAM-4 TII 78: View of Tier II Disposal Facility from mound to the west.



Photograph CAM-4 TII 79: Aerial view of Upper Site area.

4.3.1.4 Trend Analysis

A trend analysis was conducted with regards to observations made during the visual inspection of the Tier II Disposal Facility. The following Table 4-7 outlines the results of the visual trend analysis.

Table 4-7: Visual Inspection Trends ï Tier II Disposal Facility

Checklist Item	Feature Number	Comparison with Historical Observations
Settlement	A	Length increased from 1.0 to 0.2-2.0 m, width from 0.2 to 0.2-0.3 m.
	G	Length increased from 0.6 to 1.5 m between 2013 and 2016.
	H	Depressions have increased in length from 1.0 to 3.0-8.0 m between 2013 and 2016.
	I	No significant change between 2013 and 2016.
	J	New observation in 2016.
	L	New observation in 2016.
	M	New observation in 2016.
Erosion	B	Not observed in 2013 due to snow cover. No significant change from 2011 to 2016.
Cracking	K	New observation in 2016.
Staining	E	Not observed in 2011 due to snow cover. Staining observed in multiple areas around landfill toe in 2011, but only one location in 2016.
Seepage	F	Not observed in 2013 due to snow cover. Was observed in nine locations along landfill toe in 2011 compared to only one location in 2016. Seepage likely varies temporally due to differences in precipitation.

4.3.1.5 Discussion of Results/Trends

A comparison of the visual inspection results of the 2013 and 2016 monitoring events at the Tier II Disposal Facility indicates that one existing settlement feature and one erosion feature underwent no significant change between 2013 and 2016. Three other settlement features exhibited increases in size. Staining and seepage were only observed at one location in 2016, while multiple locations were observed in previous years. Three new settlement and one new cracking feature were observed in 2016.

The presence of the new cracking feature (Feature K) indicates that the stability of the landfill in this area is being affected, as the crack is evidence that a portion of the northeast slope has undergone movement downslope sufficient to generate this crack. This feature was not present during the previous monitoring event in 2013 so it is unknown if this crack was formed over the past three years, or potentially more rapidly over a shorter period of time. The potential exists for additional movement of the slope which would worsen the crack and may affect the stability of the landfill. The performance of the landfill is currently acceptable, however due to the potential for additional movement it is recommended that the monitoring schedule be amended to allow this landfill to be monitored annually.

4.3.2 Soil Sampling

Soil sampling of the Tier II Disposal Facility was conducted on August 20-22, 2016. The soil sampling was conducted in compliance with Section 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections 4.3.2.1 through 4.3.2.3.

4.3.2.1 Laboratory Analytical Results

A total of twelve soil samples were analysed from six soil sample locations at the Tier II Disposal Facility. Table 4-8 and Table 4-9 present the soil analytical results. Figure CAM-4.3B presents a summary of significant soil analytical results.

Table 4-8: Soil Chemical Analysis Results ï Tier II Disposal Facility

Tier II Disposal Facility																	
Sample ID	**Sampling Station**	**Monitoring Year**	**Depth**	**Cu**	**Ni**	**Co**	**Cd**	**Pb**	**Zn**	**Cr**	**As**	**Hg**	**Total PCB**	**F1 C6-C10**	**F2 C10-C16**	**F3 C16-C34**	**Modified TPH Total C6-C34**
Comparison Values																	
Background				14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012				38
Baseline				**14**	**14**	**6.8**	**1.00**	**22**	**79**	**28**	**2.0**	**0.100**	**0.16**				**1029**
Baseline +3 Standard Deviations				32	29	17	1.6	101	227	66	5.0	0.38	1.3				10635
Upgradient																	
MW-14 Surface																	
24808	MW-14	2007	0	8.3	13	**8.5**	<1.0	<10	36	28	**2.9**	<0.10	<0.0030	<10	7.4	<9.0	17
MW-14-A-15	MW-14	2008	15	11	13	6.2	<0.50	8.0	33	28	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-14WA	MW-14	2009	0-15	13	**20**	**8.0**	<0.10	8.0	45	**38**	**3.0**	<0.050	<0.010	<12	<10	33	44
C410-14WA	MW-14	2010	0-15	**28**	**19**	**9.0**	<0.10	15	50	**35**	**3.0**	<0.050	0.013	<12	<10	38	49
C4 11-14WA	MW-14	2011	0-15	13	**19**	**8.0**	<0.10	9.0	56	**42**	**4.0**	<0.050	0.034	<12	<10	120	131
2013-C4-MW-14A	MW-14	2013	0-15	13	**30**	**8.0**	<0.10	10	47	**60**	**3.4**	<0.050	<0.010	<12	<10	65	76
16-C4-MW14AA	MW-14	2016	0-15	9.5	13	6.3	<0.050	7.9	39	26	**2.5**	<0.050	<0.010	<12	<10	54	65
MW-14 Depth																	
24810	MW-14	2007	30	10	**15**	**11**	<1.0	<10	48	**30**	**2.5**	<0.10	<0.0030	<10	6.3	33	44
MW-14-A-30	MW-14	2008	30	12	**14**	6.4	<0.50	8.2	35	28	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-14WB	MW-14	2009	40-50	9.0	**16**	6.0	<0.10	8.0	38	**33**	<1.0	<0.050	<0.010	<12	<10	39	50
C410-14WB	MW-14	2010	40-50	**62**	**25**	**10**	<0.10	11	67	**44**	**4.0**	<0.050	<0.010	<12	<10	14	25
C4 11-14WB	MW-14	2011	40-50	**16**	**23**	**9.0**	<0.10	9.0	56	**42**	**3.0**	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-14B	MW-14	2013	40-50	11	**43**	**7.6**	<0.10	7.0	40	**89**	**2.8**	<0.050	0.014	<12	<10	45	56
16-C4-MW14AB	MW-14	2016	40-50	12	**15**	**7.0**	<0.050	7.4	42	27	**3.1**	<0.050	<0.010	<12	<10	<50	36
MW-15 Surface																	
24840/41	MW-15	2007	0	8.7	9.0	**7.3**	<1.0	12	56	<20	**3.3**	<0.10	<0.0030	<10	<4.0	83	90
MW-15-15	MW-15	2008	15	9.8	9.4	6.5	<0.50	8.0	41	17	<5.0	<0.0050	<0.050	<10	118	235	358
C409-15WA	MW-15	2009	0-15	8.0	9.0	6.0	0.10	4.0	32	13	1.0	<0.050	0.021	<12	13	78	97
C410-15WA	MW-15	2010	0-15	**35**	6.0	6.0	<0.10	9.0	42	10	**3.0**	<0.050	<0.010	<12	<10	<10	16

Tier II Disposal Facility																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C4 11-15WA	MW-15	2011	0-15	12	13	7.0	<0.10	11	46	26	2.0	<0.050	0.035	<12	<10	49	60
2013-C4-MW-15A	MW-15	2013	0-15	7.5	6.2	6.0	<0.10	4.3	41	11	2.2	<0.050	<0.010	<12	<10	<50	36
16-C4-MW15A	MW-15	2016	0-15	9.8	6.1	5.4	<0.050	4.4	37	12	1.6	<0.050	<0.010	<12	<10	72.0	83
MW-15 Depth																	
24842	MW-15	2007	30	7.6	10	8.3	<1.0	<10	47	<20	2.0	<0.10	<0.0030	<10	6.8	26	38
MW-15-25	MW-15	2008	25	11	9.3	7.0	<0.50	7.4	44	18	<5.0	<0.0050	<0.050	<10	119	302	426
C409-15WB	MW-15	2009	40-50	6.0	12	5.0	<0.10	4.0	30	23	<1.0	<0.050	0.038	<12	57	140	203
C410-15WB	MW-15	2010	40-50	36	6.0	6.0	<0.10	3.0	41	11	3.0	<0.050	<0.010	<12	<10	<10	16
C4 11-15WB	MW-15	2011	40-50	9.0	22	7.0	<0.10	6.0	42	44	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-15B	MW-15	2013	40-50	7.5	6.7	6.6	<0.10	3.9	48	11	2.6	<0.050	<0.010	<12	<10	<50	36
16-C4-MW15B	MW-15	2016	40-50	6.1	5.4	5.1	<0.050	3.2	36	9.3	1.4	<0.050	<0.010	<12	<10	<50	36
MW-16 Surface																	
24844	MW-16	2007	0	20	26	15	<1.0	11	82	47	3.4	<0.10	<0.0030	<10	1100	620	1725
MW-16-15	MW-16	2008	15	14	16	7.8	<0.50	8.4	43	32	<5.0	<0.0050	<0.050	<10	286	133	424
C409-16WA	MW-16	2009	0-15	8.0	11	5.0	<0.10	5.0	29	22	1.0	<0.050	<0.010	<12	<10	22	33
C410-16WA	MW-16	2010	0-15	26	11	6.0	<0.10	5.0	33	22	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-16WA	MW-16	2011	0-15	11	12	6.0	<0.10	5.0	35	23	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-16A	MW-16	2013	0-15	14	34	8.4	<0.10	8.4	48	66	2.2	<0.050	<0.010	<12	<10	<50	36
16-C4-MW16A	MW-16	2016	0-15	10.0	54	6.2	<0.050	5	39	120	1.8	<0.050	<0.03	230	11000	1500	*12730*
MW-16 Depth																	
24846	MW-16	2007	30	9.7	14	9.0	<1.0	<10	39	29	2.0	<0.10	<0.0030	<10	79	72	156
MW-16-40	MW-16	2008	40	12	15	7.8	<0.50	8.0	39	30	<5.0	<0.0050	<0.050	<10	49	<50	79
C409-16WB	MW-16	2009	40-50	17	21	8.0	<0.10	8.0	54	40	2.0	<0.050	<0.010	<12	<10	39	50
C410-16WB	MW-16	2010	40-50	18	12	7.0	<0.10	6.0	36	25	2.0	<0.050	<0.010	<12	230	<10	241
C4 11-16WB	MW-16	2011	40-50	11	16	7.0	<0.10	8.0	41	29	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-16B	MW-16	2013	40-50	7.0	11	5.5	<0.10	4.8	27	20	1.3	<0.050	<0.010	<12	2700	460	3166
16-C4-MW16B	MW-16	2016	40-50	7.2	11	5.6	<0.050	4.7	32	23	6.8	<0.050	<0.010	150	8700	1200	10050
Downgradient																	

Tier II Disposal Facility																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
MW-5 Surface																	
24828	MW-5	2007	0	9.9	10	8.7	<1.0	<10	40	21	2.2	<0.10	<0.0030	<10	5.6	21	32
MW-5-10	MW-5	2008	10	12	9.4	6.6	<0.50	6.6	33	18	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-5WA	MW-5	2009	0-15	7.0	9.0	5.0	<0.10	4.0	28	18	2.0	<0.050	<0.010	<12	<10	18	29
C410-5WA	MW-5	2010	0-15	46	9.0	8.0	<0.10	7.0	36	16	3.0	0.060	<0.010	<12	<10	<10	16
C4 11-5WA	MW-5	2011	0-15	8.0	11	6.0	<0.10	5.0	32	21	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-5A	MW-5	2013	0-15	31	15	6.4	<0.10	6.9	63	17	1.9	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-5A	MW-5	2016	0-15	15.0	24	7.0	<0.050	4.9	33	50	1.9	<0.050	<0.010	<12	<10	<50	36
MW-5 Depth																	
24830	MW-5	2007	30	7.9	8.1	7.2	<1.0	<10	32	<20	1.7	<0.10	<0.0030	<10	4.4	20	29
MW-5-25	MW-5	2008	25	12	9.0	6.3	<0.50	6.8	34	19	<5.0	0.0051	<0.050	<10	<30	<50	45
C409-5WB	MW-5	2009	40-50	16	10	7.0	<0.10	5.0	28	19	2.0	<0.050	<0.010	<12	<10	<10	16
C410-5WB	MW-5	2010	40-50	39	7.0	8.0	<0.10	5.0	34	11	2.0	0.050	<0.010	<12	<10	<10	16
C4 11-5WB	MW-5	2011	40-50	20	10	7.0	<0.10	5.0	30	20	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-5B	MW-5	2013	40-50	9.2	65	7.5	<0.10	4.1	38	130	1.3	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-5B	MW-5	2016	40-50	12	21	4.7	<0.050	4	23	44	2.0	<0.050	<0.010	<12	<10	<50	36
MW-8 Surface																	
24836	MW-8	2007	0	9.5	11	9.2	<1.0	<10	46	23	2.2	<0.10	<0.0030	<10	5.0	57	67
MW-8-10	MW-8	2008	10	12	11	6.8	<0.50	7.9	41	20	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-8WA	MW-8	2009	0-15	8.0	12	5.0	<0.10	12	34	24	1.0	<0.050	0.015	<12	<10	41	52
C410-8WA	MW-8	2010	0-15	59	11	7.0	<0.10	8.0	89	21	2.0	0.050	<0.010	<12	<10	<10	16
C4 11-8WA	MW-8	2011	0-15	7.0	20	5.0	<0.10	6.0	33	40	2.0	<0.050	0.013	<12	<10	<10	16
2013-C4-MW-8A	MW-8	2013	0-15	15	10	6.6	<0.10	7.5	44	19	2.1	<0.050	<0.010	<12	<10	<50	36
16-C4-8A	MW-8	2016	0-15	11	13	5.6	<0.050	6.5	34	25	1.8	<0.050	<0.010	<12	33	<50	64
MW-8 Depth																	
24838	MW-8	2007	30	7.3	12	8.5	<1.0	<10	35	26	1.6	<0.10	<0.0030	89	1300	160	1549
MW-8-20	MW-8	2008	20	12	11	6.4	<0.50	14	39	23	<5.0	0.0066	<0.050	<10	296	121	422
C409-8WB	MW-8	2009	40-50	10	12	6.0	<0.10	6.0	34	25	1.0	<0.050	<0.010	<12	340	21	367

Tier II Disposal Facility																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C410-8WB	MW-8	2010	40-50	38	15	8.0	<0.10	7.0	42	31	2.0	<0.050	<0.010	40	630	<10	675
C4 11-8WB	MW-8	2011	40-50	17	17	7.0	<0.10	7.0	44	33	2.0	<0.050	<0.020	510	5900	820	7230
2013-C4-MW-8B	MW-8	2013	40-50	11	9.5	8.0	<0.10	8.0	49	17	2.2	<0.050	<0.010	<12	<10	71	82
16-C4-MW-8B	MW-8	2016	40-50	9.8	31	6.2	<0.050	5.6	35	67.0	2.0	<0.050	<0.010	120	2700	200	3020
MW-9 Surface																	
24832	MW-9	2007	0	9.3	9.6	8.1	<1.0	<10	37	<20	2.4	<0.10	<0.0030	<10	5.6	17	28
MW-9-15	MW-9	2008	15	10	8.9	6.4	<0.50	12	36	18	<5.0	0.0070	<0.050	<10	<30	69	89
C409-9WA	MW-9	2009	0-15	10	12	6.0	<0.10	6.0	29	23	1.0	<0.050	<0.010	<12	<10	20	31
C410-9WA	MW-9	2010	0-15	41	10	7.0	0.10	54	52	19	2.0	<0.050	0.094	<12	<10	120	131
C4 11-9WA	MW-9	2011	0-15	9.0	24	7.0	<0.10	8.0	40	49	2.0	<0.050	0.013	<12	<10	<10	16
2013-C4-MW-9A	MW-9	2013	0-15	13	9.4	6.4	<0.10	6.0	34	18	1.9	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-9A	MW-9	2016	0-15	11	27	7.7	<0.050	6.8	45	56	2.2	<0.050	<0.010	<12	<10	<50	36
16-C4-DUP1	MW-9	2016	0-15	12	10	7.3	<0.050	7.8	45	19	2.1	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-9A ALS	MW-9	2016	0-15	8.48	8.73	6.71	0.042	7.12	40.9	14.8	2.37	0.0401	<0.050	<10	<20	32	46
MW-9 Depth																	
24834	MW-9	2007	30	10	10	8.5	<1.0	<10	40	<20	2.3	<0.10	0.0041	<10	5.1	29	39
MW-9-25	MW-9	2008	25	10	7.9	6.2	<0.50	9.7	36	17	<5.0	0.0056	<0.050	<10	<30	<50	45
C409-9WB	MW-9	2009	40-50	8.0	10	5.0	<0.10	9.0	34	19	<1.0	<0.050	0.010	<12	360	71	437
C410-9WB	MW-9	2010	40-50	44	11	7.0	<0.10	22	53	22	2.0	<0.050	0.045	<12	410	110	526
C4 11-9WB	MW-9	2011	40-50	12	15	7.0	<0.10	7.0	43	29	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-9B	MW-9	2013	40-50	10	8.7	5.8	<0.10	6.3	36	16	1.9	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-9B	MW-9	2016	40-50	20	31	9.9	<0.050	7.6	62	59	3.1	<0.050	<0.010	<12	20	<50	51

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline +3 standard deviations*

**** All units in mg/kg**

Table 4-9: PHC F4 Soil Chemical Analysis Results - Tier II Disposal Facility

Tier II Disposal Facility			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**PHC F4 (mg/kg)**
MW-14	16-C4-MW14AA	0 - 0.15	<50
	16-C4-MW14AB	0.4 ï 0.5	<50
MW-15	16-C4-MW15A	0 - 0.15	<50
	16-C4-MW15B	0.4 ï 0.5	<50
MW-16	16-C4-MW16A	0 - 0.15	50
	16-C4-MW16B	0.4 ï 0.5	<50
MW-5	16-C4-5A	0 - 0.15	<50
	16-C4-5B	0.4 ï 0.5	<50
MW-8	16-C4-8A	0 - 0.15	<50
	16-C4-8B	0.4 ï 0.5	<50
MW-9	16-C4-9A	0 - 0.15	<50
	16-C4-9B	0.4 ï 0.5	<50

4.3.2.2 Discussion of Results ï Comparison to Baseline/Background

Analytical results were compared against baseline data, and background concentrations. The following Table 4-10 summarizes the comparison of results.

Table 4-10: Evaluation of Results by Parameter ï Tier II Disposal Facility

Tier II Disposal Facility	
Parameter	**Discussion of Results**
Copper (Cu)	Copper analysis reported concentrations below background and baseline, with the exception of samples 16-C4-5A and 16-C4-9B, which reported concentrations of 15 mg/kg and 20 mg/kg, respectively, exceeding the background and baseline level of 14 mg/kg.
Nickel (Ni)	Nickel was reported to exceed the background and/or baseline concentrations of 16 mg/kg and 14 mg/kg in seven sample locations, as follows; MW-14AB at 15 mg/kg, and MW-16A at 54 mg/kg, which are both up-gradient, as well as MW-5A at 24 mg/kg, MW-5B at 21 mg/kg, MW-8B at 31 mg/kg, MW-9A at 27 mg/kg, and MW-9B at 31 mg/kg, all of which are downgradient.
Cobalt (Co)	Cobalt was reported to exceed either the background and baseline concentrations of 8.3 mg/kg and 6.8 mg/kg, or both, in four sample locations, as follows, MW-14AB at 7 mg/kg, which is up-gradient, as well as MW-5A at 7 mg/kg, MW-9 surface at 7.7 mg/kg, and MW-9 depth at 9.9 mg/kg, all of which are downgradient.
Cadmium (Cd)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cd.

Tier II Disposal Facility	
Parameter	**Discussion of Results**
Lead (Pb)	Lead was reported to exceed the background concentration of 6.4 mg/kg in five sample locations, as follows; MW-14AA at 7.9 mg/kg and MW-14AB at 7.4 mg/kg, both up-gradient sample locations, as well as MW-8A at 6.5 mg/kg, MW-9A at 6.8 mg/kg, and MW-9B at 7.6 mg/kg, all of which are downgradient.
Zinc (Zn)	Zinc analysis reported concentrations below background and baseline, with the exception of one sample MW-9B, which reported concentrations of 62 mg/kg, exceeding the background level of 50 mg/kg.
Chromium (Cr)	Chromium was reported to exceed the background and baseline concentrations of 32 mg/kg and 28 mg/kg respectively in six sample locations MW-16A surface at 120 mg/kg, which is up-gradient, as well as MW-5A surface at 50 mg/kg, MW-5B at 44 mg/kg, MW-8B at 67 mg/kg, MW-9A at 56 mg/kg, and MW-9B at 59 mg/kg, all of which are downgradient.
Arsenic (As)	Arsenic was reported to exceed the background and baseline concentrations of 2.4 mg/kg and 2.0 mg/kg respectively in five sample locations, as follows; MW-14AA at 2.5 mg/kg, MW-14AB at 3.1 mg/kg, and MW-16B at 6.8 mg/kg, all of which are up-gradient, as well as MW-9A at 2.2 mg/kg and MW-9B at 3.1 mg/kg, both of which are downgradient.
Mercury (Hg)	All soil samples reported non-detect concentrations for Mercury.
PCBs (Total)	All soil samples reported non-detect concentrations for PCBs.
F1 (C_6-C_{10})	All soil samples reported either non-detect concentrations for F1, with the exception of MW-8B, MW-16A and MW-16B. No background or baseline comparison values exist for F1 PHC.
F2 (C_{10}-C_{16})	All soil samples reported non-detect concentrations for F2, with the exception of MW-8A, MW8B, MW-16A, MW-16B, and MW-9B. No background or baseline comparison values exist for F2 PHC.
F3 (C_{16}-C_{34})	All soil samples reported non-detect concentrations for F3, with the exception of MW-8B, MW-14A, MW-15A, MW16A, and MW16B. No background or baseline comparison values exist for F3 PHC.
Modified TPH (C_6-C_{34})	Modified TPH was reported to exceed the background and/or baseline concentrations of 38 mg/kg and 1029 mg/kg respectively in seven sample locations, as follows; MW-14AA at 65 mg/kg, MW-15A at 83 mg/kg, MW-16A at 12,730 mg/kg, and MW-16B at 10,050 mg/kg, all of which are up-gradient, as well as MW-8A at 64 mg/kg, MW-8B at 3020 mg/kg, and MW-9B at 51 mg/kg, all of which are downgradient.

4.3.2.3 Soil Trend Analysis by Parameter & Discussion of Trends

A soil chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A Series of graphs were generated including a visual comparison to background, baseline and historical concentrations using differentiating colours (See Appendix E). The following Table provides a summary of soil trend analysis findings and presents a discussion of the observed trends by parameter.

Table 4-11: Discussion of Trends ï Tier II Disposal Facility

Tier II Disposal Facility	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend. Concentrations increased significantly in 2010 but later trended downwards in all sample locations from 2010 to 2016.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. Increases are observable over time in many sampling locations but not enough data exists to determine an obvious trend.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend and/or is trending downward slightly.
Cadmium (Cd)	Based on mostly non-detect concentrations, Cd has no observable trend. Some of the samples indicate a downward trend from low-level detections in previous monitoring rounds to non-detect concentrations in 2016.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend. Significant concentration increases were measured at sampling location MW-9 in 2010, however concentrations decreased significantly since then.
Zinc (Zn)	Based on fluctuating reported concentrations over multiple years data, Zn has no observable trend.
Chromium (Cr)	Based on current and historical results, it appears that Cr is increasing in concentration in both up-gradient and downgradient sampling locations, with the exception of downward trends observed at sample station MW-15.
Arsenic (As)	Based on current and historical results, Arsenic has reported fluctuating concentrations throughout the monitoring years. Overall, no trend is observable.
Mercury (Hg)	Based on mostly non-detect concentrations, Hg has no observable trend.
PCBs (Total)	Multiple sampling locations were reported to have fluctuations of PCB concentrations above detection limit and in some instances above baseline and/or background comparison values. No pattern or observable trend was determined to exist in any of these sampling locations over time.
Modified TPH (C_6-C_{34})	Reported concentrations of Modified TPH at sampling locations MW-8B, MW-16A, and MW-16B exceeded the baseline plus three standard deviation comparison concentration for TPH, which was considered anomalously high as compared with previous yearsôdata,.Some instances of TPH concentrations above standard deviations have been reported in previous monitoring events, though no observable trend was determined based on the fluctuating historical data. Further data points are required to determine the existence of any Modified TPH trends over time.

Trend analysisôpresented are based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

4.3.3 Groundwater Sampling

Seven groundwater monitoring wells (MW-5, MW-8, MW-9, MW-14A/B, MW-15, MW-16) are present at the Tier II Disposal Facility. Groundwater sampling of the Tier II Disposal Facility was conducted on August 20 and 21, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following 4.3.3.1 to 4.3.3.5.

4.3.3.1 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

Table 4-12: CAM-4 Monitoring Well Log for MW-5

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-5	UTM Coordinates:	10039.3 North 10136.9 East
Sample Number(s) (include dups.):	CAM4-MW5 and DUP2		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 21/16	Time:	11:50
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	360	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	0.60	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=		60	
Static water level (cm) from top of pipe =		121.2	
Static water level (cm) (below ground surface) calculated =		0.612	
Measured well refusal depth (cm) (measure after sampling) =		324.6	
Thickness of water column (cm)=	203.4	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	4.5 L over 25 m		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	See Table 4-18			
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé):

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-12: CAM-4 Monitoring Well Log for MW-8

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-8	UTM Coordinates:	10135.4 North 10107.9 East
Sample Number(s) (include dups.):	16-C4-MW-8		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 20/16	Time:	12:35
Weather:	Clear, 15 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition ï moderate ponding		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	330	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	92	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		91	
Static water level (cm) from top of pipe =		78.9	
Static water level (cm) (below ground surface) calculated =		-12 (above surface)	
Measured well refusal depth (cm) (measure after sampling) =		251	
Thickness of water column (cm)=	172.3	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	4.5 L over 30 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 4-18	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, silty

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and Distilled Water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-13: CAM-4 Monitoring Well Log for MW-9

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-9	UTM Coordinates:	10099.2 North 10145.6 East
Sample Number(s) (include dups.):	16-C4-MW-9 + CAM4-DUP1 + CAM4-DUP1 (ALS)		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB) + 7 (4 PHC, 3 Metals) + 7 (4 PHC, 3 Metals)		
Date of Sampling Event:	Aug 20/16	Time:	10:45
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition ï moderated ponding		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	330	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	92	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		28	
Static water level (cm) from top of pipe =		29	
Static water level (cm) (below ground surface) calculated =		1	
Measured well refusal depth (cm) (measure after sampling) =		212.6	
Thickness of water column (cm)=	183.6	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	4 L over 30 minutes (dry x 1)		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 4-18	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): slightly cloudy

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-14: CAM-4 Monitoring Well Log for MW-14A

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-14A	UTM Coordinates:	10024.4 North 10022.3 East
Sample Number(s) (include dups.):	16-C4-MW-14A		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 20/16	Time:	14:45
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	470	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	170	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		51	
Static water level (cm) from top of pipe =		98.5	
Static water level (cm) (below ground surface) calculated =		47.5	
Measured well refusal depth (cm) (measure after sampling) =		263.5	
Thickness of water column (cm)=	165	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	3.5 L over 30 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 4-18	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, sandy ï becoming clear

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-15: CAM-4 Monitoring Well Log for MW-14B

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-14B	UTM Coordinates:	10024.4 North 10022.3 East
Sample Number(s) (include dups.):	16-C4-MW-14B		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 20/16	Time:	N/A
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition ï no well cap (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	362	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	50	Length screened section (cm)=	230

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		54	
Static water level (cm) from top of pipe =		Dry	
Static water level (cm) (below ground surface) calculated =		Dry	
Measured well refusal depth (cm) (measure after sampling) =		209.6	
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): dry

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-16: CAM-4 Monitoring Well Log for MW-15

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-15	UTM Coordinates:	10088.3 North 10013.9 East
Sample Number(s) (include dups.):	16-C4-MW-15		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB) + CAM4 - DUP1 (2xPCB)		
Date of Sampling Event:	Aug 20/16	Time:	13:40
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	330	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	33	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		78	
Static water level (cm) from top of pipe =		37.6	
Static water level (cm) (below ground surface) calculated =		42	
Measured well refusal depth (cm) (measure after sampling) =		209.9	
Thickness of water column (cm)=	172.1	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic Pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	5 L over 25 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			See Table 4-18	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé):	clear

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-17: CAM-4 Monitoring Well Log for MW-16

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Tier II Disposal Facility
Monitoring Well ID:	MW-16	UTM Coordinates:	10154.5 North 10003.8 East
Sample Number(s) (include dups.):	16-C4-MW-16		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 20/16	Time:	N/A
Weather:	Clear, 16 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	301	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	54	Length screened section (cm)=	230

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		49	
Static water level (cm) from top of pipe =		Dry	
Static water level (cm) (below ground surface) calculated =		Dry	
Measured well refusal depth (cm) (measure after sampling) =		114.2	
Thickness of water column (cm)=	N/A	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	N/A		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			Not sampled - dry	
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): dry

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 4-18: Summary of Groundwater Field Chemistry ï Tier II Disposal Facility

Tier II Disposal Facility						
	Time (min)	Temperature (°C)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
Downgradient						
MW-16						
	Dry					
	Not Sampled					
MW-15						
	5	4.6	549	10.97	7.17	-24.1
	10	4.9	535	8.44	7.15	-31
	15	4.92	521	7.07	7.15	-33.9
	20	4.91	508	6.50	7.13	-35.9
	25	Sampled				
MW-14						
	10	3.66	434	4.31	7.30	5.6
	15	3.99	439	7.55	7.32	3.4
	20	4.0	441	6.89	7.31	3.1
	25	4.1	442	6.76	7.31	2.9
	30	Sampled				
MW-5						
	5	4.09	544	14.57	7.55	66
	10	5.08	562	9.41	7.54	58.2
	15	4.60	561	7.98	7.55	52.6
	20	4.80	561	7.87	7.54	50.5
	25	Sampled				
MW-8						
	10	3.93	688	8.59	7.94	-31.5
	15	3.80	731	6.11	7.85	-48.6
	20	3.05	893	5.88	7.73	-39.6
	25	2.99	900	5.79	7.70	-39
	30	Sampled				
MW-9						
	5	4.07	740	9.59	7.56	96.3
	10	4.75	746	7.05	7.34	67
	15	5.87	752	5.22	7.60	24.2
	20	4.89	758	5.16	7.61	10.5
	25	4.68	748	4.79	7.61	-5.4
	30	4.67	795	4.66	7.62	-20.2
	35	Sampled				

4.3.3.2 Water Levels/Groundwater Flow

Groundwater levels were collected and are presented below in Table 4-19.

Table 4-19: Summary of Groundwater Levels ï Tier II Disposal Facility

Tier II Disposal Facility				
Monitoring Well ID	**Water Level (TOC) (m)**	**Water Level (from ground surface) (m)**	**Water Elevation (masl)**	**Comments**
MW-5	1.212	0.612	308.88	Sufficient recharge ï sample collected
MW-8	0.789	-0.12	309.41	Sufficient recharge ï sample collected
MW-9	0.290	0.010	310.11	Sufficient recharge ï sample collected
MW-14A	0.985	0.475	316.71	Sufficient recharge ï sample collected
MW-14B	-	-	-	Well was dry
MW-15	0.376	-0.102	317.32	Sufficient recharge ï sample collected
MW-16	-	-	-	Well was dry

Insufficient information was available to ascertain a groundwater flow direction.

4.3.3.3 Groundwater Laboratory Analytical Results

Five groundwater samples were collected and analysed from the Tier II Disposal Facility. Table 4-20 and Table 4-21 presents the groundwater analytical results. Figure CAM-4.3C presents a summary of significant groundwater analytical results.

Table 4-20: Groundwater Chemical Analysis Results ï Tier II Disposal Facility

Tier II Disposal Facility																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																
Background			0.17	0.25	0.14	0.003	0.1	0.75	0.5	0.021	0.00040	0.00002				44
Baseline			**0.043**	**0.074**	**0.014**	**0.00100**	**0.010**	**0.35**	**0.13**	**0.0049**	**0.00040**	**0.000020**				**1.0**
Baseline +3 Standard Deviations			0.12	0.36	0.060	0.0	0.040	2.2	0.69	0.017	0.0004	0.00002				13
Upgradient																
MW-14																
24922	MW-14	2007	**0.056**	0.064	0.010	<0.0010	<0.01	5.2	0.1	<0.0030	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-14A	MW-14	2008	0.015	0.0091	0.0014	0.000067	0.0011	2.4	0.010	0.00067	<0.000020	<0.0010	-	-	-	0.33
C409-14AW	MW-14	2009	0.011	0.023	0.00080	0.00028	<0.00020	12	0.011	0.00030	0.000025	<0.000050	<0.1	<0.1	<0.1	0.15
C410-14AW	MW-14	2010	0.025	0.020	0.00050	0.00023	0.00040	8.9	0.0090	0.00060	0.000004	<0.000050	-	-	-	<0.10
C4 11-14W	MW-14	2011	**0.075**	0.020	0.0039	<0.00020	0.0071	2.5	0.016	0.0020	0.000021	<0.000050	-	-	-	<2.0
2013-C4-MW-14	MW-14	2013	0.018	0.015	0.00030	0.00047	<0.00020	1.3	<0.0010	0.00033	<0.0000020	<0.000050	-	-	-	<0.10
16-C4-MW14A	MW-14	2016	0.008	0.0091	0.00096	0.00008	0.00057	**0.45**	0.010	0.00093	<0.0000020	<0.000050	<0.10	<0.10	<0.20	0.20
MW-15																
24939	MW-15	2007	0.0091	0.028	0.0048	<0.0010	<0.010	1.4	0.017	<0.0030	<0.00040	<0.000020	1.9	5.9	<1.0	**8.3**
MW-15	MW-15	2008	<0.0020	0.0064	0.00212	<0.000034	<0.0010	0.25	0.0020	0.0020	<0.000020	<0.0010	-	-	-	**7.4**
C409-15W	MW-15	2009	0.0030	0.0080	<0.0020	0.00035	<0.0010	0.070	<0.0050	<0.0010	<0.000005	<0.000050	0.44	6.9	0.6	**7.9**
C410-15W	MW-15	2010	0.0041	0.010	0.0019	0.000066	0.0021	0.086	0.0050	0.0017	0.000004	<0.000050	-	-	-	**11**
C4 11-15W	MW-15	2011	0.0048	0.014	0.0033	<0.00020	0.0019	0.11	0.0080	0.0020	0.000012	<0.000050	-	-	-	**10**
buried under significant amount of snow - inaccessible	MW-15	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16-C4-MW15	MW-15	2016	0.0019	0.0044	0.0013	0.00056	0.00059	0.08	0.003	0.0014	<0.000020	<0.000050	0.32	4	0.37	**4.69**
MW-16																
24942	MW-16	2007	0.023	0.047	0.0039	<0.0010	<0.010	0.035	0.043	<0.0030	<0.00040	<0.000020	-	-	-	63
MW-16	MW-16	2008	0.0040	0.012	0.0021	0.000082	0.00056	0.015	0.0025	0.00076	<0.000020	<0.0010	-	-	-	87
C409-16W	MW-16	2009	0.0030	0.013	<0.0020	0.00097	<0.0010	<0.020	<0.0050	<0.0010	0.000006	<0.000050	3.7	58	4.5	66
C410-16W	MW-16	2010	0.0041	0.013	0.0019	0.00012	0.0012	0.015	0.0030	0.0011	0.000008	<0.000050	-	-	-	63

Tier II Disposal Facility																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
dry or insufficient	MW-16	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-C4-MW-16	MW-16	2013	0.00073	0.043	0.0031	0.000078	<0.00020	0.086	<0.0010	0.0015	<0.0000020	<0.000050	-	-	-	39
No sample. Well dry.	MW-16	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Downgradient																
MW-5																
24923	MW-5	2007	0.045	0.12	0.022	<0.0010	0.021	0.32	0.086	0.0051	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-5	MW-5	2008	0.0043	0.0086	0.00030	0.000039	0.0014	0.037	0.0051	<0.00050	<0.000020	<0.0010	-	-	-	0.33
C409-5W	MW-5	2009	0.012	0.029	0.0011	0.00017	0.0092	0.56	0.023	0.00070	0.000029	<0.000050	<0.1	<0.1	<0.1	0.15
C410-5W	MW-5	2010	0.016	0.089	0.0017	0.00059	0.015	0.47	0.024	0.00060	0.000005	<0.000050	-	-	-	<0.10
CW 11-5W	MW-5	2011	0.011	0.032	0.0011	<0.00020	0.0042	0.082	0.036	<0.0010	0.00001	<0.000050	-	-	-	<2.0
not sampled - insufficient water	MW-5	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16-C4-MW5	MW-5	2016	0.0029	0.0057	<0.00030	0.000031	0.00032	0.023	0.006	0.00026	<0.0000020	<0.000050	<0.10	<0.10	<0.20	0.20
CAM4-DUP2	MW-5	2016	0.0032	0.0056	<0.00030	0.000020	0.00032	0.025	0.0053	0.00033	<0.0000020	<0.000050	<0.10	<0.10	<0.20	0.20
CAM4-DUP2 ALS	MW-5	2016	0.00268	0.00541	0.00019	0.0000224	0.000457	0.0230	0.00444	0.00025	<0.0000050	<0.000050	<0.10	<0.10	<0.25	0.225
MW-8																
24926	MW-8	2007	0.056	0.18	0.021	<0.0010	0.014	0.15	0.33	0.016	<0.00040	<0.000020	1.5	1.9	<1.0	3.9
MW-8	MW-8	2008	0.023	0.027	0.0031	0.00017	<0.0025	0.039	<0.0050	<0.0025	<0.000020	<0.0010	-	-	-	13
C409-8W	MW-8	2009	<0.0010	0.026	0.0030	<0.000030	0.0030	0.040	0.011	0.0080	0.000027	<0.000050	1.9	1.9	0.3	4.1
C410-8W	MW-8	2010	0.014	0.012	0.0045	0.00023	0.0049	0.082	0.016	0.0018	0.000005	<0.000050	-	-	-	5.9
C4 11-8W	MW-8	2011	0.0090	0.058	0.0042	0.00030	0.0058	0.047	0.022	0.0020	<0.0000060	<0.000050	-	-	-	3.0
2013-C4-MW-8	MW-8	2013	0.0015	0.015	0.0012	0.000091	0.00088	<0.0030	<0.0010	0.0017	<0.0000020	<0.000050	-	-	-	47
16-C4-MW8	MW-8	2016	0.004	0.0160	0.0025	0.00019	0.0023	0.02	0.007	0.0019	0.0000053	<0.000050	2.5	5	0.36	7.86
MW-9																
24927	MW-9	2007	0.056	0.064	0.0083	<0.0010	<0.010	5.2	0.11	<0.0030	<0.00040	<0.000020	<0.05	<0.5	3.6	3.9
MW-9	MW-9	2008	0.0071	0.0079	<0.0015	<0.000085	<0.0025	0.038	0.018	<0.0025	<0.000020	<0.0010	-	-	-	1.1
C409-9W	MW-9	2009	0.0037	0.0045	0.00060	0.00017	0.00040	0.0050	0.029	0.0042	0.000022	<0.000050	<0.1	0.1	0.3	0.45
C410-9W	MW-9	2010	0.0050	0.0087	0.00060	0.000050	0.00090	0.015	0.021	0.0027	0.000003	<0.000050	-	-	-	0.20
C4 11-9W	MW-9	2011	0.014	0.039	0.0028	<0.00020	0.0056	0.020	0.074	0.0060	0.000008	<0.000050	-	-	-	3.0

Tier II Disposal Facility																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
2013-C4-MW-9	MW-9	2013	0.0013	0.0026	<0.00030	0.000033	<0.00020	<0.0030	0.0019	0.00062	<0.0000020	<0.000050	-	-	-	<0.10
16-C4-MW9	MW-9	2016	0.0067	0.0190	0.0011	0.00073	0.0014	0.028	0.024	0.0019	0.000078	<0.000050	<0.10	<0.10	0.32	0.42
CAM4-DUP1	MW-9	2016	0.0060	0.017	0.00098	0.00069	0.0012	0.024	0.022	0.0017	0.0000440	<0.000050	<0.10	<0.10	0.22	0.21
CAM4-DUP1-ALS	MW-9	2016	0.0107	0.0307	0.00139	0.000259	0.00289	0.0437	0.0321	0.00367	<0.0000050	<0.000050	<0.10	0.28	0.41	0.74

Notes:

XX sample exceeds background

XX **sample exceeds baseline**

XX *sample exceeds baseline + 3 standard deviations*

**** All units in mg/L**

Table 4-21: PHC F4 Groundwater Chemical Analysis Results ï Tier II Disposal Facility

Station Area Non-Hazardous Waste Landfill	
Sample ID	**PHC F4 (mg/kg)**
MW-5	< 0.20
MW-8	< 0.20
MW-9	< 0.20
MW-14	< 0.20
MW-15	< 0.20

4.3.3.4 Discussion of Groundwater Results by Parameter

Analytical results were compared against background and baseline data. The following Table 4-22 summarizes the comparison of results.

Table 4-22: Evaluation of Groundwater Analytical Results ï Tier II Disposal Facility

Tier II Disposal Facility	
Parameter	**Discussion of Results**
Copper (Cu)	Cu was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Nickel (Ni)	Ni was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cobalt (Co)	Co was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cadmium (Cd)	Cd was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Lead (Pb)	Pb was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Zinc (Zn)	Zn was reported to exceed the baseline concentration of 0.35 mg/L in one sampling location, MW-14A with reported concentration at 0.45 mg/L.
Chromium (Cr)	Cr was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Arsenic (As)	As was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Mercury (Hg)	Hg was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
PCBs (Total)	PCBs was reported at non-detect concentrations for all 2016 site-specific groundwater samples.

Tier II Disposal Facility	
Parameter	**Discussion of Results**
F1 (C_6-C_{10})	F1 was reported to have concentrations above detection in two sampling locations, MW-8 and MW-15. No baseline or background comparison values exist for F1 PHC concentrations.
F2 (C_{10}-C_{16})	F2 was reported to have concentrations above detection in two sampling locations, MW-8 and MW-15. No baseline or background comparison values exist for F2 PHC concentrations.
F3 (C_{16}-C_{34})	F3 was reported to have concentrations above detection in two sampling locations, MW-8 and MW-15. No baseline or background comparison values exist for F3 PHC concentrations.
Modified TPH (C_6-C_{34})	Modified TPH was reported to exceed baseline concentrations of 1.0 mg/L in two sampling locations, as follows: MW-15 at 4.69 mg/L, and MW-8 at 7.86 mg/L.

4.3.3.5 Groundwater Trend Analysis by Parameter and Discussion of Trends

A groundwater chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to baseline and historical concentrations using differentiating colours (See Appendix F). The following Table 4-23 provides a summary of groundwater trend analysis findings and presents a discussion of the observed trends by parameter.

Table 4-23: Evaluation of Groundwater Chemistry Trends Tier II Disposal Facility

Tier II Disposal Facility	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend or is trending downward slightly. Further data points are required to determine any existing trends.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Ni concentrations.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Co concentrations.
Cadmium (Cd)	Based on current and historical results, it appears that Cd has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Cd concentrations.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Pb concentrations.
Zinc (Zn)	Based on current and historical results, it appears that Zn has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Zn concentrations.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend.

Tier II Disposal Facility	
Parameter	**Discussion of Trends**
Arsenic (As)	Based on current and historical results, it appears that As has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in As concentrations.
Mercury (Hg)	Based on current and historical results, it appears that Hg has no observable trend.
PCBs (Total)	Based on current and historical results, it appears that PCBs have no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, it appears that Modified TPH has no observable trend.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

4.3.4 Thermal Monitoring

4.3.4.1 Thermistor Annual Maintenance Reports

As per Section 5.4.3 of the TOR, thermistor inspection logs were filled out for thermistors as provided below.

Table 4-24: CAM-4 Thermistor Log for VT-5

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:		S. Borcsok								
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Tier II Disposal Facility						
Thermistor Number:	**VT-5**		Inclination:		Vertical					
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**13-Aug-06**		First Date Event		**27-Aug-07**	Last Date Event		**31-Aug-13**		
*Coordinates and Elevation		N	**10033.5**		E	**10043.8**		Elev	**319.18**	
Length of Cable (m)	**0.40 m**	Cable Lead Above Ground (m)				1.31 m				
Datalogger Serial #	**111092**	Nodal Points	13							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X							
	Cover		X							
	Data Logger		X							
	Cable		X							
	Beads		X							
	Lock condition		X			New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	13.99 then 13.63 V		
		NEW Batteries:		11.34 V				13.26 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.1354	6.3295		9	0.7765		-5.6611
2	1.2037	8.5688		10	0.7517		-6.5389
3	1.0392	3.1819		11	0.7289		-7.3540
4	0.9700	0.9061		12	0.7073		-8.1381
5	0.9162	-0.8835		13	0.7022		-8.3253
6	0.8657	-2.5836		14	0.0000		381.0742
7	0.8351	-3.6243		15	0.0000		381.0742
8	0.8071	-4.5926		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):		7 years - July 2023				

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48 hr frequency

Observations and Proposed Maintenance

Very short cable inside casing, very difficult to get on/off. No maintenance required.

Table 4-25: CAM-4 Thermistor Log for VT-6

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Tier II Disposal Facility						
Thermistor Number:	**VT-6**		Inclination:		Vertical					
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**13-Aug-06**		First Date Event		**27-Aug-07**	Last Date Event		**31-Aug-13**		
*Coordinates and Elevation		N	**10090**		E	**10060.8**		Elev	**319.18**	
Length of Cable (m)	**0.36 m**	Cable Lead Above Ground (m)				1.25 m				
Datalogger Serial #	**111102**	Nodal Points	10							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X							
	Cover		X							
	Data Logger		X							
	Cable		X							
	Beads		X							
	Lock condition		X			New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	13.87 V		
		NEW Batteries:		11.34 V				13.50 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2445	9.8957		9	0.7655		-6.0487
2	1.1349	6.2721		10	0.7594		-6.2649
3	1.0762	4.3706		11	0.0000		381.0742
4	0.9987	1.8519		12	0.0000		381.0742
5	0.9217	-0.7178		13	0.0000		381.0742
6	0.8780	-2.1652		14	0.0000		381.0742
7	0.8322	-3.7264		15	0.0000		381.0742
8	0.7973	-4.9320		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					
Datalogger Programming (Describe programming completed; beads and frequency)						
Reprogrammed to 48 hr frequency						
Observations and Proposed Maintenance						
No maintenance required.						
Datalogger was inside casing but not connected to cable with beads.						

Table 4-26: CAM-4 Thermistor Log for VT-7

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok					Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:		S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)											
Site Name:	**CAM-4**		Landfill:	Tier II Disposal Facility							
Thermistor Number:	**VT-7**		Inclination:		Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:						CCUSB		
*Install Date:	**13-Aug-06**		First Date Event		**27-Aug-07**	Last Date Event			**31-Aug-13**		
*Coordinates and Elevation		N	**10097.1**		E	**10100.4**		Elev	**319.18**		
Length of Cable (m)	**0.54 m**	Cable Lead Above Ground (m)				1.03 m (casing height)					
Datalogger Serial #	**108067**	Nodal Points	16								
Thermistor Inspection											
		Good		Needs Maintenance		Description					
	Casing		X								
	Cover		X								
	Data Logger		X								
	Cable		X								
	Beads		X								
	Lock condition		X			New Lock					
	Battery Installation Date		19-Aug-16								
	Battery Levels		Main	11.34 V			Aux	13.63 V			
		NEW Batteries:		11.34 V				13.14 V			

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.1044	5.3136		9	0.7224		-7.5884
2	1.0166	2.4387		10	0.7014		-8.3561
3	0.9230	-0.6567		11	0.6839		-9.0090
4	0.8786	-2.1446		12	0.6674		-9.6161
5	0.8412	-3.4153		13	0.6546		-10.0996
6	0.8065	-4.6111		14	0.6435		-10.5236
7	0.7788	-5.5780		15	0.6509		-10.2415
8	0.7492	-6.6286		16	0.6629		-9.7854

Battery Information							
Batteries changed ?	Yes	X	No		Monitoring Year:	10	
Battery model number installed or model of battery in place:					UBL15, ULB1		
Expected remaining battery life (years):	7 years - July 2023						
Datalogger Programming (Describe programming completed; beads and frequency)							
Reprogrammed to 48 hr frequency							
Observations and Proposed Maintenance							
No maintenance required.							

Table 4-27: CAM-4 Thermistor Log for VT-8

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Tier II Disposal Facility						
Thermistor Number:	**VT-8**		Inclination:		Vertical					
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**13-Aug-06**		First Date Event		**27-Aug-07**	Last Date Event		**31-Aug-13**		
*Coordinates and Elevation		N	**10050.8**		E	**10086.6**		Elev	**319.18**	
Length of Cable (m)	**0.25 m**	Cable Lead Above Ground (m)				1.16m (casing height)				
Datalogger Serial #	**108038**	Nodal Points	10							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X		I					
	Cover		X		I					
	Data Logger		X		I					
	Cable		X		I					
	Beads		I		X	Bead 9 not reading				
	Lock condition		X		I	New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	13.87 then 13.63 V		
		NEW Batteries:		11.34 V				13.26 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2700	10.7665		9	0.0000		381.0742
2	1.1024	5.2488		10	0.7253		-7.4835
3	1.1076	5.4184		11	0.0000		381.0742
4	1.0275	2.7967		12	0.0000		381.0742
5	0.9321	-0.3515		13	0.0000		381.0742
6	0.8729	-2.3380		14	0.0000		381.0742
7	0.8194	-4.1650		15	0.0000		381.0742
8	0.7852	-5.3558		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48 hr frequency

Observations and Proposed Maintenance

No maintenance required. Datalogger was not recording over last period. Cable is very short and is difficult to attach to logger. No dessicant was present in logger. One bead malfunctioning.

4.3.4.2 Summary of Findings from Annual DEW Line Thermal Reports

Results, conclusions and recommendations from the DEW Line thermal reports are to be provided by DND for incorporation into the monitoring reports. No analysed data was provided to Arcadis for inclusion into the 2016 monitoring report at the time of report finalization. The summary of findings for thermal reporting (including 2016 monitoring year data) will be provided under separate cover.

4.4 Conclusions and Overall Landfill Performance

Based on the results of the 2016 monitoring program, the overall performance of the Tier II Disposal Facility is acceptable.

4.5 Recommendations and Conclusions

Based on review and analysis of chemical data, it appears that the soil concentrations for the parameters tested have no observable trend with no obvious soil parameter concentration increases over time. Based on this review, it is recommended to continue the long-term monitoring of soils as planned.

Based on the results of the visual inspection, the performance of the landfill is acceptable. No remedial work is necessary at this time. However, the conditions observed along the northeast slope (specifically new cracking Feature K) warrant additional monitoring in advance of the next scheduled monitoring event in 2021. It is recommended that this landfill be monitored annually to observe whether this additional movement of the northwest slope is occurring.

5 CAM-4: UPPER SITE LANDFILL

5.1 Landfill Description

The Upper Site Landfill is located in the eastern portion of the Station Area, east of the Tier II Disposal Facility, at the end of the access road. During the assessment phase of the project, geophysics had identified three lobes, namely the south, central and north lobes.

The remediation for this landfill included the complete excavation of the north lobe, partial excavation and the installation of a leachate containment system at the central lobe, and regrading of the south lobe. Thermistors and pore pressure piezometers were installed within the central landfill lobe, and groundwater monitoring wells were installed at the landfill perimeter.

The long-term monitoring plan for the Upper Site Landfill consists of visual inspection, the collection of soil samples, collection of groundwater samples and downloading of ground temperature data.

The landfill layout, visual observations and photographic locations are presented on Figure CAM-4.4A and soil analytical results are presented on Figure CAM-4.4B in the figures section.

5.2 Summary of Work Conducted

5.2.1 Visual Inspection

A visual inspection was conducted on the Upper Site Landfill on August 19, 2016. The visual inspection of the landfill was completed with no deviations from the visual inspection work plan.

5.2.2 Thermal Monitoring

Four thermistors (VT-1, VT-2, VT-3, and VT-4) are present at the Upper Site Landfill. Each of the thermistor installations was inspected and data downloaded from the data loggers as per Section 5.4 of the Terms of Reference. Thermistor inspection reports were filled out for each of the installations and further details are provided in Section 7.3.4.1.

5.2.3 Soil Sampling

Soil sampling at the Upper Site Landfill was conducted on August 20 and 22, 2016 and consisted of the collection of eight soil samples from four soil sample stations (MW-10, MW-11, MW-12 and MW-13). No depth limitations were encountered.

The following

Table 5-1 outlines the soil sampling activities conducted at the Upper Site Landfill.

Table 5-1: Summary of Work Conducted by Soil Sampling Location

Upper Site Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-10	16-C4-MW10A	0 - 0.15	Sand, brown, medium, trace gravel, damp
	16-C4-MW10B	0.4-0.5	Sand, brown, medium, trace gravel, damp
MW-11	16-C4-MW11A	0 - 0.15	Sand, brown, fine, trace silt, rootlets and gravel, dry to moist
	16-C4-MW11B	0.4 ï 0.5	Sand, brown, fine, trace silt, rootlets and gravel, moist
MW-12	16-C4-MW12A	0 - 0.15	Sand, grey/brown, fine to medium, trace gravel, dry to damp
	16-C4-MW12B	0.4 ï 0.5	Sandy Silt, dark brown, some gravel and organics, damp
MW-13	16-C4-MW13A	0 - 0.15	Sand, brown, some gravel, moist
	16-C4-MW13B	0.4-0.5	Silty Sand, dark brown, trace gravel, moist

5.2.4 Groundwater Sampling

Groundwater monitoring at the Upper Site Landfill was conducted on August 20, 2016 and consisted of the inspection and groundwater monitoring of two monitoring wells (MW-11 and MW-12). Two monitoring wells, MW-10 and MW-13, were observed to be dry. Monitoring well MW-11 and MW-12 contained water and a groundwater samples were collected for analysis. Monitoring well sampling logs are presented in Section 5.3.3.1.

The following Table 5-2 outlines the groundwater sampling activities conducted at the Upper Site Landfill.

Table 5-2: Summary of Work Conducted by Monitoring Well.

Upper Site Landfill		
Monitoring Well ID	**Observations**	**# of Groundwater Samples Collected**
MW-10	Good condition, well was dry	0
MW-11	Good condition, no surface water around well	1
MW-12	Good condition, no surface water around well	1
MW-13	Good condition, well was dry after 0.5 hr of purging	0

5.3 Results of the Monitoring Program

The following Sections 5.3.1 through 5.3.4 summarize the results of the CAM-4 Monitoring program at the Upper Site Landfill.

5.3.1 Visual Inspection

The visual inspection of the Upper Site Landfill was conducted on August 19, 2016. The visual inspection was conducted in compliance with Section 5.2 of the Terms of Reference and details are provided below in the following Sections. Figure CAM-4.4A presents the visual inspection findings and photographic locations for the Upper Site Landfill.

5.3.1.1 Inspection Checklist

The visual inspection was completed as per the Terms of Reference and the visual inspection checklist is included as Table 5-3 of this report below.

Table 5-3: Visual Inspection Checklist ï Upper Site Landfill

SITE NAME: **CAM-4 Pelly Bay**

LANDFILL DESIGNATION: Upper Site Landfill
LANDFILL TYPE: Leachate Contained
DATE OF INSPECTION: August 19, 2016
WEATHER CONDITIONS: 10ºC, sunny
DATE OF PREVIOUS INSPECTION: September 3, 2013
INSPECTED BY: Stephen Borcsok
REPORT PREPARED BY: Stephen Borcsok

The preparer represents to the best of the preparerôs knowledge, the following statements and observations are true and correct and to the best of the preparerôs actual knowledge, no material facts have been suppressed or misstated.

Visual Inspection Checklist: Upper Site Landfill												
Checklist Item	Present (Yes/No)	Feature Number	Feature Location	GPS Coordinates Easting/Northing/Zone		Length (m)	Width (m)	Depth (m)	Extent Relative to Landfill Surface	Description	Comparison with Historical Observations	Additional Comments / Severity Rating	Photographic Records (photo reference, location, view point & direction, feature of note, scale)
Settlement	Yes	A	West landfill cover	388830.993 / 7594299.489	16	1.0-5.0	0.2	0.05-10	<1%	Two linear depressions on landfill cover	Length of one depression increased from 1.0 to 5.0 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 28, 29
Settlement	Yes	B	East side slope of South Lobe	388879.039 / 7594233.815	16	2.0	1.0	0.1	<1%	Minor depression on landfill side slope	Width decreased from 1.15 to 1.0 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 38, 39, 46
Settlement	Yes	C	South cover of South Lobe	388863.076 / 7594214.69	16	0.5	0.5	0.1	<1%	Minor depression on landfill cover	Feature described as irregular linear depressions in 2013. Only one circular depression observed in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 40, 41
Settlement	Yes	J	West landfill cover	388829.448 / 7594294.353	16	10	0.2	0.05	<1%	Linear depression on landfill cover	Width decreased from 0.4 to 0.2 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 30, 31, 32
Settlement	Yes	L	East crest of landfill	388883.185 / 7594297.812	16	1.0	0.4	0.1	<1%	Linear depression on landfill crest	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 54
Settlement	Yes	M	Southeast landfill cover	388876.73 / 7594276.526	16	0.3	0.3	0.05	<1%	Minor depression on landfill cover	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 55
Settlement	Yes	O	North landfill cover	388846.685 / 7594358.315	16	0.5	0.5	0.05	<1%	Minor depression on landfill cover	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 59
Settlement	Yes	P	Northwest landfill toe	388834.101 / 7594368.045	16	0.1-0.5	0.1-0.2	0.1-0.2	<1%	Four minor depressions at landfill toe	New observation in 2016.	Severity Rating ï Acceptable (features are minor and not affecting stability of landfill)	CAM4 US 60
Settlement	Yes	Q	West cover of South Lobe	388853.047 / 7594228.913	16	4.0	0.05	0.05	<1%	Linear depression on landfill cover	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 45
Settlement	Yes	R	South toe between Main and South Lobes	388868.595 / 7594255.976	16	0.2-0.4	0.2	0.1	<1%	Three minor depressions	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 56
Settlement	No	I	North of South Lobe			4	2	0.1-0.3	<1%	Settlement of fines between cobbles and boulders.	Observed in 2010, 2011, 2013. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A

Visual Inspection Checklist: Upper Site Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Erosion	No	D	Southwest toe of landfill		50	0.3-1.00	0.02-0.05	<1%	Minor erosion along drainage feature along southwest toe.	Observed in 2009 (as Feature B), 2010, 2011. Covered in snow in 2013. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Erosion	No	E	East crest of Main Lobe		8	5	0.05-0.2	<1%	Minor washing of fines in vicinity of VT-2	Observed in 2011, covered in snow in 2013. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Erosion	No	F (2011)	North side of South Lobe		0.8-7	0.2-0.3	0.05-0.15	<1%	Minor erosion along east and southeast crests.	Observed in 2011, not observed in 2013 (Feature F noted in 2013 was exposed debris first noted in 2010, see below), not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Erosion	No	G	North side of South Lobe		25	0.5	0.05-0.15	<1%	Minor erosion feature along drainage feature extending along north side of lobe.	Observed in 2011, not observed or noted in 2013. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Lateral Movement	No											
Frost Action	No											
Sloughing	No											
Cracking	Yes	K	South toe of South Lobe	388845.017 / 7594223.413	16	2.0	0.02	0.02	<1%	Continuous tension crack on South Lobe	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 43
Cracking	Yes	N	Southwest toe of landfill	388834.991 / 7594267.589	16	5.0	0.05	0.05	<1%	Continuous tension crack on toe of landfill	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting stability of landfill)	CAM4 US 57, 58
Animal Burrows	No											
Vegetation Establishment	No											
Staining	No											
Vegetation Stress	No											
Seepage Points (or) Ponded Water	No											
Debris and/or Liner Exposed	Yes	H	South Lobe landfill cover	388847.841 / 7594229.123	16	0.3	0.2	N/A	<1%	Partially buried cloth debris.	Not observed in 2013 due to snow cover, noted as Feature G in 2013. No significant change from 2011 to 2016.	Severity Rating ï Acceptable (debris is minor and exposure is not worsening with time)	CAM4 US 45

Visual Inspection Checklist: Upper Site Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Debris and/or Liner Exposed	No	F (2010)	East slope of Main Lobe		1.5	0.2	N/A	<1%	Partially exposed piece of insulated cable	Observed in 2010, not observed in 2011, noted in 2013 but not observed due to snow cover. Not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Presence & Condition of Monitoring Instruments	Yes	N/A	Four monitoring wells outside landfill, four thermistors on landfill cover	16	N/A	N/A	N/A	N/A	MW10, MW11, MW12, MW13, VT-1, VT-2, VT-3, VT-4	All monitoring wells and thermistors were in good condition in 2013 and 2016.	Severity Rating - Acceptable	CAM4 US 3, 4, 7, 8, 11, 12, 15, 16, 21, 22, 23, 33, 34, 35
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	No											
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	No											

5.3.1.2 Stability Assessment

The Preliminary Stability Assessment for the Upper Site Landfill was conducted on August 19, 2016 as per the Terms of Reference and the results are provided below.

Table 5-4: Preliminary Stability Assessment ï Upper Site Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Acceptable	Isolated
Animal Burrows	Not Observed	None
Vegetation Establishment	Not Observed	None
Staining	Not Observed	None
Vegetation Stress	Not Observed	None
Seepage / Ponded Water	Not Observed	None
Debris and/or Liner Exposure	Acceptable	Isolated
Other	Not Observed	None
Overall Landfill Performance	**Acceptable**	

Performance / Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.

Performance / Severity Rating	Description
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

5.3.1.3 Photographic Records

The photographic record for the Upper Site Landfill has been completed as per Section 5.5 of the Terms of Reference and is included in the following page as Table 5-5. The Photographic Record only contains an index of photographs collected; full sized photographs are contained in the Appended CD/DVD-ROM. Selected photographs are shown in Table 5-6. Figure CAM-4.4A presents the photograph locations and directions.

Table 5-5: Photographic Records ï Upper Site Landfill

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-MW10-1	SM10	N	Sample station MW-10	MW-10 soil	MW-10	Test pit location
C4-MW10-2	SM10	N/A	Sample station MW-10	MW-10 soil	MW-10	Test pit close-up

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
C4-MW10-3	SM10	N/A	Sample station MW-10	MW-10 soil	MW-10	Test pit backfilled
C4-MW11-1	SM11	S	Sample station MW-11	MW-11 soil	MW-11	Test pit location
C4-MW11-2	SM11	N/A	Sample station MW-11	MW-11 soil	MW-11	Test pit close-up
C4-MW11-3	SM11	N/A	Sample station MW-11	MW-11 soil	MW-11	Test pit backfilled
C4-MW12-1	SM12	W	Sample station MW-12	MW-12 soil	MW-12	Test pit location
C4-MW12-2	SM12	N/A	Sample station MW-12	MW-12 soil	MW-12	Test pit close-up
C4-MW12-3	SM12	N/A	Sample station MW-12	MW-12 soil	MW-12	Test pit backfilled
C4-MW13-1	SM13	N	Sample station MW-13	MW-13 soil	MW-13	Test pit location
C4-MW13-2	SM13	N/A	Sample station MW-13	MW-13 soil	MW-13	Test pit close-up
C4-MW13-3	SM13	N/A	Sample station MW-13	MW-13 soil	MW-13	Test pit backfilled
Visual Inspection Photographs						
CAM4 US 3	3	W	Monitoring well MW11	Monitoring well	MW11	
CAM4 US 4	4	E	Monitoring well MW11 and west side of landfill	Monitoring well	MW11	
CAM4 US 7	7	E	Monitoring well MW13 and south	Monitoring well	MW13	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
			side of landfill			
CAM4 US 8	8	N	Monitoring well MW13 and south side of landfill	Monitoring well	MW13	
CAM4 US 11	11	SW	Monitoring well MW12	Monitoring well	MW12	
CAM4 US 12	12	SE	Monitoring well MW12	Monitoring well	MW12	
CAM4 US 15	15	E	Monitoring well MW10	Monitoring well	MW10	
CAM4 US 16	16	W	Monitoring well MW10	Monitoring well	MW10	
CAM4 US 17	17	N	North landfill side slope from landfill cover			
CAM4 US 18	18	SE	Landfill cover from northwest landfill cover			
CAM4 US 19	19	SW	West landfill cover and side slope			
CAM4 US 20	20	S	West landfill side slope			
CAM4 US 21	21	E	Thermistor VT-4	Thermistor	VT-4	
CAM4 US 22	22	SE	Thermistors VT-3 in foreground, VT-4 in background	Thermistor	VT-3, VT-4	
CAM4 US 23	23	E	Side slope southwest of thermistor VT-4		VT-4	
CAM4 US 24	24	SE	South landfill cover			

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM4 US 25	25	E	West side slope of landfill			
CAM4 US 26	26	N	West side slope of landfill, minor ponding at toe			
CAM4 US 27	27	S	Minor ponding at west landfill toe			
CAM4 US 28	28	W	Minor depressions on west landfill cover	Settlement	A	
CAM4 US 29	29	E	Minor depressions on west landfill cover	Settlement	A	
CAM4 US 30	30	S	Linear depression on west landfill cover	Settlement	J	
CAM4 US 31	31	S	Linear depression on west landfill cover	Settlement	J	
CAM4 US 32	32	NW	Linear depression on west landfill cover	Settlement	J	
CAM4 US 33	33	NE	Landfill cover and thermistors VT-3 and VT-2	Thermistor	VT-3, VT-2	
CAM4 US 34	34	N	Thermistor VT-2	Thermistor	VT-2	
CAM4 US 35	35	N	Thermistor VT-1	Thermistor	VT-1	

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM4 US 36	36	E	Southeast landfill side slope			
CAM4 US 37	37	N	Southeast landfill side slope			
CAM4 US 38	38	NE	Minor depression on South Lobe	Settlement	B	
CAM4 US 39	39	E	Minor depression on South Lobe	Settlement	B	
CAM4 US 40	40	SW	Minor depression on South Lobe	Settlement	C	
CAM4 US 41	41	E	Minor depression on South Lobe	Settlement	C	
CAM4 US 42	42	NW	Landfill cover on South Lobe			
CAM4 US 43	43	SE	Tension crack on South Lobe	Cracking	K	New observation in 2016
CAM4 US 44	44	N	South side slope of landfill			
CAM4 US 45	45	SE	Minor settlement and exposed cloth debris on South Lobe	Settlement Debris	Q H	New settlement observation in 2016
CAM4 US 46	46	S	Minor settlement on east side	Settlement	B	

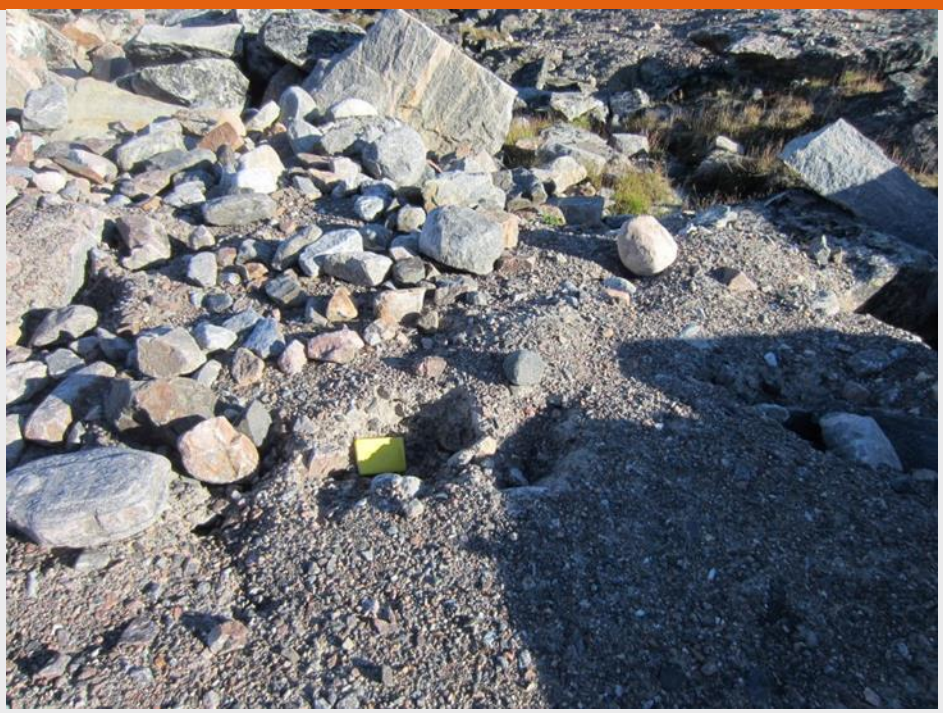
Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
			of South Lobe			
CAM4 US 47	47	N	East landfill side slope			
CAM4 US 48	48	SW	East landfill side slope			
CAM4 US 49	49	W	East landfill side slope			
CAM4 US 50	50	NW	East landfill side slope			
CAM4 US 51	51	SE	Landfill cover and east side slope			
CAM4 US 52	52	NE	Landfill cover and east side slope			
CAM4 US 53	53	E	Minor settlement and exposed cloth debris on South Lobe	Settlement Debris	Q H	New settlement observation in 2016
CAM4 US 54	54	E	Minor settlement on east landfill crest	Settlement	L	New observation in 2016
CAM4 US 55	55	NE	Minor settlement on southeast landfill cover	Settlement	M	New observation in 2016
CAM4 US 56	56	S	Minor settlement on south landfill toe between Main and South Lobes	Settlement	R	New observation in 2016
CAM4 US 57	57	SW	Cracking at southwest landfill toe	Cracking	N	New observation in 2016

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
CAM4 US 58	58	SW	Cracking at southwest landfill toe	Cracking	N	New observation in 2016
CAM4 US 59	59	N	Minor settlement on north landfill cover	Settlement	O	New observation in 2016
CAM4 US 60	60	SW	Multiple depressions at northwest landfill toe	Settlement	P	New observation in 2016
CAM4 US 61	61	E	View of Upper Site Landfill from Tier II Disposal Facility			
CAM4 US 62	62	SE	View of Upper Site Landfill from Tier II Disposal Facility			
CAM4 US 63	63	SE	View of Upper Site Landfill from Tier II Disposal Facility			

Table 5-6: Selected Photographs ï Upper Site Landfill

Upper Site Landfill
Photograph CAM-4 US 43: Tension crack (Feature K) on South Lobe.
Photograph CAM-4 US 54: Minor settlement (Feature L) on east landfill crest.

Upper Site Landfill



Photograph CAM-4 US 56: Minor settlement (Feature R) on south landfill toe between Main and South Lobes.

Photograph CAM-4 US 57: Cracking (Feature N) at southwest landfill toe.

Upper Site Landfill

Photograph CAM-4 US 60: Multiple depressions (Feature P) at northwest landfill toe.

Photograph CAM-4 US 62: View of Upper Site Landfill from Tier II Disposal Facility

5.3.1.4 Trend Analysis

A trend analysis was conducted with regards to observations made during the visual inspection of the Upper Site Landfill. The following Table 5-7 outlines the results of the visual trend analysis.

Table 5-7: Visual Inspection Trends ï Upper Site Landfill

Checklist Item	Feature Number	Comparison with Historical Observations
Settlement	A	Length of one depression increased from 1.0 to 5.0 m between 2013 and 2016.
	B	Width decreased from 1.15 to 1.0 m between 2013 and 2016.
	C	Feature described as irregular linear depressions in 2013. Only one circular depression observed in 2016.
	J	Width decreased from 0.4 to 0.2 m between 2013 and 2016.
	L	New observation in 2016.
	M	New observation in 2016.
	O	New observation in 2016.
	P	New observation in 2016.
	Q	New observation in 2016.
	R	New observation in 2016.
Cracking	K	New observation in 2016.
	N	New observation in 2016.
Debris Exposure	H	No significant change between 2011 and 2016.

5.3.1.5 Discussion of Results/Trends

A comparison of the visual inspection results of the 2013 and 2016 monitoring events at the Upper Site Landfill indicates that one previously observed settlement feature showed an increase in length, while other settlement features were either not observed or showed a decrease in size. One area of debris exposure showed no significant change. Two new tension crack features and six new settlement features were observed in 2016. The results of the visual inspection and the observed trends indicate that the overall performance of the landfill is acceptable.

5.3.2 Soil Sampling

Soil sampling of the Upper Site Landfill was conducted on August 20 and 22, 2016. The soil sampling was conducted in compliance with Section 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections 5.3.2.1 through 5.3.2.3.

5.3.2.1 Laboratory Analytical Results

A total of eight soil samples were analysed from four soil sample locations at the Upper Site Landfill. Table 5-8 and Table 5-9 present the soil analytical results. Figure CAM-4.4B presents a summary of significant soil analytical results.

Table 5-8: Soil Chemical Analysis Results ï Upper Site Landfill

Upper Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																	
Background				14	16	8.3	1.00	10.0	50	32	2.4	0.100	0.003				38
Baseline				13	11	5.5	1.00	10	63	23	2.5	0.100	0.100				608
Baseline +3 Standard Deviations				52	25	18	1.8	61	250	60	26	0.0	0.32				5046
Upgradient																	
MW-11 Surface																	
24812	MW-11	2007	0	14	18	10	<1.0	<10	66	36	2.6	<0.10	<0.0030	<10	580	48000	48585
MW-11-10	MW-11	2008	10	11	12	7.0	<0.50	19	44	28	<5.0	<0.0050	<0.050	<10	<30	1230	1250
C409-11WA	MW-11	2009	0-15	11	13	6.0	<0.10	6.0	36	26	1.0	<0.050	<0.010	<12	<10	1500	1511
C410-11WA	MW-11	2010	0-15	13	12	7.0	<0.10	6.0	36	25	2.0	0.060	<0.010	<12	<10	1200	1211
C4 11-11WA	MW-11	2011	0-15	10	16	7.0	<0.10	8.0	42	33	2.0	<0.050	<0.10	<12	140	11000	11146
2013-C4-MW-11-A	MW-11	2013	0-15	30	15	8.3	<0.10	9.6	60	28	2.3	<0.050	<0.10	<12	32	5200	5238
16-C4-MW11A	MW-11	2016	0-15	12	20	7.2	0.1	11	52	40.0	2.6	<0.050	0.015	<12	14	480	500
MW-11 Depth																	
24814	MW-11	2007	30	9.2	12	7.3	<1.0	<10	39	25	1.2	<0.10	<0.0030	<10	47	4100	4152
MW-11-40	MW-11	2008	40	10	12	6.5	<0.50	8.1	33	23	<5.0	<0.0050	<0.050	<10	<30	1150	1170
C409-11WB	MW-11	2009	40-50	8.0	10	5.0	<0.10	5.0	26	20	1.0	<0.050	<0.010	<12	<10	790	801
C410-11WB	MW-11	2010	40-50	31	14	7.0	<0.10	6.0	39	29	2.0	<0.050	<0.010	<12	<10	1300	1311
C4 11-11WB	MW-11	2011	40-50	11	15	7.0	<0.10	7.0	38	28	2.0	<0.050	<0.50	24	170	10000	10194
2013-C4-MW-11-B	MW-11	2013	40-50	22	21	9.6	<0.10	10	65	39	3.0	<0.050	<0.10	<12	10	1000	1016
16-C4-MW11B	MW-11	2016	40-50	9.3	16	6.9	<0.050	9	40	31.0	2.0	<0.050	<0.010	<12	<10	76	87
Downgradient																	
MW-10 Surface																	
24824	MW-10	2007	0	3.2	6.6	<5.0	<1.0	<10	<15	<20	1.1	<0.10	<0.0030	<10	4.2	20	29
MW-10-15	MW-10	2008	15	6.5	11	5.0	<0.50	5.6	23	22	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-10WA	MW-10	2009	0-15	12	14	7.0	<0.10	7.0	39	27	1.0	<0.050	<0.010	<12	<10	26	37

Upper Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C410-10WA	MW-10	2010	0-15	<5.0	8.0	4.0	<0.10	3.0	18	15	1.0	0.060	<0.010	<12	<10	<10	16
C4 11-10WA	MW-10	2011	0-15	6.0	14	4.0	<0.10	4.0	22	29	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-10-A	MW-10	2013	0-15	9.5	11	5.8	<0.10	6.9	39	22	1.5	<0.050	<0.010	<12	<10	<50	36
16-C4-MW10A	MW-10	2016	0-15	3.6	7.2	3.6	<0.050	3.2	17	12.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-10 Depth																	
24826	MW-10	2007	30	4.0	7.7	5.2	<1.0	<10	21	<20	1.2	<0.10	<0.0030	<10	5.3	32	42
MW-10-35	MW-10	2008	35	8.4	20	9.0	<0.50	6.2	27	25	94	<0.0050	<0.050	<10	<30	<50	45
C409-10WB	MW-10	2009	40-50	8.0	11	5.0	<0.10	5.0	28	22	<1.0	<0.050	<0.010	<12	<10	36	47
C410-10WB	MW-10	2010	40-50	<5.0	9.0	5.0	<0.10	5.0	21	20	2.0	0.070	<0.010	<12	<10	<10	16
C4 11-10WB	MW-10	2011	40-50	<5.0	7.0	4.0	<0.10	4.0	18	16	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-10-B	MW-10	2013	40-50	6.9	11	4.9	<0.10	4.5	26	19	1.2	<0.050	<0.010	<12	<10	<50	36
16-C4-MW10B	MW-10	2016	40-50	5.6	9.1	5	<0.050	4.5	23	17.0	1.6	<0.050	<0.010	<12	<10	<50	36
MW-12 Surface																	
24820/21	MW-12	2007	0	4.1	7.2	5.8	<1.0	<10	22	<20	1.6	<0.10	<0.0030	<10	6.7	36	48
MW-12-15	MW-12	2008	15	6.0	6.8	3.6	<0.50	4.9	23	17	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-12WA	MW-12	2009	0-15	6.0	9.0	5.0	<0.10	4.0	22	18	<1.0	<0.050	<0.010	<12	<10	25	36
C410-12WA	MW-12	2010	0-15	25	10	5.0	0.30	8.0	77	23	1.0	<0.050	0.087	<12	130	640	776
C4 11-12WA	MW-12	2011	0-15	13	13	6.0	0.50	21	94	30	1.0	<0.050	<0.10	<12	<10	160	171
2013-C4-MW-12-A	MW-12	2013	0-15	10	11	5.9	0.18	15	53	21	1.4	<0.050	<0.010	<12	<10	<50	36
16-C4-MW12A	MW-12	2016	0-15	12	13	7.3	0.086	8.9	48	23.0	2.2	<0.050	<0.010	<12	11	54	71
MW-12 Depth																	
24822	MW-12	2007	30	4.0	7.6	5.9	<1.0	<10	21	<20	1.6	<0.10	<0.0030	<10	<4.0	28	35
MW-12-30	MW-12	2008	30	5.4	6.9	3.8	<0.50	4.9	21	15	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-12WB	MW-12	2009	40-50	7.0	11	5.0	<0.10	5.0	26	22	3.0	<0.050	<0.010	<12	11	29	46
C410-12WB	MW-12	2010	40-50	27	12	7.0	0.10	7.0	51	28	2.0	<0.050	0.079	<12	410	1100	1516
C4 11-12WB	MW-12	2011	40-50	6.0	13	5.0	<0.10	5.0	26	26	1.0	<0.050	<0.050	<12	400	99	505
2013-C4-MW-12-B	MW-12	2013	40-50	7.7	9.6	4.9	<0.10	5.0	31	19	1.3	<0.050	<0.010	<12	<10	<50	36
16-C4-MW12B	MW-12	2016	40-50	14	13	7.2	0.33	15	73	25.0	2.3	<0.050	<0.030	<12	57	760	823

Upper Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
MW-13 Surface																	
24816	MW-13	2007	0	4.2	8.8	**5.7**	<1.0	<10	24	<20	1.6	<0.10	<0.0030	<10	4.7	9.7	19
MW-13-15	MW-13	2008	15	7.1	8.6	5.1	<0.50	5.7	31	18	<5.0	0.012	<0.050	<10	<30	76	96
C409-13WA	MW-13	2009	0-15	8.0	**11**	5.0	<0.10	5.0	31	22	1.0	<0.050	<0.010	<12	<10	51	62
C410-13WA	MW-13	2010	0-15	**17**	9.0	5.0	<0.10	5.0	30	19	1.0	0.060	<0.010	<12	<10	47	58
C411-13WA	MW-13	2011	0-15	<5.0	9.0	4.0	<0.10	5.0	34	22	1.0	<0.050	<0.020	<12	<10	11	22
2013-C4-MW-13-A	MW-13	2013	0-15	9.3	**36**	**6.2**	<0.10	5.5	35	**79**	1.8	<0.050	<0.010	<12	<10	<50	36
16-C4-MW13A	MW-13	2016	0-15	7.1	8.3	4.6	<0.050	4.5	28	17.0	1.4	<0.050	<0.010	<12	<10	<50	36
MW-13 Depth																	
24818	MW-13	2007	30	3.2	6.3	<5.0	<1.0	<10	19	<20	1.9	<0.10	<0.0030	<10	4.8	18	28
MW-13-30	MW-13	2008	30	3.5	6.6	3.6	<0.50	3.7	17	15	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-13WB	MW-13	2009	40-50	<5.0	**11**	3.0	<0.10	3.0	17	22	<1.0	<0.050	<0.010	<12	<10	21	32
C410-13WB	MW-13	2010	40-50	**18**	**11**	**6.0**	<0.10	5.0	31	**26**	2.0	0.050	<0.010	<12	<10	<10	16
C4 11-13WB	MW-13	2011	40-50	<5.0	**12**	3.0	<0.10	3.0	18	**24**	<1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-13-B	MW-13	2013	40-50	8.0	8.4	5.4	<0.10	5.6	34	16	1.7	<0.050	<0.010	<12	<10	<50	36
16-C4-MW13B	MW-13	2016	40-50	7.2	**17**	4.9	<0.050	4.7	31	**36.0**	1.7	<0.050	<0.010	<12	<10	<50	36

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline +3 standard deviations*

**** All units in mg/kg**

Table 5-9: PHC F4 Soil Chemical Analysis Results ï Upper Site Landfill

Sample Location	Sample ID	Sample Depth (m bgs)	PHC F4 (mg/kg)
MW-10	16-C4-MW10A	0 - 0.15	<50
	16-C4-MW10B	0.4 ï 0.5	<50
MW-11	16-C4-MW11A	0 - 0.15	280
	16-C4-MW11B	0.4 ï 0.5	<50
MW-12	16-C4-MW12A	0 - 0.15	<50
	16-C4-MW12B	0.4 ï 0.5	100
MW-13	16-C4-MW13A	0 - 0.15	<50
	16-C4-1MW3B	0.4 ï 0.5	<50

5.3.2.2 Discussion of Results ï Comparison to Baseline/Background

Analytical results were compared against baseline data, and background concentrations. The following Table 5-10 summarizes the comparison of results.

Table 5-10: Evaluation of Results by Parameter ï Upper Site Landfill

Upper Site Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	Soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cu, with the exception of MW-12B which was reported to exceed the baseline concentration of 13 mg/kg.
Nickel (Ni)	One sample taken at surface from MW-11 was reported to exceed baseline and background Ni concentrations with a reported value of 20 mg/kg. Samples MW-11B and MW-12B were reported to exceed baseline Ni concentrations with reported values of 16 mg/kg and 13 mg/kg. Sample MW-13B exceeded both the background and baseline values for Ni with a reported value of 17 mg/kg.
Cobalt (Co)	MW-11A, MW-11B, MW-12A and MW-12B, were reported to exceed the baseline concentration for Cobalt.
Cadmium (Cd)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cd.
Lead (Pb)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Pb, with the exception of sample location MW-11A which was reported at a concentration of 11 mg/kg, and station MW-12B with a reported concentration of 15 mg/kg.
Zinc (Zn)	All soil samples reported non-detect concentrations or were below both background and baseline concentrations for Zn, apart from sample location MW-11 surface which was

Upper Site Landfill	
Parameter	**Discussion of Results**
	reported at a concentration of 52 mg/kg which exceeded the background concentration of 50 mg/kg and sample station MW-12 depth which reported a concentration of 73 mg/kg exceeding the background and baseline concentrations for Zn.
Chromium (Cr)	Sampling locations MW-11B and MW-12B samples exceeded the baseline concentration of 23 mg/kg for Cr with concentrations of 31 mg/kg and 25 mg/kg respectively, and sampling stations MW-11A and MW-13B were reported to exceed both the baseline and background concentrations for Cr with concentrations of 40 mg/kg and 36 mg/kg respectively.
Arsenic (As)	Arsenic was reported to exceed the background concentration of 2.4 mg/kg and baseline concentration of 2.5 mg/kg at tone sample location, MW-11A with a reported concentration of 2.6 mg/kg.
Mercury (Hg)	All soil samples were reported as non-detect concentrations for Hg.
PCBs (Total)	All soil samples were reported as non-detect concentrations for PCBs, with the exception of MW-11A which was reported at a concentration of 0.015 mg/kg, which exceeded the background value for PCBs of 0.003 mg/kg.
F1 (C_6-C_{10})	All soil samples reported non-detect concentrations for F1
F2 (C_{10}-C_{16})	Soil samples MW-11A and MW-12A reported F2 concentrations of 14 mg/kg and 11 mg/kg respectively and sample location MW-12B also reported an F2 concentration of 57 mg/kg. All other samples reported non-detect concentrations.
F3 (C_{16}-C_{34})	Soil samples from MW-11A and MW11B reported F3 concentrations of 480 mg/kg and 76 mg/kg, and samples location MW-12A and MW12B reported concentrations of 54 mg/kg and 760 mg/kg respectively. All other samples reported non-detect concentrations.
Modified TPH (C_6-C_{34})	Modified TPH was reported to exceed the background concentration of 38 mg/kg and 608 mg/kg in two sample locations as follows, MW-12A at 71 mg/kg, MW-11A at 500 mg/kg and MW-11B at 87 mg/kg. Modified TPH was reported to exceed the baseline concentration of 608 mg/kg in one sample location, MW-12B at 823 mg/kg

5.3.2.3 Soil Trend Analysis by Parameter & Discussion of Trends

A soil chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to background, baseline and historical concentrations using differentiating colours (See Appendix E3). The following Table provides a summary of soil trend analysis findings and presents a discussion of the observed trends by parameter.

Table 5-11: Discussion of Trends ï Upper Site Landfill

Upper Site Landfill	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu concentrations have no observable trend.
Nickel (Ni)	Based on current and historical results, it appears that Ni concentrations have no observable trend.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend. Recent monitoring data indicates a potential for a slight downward trend. Further data points are required to confirm any trends in Co concentrations.
Cadmium (Cd)	Based on current and historical results, it appears that Cd concentrations have no observable trend. Cd concentrations remain steady at either slightly above or below reported detection limits
Lead (Pb)	Based on current and historical results, it appears that Pb concentrations have no observable trend.
Zinc (Zn)	Based on current and historical results, it appears that Zn concentrations are increasing slightly over time, with a small increase in concentrations at soil sampling stations overall.
Chromium (Cr)	Based on current and historical results, it appears that Cr concentrations are increasing with time. Overall soil sampling stations reported increases in Cr concentrations from previous monitoring events.
Arsenic (As)	Based on current and historical results, Arsenic has reported concentrations in the same range at each sampling station and has no observable trend.
Mercury (Hg)	Based on current and historical results, it appears that Hg concentrations remain steady at below reported detection limits.
PCBs (Total)	Based on current and historical results, the trend for PCBs remains steady at below detection limits. One anomalous result exists above baseline levels at the MW11A location in 2016.
Modified TPH (C_6-C_{34})	Based on current and historical results, Modified TPH concentrations in the area of the up-gradient wells are slightly decreasing while the downgradient wells have no observable trend.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods.

5.3.3 Groundwater Sampling

Four groundwater monitoring wells (MW-10, MW-11, MW-12, and MW-13) are present at the Upper Site Landfill. Groundwater sampling of the Upper Site Landfill was conducted on August 22, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following 5.3.3.1 and 5.3.3.2

5.3.3.1 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

Table 5-12: CAM-4 Monitoring Well Log for MW-10

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Upper Site Landfill
Monitoring Well ID:	MW-10	UTM Coordinates:	10061.4 North 10233.7East
Sample Number(s) (include dups.):	16-C4-MW10		
Bottles filled (by parameter type):	0 (Well Dry)		
Date of Sampling Event:	Aug 20/16	Time:	N/A
Weather:	Clear, 15-18 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	337	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	38	Length screened section (cm)=	203

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=	67		
Static water level (cm) from top of pipe =	No Liquid Water in Well		
Static water level (cm) (below ground surface) calculated =	No Liquid Water in Well		
Measured well refusal depth (cm) (measure after sampling) =	236.5		
Thickness of water column (cm)=	-	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	None		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	Well was dry			
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé):

Decontamination of sampling equipment

Type of decontamination fluid (s):			
Number washes:	N/A	Number rinses:	N/A

Other Relevant Comments:

Table 5-13: CAM-4 Monitoring Well Log for MW-11

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Upper Site Landfill
Monitoring Well ID:	MW-11	UTM Coordinates:	9998.8 North 10114.0 East
Sample Number(s) (include dups.):	16-C4-MW11		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 20/16	Time:	15:40
Weather:	Clear, 15 °C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	390	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	86	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	55		
Static water level (cm) from top of pipe =	170.5		
Static water level (cm) (below ground surface) calculated =	115.5		
Measured well refusal depth (cm) (measure after sampling) =	323.8		
Thickness of water column (cm)=	153.3	Static volume of water in well (mL)=	3,131.64
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	4 L over 25 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.50	7.46	7.46	
Conductivity (uS/cm)	457	456	454	
Turbidity (NTU)				
Temperature (degC)	3.60	3.59	3.68	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): c, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 5-14: CAM-4 Monitoring Well Log for MW-12

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Upper Site Landfill
Monitoring Well ID:	MW-12	UTM Coordinates:	10013.3 North 10247.3 East
Sample Number(s) (include dups.):	16-C4-MW12		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB) ï same for all		
Date of Sampling Event:	Aug 20/16	Time:	17:00
Weather:	Clear, 12ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	370	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	68	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		68	
Static water level (cm) from top of pipe =		154.0	
Static water level (cm) (below ground surface) calculated =		86.0	
Measured well refusal depth (cm) (measure after sampling) =		230.4	
Thickness of water column (cm)=	75.4	Static volume of water in well (mL)=	1540.3
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	~6L over 20 minutes		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.33	7.29	7.29	*well nearly dry at 15 minutes begin sampling before stabilization
Conductivity (uS/cm)	223	221	210	
Turbidity (NTU)				
Temperature (degC)	3.41	3.25	3.21	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox and distilled water - dedicated sampling train

Number washes: 1 Number rinses: 1

Other Relevant Comments:

Table 5-15: CAM-4 Monitoring Well Log for MW-13

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Upper Site Landfill
Monitoring Well ID:	MW-13	UTM Coordinates:	9954.9North 10189.6 East
Sample Number(s) (include dups.):	16-C4-MW13		
Bottles filled (by parameter type):	0 (well went dry)		
Date of Sampling Event:	Aug 22/16	Time:	
Weather:			
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	318	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	20	Length screened section (cm)=	140

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		62	
Static water level (cm) from top of pipe =		200.5	
Static water level (cm) (below ground surface) calculated =		138.3	
Measured well refusal depth (cm) (measure after sampling) =		244.8	
Thickness of water column (cm)=	44	Static volume of water in well (mL)=	898.8
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	Well Dry after 0.5 hours		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	Well went Dry			
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): Sandy- well went dry

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	-	Number rinses:	-

Other Relevant Comments:

Table 5-16: Summary of Groundwater Field Chemistry ï Upper Site Landfill

Upper Site Landfill						
	Time (min)	Temperature (ºC)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
Downgradient						
MW-10						
	No Water in Well					
	Not Sampled					
MW-11						
	5	3.60	457	24.3	7.50	47.4
	10	3.53	456	11.45	7.45	47.0
	15	3.59	456	7.6	7.46	39.5
	20	3.70	455	6.8	7.46	38.4
	25	3.68	456	6.4	7.46	38.2
	30	Sampled				
MW-12						
	5	3.27	512	13.00	7.37	51.7
	10	3.2	517	10.87	7.25	49.0
	15	3.44	522	7.47	7.25	47.7
	20	Sampled (well dry to nearly dry-therefore sampled before stabilization)				
MW-13						
	Insufficient water quantity					
	Not Sampled					

5.3.3.2 Water Levels/Groundwater Flow

Groundwater levels were collected and are presented below:

Table 5-17: Summary of Groundwater Levels ï Upper Site Landfill

Upper Site Landfill				
Monitoring Well ID	Water Level (TOC) (m)	Water Level (from ground surface) (m)	Water Elevation (masl)	Comments
MW-10	N/A	N/A	N/A	Well was dry
MW-11	1.705	1.155	311.5	Sufficient recharge ï sample collected
MW-12	1.540	0.860	295	Sufficient recharge ï sample collected
MW-13	2.005	1.383	301	Insufficient recharge ï no sample collected

Insufficient information was available to ascertain a groundwater flow direction.

5.3.3.3 Groundwater Laboratory Analytical Results

Two groundwater samples were collected and analysed from the Upper Site Landfill. The following Table 5-18 presents the groundwater analytical results. Figure CAM-4.4C presents a summary of significant groundwater analytical results.

Table 5-18: Groundwater Chemical Analysis Results ï Upper Site Landfill

Upper Site Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																
Background			0.17	0.25	0.14	0.003	0.11	0.75	0.48	0.02	0.0004	0.00002				44
Baseline			**0.10**	**0.12**	**0.05**	**0.001**	**0.04**	**0.33**	**0.19**	**0.01**	**0.0004**	**0.00002**				**1.8**
Baseline +3 Standard Deviations			0.55	0.70	0.34	0.001	0.30	1.89	1.12	0.08	0.00040	0.00002				11
Upgradient																
MW11																
24924	MW11	2007	0.0057	0.015	<0.0030	<0.0010	<0.010	0.024	0.024	<0.0030	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-11	MW-11	2008	<0.0020	0.0026	0.0015	<0.000034	<0.0010	<0.0050	<0.0020	0.0011	<0.000020	<0.0010	_	_	_	0.47
C409-11W	MW-11	2009	0.0036	0.0088	0.0017	0.071	0.0014	0.0080	0.0060	0.00070	0.000014	<0.000050	<0.1	<0.1	<0.1	0.15
C410-11W	MW-11	2010	0.036	0.029	0.0054	0.00053	0.0051	**0.037**	0.018	0.0045	0.000002	<0.000050	_	_	_	<0.10
C4 11-11W	MW-11	2011	0.0065	0.016	0.0018	<0.00020	0.0011	0.0050	0.018	0.0020	0.000005	<0.000050	-	-	-	<2.0
2013-C4-MW-11	MW-11	2013	0.0022	0.0022	<0.00030	0.000069	<0.00020	<0.0030	<0.0010	0.00022	<0.0000020	<0.000050	_	_	_	<0.10
16-C4-MW11	MW-11	2016	0.00250	0.00520	0.00058	0.000034	<0.00020	0.0041	0.005	0.00053	<0.0000020	<0.000050	<0.10	<0.10	<0.20	0.20
Downgradient																
MW-10																
not sampled, well dry	MW-10	2007	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2008	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2009	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2010	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2011	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2013	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-10	2016	_	_	_	_	_	_	_	_	_	_	_	_	_	_
MW-12																
MW-12	MW-12	2008	0.043	0.042	0.016	0.00014	0.016	0.21	0.054	0.0051	<0.000020	<0.0012	_	_	_	**3.3**
C409-12W	MW-12	2009	**0.13**	**0.15**	**0.050**	0.88	**0.064**	**1.1**	**0.22**	**0.019**	0.000061	<0.000050	<0.1	<0.1	0.2	0.3
C410-12W	MW-12	2010	0.041	0.030	0.010	0.00025	0.017	**0.41**	0.026	0.0040	0.000004	<0.000050	_	_	_	<0.10

Upper Site Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C4 11-12W	MW-12	2011	0.050	0.071	0.042	0.00030	0.014	0.30	0.060	0.0050	0.00005	<0.000050	_	_	_	<2.0
2013-C4-MW-12	MW-12	2013	0.0017	0.0014	0.00037	0.00019	<0.00020	0.093	<0.0010	<0.00020	<0.0000020	<0.000050	_	_	_	<0.10
16-C4-MW12	MW-12	2016	0.0061	0.0069	0.002	0.00012	0.0021	0.15	0.0089	0.00083	0.000005	<0.000050	<0.10	<0.10	<0.20	0.20
MW-13																
24925	MW-13	2007	0.075	0.11	0.012	<0.0010	0.019	**0.39**	**0.21**	<0.0030	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-13	MW-13	2008	0.029	0.026	0.010	0.00018	0.0073	0.081	0.021	0.0022	<0.000020	<0.0011	_	_	_	1.1
C409-13W	MW-13	2009	**0.22**	**0.15**	0.049	**0.63**	**0.058**	**0.58**	0.17	**0.014**	0.000057	<0.000050	_	_	_	<1.0
not sampled, well dry	MW-13	2010	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-13	2011	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-13	2013	_	_	_	_	_	_	_	_	_	_	_	_	_	_
not sampled, well dry	MW-13	2016	_	_	_	_	_	_	_	_	_	_	_	_	_	_

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline + 3 standard deviations*

**** All units in mg/L**

Table 5-19: PHC F4 Groundwater Chemical Analysis Results ï Upper Site Landfill

Station Area Non-Hazardous Waste Landfill	
Sample ID	**PHC F4 (mg/kg)**
MW10	< 0.2
MW-11	< 0.2
MW-12	< 0.2
MW-13	< 0.2

5.3.3.4 Discussion of Groundwater Results by Parameter

Analytical results were compared against background and baseline data. The following Table 5-20 summarizes the comparison of results.

Table 5-20: Evaluation of Groundwater Analytical Results ï Upper Site Landfill

Upper Site Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	Cu was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Nickel (Ni)	Ni was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cobalt (Co)	Co was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cadmium (Cd)	Cd was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Lead (Pb)	Pb was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Zinc (Zn)	Zn was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Chromium (Cr)	Cr was reported below the background and baseline concentration for all 2016 site-specific groundwater samples..
Arsenic (As)	As was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Mercury (Hg)	Hg was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
PCBs (Total)	PCBs was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F1 (C_6-C_{10})	F1 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.

Upper Site Landfill	
Parameter	**Discussion of Results**
F2 (C_{10}-C_{16})	F2 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F3 (C_{16}-C_{34})	F3 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
Modified TPH (C_6-C_{34})	Modified TPH was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.

5.3.3.5 Groundwater Trend Analysis by Parameter and Discussion of Trends

A groundwater chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to baseline and historical concentrations using differentiating colours (See Appendix F). The following Table 5-21 provides a summary of groundwater trend analysis findings and presents a discussion of the observed trends by parameter.

Table 5-21: Evaluation of Groundwater Chemistry Trends

Upper Site Landfill	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend. Recent MW-12 data indicates a potential slight downward trend in reported Cu concentrations. Further data points are required to confirm any observable trends.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend.
Cobalt (Co)	Based on current and historical results, it appears that Co is trending downward slightly or has no observable trend. Further data points are required to determine any observable trends.
Cadmium (Cd)	Based on current and historical results, it appears that Cd has no observable trend.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend.
Zinc (Zn)	Based on current and historical results, it appears that Zn has no observable trend, or is trending downward slightly due to recent reported concentrations in MW-!2. Further data points are required to confirm any observable trends.
Chromium (Cr)	Based on current and historical results, it appears that Cr in the downgradient MW-12 well is trending downward whereas at the up-gradient well, the Cr concentration is remaining steady.
Arsenic (As)	Based on current and historical results, it appears that Arsenic has no observable trend.

Upper Site Landfill	
Parameter	**Discussion of Trends**
Mercury (Hg)	Based on current and historical results, it appears that Hg is remaining steady, fluctuating slightly above and below detection limits.
PCBs (Total)	Based on all non-detect concentrations, PCBs is remaining steady below reported detection limits.
Modified TPH (C_6-C_{34})	Based on current and historical results, it appears that Modified TPH has no observable trend.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

5.3.4 Thermal Monitoring

5.3.4.1 Thermistor Annual Maintenance Reports

As per Section 5.4.3 of the TOR, thermistor inspection logs were filled out for thermistors as provided below.

Table 5-22: CAM-4 Thermistor Log for VT-1

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	18-Aug-16			
Inspector Signature / Prepared By:	S. Borcsok								

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	**CAM-4**		Landfill:	Upper Site Landfill					
Thermistor Number:	**VT-1**		Inclination:	Vertical					
Datalogger model no:	**N/A**		Datalogger cable download model:				N/A		
*Install Date:	**28-Sep-06**		First Date Event		**27-Aug-07**	Last Date Event		**17-Aug-11**	
*Coordinates and Elevation		N	**10043.3**		E	**10214.8**		Elev	**304.4**
Length of Cable (m)	**0.92 m**	Cable Lead Above Ground (m)				1.05 m (casing height)			
Datalogger Serial #	**N/A**	Nodal Points	Unknown						

Thermistor Inspection

		Good	Needs Maintenance	Description
	Casing	X		
	Cover	X		
	Data Logger		X	No Datalogger present
	Cable	X		
	Beads			Unknown
	Lock condition	X		New Lock
	Battery Installation Date	N/A		
	Battery Levels	Main	N/A	Aux N/A

Manual Ground Temperature Readings

Bead	Volts	Degrees C	Bead	Volts	Degrees C
1	N/A	N/A	9	N/A	N/A
2	N/A	N/A	10	N/A	N/A
3	N/A	N/A	11	N/A	N/A
4	N/A	N/A	12	N/A	N/A
5	N/A	N/A	13	N/A	N/A
6	N/A	N/A	14	N/A	N/A
7	N/A	N/A	15	N/A	N/A
8	N/A	N/A	16	N/A	N/A

Battery Information

Batteries changed ?	Yes		No	X	Monitoring Year:	10	
Battery model number installed or model of battery in place:					N/A		
Expected remaining battery life (years):	N/A						

Datalogger Programming (Describe programming completed; beads and frequency)

N/A

Observations and Proposed Maintenance

Datalogger was not present. Datalogger should be brought to site and re-installed.

Table 5-23: CAM-4 Thermistor Log for VT-2

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Upper Site Landfill						
Thermistor Number:	**VT-2**		Inclination:	Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**28-Sep-06**		First Date Event	**27-Aug-07**		Last Date Event		**31-Aug-13**		
*Coordinates and Elevation		N	**10002.4**	E	**10204.2**		Elev	**306.7**		
Length of Cable (m)	**0.85 m**	Cable Lead Above Ground (m)				0.93 m (casing height)				
Datalogger Serial #	**02020175**	Nodal Points	11							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X		I					
	Cover		X		I					
	Data Logger		X		I					
	Cable		X		I					
	Beads		I		X	Beads 2, 3 malfunctioning				
	Lock condition		X		I	New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	13.38 V		
		NEW Batteries:		11.34 V				13.02 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2883	11.3788		9	0.7952		-5.0065
2	0.0005	-101.4553		10	0.7557		-6.3950
3	0.0005	-101.4553		11	0.7186		-7.7268
4	1.0706	4.2083		12	0.0000		381.0742
5	0.9562	0.4492		13	0.0000		381.0742
6	0.9025	-1.3408		14	0.0000		381.0742
7	0.8651	-2.6017		15	0.0000		381.0742
8	0.8266	-3.9179		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					
Datalogger Programming (Describe programming completed; beads and frequency)						
Reprogrammed to 48 hr frequency						
Observations and Proposed Maintenance						
Two beads malfunctioning.						

Table 5-24: CAM-4 Thermistor Log for VT-3

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16					
Inspector Signature / Prepared By:	S. Borcsok										
Thermistor Information (*Some Information can be pre-populated from thermistor logs)											
Site Name:	**CAM-4**		Landfill:	Upper Site Landfill							
Thermistor Number:	**VT-3**		Inclination:	Vertical							
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB			
*Install Date:	**26-Sep-06**		First Date Event		**27-Aug-07**	Last Date Event		**31-Aug-13**			
*Coordinates and Elevation		N	**10013.3**	E	**10177.1**		Elev	**312.8**			
Length of Cable (m)	**0.85 m**	Cable Lead Above Ground (m)				0.93 m (casing height)					
Datalogger Serial #	**111126**	Nodal Points	12								
Thermistor Inspection											
		Good		Needs Maintenance		Description					
	Casing		X								
	Cover		X								
	Data Logger		X								
	Cable		X								
	Beads		X								
	Lock condition		X			New Lock					
	Battery Installation Date		19-Aug-16								
	Battery Levels		Main	11.34 V			Aux	13.99, then 13.75 V			
		NEW Batteries:		11.34 V				13.50 V			

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2883	11.3788		9	0.7803		-5.5271
2	1.1354	6.3295		10	0.7425		-6.8659
3	1.0924	4.9220		11	0.7156		-7.8371
4	1.0103	2.2332		12	0.8341		-3.6584
5	0.9278	-0.4939		13	0.0000		381.0742
6	0.8878	-1.8357		14	0.0000		381.0742
7	0.8516	-3.0609		15	0.0000		381.0742
8	0.8143	-4.3415		16	0.0000		381.0742

Battery Information								
Batteries changed ?	Yes	X	No		Monitoring Year:	10		
Battery model number installed or model of battery in place:					UBL15, ULB1			
Expected remaining battery life (years):	7 years - July 2023							
Datalogger Programming (Describe programming completed; beads and frequency)								
Reprogrammed to 48 hr frequency								
Observations and Proposed Maintenance								
No maintenance required. On download, Prolog showed 'ERROR: The logger's next recording time stamp was invalid. The time displayed may be inaccurate'. Then, 'Error: The sample rate of the data logger was invalid.' Then Error 1 again. Started the download and it then said 'Bad Recording Rate' twice, then again 4 times, then 'There was an error calculating the time in the raw file. This is usually caused by a hardware problem or power interruption to the datalogger. The following time was stored in the raw file: Year=2016, Month=0, Day=0, Hour=0, Min=0, Sec=0 (Encode Time Call #0). After resetting clock, got Error 1 but saying 'last recording' instead of 'next recording'.								

Table 5-25: CAM-4 Thermistor Log for VT-4

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Upper Site Landfill						
Thermistor Number:	**VT-4**		Inclination:	Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**26-Sep-06**		First Date Event	**27-Aug-07**		Last Date Event		**31-Aug-13**		
*Coordinates and Elevation		N	**10021.2**	E	**10150.4**		Elev	**312.8**		
Length of Cable (m)	**0.52 m**	Cable Lead Above Ground (m)				1.14 m				
Datalogger Serial #	**207046**	Nodal Points	10							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X							
	Cover		X							
	Data Logger		X							
	Cable		X							
	Beads		X							
	Lock condition		X			New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	14.11 V		
		NEW Batteries:		11.34 V				13.87 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2694	10.7486		9	0.7932		-5.0757
2	1.1256	6.0074		10	0.7883		-5.2463
3	1.1373	6.3920		11	0.0000		381.0742
4	1.0636	3.9787		12	0.0000		381.0742
5	0.9530	0.3430		13	0.0000		381.0742
6	0.9065	-1.2078		14	0.0000		381.0742
7	0.8683	-2.4931		15	0.0000		381.0742
8	0.8249	-3.9756		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48 hr frequency

Observations and Proposed Maintenance

None required.

5.3.4.2 Summary of Findings from Annual DEW Line Thermal Reports

Results, conclusions and recommendations from the DEW Line thermal reports are to be provided by DND for incorporation into the monitoring reports. No analysed data was provided to Arcadis for inclusion into the 2016 monitoring report at the time of report finalization. The summary of findings for thermal reporting (including 2016 monitoring year data) will be provided under separate cover.

5.4 Conclusions and Overall Landfill Performance

Based on the results of the 2016 monitoring program, the overall performance of the Upper Site Landfill is acceptable.

5.5 Recommendations and Conclusions

Based on review and analysis of chemical data, it appears that the soil concentrations for the parameters tested had no observable trend with no obvious soil concentration increases over time. Based on this review, it is recommended to continue the long-term monitoring of soils as planned.

Based on the results of the visual inspection, the landfill performance is acceptable. No remedial work or deviations from the monitoring plan are recommended at this time.

6 CAM-4: LOWER SITE NON-HAZARDOUS WASTE LANDFILL

6.1 Landfill Description

As stated in Annex G, Section G.5 of the Terms of Reference, dated November 2015, the Lower Site Non-Hazardous Waste Landfill is located along the south side of the Abandoned Camp Road, across the road from the main lobe of the Lower Site Landfill, as shown on Figure CAM-4.1. The design of this landfill included compacted perimeter berms, and placement of a cover of compacted granular fill over the landfilled material. Three groundwater monitoring wells were installed at the landfill perimeter.

The long-term monitoring plan for the Lower Site Non-Hazardous Waste Landfill consists of visual inspection, and the periodic collection of soil and groundwater samples.

The landfill layout, visual observations and photographic locations are presented on Figure CAM-4.5A in the figures Section of this report. Soil and groundwater analytical results are presented on Figure CAM-4.5B and Figure CAM-4.5C, respectively, in the figures section of this report.

6.2 Summary of Work Conducted

6.2.1 Visual Inspection

A visual inspection was conducted on the Lower Site Non-Hazardous Waste Landfill on August 18, 2016. The visual inspection of the landfill was completed with no deviations from the visual inspection work plan.

6.2.2 Soil Sampling

Soil sampling at the Lower Site Non-Hazardous Waste Landfill was conducted on August 21 to 22, 2016 and consisted of the collection of seven soil samples (includes one duplicate) from three soil sample stations (MW-21, MW-22, and MW-23). No depth limitations were encountered at any of soil sampling stations.

The following Table 6-1 outlines the soil sampling activities conducted at the Lower Site Non-Hazardous Waste Landfill.

Table 6-1: Summary of Work Conducted by Soil Sampling Location

Lower Site Non-Hazardous Waste Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-21	16-C4-MW-21A	0 - 0.15	SAND ï brown, damp, trace gravel, rootlets
	16-C4-MW-21B	0.4 - 0.5	SAND ï reddish brown, damp, some gravel
MW-22	16-C4-MW-22A	0 - 0.15	SAND ï brown, damp, trace rootlets, gravel
	16-C4-DUP6	0 - 0.15	SAND ï brown, damp, trace rootlets, gravel
	16-C4-MW-22B	0.4 - 0.5	SAND ï brown, damp, trace to some gravel
MW-23	16-C4-MW-23A	0 - 0.15	SAND ï brown, damp, trace gravel, rootlets
	16-C4-MW-23B	0.4 - 0.5	SAND ï brown, damp, trace gavel

6.2.3 Groundwater Sampling

Groundwater monitoring at the Lower Site Non-Hazardous Waste Landfill was conducted on August 22, 2016 and consisted of the inspection and groundwater monitoring of three monitoring wells (MW-21, MW-22, and MW-23). One monitoring well, MW-21, was observed to be dry. Monitoring wells MW-22 and MW-23 contained water and groundwater samples were collected for analysis. Monitoring well sampling logs are presented in Section 6.3.3.1.

The following Table 6-2 outlines the groundwater sampling activities conducted at the Lower Site Non-Hazardous Waste Landfill.

Table 6-2: Summary of Work Conducted by Monitoring Well

Lower Site Non-Hazardous Waste Landfill		
Monitoring Well ID	**Observations**	**# of Groundwater Samples Collected**
MW-21	Good condition, well was dry	0
MW-22	Good condition, no surface water around well	1
MW-23	Good condition, no surface water around well	1

6.2.4 Thermal Monitoring

No thermistors are present at the Lower Site Non-Hazardous Waste Landfill.

6.3 Results of the Monitoring Program

The following Sections 6.3.1 through 6.3.4 summarize the results of the CAM-4 Monitoring program at the Lower Site Non-Hazardous Waste Landfill.

6.3.1 Visual Inspection

The visual inspection of the Lower Site Non-Hazardous Waste Landfill was conducted on August 18, 2016. The visual inspection was conducted in compliance with Section 5.2 of the Terms of Reference and details are provided below in the following Sections 6.3 through 6.3.1.5. Figure CAM-4.5A presents the visual inspection findings and photographic locations.

6.3.1.1 Inspection Checklist

The visual inspection was completed as per the Terms of Reference and the visual inspection checklist is included as Table 6-3 of this report below.

Table 6-3: Visual Inspection Checklist – Lower Site Non-Hazardous Waste Landfill

SITE NAME: **CAM-4 Pelly Bay**

LANDFILL DESIGNATION: Lower Site Non-Hazardous Waste Landfill
LANDFILL TYPE: Non-Hazardous Waste Landfill
DATE OF INSPECTION: August 18, 2016
WEATHER CONDITIONS: 8ºC, cloudy
DATE OF PREVIOUS INSPECTION: September 4, 2013
INSPECTED BY: Stephen Borcsok
REPORT PREPARED BY: Stephen Borcsok

The preparer represents to the best of the preparer's knowledge, the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.

Visual Inspection Checklist: Lower Site Non-Hazardous Waste Landfill												
Checklist Item	Present (Yes/No)	Feature Number	Feature Location	GPS Coordinates Easting/Northing/Zone	Length (m)	Width (m)	Depth (m)	Extent Relative to Landfill Surface	Description	Comparison with Historical Observations	Additional Comments /Severity Rating	Photographic Records (photo reference, location, view point & direction, feature of note, scale)
Settlement	Yes	A	Northeast side slope	391801.219 / 7594804.67	16	2.0	1.0	0.05	<1%	Minor depression	Feature has widened from 0.3 m to 1.0 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LNH 29, 30
Settlement	Yes	B	West cover	391839.615 / 7594831.56	16	1.0	0.3	0.05	<1%	Linear depression	Feature has widened from 0.2 m to 0.3 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LNH 27, 28
Settlement	Yes	C	West cover	391802.316 / 7594795.84	16	0.5	0.5	0.05	<1%	Minor depression	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LNH 34, 35
Erosion	No												
Lateral Movement	No												
Frost Action	No												
Sloughing	No												
Cracking	No												
Animal Burrows	No												
Vegetation Establishment	Yes		Landfill cover, northeast and southwest side slopes					<1%	Sparse plants present on landfill	Vegetation not noted in 2013 visual inspection checklist, however vegetation on landfill surface was noted in one photograph.	Severity Rating ï Acceptable (vegetation establishment will be beneficial for landfill stability)	CAM-4 LNH 2, 10, 11, 12, 26, 28
Staining	No											
Vegetation Stress	No											
Seepage Points (or) Ponded Water	No											
Debris and/or Liner Exposed	No											
Presence & Condition of Monitoring Instruments	Yes	N/A	Outside landfill footprint	N/A	N/A	N/A	N/A	N/A	MW20, MW21, MW22, MW23	Monitoring wells generally appear to be in good condition. MW23 cap is damaged.		CAM-4 LNH 4, 5, 8, 9, 13, 14, 31

Visual Inspection Checklist: Lower Site Non-Hazardous Waste Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments /Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	No											

6.3.1.2 Stability Assessment

The Preliminary Stability Assessment for the Lower Site Non-Hazardous Waste Landfill was conducted on August 18, 2016 as per the Terms of Reference and the results are provided below in Table 6-4.

Table 6-4: Preliminary Stability Assessment ï Lower Site Non-Hazardous Waste Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Not Observed	None
Animal Burrows	Not Observed	None
Vegetation Establishment	Acceptable	Occasional
Staining	Not Observed	None
Vegetation Stress	Not Observed	None
Seepage / Ponded Water	Not Observed	None
Debris and/or Liner Exposure	Not Observed	None
Other	Not Observed	None
Overall Landfill Performance	**Acceptable**	

Performance / Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential

Performance / Severity Rating	Description
	settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

6.3.1.3 Photographic Records

The photographic record for the Lower Site Non-Hazardous Waste Landfill has been completed as per Section 5.5 of the Terms of Reference and is included in the following page as Table 6-5. The Photographic Record only contains an index of photographs collected; full sized photographs are contained in the Appended CD/DVD-ROM. Selected photographs are shown in Table 6-6. Figure CAM-4.5A presents the photograph locations and directions.

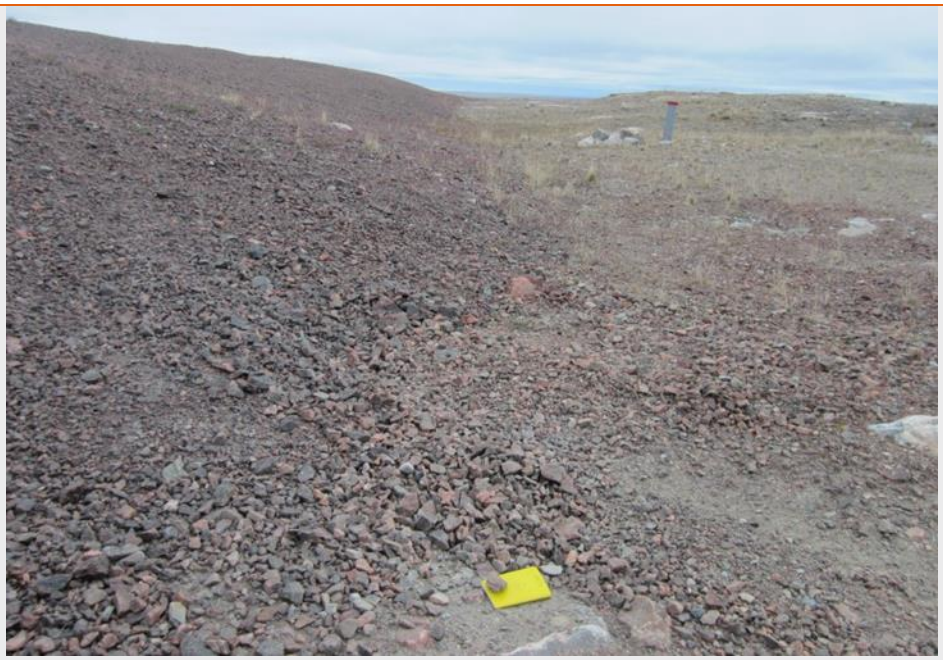
Table 6-5: Photographic Records ï Lower Site Non-Hazardous Waste Landfill

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-MW21-1	SM21	N	Sample station MW-21	MW-21 soil	MW-21	Test pit location
C4-MW21-2	SM21	N/A	Sample station MW-21	MW-21 soil	MW-21	Test pit close-up
C4-MW21-3	SM21	N/A	Sample station MW-21	MW-21 soil	MW-21	Test pit backfilled
C4-MW22-1	SM22	S	Sample station MW-22	MW-22 soil	MW-22	Test pit location
C4-MW22-2	SM22	N/A	Sample station MW-22	MW-22 soil	MW-22	Test pit close-up
C4-MW22-3	SM22	N/A	Sample station MW-22	MW-22 soil	MW-22	Test pit backfilled
C4-MW23-1	SM23	SW	Sample station MW-23	MW-23 soil	MW-23	Test pit location
C4-MW23-2	SM23	N/A	Sample station MW-23	MW-23 soil	MW-23	Test pit close-up
C4-MW23-3	SM23	N/A	Sample station MW-23	MW-23 soil	MW-23	Test pit backfilled

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
Visual Inspection Photographs						
CAM-4 LNH 1	1	NE	West corner of landfill	Monitoring well	MW20	
CAM-4 LNH 2	2	SE	West corner of landfill with sparse vegetation	Vegetation Monitoring well	N/A MW21	
CAM-4 LNH 3	3	SE	Northwest side slope			
CAM-4 LNH 4	4	SE	Monitoring well MW20 and northwest side slope	Monitoring well	MW20	
CAM-4 LNH 5	5	NE	Monitoring well MW20	Monitoring well	MW20	
CAM-4 LNH 6	6	SW	North corner of landfill			
CAM-4 LNH 7	7	SE	North corner of landfill			
CAM-4 LNH 8	8	SW	Monitoring well MW23 and northeast side slope	Monitoring well	MW23	
CAM-4 LNH 9	9	NE	Monitoring well MW23	Monitoring well	MW23	Monitoring well cap is damaged
CAM-4 LNH 10	10	SW	Northeast side of landfill with sparse vegetation	Vegetation	N/A	
CAM-4 LNH 11	11	SW	Landfill cover from top of east corner with sparse vegetation	Vegetation	N/A	
CAM-4 LNH 12	12	NW	Landfill cover from top of east corner with sparse vegetation	Vegetation	N/A	
CAM-4 LNH 13	13	NW	Monitoring well MW22 and southeast side slope	Monitoring well	MW22	
CAM-4 LNH 14	14	SE	Monitoring well MW22	Monitoring well	MW22	
CAM-4 LNH 15	15	NE	South corner of landfill			
CAM-4 LNH 16	16	NW	South corner of landfill			
CAM-4 LNH 17	17	NE	Landfill cover from top of south corner			
CAM-4 LNH 18	18	NW	Landfill cover from top of south corner			
CAM-4 LNH 19	19	S	Landfill cover from centre of landfill			

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LNH 20	20	W	Landfill cover from centre of landfill			
CAM-4 LNH 21	21	N	Landfill cover from centre of landfill			
CAM-4 LNH 22	22	E	Landfill cover from centre of landfill			
CAM-4 LNH 23	23	SE	Landfill cover from top of north corner			
CAM-4 LNH 24	24	SW	Landfill cover from top of north corner			
CAM-4 LNH 25	25	NE	West corner of landfill			
CAM-4 LNH 26	26	SE	West corner of landfill with sparse vegetation	Vegetation Monitoring well	N/A MW21	
CAM-4 LNH 27	27	NW	Linear depression on northeast side slope	Settlement	B	
CAM-4 LNH 28	28	E	Linear depression on northeast side slope, sparse vegetation	Settlement Vegetation	B N/A	
CAM-4 LNH 29	29	S	Minor depression on west landfill cover	Settlement	A	
CAM-4 LNH 30	30	NW	Minor depression on west landfill cover	Settlement	A	
CAM-4 LNH 31	31	S	Monitoring well MW21	Monitoring well	MW21	
CAM-4 LNH 32	32	SE	Landfill cover from top of west corner			
CAM-4 LNH 33	33	NE	Landfill cover from top of west corner			
CAM-4 LNH 34	34	SE	Minor depression on west landfill cover	Settlement	C	New feature in 2016
CAM-4 LNH 35	35	NW	Minor depression on west landfill cover	Settlement	C	New feature in 2016
CAM-4 LNH 36	36	NE	Southwest side of landfill			

Table 6-6: Selected Photographs ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill
Photograph CAM-4 LNH 9: Damaged cap on monitoring well MW23.

Photograph CAM-4 LNH 26: West corner of landfill with sparse vegetation and monitoring well MW21 in background.

Lower Site Non-Hazardous Waste Landfill

Photograph CAM-4 LNH 28: Linear depression (Feature B) and sparse vegetation on northeast side slope.

Photograph CAM-4 LNH 35: New settlement feature (Feature C) on west landfill cover.

6.3.1.4 Trend Analysis

A trend analysis was conducted with regards to observations made during the visual inspection of the Lower Site Non-Hazardous Waste Landfill. The following Table 6-7 outlines the results of the visual trend analysis.

Table 6-7: Visual Inspection Trends ï Lower Site Non-Hazardous Waste Landfill

Checklist Item	Feature Number	Comparison with Historical Observations
Settlement	A	Width of feature enlarged from 0.3 to 1.0 m between 2013 and 2016.
	B	Width of feature enlarged from 0.2 to 0.3 m between 2013 and 2016.
	C	New feature in 2016.
Vegetation Establishment	N/A	Vegetation was not noted in 2013 visual inspection checklist, however vegetation on landfill surface was noted in one photograph (Photo 31) in 2013.

6.3.1.5 Discussion of Results/Trends

A comparison of the visual inspection results of the 2013 and 2016 monitoring events at the Lower Site Non-Hazardous Waste Landfill indicates that previously observed minor settlement features have undergone increases in their width. One new minor settlement feature was observed in 2016, however the results of the visual inspection and the observed trends indicate that the performance of the landfill is acceptable.

6.3.2 Soil Sampling

Soil sampling of the Lower Site Non-Hazardous Waste Landfill was conducted on August 21 to 22, 2016. The soil sampling was conducted in compliance with Section 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections 6.3.2.1 through 6.3.2.3.

6.3.2.1 Laboratory Analytical Results

A total of seven soil samples (including one duplicate) were analysed from three soil sample locations (MW-21, MW-22, and MW-23) at the Lower Site Non-Hazardous Waste Landfill. Table 6-8 and Table 6-9 present the soil analytical results. Figure CAM-4.5B presents a summary of significant soil analytical results.

Table 6-8: Soil Chemical Analysis Results ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill																	
Sample ID	**Sampling Station**	**Monitoring Year**	**Depth**	**Cu**	**Ni**	**Co**	**Cd**	**Pb**	**Zn**	**Cr**	**As**	**Hg**	**Total PCB**	**F1 C6-C10**	**F2 C10-C16**	**F3 C16-C34**	**Modified TPH Total C6-C34**
Comparison Values																	
Background				14	16	8.3	1.0	10	50	32	2.4	0.10	0.003				38
Baseline				**11**	**11**	**4.6**	**1.00**	**10**	**44**	**24**	**2.2**	**0.10**	**0.026**				**55**
Baseline +3 Standard Deviations				21	32	12	1.0	79	159	101	11	0.1	0.14				313
Upgradient – No Upgradient Locations																	
Downgradient																	
MW-21 Surface																	
24892	MW-21	2007	0	7.8	9.3	**5.8**	<1.0	**43**	**100**	24	2.1	<0.10	0.0038	<10	5.3	290	**300**
C409-21WA	MW-21	2009	0-15	6.0	8.0	3.0	<0.10	**15**	37	17	1.0	<0.050	<0.010	<10	<10	240	**250**
C4 11-21WA	MW-21	2011	0-15	8.0	**84**	4.0	<0.10	**33**	**84**	**32**	2.0	<0.050	<0.050	<12	<10	<10	16
2013-C4-MW-21-A	MW-21	2013	0-15	**11**	**11**	**5.2**	0.16	**56**	**120**	**26**	**2.3**	<0.050	<0.010	<12	14	220	**240**
16-C4-MW-21A	MW-21	2016	0-15	9.7	**11**	**5.3**	0.16	**39**	**100**	24	2.1	<0.050	<0.010	<12	<10	230	**241**
MW-21 Depth																	
24894	MW-21	2007	30	10	**11**	**6.6**	<1.0	**28**	**80**	**27**	2.2	<0.10	<0.0030	<10	4.5	110	**120**
C409-21WB	MW-21	2009	40-50	7.0	8.0	4.0	<0.10	**13**	40	16	1.0	<0.050	<0.010	<10	<10	67	**77**
C4 11-21WB	MW-21	2011	40-50	8.0	9.0	4.0	<0.10	**12**	41	19	2.0	<0.050	<0.050	<12	<10	31	42
2013-C4-MW-21-B	MW-21	2013	40-50	9.0	9.2	4.4	<0.10	**28**	**68**	19	2.2	<0.050	<0.010	<12	<10	150	**161**
16-C4-MW-21B	MW-21	2016	40-50	4.6	5.5	3.3	0.059	**11**	37	14	1.7	<0.050	<0.010	<12	<10	140	**151**
MW-22 Surface																	
24896	MW-22	2007	0	6.1	7.1	<5.0	<1.0	<10	24	<20	1.9	<0.10	<0.0030	<10	4.8	<9.0	14
C409-22WA	MW-22	2009	0-15	6.0	6.0	3.0	<0.10	6.0	16	12	<1.0	<0.050	<0.010	<12	<10	14	25
C4 11-22WA	MW-22	2011	0-15	8.0	**11.0**	**5.0**	<0.10	7.0	23	21	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-22-A	MW-22	2013	0-15	10	6.7	4.5	<0.10	8.8	**45**	18	1.4	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-22A	MW-22	2016	0-15	7.0	6.4	3.0	<0.050	7.9	17	8.2	**12**	<0.050	<0.010	<12	<10	<50	36
16-C4-DUP6	MW-22	2016	0-15	7.4	6.3	2.9	<0.050	9.1	18	9.2	1.3	<0.050	<0.010	<12	<10	<50	36
MW-22 Depth																	

Lower Site Non-Hazardous Waste Landfill																	
Sample ID	**Sampling Station**	**Monitoring Year**	**Depth**	**Cu**	**Ni**	**Co**	**Cd**	**Pb**	**Zn**	**Cr**	**As**	**Hg**	**Total PCB**	**F1 C6-C10**	**F2 C10-C16**	**F3 C16-C34**	**Modified TPH Total C6-C34**
24898	MW-22	2007	30	6.9	7.6	<5.0	<1.0	<10	25	<20	1.5	<0.10	<0.0030	<10	<4.0	<9.0	12
C409-22WB	MW-22	2009	40-50	7.0	10	4.0	<0.10	6.0	20	21	<1.0	<0.050	<0.010	<12	<10	13	24
C4 11-22WB	MW-22	2011	40-50	<5.0	9.0	3.0	<0.10	4.0	18	16	2.0	<0.050	<0.050	<12	<10	<10	16
2013-C4-MW-22-B	MW-22	2013	40-50	<5.0	**11**	**5.3**	<0.10	5.1	25	11	<1.0	0.052	<0.010	<12	<10	<50	36
16-C4-MW-22B	MW-22	2016	40-50	8.0	6.7	3.4	<0.050	**11**	20	9.4	**5.1**	<0.050	<0.010	<12	<10	<50	36
MW-23 Surface																	
24900/01	MW-23	2007	0	7.9	8.6	**6.4**	<1.0	<10	31	<20	1.4	<0.10	<0.0030	<10	4.2	10	20
C409-23WA	MW-23	2009	0-15	9.0	10	4.0	<0.10	**10**	29	17	1.0	<0.050	<0.010	<12	<10	11	22
C4 11-23WA	MW-23	2011	0-15	7.0	9.0	4.0	<0.10	**14**	26	16	2.0	<0.050	<0.050	<12	<10	<10	16
2013-C4-MW-23-A	MW-23	2013	0-15	9.7	**11**	**5.3**	<0.10	8.8	34	18	1.6	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-23A	MW-23	2016	0-15	7.4	7.5	4.0	<0.050	6.9	26	13	1.4	<0.050	<0.010	<12	<10	<50	36
MW-23 Depth																	
24902	MW-23	2007	30	8.5	8.9	**6.0**	<1.0	<10	30	<20	1.2	<0.10	<0.0030	<10	<4.0	9.6	17
C409-23WB	MW-23	2009	40-50	7.0	**11**	4.0	<0.10	5.0	19	20	<1.0	<0.050	<0.010	<12	<10	13	24
C4 11-23WB	MW-23	2011	40-50	7.0	**12**	4.0	<0.10	6.0	25	21	**6.0**	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-23-B	MW-23	2013	40-50	9.9	10	**5.3**	<0.10	**12**	36	18	1.8	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-23B	MW-23	2016	40-50	8.2	**19**	4.0	0.079	7.2	27	**38**	1.5	<0.050	<0.010	<12	<10	<50	36

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline +3 standard deviations*

**** All units in mg/kg**

Table 6-9: PHC F4 Soil Chemical Analysis Results ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**PHC F4 (mg/kg)**
MW-21	16-C4-MW-21A	0 - 0.15	130
	16-C4-MW-21B	0.4 - 0.5	57
MW-22	16-C4-MW-22A	0 - 0.15	<50
	16-C4-DUP6	0 - 0.15	<50
	16-C4-MW-22B	0.4 - 0.5	<50
MW-23	16-C4-MW-23A	0 - 0.15	<50
	16-C4-MW-23B	0.4 - 0.5	<50

6.3.2.2 Discussion of Results ï Comparison to Baseline/Background

Analytical results were compared against historical data, baseline data, and background concentrations. The following Table 6-10 summarizes the comparison of results.

Table 6-10: Evaluation of Results by Parameter ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	All soil samples reported were below both background and baseline concentrations for Cu.
Nickel (Ni)	Ni was reported to exceed the baseline concentration of 11 mg/kg in two samples as follows; 16-C4-MW-21A at 11 mg/kg and 16-C4-MW-23B at 19 mg/kg. One of those samples (16-C4-MW-23B) was also reported above the background concentration of 16 mg/kg.
Cobalt (Co)	All soil samples reported concentrations of Co below both the background concentration (8.3 kg/mg) and baseline concentration (4.6 kg/mg) with the exception of sample 16-C4-MW-21A, which reported a Co concentration of 5.3 mg/kg.
Cadmium (Cd)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cd.
Lead (Pb)	Pb was reported to exceed the baseline and background concentration of 10 mg/kg in three samples as follows; 16-C4-MW-21A at 39 mg/kg, 16-C4-MW21B and 16-C4-MW-22B both at 11 mg/kg.
Zinc (Zn)	All soil samples reported concentrations of Zn below both the background concentration (50 kg/mg) and baseline concentration (44 kg/mg) with the exception of sample 16-C4-MW-21A, which reported a Zn concentration of 100 mg/kg.
Chromium (Cr)	All soil samples reported concentrations of Cr below both the background concentration (32 kg/mg) and baseline concentration (24 mg/kg) with the exception of sample 16-C4-MW-23B, which reported a Cr concentration of 38 mg/kg.

Lower Site Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Arsenic (As)	As was reported to exceed the baseline concentration of 2.2 mg/kg in two samples as follows; 16-C4-MW-22A at 12 mg/kg and 16-C4-MW-22B at 5.1 mg/kg. Both of those samples were also reported above the background concentration of 2.4 mg/kg. Notably, the concentration of As in soil sample 16-C4-MW-22A also exceeded the baseline plus three standard deviations concentration.
Mercury (Hg)	All soil samples reported non-detect concentrations for Hg.
PCBs (Total)	All soil samples reported non-detect concentrations for PCBs.
F1 (C_6-C_{10})	All soil samples reported non-detect concentrations for F1
F2 (C_{10}-C_{16})	All soil samples reported non-detect concentrations for F2
F3 (C_{16}-C_{34})	All soil samples reported non-detect concentrations for F3 with the exception of two samples as follows; 16-C4-MW-21A at 230 mg/kg and 16-C4-MW-21B at 140 mg/kg.
F4 (C_{34}- C_{50})	All soil samples reported non-detect concentrations for F4 with the exception of two samples as follows: 16-C4-MW-21A at 130 mg/kg and 16-C4-MW-21B at 57 mg/kg.
Modified TPH (C_6-C_{34})	Modified TPH was reported to exceed the baseline concentration of 55 mg/kg in two samples as follows; 16-C4-MW-21A at 241 mg/kg and 16-C4-MW-21B at 151 mg/kg. Both of those samples were also reported above the background concentration of 38 mg/kg.

6.3.2.3 Soil Trend Analysis by Parameter & Discussion of Trends

A soil chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to background, baseline and historical concentrations using differentiating colours (See Appendix E). The following Table 6-11 provides a summary of soil trend analysis findings and presents a discussion of the observed trends by parameter.

Table 6-11: Discussion of Trends ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill	
Parameter	Discussion of Trends
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. The current monitoring event reported one anomalous elevated Ni concentration at downgradient sample station MW-23B; however, there is insufficient data to draw any further trend assessment.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend.
Cadmium (Cd)	Based on mostly non-detect concentrations, Cd has no observable trend.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend.
Zinc (Zn)	Based on current and historical results, it appears that Zn has no observable trend.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend.

Arsenic (As)	Based on current and historical results, it appears that As has no observable trend. The current monitoring event reported one anomalous elevated As concentration at downgradient sample station MW-22B. Further data points are required to determine any observable trends
Mercury (Hg)	Based on mostly non-detect concentrations, Hg has no observable trend.
PCBs (Total)	Based on mostly non-detect concentrations, PCBs have no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, Modified TPH concentrations have no observable trend.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

6.3.3 Groundwater Sampling

Three groundwater monitoring wells (MW-21, MW-22, and MW-23) are present at the Lower Site Non-Hazardous Waste Landfill. Groundwater sampling of the Lower Site Non-Hazardous Waste Landfill was conducted on August 22, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following 6.3.3.1 to 6.3.3.5.

6.3.3.1 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

Table 6-12: CAM-4 Monitoring Well Log for MW-21

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Non-Hazardous Waste Landfill	
Monitoring Well ID:	MW-21	UTM Coordinates:	North 20415.1	East 18807.1
Sample Number(s) (include dups.):	CAM4-MW21			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)			
Date of Sampling Event:	Aug 22/16	Time:	N/A	
Weather:	Clear, Windy 12-14 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	382	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	83	Length screened section (cm)=	203

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=	62		
Static water level (cm) from top of pipe =	No Liquid Water in Well		
Static water level (cm) (below ground surface) calculated =	No Liquid Water in Well		
Measured well refusal depth (cm) (measure after sampling) =	220.8		
Thickness of water column (cm)=	-	Static volume of water in well (mL)=	N/A
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	N/A		
Well purged (Y/N):	N/A	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	None		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	Well was dry			
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé):

Decontamination of sampling equipment

Type of decontamination fluid (s):			
Number washes:	N/A	Number rinses:	N/A

Other Relevant Comments:

Table 6-13: CAM-4 Monitoring Well Log for MW-22

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Non-Hazardous Waste Landfill	
Monitoring Well ID:	MW-22	UTM Coordinates:	North 20372.7	East 18866.1
Sample Number(s) (include dups.):	CAM4-MW22			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)			
Date of Sampling Event:	Aug 22/16	Time:	13:20	
Weather:	Clear, Windy 12-14 ºC			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	360	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	50	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	61		
Static water level (cm) from top of pipe =	125.0		
Static water level (cm) (below ground surface) calculated =	64.0		
Measured well refusal depth (cm) (measure after sampling) =	260.2		
Thickness of water column (cm)=	135.2	Static volume of water in well (mL)=	3400
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	3.5 L over 20 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	6.36	8.15	8.14	
Conductivity (uS/cm)	101	101	100	
Turbidity (NTU)				
Temperature (degC)	4.7	4.95	4.99	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, sandy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 6-14: CAM-4 Monitoring Well Log for MW-23

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Non-Hazardous Waste Landfill	
Monitoring Well ID:	MW-23	UTM Coordinates:	North 20463.9	East 18876.7
Sample Number(s) (include dups.):	CAM4-MW23			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB) ï same for all			
Date of Sampling Event:	Aug 22/16	Time:	12:15	
Weather:	Clear, Windy 12-14 °C			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	2.752	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	78	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	15		
Static water level (cm) from top of pipe =	125.0		
Static water level (cm) (below ground surface) calculated =	110.0		
Measured well refusal depth (cm) (measure after sampling) =	260.2		
Thickness of water column (cm)=	135.2	Static volume of water in well (mL)=	3400
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	N/A
Volume Purged (L) (note multiple purging events if applicable):	4.5 L over 30 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.37	7.25	7.25	
Conductivity (uS/cm)	512	522	523	
Turbidity (NTU)				
Temperature (degC)	3.27	3.44	3.63	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): slightly cloudy becoming clear, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 6-15: Summary of Groundwater Field Chemistry ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill						
	Time (min)	Temperature (ºC)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
Downgradient						
MW-21						
	No Liquid Water in Well					
	Not Sampled					
MW-22						
	5	4.7	101	18.5	8.36	102
	10	4.85	109	13.4	8.20	56.3
	15	4.95	101	13.7	8.15	61
	20	4.99	100	13.8	8.14	62
	25	Sampled				
MW-23						
	10	3.27	512	13.00	7.37	51.7
	15	3.2	517	10.87	7.25	49.0
	20	3.44	522	7.47	7.25	47.7
	25	3.59	525	7.00	7.25	46.9
	30	3.59	523	6.92	7.25	46.1
	35	Sampled				

6.3.3.2 Water Levels/Groundwater Flow

Groundwater levels were collected and are presented in the Table below.

Table 6-16: Summary of Groundwater Levels ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill				
Monitoring Well ID	Water Level (TOC) (m)	Water Level (from ground surface) (m)	Water Elevation (masl)	Comments
MW-21	N/A	N/A	N/A	Well was dry
MW-22	1.250	0.64	136.6	Sufficient recharge ï sample collected
MW-23	1.250	1.1	134.7	Sufficient recharge ï sample collected

Insufficient information was available to ascertain a groundwater flow direction.

6.3.3.3 Groundwater Laboratory Analytical Results

Two groundwater samples were collected and analysed from the Lower Site Non-Hazardous Waste Landfill. Table 6-17 and Table 6-18 presents the groundwater analytical results. Figure CAM-4.5C presents a summary of significant groundwater analytical results.

Table 6-17: Groundwater Chemical Analysis Results ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																
Background			0.19	0.15	0.061	0.00050	0.079	0.44	0.31	0.027	0.00065	0.000010				0.58
Baseline			**0.20**	**0.16**	**0.06**	**0.0010**	**0.09**	**1.15**	**0.33**	**0.02**	**0.00040**	**0.00002**				**1.0**
Baseline +3 Standard Deviations			0.81	0.62	0.27	0.001	0.38	5.38	1.55	0.10	0.0028	0.003				4.35
Upgradient ï No Upgradient Locations																
Downgradient																
MW-21																
well was dry	MW-21	2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-21W	MW-21	2009	**0.41**	**0.18**	0.024	0.00069	**0.094**	1.1	0.17	0.0095	0.00004	-	<0.1	<0.1	<0.1	0.10
C4 11-21W	MW-21	2011	**0.29**	0.10	0.0070	0.00030	0.044	0.62	0.081	0.0050	0.000065	<0.000054	-	-	-	<2.0
insufficient water	MW-21	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
well was dry	MW-21	2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-22																
24929	MW-22	2007	0.041	0.039	0.020	<0.0010	0.028	0.12	0.065	0.0063	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
C409-22W	MW-22	2009	0.16	0.096	0.030	**0.0014**	0.079	0.50	0.10	0.011	0.0002	<0.000050	<0.1	<0.1	<0.1	0.10
C4 11-22W	MW-22	2011	0.087	0.051	0.014	0.00060	0.032	0.27	0.056	0.0060	0.00018	<0.000050	-	-	-	<2.0
insufficient water	MW-22	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16-C4-MW22	MW-22	2016	0.0025	0.0012	<0.00030	0.000026	0.00056	0.0039	0.0016	0.00024	<0.0000020	<0.000050	<0.1	<0.10	<0.20	0.20
MW-23																
24930/31	MW-23	2007	0.033	0.070	0.0097	<0.0010	0.013	0.34	0.12	<0.0030	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
C409-23W	MW-23	2009	0.045	0.036	0.0069	0.00027	0.013	0.58	0.055	0.00050	0.000028	<0.000050	<0.1	<0.1	<0.1	0.10
C4 11-23W	MW-23	2011	0.028	0.022	0.0014	<0.00020	0.0049	0.25	0.026	0.0020	0.00001	<0.000050	-	-	-	<2.0
2013-C4-MW-23	MW-23	2013	0.0040	0.0034	<0.00030	0.00069	<0.00020	0.26	<0.0010	<0.00020	<0.00005	<0.000050	-	-	-	<0.10
16-C4-MW23	MW-23	2016	0.0090	0.0061	0.00035	0.000030	0.00042	0.034	0.0040	0.00048	<0.0000020	<0.000050	<0.1	<0.10	<0.20	0.20

Notes:

XX sample exceeds background

XX **sample exceeds baseline**

XX *sample exceeds baseline + 3 standard deviations*

**** All units in mg/L**

Table 6-18: PHC F4 Groundwater Chemical Analysis Results ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill	
Monitoring Well ID	**PHC F4 (mg/L)**
MW-21	Well was dry
MW-22	<0.20
MW-23	<0.20

6.3.3.4 Discussion of Groundwater Results by Parameter

Analytical results were compared against background and baseline data. The following Table 6-19 summarizes the comparison of results.

Table 6-19: Evaluation of Groundwater Analytical Results ï Lower Site Non-Hazardous Waste Landfill

Lower Site Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	Cu was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Nickel (Ni)	Ni was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cobalt (Co)	Co was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cadmium (Cd)	Cd was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Lead (Pb)	Pb was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Zinc (Zn)	Zn was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Chromium (Cr)	Cr was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Arsenic (As)	As was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Mercury (Hg)	Hg was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
PCBs (Total)	PCBs was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F1 (C_6-C_{10})	F1 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F2 (C_{10}-C_{16})	F2 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F3 (C_{16}-C_{34})	F3 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F4 (C_{34}- C_{50})	All 2016 site-specific groundwater samples reported non-detect concentrations for PHC F4.

Lower Site Non-Hazardous Waste Landfill	
Parameter	**Discussion of Results**
Modified TPH (C_6-C_{34})	Modified TPH was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.

6.3.3.5 Groundwater Trend Analysis by Parameter and Discussion of Trends

A groundwater chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to baseline and historical concentrations using differentiating colours (See Appendix F). The following Table 6-20 provides a summary of groundwater trend analysis findings and presents a discussion of the observed trends by parameter.

Table 6-20: Evaluation of Groundwater Chemistry Trends

Lower Site Non-Hazardous Waste Landfill	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu is trending downward slightly.
Nickel (Ni)	Based on current and historical results, it appears that Ni is trending downward slightly.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend.
Cadmium (Cd)	Based on current and historical results, it appears that Cd is trending downward slightly.
Lead (Pb)	Based on current and historical results, it appears that Pb is trending downward slightly.
Zinc (Zn)	Based on current and historical results, it appears that Zn is trending downward slightly.
Chromium (Cr)	Based on current and historical results, it appears that Cr is trending downward slightly.
Arsenic (As)	Based on current and historical results, it appears that As is trending downward slightly.
Mercury (Hg)	Based on current and historical results, it appears that Hg is trending downward slightly.
PCBs (Total)	Based on all non-detect concentrations, PCBs have no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, it appears that Modified TPH has no observable trend.

Trend analysis presented is based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

6.3.4 Thermal Monitoring

No thermistors are present at the Lower Site Non-Hazardous Waste Landfill; therefore, no thermal monitoring was conducted.

6.4 Conclusions and Overall Landfill Performance

Based on the results of the 2016 monitoring program, the overall performance of the Lower Site Non-Hazardous Waste Landfill is acceptable.

6.5 Recommendations and Conclusions

Based on review and analysis of chemical data, it appears that the soil concentrations for the parameters tested have no observable trend. Although some anomalous elevated metal concentrations were detected at down-gradient sample stations MW22 and MW23, there is insufficient analytical data to draw any further trend assessment. Based on this review, it is recommended to continue the long-term monitoring of soils as planned.

Based on review and analysis of chemical data, it appears that the groundwater concentrations for the parameters tested have no observable trend with no obvious groundwater parameter concentration increases over time. Based on this review, it is recommended to continue the long-term monitoring of groundwater as planned.

Based on the results of the visual inspection, the landfill performance is acceptable. No remedial work or deviations from the monitoring plan are recommended at this time.

7 CAM-4: LOWER SITE LANDFILL

7.1 Landfill Description

As stated in Annex G, section G.6 of the Terms of Reference dated November 2015, the Lower Site Landfill is located approximately 1.5 kilometres west of the west end of the airstrip along the Abandoned Camp Road, as shown on Figure CAM-4.1. Four main lobes of buried material were initially identified at this location.

The remediation for the main lobe of the landfill included installation of a double synthetic liner system anchored into the permafrost along the toe, and regrading with the placement of additional granular fill sufficient to cause permafrost aggradation through the landfill contents. The remediation of the other three lobes included complete excavation of the north lobe, and regrading of the south and east lobes. Thermistors and pore pressure piezometers were installed within the main landfill lobe and groundwater monitoring wells were installed at the main lobeôs perimeter.

The long-term monitoring plan is limited to the main and east lobes and consists of a visual inspection, the collection of soil and groundwater samples and thermal monitoring.

The landfill layout, visual observations and photographic locations are presented on Figure CAM-4.6A in the figures section of this report. Soil and groundwater analytical results are presented on Figure CAM-4.6B and Figure CAM-4.6C, respectively, in the figures section of this report.

7.2 Summary of Work Conducted

7.2.1 Visual Inspection

A visual inspection was conducted on the Lower Site Landfill on August 18 to 19, 2016. The visual inspection of the landfill was completed with no deviations from the visual inspection work plan.

7.2.2 Soil Sampling

Soil sampling at the Lower Site Landfill was conducted on August 22, 2016 and consisted of the collection of 15 soil samples (includes one duplicate) from seven soil sample stations (MW-17, MW-18, MW-19, MW-20, C4-1, C4-2, and C4-3). The maximum depth of one soil sample (16-C4-3B) at soil sampling station C4-3 could not be achieved due to rocks encountered at 0.4 m bgs. No depth limitations were encountered at any of other soil sampling stations.

The following Table 7-1 outlines the soil sampling activities conducted at the Lower Site Landfill.

Table 7-1: Summary of Work Conducted by Soil Sampling Location

Lower Site Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**Notes**
MW-17	16-C4-MW-17A	0 - 0.15	SAND ï brown, damp, some gravel, trace rootlets, coarse to medium
	16-C4-MW-17B	0.4 - 0.5	SAND ï brownish black, moist, trace gravel, rootlets, organics, coarse to medium
MW-18	16-C4-MW-18A	0 - 0.15	SAND ï brown, moist, trace gravel
	16-C4-MW-18B	0.4 - 0.5	SAND ï brown, wet, trace gravel. Water encountered.
MW-19	16-C4-MW-19A	0 - 0.15	SAND ï brown, wet, trace gravel, rootlets
	16-C4-MW-19B	0.4 - 0.5	SAND ï brown, wet, trace gravel, rootlets. Water encountered.
MW-20	16-C4-MW-20A	0 - 0.15	SAND ï brown, damp, trace gravel
	16-C4-DUP4	0 - 0.15	SAND ï brown, damp, trace gravel
	16-C4-MW-20B	0.4 - 0.5	SAND ï brown, damp, some gravel
C4-1	16-C4-1A	0 - 0.15	SAND ï greyish brown, dry to damp, some gravel, medium
	16-C4-1B	0.4 - 0.5	SAND ï brown, damp, some gravel, medium
C4-2	16-C4-2A	0 - 0.15	SANDY GRAVEL ï dark brown to black, damp, trace rootlets
	16-C4-2B	0.4 - 0.5	SANDY GRAVEL ï dark brown to black, damp, trace rootlets
C4-3	16-C4-3A	0 - 0.15	SANDY GRAVEL ï dark brown, damp, some silt, trace rootlets
	16-C4-3B	0.3 - 0.4	SANDY GRAVEL ï dark brown, damp, trace silt (depth of sample reduced due to rock refusal)

7.2.3 Groundwater Sampling

Groundwater monitoring at the Lower Site Landfill was conducted on August 21 to 22, 2016 and consisted of the inspection and groundwater monitoring of four monitoring wells (MW-17, MW-18, MW-19 and MW-20). All four monitoring wells contained water and a groundwater samples were collected for analysis. Monitoring well sampling logs are presented in 7.3.3.1.

The following Table 7-2 outlines the groundwater sampling activities conducted at the Lower Site Landfill.

Table 7-2: Summary of Work Conducted by Monitoring Well

Lower Site Landfill		
Monitoring Well ID	**Observations**	**# of Groundwater Samples Collected**
MW-17	Well has heaved, cap on riser no longer fits when casing is closed, no surface water around well	1
MW-18	Good condition, some surface water around well	1
MW-19	Good condition, surface water around well	1
MW-20	Good condition, no surface water around well	1

7.2.4 Thermal Monitoring

Four thermistors (VT-9, VT-10, VT-11, and VT-12) are present at the Lower Site Landfill. Each of the thermistor installations was inspected and data downloaded from the data loggers as per Section 5.4 of the Terms of Reference. Thermistor inspection reports were filled out for each of the installations and further details are provided in Section 7.3.4.1.

7.3 Results of the Monitoring Program

The following Sections 7.3.1 through 7.3.4 summarize the results of the CAM-4 monitoring program at the Lower Site Landfill.

7.3.1 Visual Inspection

The visual inspection of the Lower Site Landfill was conducted on August 18 and 19, 2016. The visual inspection was conducted in compliance with Section 5.2 of the Terms of Reference and details are provided below in the following Sections. Figure CAM-4.6A presents the visual inspection findings and photographic locations.

7.3.1.1 Inspection Checklist

The visual inspection was completed as per the Terms of Reference and the visual inspection checklist is included as Table 7-3 of this report below.

Table 7-3: Visual Inspection Checklist ï Lower Site Landfill

SITE NAME: **CAM-4 Pelly Bay**

LANDFILL DESIGNATION: Lower Site Landfill
LANDFILL TYPE: Leachate contained (Main Lobe), Regraded (East Lobe)
DATE OF INSPECTION: August 18-19, 2016
WEATHER CONDITIONS: 8ºC, partly cloudy
DATE OF PREVIOUS INSPECTION: September 4, 2013
INSPECTED BY: Stephen Borcsok
REPORT PREPARED BY: Stephen Borcsok

The preparer represents to the best of the preparerôs knowledge, the following statements and observations are true and correct and to the best of the preparerôs actual knowledge, no material facts have been suppressed or misstated.

Visual Inspection Checklist: Lower Site Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Settlement	Yes	A	Along east and west landfill crests of Main Lobe	391724.129 / 7594893.757 16 391719.284 / 7594898.297 16 391756.378 / 7594890.507 16	0.5-2.0	0.2-0.4	0.05-0.15	<1%	Three minor depressions	No significant change from 2013 to 2016.	Severity Rating ï Acceptable (features are minor and not affecting landfill stability)	CAM-4 LS 14, 39, 40, 41, 42
Settlement	Yes	B	South side slope of Main Lobe	391695.823 / 7594829.742 16	0.5	0.5	0.1	<1%	One minor depression	Significant decrease in size from 2013 to 2016. Length decreased from 2.0 to 0.5 m, width increased from 0.4 to 0.5 m, depth decreased from 0.15 to 0.1 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 37, 38
Settlement	Yes	J	East crest of Main Lobe	391765.288 / 7594890.535 16	0.5	0.5	0.05	<1%	One minor depression	Two depressions were observed in 2013, only one was observed in 2016. Observed length decreased from 0.6-1.00 to 0.5 m, width from 0.3-0.4 m to 0.5, depth from 0.03-0.05 to 0.05 m between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 43
Settlement	Yes	K	Northeast landfill cover on Main Lobe	391778.909 / 7594930.468 16	0.4	0.4	0.05	<1%	One minor depression	No significant change between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 45, 46
Settlement	Yes	L	Northwest side slope of Main Lobe	391750.847 / 7594945.938 16	0.5	0.3	0.1	<1%	One minor depression	No significant change between 2013 and 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 47, 48
Settlement	Yes	N	East Lobe toe	391930.334 / 7594904.622 16	10	0.3	0.1	<1%	Linear settlement extending from east toe	No significant change between 2013 and 2016	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 71
Settlement	No	O	North end of East Lobe		1	1	0.05	<1%	Circular area of settlement on north end of East Lobe	Observed in 2013, not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Settlement	Yes	Q	Northeast side slope of Main Lobe	391771.331 / 7594962.573 16 391780.751 / 7594961.376	0.3 7.0	0.3 0.2	0.05 0.05	<1%	One linear depression and one minor depression	New observation in 2016.	Severity Rating ï Acceptable (features are minor and not affecting landfill stability)	CAM-4 LS 80, 81
Settlement	Yes	S	Between Abandoned Camp Road and East Lobe of landfill	391891.168 / 7594907.921 391896.342 / 7594898.043 16	1.0-5.0	0.2-0.3	0.05-0.1	<1%	Six minor depressions and one linear depression	New observation in 2016.	Severity Rating ï Acceptable (features are not on landfill)	CAM-4 LS 63, 64, 65, 66, 72
Settlement	Yes	T	South cover of Main Lobe	391716.279 / 7594861.327 16	0.3	0.3	0.05	<1%	One minor depression	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	CAM-4 LS 82

Visual Inspection Checklist: Lower Site Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Settlement	No	D	South side of East Lobe		2	0.3	0.2+	<1%	Settlement of fines between boulder fill on side slope of lobe	Observed in 2011, 2013, not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Erosion	Yes	E	Southeast portion of East Lobe	391926.825 / 7594890.299 391930.961 / 7594888.682 391941.059 / 7594887.943 391943.883 / 7594882.985 391939.387 / 7594893.575	7.0-18.0	0.3	0.05-0.2	<1%	Five erosion channels and washing of fines	Three erosion channels were present in 2013 while five were present in 2016. Length changed from 10.0-15.0 to 7.0-18.0 m between 2013 and 2016 while width and depth remained stable.	Severity Rating ï Acceptable (features are minor and not affecting landfill stability)	CAM-4 LS 67, 68, 69, 78
Erosion	Yes	R	Northwest side slope of Main Lobe	391730.086 / 7594920.867	16.0	0.1	0.05	<1%	Minor erosion channel	New observation in 2016.	Severity Rating ï Acceptable (feature is minor and not affecting landfill stability)	
Erosion	No	F	North end of East Lobe		13	0.2-0.6	0.05-0.15	<1%	Shallow erosion, washing of fines	Observed in 2011, not observed or noted in 2013, not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Lateral Movement	No											
Frost Action	No											
Sloughing	No											
Cracking	Yes	I	West landfill side slope of Main Lobe	391679.271 / 7594862.902 391679.672 / 7594862.561 391683.445 / 7594871.407 391689.597 / 7594881.54 391686.653 / 7594876.646	16 16 16 16 16	4-12	0.05-0.1	0.05-0.1	<1%	Five discontinuous tension cracks	Feature consisted of two cracks in 2013. Length increased from 3-7 to 4-12 m, width increased from 0.03-0.04 to 0.05-1.0, depth increased from up to 0.07 to 0.05-1.0 from 2013 to 2016.	Severity Rating ï Acceptable (features are increasing in number, but are not affecting stability of landfill)	CAM-4 LS 33, 52, 53, 54, 55, 56, 57
Animal Burrows	No											
Vegetation Establishment	Yes	M (2013)	Multiple areas on landfill cover and side slopes on Main Lobe		N/A	N/A	N/A	2%	Sparse to thick vegetation across portions of the Main Lobe	Amount of vegetation has increased since 2013. Thick vegetation on southwest corner of landfill identified as Feature M in 2013.	Severity Rating ï Acceptable (vegetation establishment will be beneficial for landfill stability)	CAM-4 LS 7, 8, 9, 12, 13, 17, 27
Staining	No	H	Northwest toe of Main Lobe		9	1	N/A	<1%	Rust-coloured staining and bacterial sheen observed in drainage path along southwest toe.	Observed in 2011, not observed or noted in 2013, not observed in 2016.	Severity Rating ï Acceptable (feature not observed)	N/A
Vegetation Stress	No											

Visual Inspection Checklist: Lower Site Landfill												
Checklist Item	**Present (Yes/No)**	**Feature Number**	**Feature Location**	**GPS Coordinates Easting/Northing/Zone**	**Length (m)**	**Width (m)**	**Depth (m)**	**Extent Relative to Landfill Surface**	**Description**	**Comparison with Historical Observations**	**Additional Comments / Severity Rating**	**Photographic Records (photo reference, location, view point & direction, feature of note, scale)**
Seepage Points (or) Ponded Water	Yes	G	West slope of Main Lobe	391741.055 / 7594934.594 16 391737.278 / 7594929.577 16	5.0-8.0	1.0-2.0	N/A	<1%	Two points of seepage on west slope of Main Lobe	Four seepage points were observed in 2013 with running water observed from seepage points. Seepage points were moist only in 2016. Width of seepage decreased from 3.0-5.0 to 1.0-2.0 m from 2013 to 2016.	Severity Rating ï Acceptable (seepage volume is minor)	CAM-4 LS 49, 50
Debris and/or Liner Exposed	Yes	P	West cover of East Lobe	391909.873 / 7594908.388 16	0.3	0.05	0.05	<1%	Exposed metal debris	No significant change in debris exposure between 2013 and 2016.	Severity Rating ï Acceptable (debris exposure is minor and not worsening with time)	CAM-4 LS 76, 77
Presence & Condition of Monitoring Instruments	Yes	N/A	Four monitoring wells outside landfill, four thermistors on landfill cover		N/A	N/A	N/A	N/A	MW17, MW18, MW19, MW20, VT-9, VT-10, VT-11, VT-12	Locations were observed to be in good condition in 2013 and 2016. MW17 has heaved upwards and well cap no longer fits on casing.	Severity Rating - Acceptable	CAM-4 LS 12, 13, 16, 19, 24, 25, 27, 30, 31, 34, 36
Features of Note/Other Relevant Observations (e.g., signs of activity, rutsé)	No											

7.3.1.2 Stability Assessment

The Preliminary Stability Assessment for the Lower Site Landfill was conducted on August 18 and 19, 2016, as per the Terms of Reference and the results are provided below in Table 7-4.

Table 7-4: Preliminary Stability Assessment ï Lower Site Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Acceptable	Occasional
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Acceptable	Occasional
Animal Burrows	Not Observed	None
Vegetation Establishment	Acceptable	Occasional
Staining	Not Observed	None
Vegetation Stress	Not Observed	None
Seepage / Ponded Water	Acceptable	Occasional
Debris and/or Liner Exposure	Acceptable	Isolated
Other	Not Observed	None
Overall Landfill Performance	**Acceptable**	

Performance / Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.

Performance / Severity Rating	Description
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

7.3.1.3 Photographic Records

The photographic record for the Lower Site Landfill has been completed as per Section 5.5 of the Terms of Reference and is included in the following page as Table 7-5. The Photographic Record only contains an index of photographs collected; full sized photographs are contained in the Appended CD/DVD-ROM. Selected photographs are shown in Table 7-6. Figure CAM-4.6A presents the photograph locations and directions.

Table 7-5: Photographic Records ï Lower Site Landfill

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-MW17-1	SM17	SW	Sample station MW-17	MW-17 soil	MW-17	Test pit location
C4-MW17-2	SM17	N/A	Sample station MW-17	MW-17 soil	MW-17	Test pit close-up
C4-MW17-3	SM17	N/A	Sample station MW-17	MW-17 soil	MW-17	Test pit backfilled
C4-MW18-1	SM18	S	Sample station MW-18	MW-18 soil	MW-18	Test pit location

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
C4-MW18-2	SM18	N/A	Sample station MW-18	MW-18 soil	MW-18	Test pit close-up
C4-MW18-3	SM18	N/A	Sample station MW-18	MW-18 soil	MW-18	Test pit backfilled
C4-MW19-1	SM19	E	Sample station MW-19	MW-19 soil	MW-19	Test pit location
C4-MW19-2	SM19	N/A	Sample station MW-19	MW-19 soil	MW-19	Test pit close-up
C4-MW19-3	SM19	N/A	Sample station MW-19	MW-19 soil	MW-19	Test pit backfilled
C4-MW20-1	SM20	S	Sample station MW-20	MW-20 soil	MW-20	Test pit location
C4-MW20-2	SM20	N/A	Sample station MW-20	MW-20 soil	MW-20	Test pit close-up
C4-MW20-3	SM20	N/A	Sample station MW-20	MW-20 soil	MW-20	Test pit backfilled
C4-1-1	S1	SE	Sample station C4-1	C4-1 soil	C4-1	Test pit location
C4-1-2	S1	N/A	Sample station C4-1	C4-1 soil	C4-1	Test pit close-up
C4-1-3	S1	N/A	Sample station C4-1	C4-1 soil	C4-1	Test pit backfilled
C4-2-1	S2	W	Sample station C4-2	C4-2 soil	C4-2	Test pit location
C4-2-2	S2	N/A	Sample station C4-2	C4-2 soil	C4-2	Test pit close-up
C4-2-3	S2	N/A	Sample station C4-2	C4-2 soil	C4-2	Test pit backfilled
C4-3-1	S3	NW	Sample station C4-3	C4-3 soil	C4-3	Test pit location
C4-3-2	S3	N/A	Sample station C4-3	C4-3 soil	C4-3	Test pit close-up
C4-3-3	S3	N/A	Sample station C4-3	C4-3 soil	C4-3	Test pit backfilled
Main Lobe Visual Inspection Photographs						
CAM-4 LS 1	N/A	N/A	No photo available			
CAM-4 LS 2	2	NE	East landfill side slope from southeast corner			
CAM-4 LS 3	3	W	South landfill toe from southeast corner			

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 4	4	N	Landfill cover from top of southeast corner			
CAM-4 LS 5	5	SW	Landfill cover from top of southeast side slope			
CAM-4 LS 6	6	NE	Landfill cover from top of southeast side slope			
CAM-4 LS 7	7	N	Southeast toe of landfill with vegetation establishment	Vegetation	N/A	
CAM-4 LS 8	8	SW	Southeast toe of landfill with vegetation establishment	Vegetation	N/A	
CAM-4 LS 9	9	E	West side slope of landfill with vegetation establishment	Vegetation	N/A	
CAM-4 LS 10	10	SW	West side slope of landfill			
CAM-4 LS 11	11	SE	Landfill cover across centre of landfill			
CAM-4 LS 12	12	NE	Vegetation establishment on west side slope, thermistors visible in background	Vegetation Thermistors	N/A VT-9, VT-10. VT-11	
CAM-4 LS 13	13	N	Vegetation establishment on west side slope, thermistor visible in background	Vegetation Thermistors	N/A VT-9	
CAM-4 LS 14	14	SW	West side slope of landfill with minor settlement	Settlement	Feature A	
CAM-4 LS 15	15	NE	Landfill cover north of VT-12			
CAM-4 LS 16	16	N	Thermistor VT-12	Thermistor	VT-12	

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 17	17	SW	Vegetation on east landfill cover	Vegetation	N/A	
CAM-4 LS 18	18	W	West landfill cover			
CAM-4 LS 19	19	NW	Thermistor VT-10 (foreground) and VT-9 (background)	Thermistors	VT-9, VT-10	
CAM-4 LS 20	20	N	North slope of landfill			
CAM-4 LS 21	21	SW	North landfill cover			
CAM-4 LS 22	22	S	East toe of landfill			
CAM-4 LS 23	23	SW	North toe of landfill			
CAM-4 LS 24	24	SW	Monitoring well MW17	Monitoring well	MW17	
CAM-4 LS 25	25	NW	Monitoring well MW17	Monitoring well	MW17	Monitoring well has heaved and cap no longer fits
CAM-4 LS 26	26	SW	Northwest side slope of landfill			
CAM-4 LS 27	27	E	Thermistor VT-9 and vegetation on northwest side slope	Vegetation Thermistor	N/A VT-9	
CAM-4 LS 28	28	SW	Northwest side slope of landfill			
CAM-4 LS 29	29	NW	Northwest toe of landfill			
CAM-4 LS 30	30	SW	Monitoring well MW18	Monitoring well	MW18	
CAM-4 LS 31	31	NE	Monitoring well MW18 and northwest landfill side slope	Monitoring well	MW18	
CAM-4 LS 32	32	S	Drainage channel along west landfill toe			
CAM-4 LS 33	33	W	Close-up of tension crack on west side slope	Cracking	I	

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 34	34	SE	Monitoring well MW19	Monitoring well	MW19	
CAM-4 LS 35	35	NE	West landfill side slope showing vegetation establishment	Vegetation	N/A	
CAM-4 LS 36	36	SW	Monitoring well MW19	Monitoring well	MW19	
CAM-4 LS 37	37	SW	Minor depression on south side slope	Settlement	B	
CAM-4 LS 38	38	NW	Minor depression on south side slope	Settlement	B	
CAM-4 LS 39	39	W	Minor depression on landfill cover	Settlement	A	
CAM-4 LS 40	40	NE	Minor depression on landfill cover	Settlement	A	
CAM-4 LS 41	41	E	Minor depression on landfill cover	Settlement	A	
CAM-4 LS 42	42	NE	Minor depression on landfill cover	Settlement	A	
CAM-4 LS 43	43	E	Minor depression on landfill cover	Settlement	J	
CAM-4 LS 44	44	SE	East landfill cover			
CAM-4 LS 45	45	SE	Two minor depressions on landfill cover	Settlement	K	
CAM-4 LS 46	46	NE	Two minor depressions on landfill cover	Settlement	K	
CAM-4 LS 47	47	SE	Minor depression on northwest landfill side slope	Settlement	L	
CAM-4 LS 48	48	SE	Minor depression on northwest landfill side slope	Settlement	L	
CAM-4 LS 49	49	E	Area of seepage on west landfill side slope	Seepage	G	
CAM-4 LS 50	50	E	Area of seepage on west landfill side slope	Seepage	G	

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 51	51	E	West landfill slope where seepage previously observed			
CAM-4 LS 52	52	W	Close-up of tension crack on west side slope	Cracking	I	
CAM-4 LS 53	53	S	Tension cracks on west side slope	Cracking	I	
CAM-4 LS 54	54	W	Close-up of tension crack on west side slope	Cracking	I	
CAM-4 LS 55	55	SW	Tension cracks on west side slope	Cracking	I	
CAM-4 LS 56	56	NE	Close-up of tension crack on west side slope	Cracking	I	
CAM-4 LS 57	57	W	Close-up of tension crack on west side slope	Cracking	I	
CAM-4 LS 80	80	SW	Minor settlement on north side slope	Settlement	Q	
CAM-4 LS 81	81	E	Minor settlement on north side slope	Settlement	Q	
CAM-4 LS 83	82	N	Minor settlement on south landfill cover	Settlement	T	
CAM-4 LS 82	83	S	Aerial view of Lower Site area			
East Lobe Visual Inspection Photographs						
CAM-4 LS 58	58	SW	Linear depression on East Lobe cover	Settlement	C	
CAM-4 LS 59	59	SE	Southeast landfill cover			
CAM-4 LS 60	60	NE	North landfill cover			
CAM-4 LS 61	61	NW	Terrain south of landfill			
CAM-4 LS 62	62	NW	Southeast landfill toe			
CAM-4 LS 63	63	NE	Area between landfill and Abandoned Camp Road			

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 64	64	SE	Settlement features between landfill and Abandoned Camp Road	Settlement	S	
CAM-4 LS 65	65	SE	Settlement feature between landfill and Abandoned Camp Road	Settlement	S	
CAM-4 LS 66	66	SW	Settlement features between landfill and Abandoned Camp Road	Settlement	S	
CAM-4 LS 67	67	NW	Erosion channels on southeast landfill slope	Erosion	E	
CAM-4 LS 68	68	NW	Erosion channels on southeast landfill slope	Erosion	E	
CAM-4 LS 69	69	W	Erosion channels on southeast landfill slope	Erosion	E	
CAM-4 LS 70	70	SE	Erosion channels on southeast landfill slope	Erosion	E	
CAM-4 LS 71	71	E	Linear depression on landfill surface	Settlement	N	
CAM-4 LS 72	72	NW	Linear depression west of landfill toe	Settlement	S	
CAM-4 LS 73	73	SE	Linear depression on landfill surface	Settlement	C	
CAM-4 LS 74	74	NE	Minor depressions on landfill surface	Settlement	C	
CAM-4 LS 75	75	SE	Minor depressions on landfill surface	Settlement	C	
CAM-4 LS 76	76	NE	Exposed metal debris on landfill surface	Exposed Debris	P	
CAM-4 LS 77	77	SW	Exposed metal debris on landfill surface	Exposed Debris	P	

Photo Identification	Figure ID	View Direction	Photo Location	Feature Identification	Feature of Note	Other Comments
CAM-4 LS 78	78	SE	Erosion channel on southeast landfill slope	Erosion	E	
CAM-4 LS 79	79	SE	South toe of landfill			

Table 7-6: Selected Photographs ï Lower Site Landfill

Lower Site Landfill
Photograph CAM-4 LS 57: Close-up of tension crack (Feature I) on west side slope of Main Lobe.
Photograph CAM-4 LS 64: Settlement features (Feature S) between East Lobe and Abandoned Camp Road.

Lower Site Landfill

Photograph CAM-4 LS 76: Exposed metal debris (Feature P) on East Lobe landfill surface.

Photograph CAM-4 LS 78: Erosion channel on East Lobe southeast landfill slope (Feature E).

Lower Site Landfill

Photograph CAM-4 LS 81: Minor settlement (Feature Q) on Main Lobe north side slope.

Photograph CAM-4 LS 83: Aerial view of Lower Site area.

7.3.1.4 Trend Analysis

A trend analysis was conducted with regards to observations made during the visual inspection of the Lower Site Landfill. The following Table 7-7 outlines the results of the visual trend analysis.

Table 7-7: Visual Inspection Trends ï Lower Site Landfill

Checklist Item	Feature Number	Comparison with Historical Observations
Settlement	A	No significant change from 2013 to 2016.
	B	Significant decrease in size from 2013 to 2016. Length decreased from 2.0 to 0.5 m, width increased from 0.4 to 0.5 m, depth decreased from 0.15 to 0.1 m between 2013 and 2016.
	J	Two depressions were observed in 2013, only one was observed in 2016. Observed length decreased from 0.6-1.00 to 0.5 m. Width increased from 0.3-0.4 m to 0.5 m, depth increased from 0.03-0.05 to 0.05 m between 2013 and 2016.
	K	No significant change between 2013 and 2016.
	L	No significant change between 2013 and 2016.
	N	No significant change between 2013 and 2016.
	Q	New observation in 2016.
	S	New observation in 2016.
	T	New observation in 2016.
Erosion	E	Three erosion channels were present in 2013 while five were present in 2016. Length changed from 10.0-15.0 to 7.0-18.0 m between 2013 and 2016 while width and depth remained stable.
	R	New observation in 2016.
Cracking	I	Feature consisted of two cracks in 2013. Length increased from 3-7 to 4-12 m, width increased from 0.03-0.04 to 0.05-1.0, depth increased from up to 0.07 to 0.05-1.0 from 2013 to 2016.
Vegetation Establishment	N/A	Amount of vegetation has increased since 2013.
Seepage	G	Four seepage points were observed in 2013 with running water observed from seepage points. Seepage points were moist only in 2016. Width of seepage decreased from 3.0-5.0 to 1.0-2.0 m from 2013 to 2016.
Exposed Debris	P	No significant change in debris exposure between 2013 and 2016.

7.3.1.5 Discussion of Results/Trends

A comparison of the visual inspection results of the 2013 and 2016 monitoring events at the Lower Site Landfill indicates that two previously observed settlement features decreased in size, and three features underwent no significant change. Erosion channels on the southeast side slope of the East Lobe increased in number from three to five. The length and number of cracks increased on the west side of the Main Lobe. The number of seepage points decreased from four to two. Three settlement and one

erosion feature were newly observed in 2016. Three new minor settlement features were observed in 2016.

It should be noted that erosion features (Feature E) on the southeast corner of the East Lobe of the Lower Site Landfill, while not currently a stability concern, may continue to erode over time. Given their location on a downslope of the landfill, the potential exists for these channels to become preferential drainage paths which may become wider and deeper through continued erosion of cover material. If this occurs, some minor repairs such as placement of large boulders within the erosion channels and/or regrading may be warranted.

The results of the visual inspection and the observed trends indicate that the performance of the landfill is acceptable.

7.3.2 Soil Sampling

Soil sampling of the Lower Site Landfill was conducted on August 22, 2016. The soil sampling was conducted in compliance with Sections 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections 7.3.2.1 through 7.3.2.3.

7.3.2.1 Laboratory Analytical Results

A total of 15 soil samples (including one duplicate) were analysed from seven soil sample locations (MW-17, MW-18, MW-19, MW-20, C4-1, C4-2, and C4-3) at the Lower Site Landfill. Table 7-8 and Table 7-9 present the soil analytical results. Figure CAM-4.6B presents a summary of significant soil analytical results.

Table 7-8: Soil Chemical Analysis Results ï Lower Site Landfill

Lower Site Landfill																	
Sample ID	**Sampling Station**	**Monitoring Year**	**Depth**	**Cu**	**Ni**	**Co**	**Cd**	**Pb**	**Zn**	**Cr**	**As**	**Hg**	**Total PCB**	**F1 C6-C10**	**F2 C10-C16**	**F3 C16-C34**	**Modified TPH Total C6-C34**
Comparison Values																	
Background				14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012				38
Baseline				**12**	**9.4**	**4.2**	**1.00**	**10**	**58**	**20**	**1.6**	**0.100**	**0.100**				**162**
Baseline +3 Standard Deviations				42	25	11	1.00	431	401	63	7.6	0.100	0.20				1182
Downgradient																	
C4-1 Surface																	
24916	C4-1	2007	0	10	8.6	**5.7**	<1.0	<10	35	<20	1.2	<0.10	<0.0030	<10	<4.0	<9.0	12
	C4-1	2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-1A	C4-1	2009	0-15	**18**	**16**	**5.0**	0.10	**19**	**150**	**29**	**2.0**	<0.050	<0.010	<10	<10	35	45
C410-1A	C4-1	2010	0-15	**15**	**12**	**6.0**	<0.10	**21**	54	**20**	**2.0**	0.050	<0.010	<12	<10	<10	16
	C4-1	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-C4-1-A	C4-1	2013	0-15	**24**	**19**	**9.8**	0.13	**36**	**110**	**36**	**4.6**	<0.050	<0.010	<12	<10	58	69
16-C4-1A	C4-1	2016	0-15	9.0	7.9	**4.4**	0.072	**11**	36	14	1.6	<0.050	<0.010	<12	<10	<50	36
C4-1 Depth																	
24918	C4-1	2007	30	8.1	8.2	**5.4**	<1.0	<10	28	<20	**1.7**	<0.10	<0.0030	<10	4.2	<9.0	14
	C4-1	2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-1B	C4-1	2009	30	**22**	**11**	**5.0**	0.40	**100**	**350**	**22**	**4.0**	<0.050	<0.010	<10	<10	100	110
C410-1B	C4-1	2010	40-50	**13**	9.0	**5.0**	<0.10	**18**	39	17	**2.0**	<0.050	<0.010	<12	<10	<10	16
	C4-1	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-C4-1-B	C4-1	2013	40-50	**14**	8.8	**4.9**	<0.10	**13**	39	15	1.2	<0.050	<0.010	<12	<10	<50	36
16-C4-1B	C4-1	2016	40-50	**16**	**12**	**6.2**	<0.050	8.4	36	**21**	**1.8**	<0.050	<0.010	<12	<10	<50	36
MW-20 Surface																	
24904	MW-20	2007	0-15	10	**9.7**	**6.5**	<1.0	**17**	30	**21**	**2.4**	< 0.1	<0.003	<10	4.1	11	20
MW-20-15	MW-20	2008	15	12	**9.6**	**5.9**	<0.50	**11**	37	18	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-20WA	MW-20	2009	0-15	9.0	9.0	4.0	<0.10	8.0	23	17	**2.0**	<0.050	<0.010	<12	<10	31	42
C410-20WA	MW-20	2010	0-15	**29**	**10**	**6.0**	<0.10	5.0	41	**21**	**2.0**	<0.050	<0.010	<12	<10	<10	16
C4 11-20WA	MW-20	2011	0-15	**15**	**21**	**8.0**	<0.10	**14**	53	**41**	**3.0**	<0.050	<0.010	<12	<10	<10	16

Lower Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
2013-C4-MW-20-A	MW-20	2013	0-15	12	11	5.9	<0.10	8.7	39	18	2.0	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-20A	MW-20	2016	0-15	9.7	9.0	5.6	<0.050	5.3	37	16	1.5	<0.050	<0.010	<12	<10	<50	36
16-C4-DUP4	MW-20	2016	0-15	8.6	9.5	5.2	0.12	5.0	50	15	1.8	<0.050	<0.010	<12	<10	<50	36
MW-20 Depth																	
24906	MW-20	2007	20	6.7	6.9	<5.0	<1.0	<10	19	<20	1.2	< 0.1	<0.003	<10	< 4.0	14	0
MW-20-35	MW-20	2008	35	10	9.5	4.9	<0.50	11	26	19	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-20WB	MW-20	2009	40-50	8.0	9.0	4.0	<0.10	5.0	19	16	1.0	<0.050	<0.010	<12	<10	18	29
C410-20WB	MW-20	2010	40-50	8.0	8.0	4.0	<0.10	5.0	26	16	2.0	<0.050	<0.010	<12	<10	<10	16
C4-11-20WB	MW-20	2011	40-50	9.0	11	5.0	<0.10	9.0	28	21	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-20-B	MW-20	2013	40-50	14	9.5	4.8	<0.10	8.1	34	16	1.7	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-20B	MW-20	2016	40-50	10	9.9	4.8	<0.050	6.9	26	18	1.5	<0.050	<0.010	<12	<10	<50	36
MW-17 Surface																	
24876	MW-17	2007	0	5.5	7.4	<5.0	<1.0	<10	21	<20	1.5	<0.10	<0.0030	<10	4.4	19	28
MW-17-15	MW-17	2008	15	6.6	6.6	3.8	<0.50	5.4	18	14	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-17WA	MW-17	2009	0-15	6.0	9.0	4.0	<0.10	5.0	20	17	1.0	<0.050	<0.010	<12	13	61	80
C410-17WA	MW-17	2010	0-15	7.0	8.0	4.0	<0.10	5.0	20	16	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-17WA	MW-17	2011	0-15	<5.0	10	4.0	<0.10	4.0	18	21	<1.0	<0.050	<0.010	<12	<10	22	33
2013-C4-MW-17-A	MW-17	2013	0-15	9.8	10	5.3	<0.10	7.1	35	19	1.6	<0.050	<0.010	<12	<10	60	71
16-C4-MW-17A	MW-17	2016	0-15	5.3	4.5	2.6	<0.050	3.4	15	8.2	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-17 Depth																	
24878	MW-17	2007	30	6.5	8.7	5.5	<1.0	<10	23	<20	1.7	<0.10	<0.0030	<10	<4.0	<9.0	12
MW-17-40	MW-17	2008	40	14	10	5.5	<0.50	8.7	32	21	<5.0	0.0052	<0.050	<10	<30	<50	45
C409-17WB	MW-17	2009	40-50	7.0	11	4.0	<0.10	6.0	21	22	2.0	<0.050	<0.010	<12	<10	25	36
C410-17WB	MW-17	2010	40-50	11	8.0	4.0	<0.10	6.0	23	16	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-17WB	MW-17	2011	40-50	5.0	13	4.0	<0.10	5.0	19	26	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-17-B	MW-17	2013	40-50	10	11	5.1	<0.10	7.0	32	18	1.6	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-17B	MW-17	2016	40-50	4.6	5.7	2.8	<0.050	3.7	14	9.7	8.1	<0.050	<0.010	<12	<10	58	69
MW-18 Surface																	
24882	MW-18	2007	0	7.3	8.0	<5.0	<1.0	10	54	<20	2.7	<0.10	<0.0030	<10	<4.0	43	50
MW-18-30	MW-18	2008	15	9.5	8.0	3.8	<0.50	7.2	31	16	<5.0	0.012	<0.050	<10	<30	<50	45

Lower Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C409-18WB	MW-18	2009	0-15	10	9.0	4.0	<0.10	10	43	17	2.0	<0.050	<0.010	<12	<10	44	55
C410-18WB	MW-18	2010	0-15	7.0	7.0	3.0	<0.10	6.0	23	14	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-18WB	MW-18	2011	0-15	8.0	21	5.0	<0.10	6.0	34	43	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-18-B	MW-18	2013	0-15	34	17	9.1	<0.10	19	64	35	2.6	0.11	<0.010	<12	<10	<50	36
16-C4-MW-18A	MW-18	2016	0-15	6.0	7.0	3.0	<0.050	5.1	25	14	1.9	<0.050	<0.010	<12	<10	<50	36
MW-18 Depth																	
24882	MW-18	2007	30	13	12	12	<1.0	18	69	24	3.9	<0.10	<0.0030	<10	4.4	35	44
MW-18-30	MW-18	2008	40	10	8.7	3.8	<0.50	8.9	36	18	<5.0	0.0085	<0.050	<10	<30	<50	45
C409-18WB	MW-18	2009	40-50	18	17	7.0	<0.10	16	84	26	2.0	<0.050	<0.010	<12	<10	97	108
C410-18WB	MW-18	2010	40-50	7.0	6.0	3.0	<0.10	5.0	22	14	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-18WB	MW-18	2011	40-50	<5.0	10	4.0	<0.10	4.0	23	19	2.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-18-B	MW-18	2013	40-50	13	13	7.2	<0.10	12	59	26	3.1	0.10	<0.010	<12	<10	<50	36
16-C4-MW-18B	MW-18	2016	40-50	4.5	4.7	2.8	<0.050	4.3	23	9.7	1.9	<0.050	<0.010	<12	<10	<50	36
MW-19 Surface																	
24884	MW-19	2007	0	6.3	7.9	<5.0	<1.0	<10	25	<20	1.4	<0.10	<0.0030	<10	28	190	223
MW-19-20	MW-19	2008	20	7.4	7.2	3.9	<0.50	6.4	27	15	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-19WA	MW-19	2009	0-15	<5.0	6.0	2.0	<0.10	3.0	13	11	<1.0	<0.050	<0.010	<12	<10	18	29
C410-19WA	MW-19	2010	0-15	11	9.0	4.0	<0.10	7.0	33	17	2.0	<0.050	<0.010	<12	<10	<10	16
C4 11-19WA	MW-19	2011	0-15	6.0	10	3.0	<0.10	5.0	19	20	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-19-A	MW-19	2013	0-15	6.7	7.1	3.3	<0.10	5.4	25	14	1.1	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-19A	MW-19	2016	0-15	5.3	4.0	1.8	<0.050	3.6	15	8.0	<1.0	<0.050	<0.010	<12	<10	<50	36
MW-19 Depth																	
24886	MW-19	2007	30	6.2	9.1	<5.0	<1.0	<10	24	<20	8.0	<0.10	<0.0030	<10	4.3	17	26
MW-19-50	MW-19	2008	50	7.1	6.6	3.9	<0.50	7.8	29	12	<5.0	<0.0050	<0.050	<10	<30	<50	45
C409-19WB	MW-19	2009	40-50	<5.0	10	2.0	<0.10	3.0	14	20	<1.0	<0.050	<0.010	<12	<10	14	25
C410-19WB	MW-19	2010	40-50	8.0	7.0	4.0	<0.10	6.0	26	15	1.0	<0.050	<0.010	<12	<10	<10	16
C4 11-19WB	MW-19	2011	40-50	7.0	10	4.0	<0.10	5.0	23	18	1.0	<0.050	<0.010	<12	<10	<10	16
2013-C4-MW-19-B	MW-19	2013	40-50	6.7	8.0	3.8	<0.10	5.8	32	15	2.2	<0.050	<0.010	<12	<10	<50	36
16-C4-MW-19B	MW-19	2016	40-50	9.6	7.8	3.8	<0.050	5.6	27	14	1.2	<0.050	<0.010	<12	<10	<50	36
C4-2 Surface																	

Lower Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
24908	C4-2	2007	0	5.8	11	9.5	<1.0	<10	48	27	1.2	<0.10	<0.0030	<10	6.3	160	171
	C4-2	2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-2A	C4-2	2009	0-15	5.0	13	7.0	<0.10	8.0	40	28	2.0	<0.050	<0.010	<10	<10	49	59
C410-2A	C4-2	2010	0-15	12	13	6.0	<0.10	8.0	33	34	3.0	0.070	<0.010	<12	<10	41	52
	C4-2	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-C4-2-A	C4-2	2013	0-15	9.4	8.3	4.6	<0.10	5.6	27	14	8.9	<0.050	<0.010	<12	<10	<50	36
16-C4-2A	C4-2	2016	0-15	11	14	8.9	0.068	10	50	32	2.2	<0.050	<0.010	<12	<10	<50	36
C4-2 Depth																	
24910	C4-2	2007	30	8.4	18	13	<1.0	<10	50	45	1.8	<0.10	<0.0030	<10	11	40	56
	C4-2	2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C409-2B	C4-2	2009	40-50	<5.0	10	5.0	<0.10	4.0	17	19	2.0	<0.050	<0.010	<10	<10	53	63
C410-2B	C4-2	2010	40-50	7.0	11	7.0	<0.10	6.0	38	24	2.0	0.090	<0.010	<12	<10	32	43
	C4-2	2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013-C4-2-B	C4-2	2013	40-50	8.0	8.2	3.9	<0.10	6.2	25	13	2.8	<0.050	<0.010	<12	<10	<50	36
16-C4-2B	C4-2	2016	40-50	13	14	10	0.074	12	49	31	3.0	<0.050	<0.010	<12	<10	<50	36
C4-3 Surface																	
24912	C4-3	2007	0	13	11	7.6	<1.0	<10	43	23	2.0	<0.10	<0.0030	<10	4.6	21	31
	C4-3	2008															
C409-3A	C4-3	2009	0-15	5.0	10	3.0	<0.10	6.0	25	22	2.0	<0.050	<0.010	<12	<10	150	161
C410-3A	C4-3	2010	0-15	20	13	7.0	0.20	9.0	36	28	3.0	<0.050	<0.010	<12	<10	<10	16
	C4-3	2011															
2013-C4-3-A	C4-3	2013	0-15	16	15	7.6	<0.10	12	64	40	6.5	0.079	<0.010	<12	<10	<50	36
16-C4-3A	C4-3	2016	0-15	12	23	16	0.051	8.2	110	45	2.5	<0.050	<0.010	<12	<10	<50	36
C4-3 Depth																	
24914	C4-3	2007	30	7.2	7.0	<5.0	<1.0	<10	21	<20	1.3	<0.10	<0.0030	<10	4.1	<9.0	14
	C4-3	2008															
C409-3B	C4-3	2009	40-50	<5.0	8.0	3.0	<0.10	4.0	18	18	1.0	<0.050	<0.010	<12	<10	67	78
C410-3B	C4-3	2010	40-50	19	12	6.0	<0.10	9.0	35	27	3.0	<0.050	<0.010	<12	<10	<10	16
	C4-3	2011															
2013-C4-3-B	C4-3	2013	40-50	24	20	10	<0.10	15	79	56	7.4	0.062	<0.010	<12	<10	71	82

Lower Site Landfill																	
Sample ID	Sampling Station	Monitoring Year	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
16-C4-3B	C4-3	2016	30-40	23	47	19	<0.050	14	120	99	5.0	<0.050	<0.010	<12	<10	<50	36

Notes:

XX sample exceeds background

XX sample exceeds baseline

XX sample exceeds baseline +3 standard deviations

**** All units in mg/kg**

Table 7-9: PHC F4 Soil Chemical Analysis Results ï Lower Site Landfill

Lower Site Landfill			
Sample Location	**Sample ID**	**Sample Depth (m bgs)**	**PHC F4 (mg/kg)**
MW-17	16-C4-MW-17A	0 - 0.15	<50
	16-C4-MW-17B	0.4 - 0.5	<50
MW-18	16-C4-MW-18A	0 - 0.15	<50
	16-C4-MW-18B	0.4 - 0.5	<50
MW-19	16-C4-MW-19A	0 - 0.15	<50
	16-C4-MW-19B	0.4 - 0.5	<50
MW-20	16-C4-MW-20A	0 - 0.15	<50
	16-C4-DUP4	0 - 0.15	<50
	16-C4-MW-20B	0.4 - 0.5	<50
C4-1	16-C4-1A	0 - 0.15	<50
	16-C4-1B	0.4 - 0.5	<50
C4-2	16-C4-2A	0 - 0.15	<50
	16-C4-2B	0.4 - 0.5	<50
C4-3	16-C4-3A	0 - 0.15	<50
	16-C4-3B	0.3 - 0.4	<50

7.3.2.2 Discussion of Results ï Comparison to Baseline/Background

Analytical results were compared against historical data, baseline data, and background concentrations. The following Table 7-10 summarizes the comparison of results.

Table 7-10: Evaluation of Results by Parameter ï Lower Site Landfill

Lower Site Landfill	
Parameter	**Discussion of Results**
Copper (Cu)	Cu was reported to exceed the baseline concentration of 12 mg/kg in three samples as follows; 16-C4-1B at 16 mg/kg, 16-C4-2B at 13 mg/kg, and 16-C4-3B at 23 mg/kg. Two of those samples (16-C4-1B and 16-C4-3B) were also reported at or above the background concentration of 14 mg/kg.
Nickel (Ni)	Ni was reported to exceed the baseline concentration of 9.4 mg/kg in seven samples as follows; 16-C4-1B at 12 mg/kg, 16-C4-DUP4 at 9.5 mg/kg, 16-C4-MW-20B at 9.9 mg/kg, 16-C4-2A 14 mg/kg, 16-C4-2B at 14 mg/kg, 16-C4-3A at 23 mg/kg, and 16-C4-3B at 47 mg/kg. Two of those samples (16-C4-3A and 16-C4-3B) were also reported at or above the background concentration of 16 mg/kg.
Cobalt (Co)	Co was reported to exceed the baseline concentration of 4.2 mg/kg in nine samples as follows; 16-C4-1A at 4.4 mg/kg, 16-C4-1B at 6.2 mg/kg, 16-C4-MW-20A at 5.6 mg/kg, 16-C4-

Lower Site Landfill	
Parameter	**Discussion of Results**
	DUP4 at 5.2 mg/kg, 16-C4-MW-20B at 4.8 mg/kg, 16-C4-2A 8.9 mg/kg, 16-C4-2B at 10 mg/kg, 16-C4-3A at 16 mg/kg, and 16-C4-3B at 19 mg/kg. Four of those samples (16-C4-2A, 16-C4-2B, 16-C4-3A and 16-C4-3B) were also reported above the background concentration of 8.3 mg/kg.
Cadmium (Cd)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Cd.
Lead (Pb)	Pb was reported to exceed the background concentration of 6.4 mg/kg in seven samples as follows; 16-C4-1A at 11 mg/kg, 16-C4-1B at 8.4 mg/kg, 6-C4-MW-20B at 6.9 mg/kg, 16-C4-2A 10 mg/kg, 16-C4-2B at 12 mg/kg, 16-C4-3A at 8.2 mg/kg and 16-C4-3B at 14 mg/kg. Three of those samples (16-C4-1A, 16-C4-2B and 16-C4-3B) were also reported above the baseline ground concentration of 10 mg/kg.
Zinc (Zn)	Zn was reported to exceed the background concentration of 50 mg/kg and baseline concentration of 58 mg/kg in two samples as follows; 16-C4-3A at 110 mg/kg and 16-C4-3B at 120 mg/kg
Chromium (Cr)	Cr was reported to exceed the baseline concentration of 20 mg/kg in five samples as follows; 16-C4-1B at 21 mg/kg, 16-C4-2A at 32 mg/kg, 16-C4-2B at 31 mg/kg, 16-C4-3A at 45 mg/kg, and 16-C4-3B at 99 mg/kg. Two of those samples (16-C4-3A and 16-C4-3B) were also reported above the background concentration of 32 mg/kg.
Arsenic (As)	As was reported to exceed the baseline concentration of 1.6 mg/kg in nine samples as follows; 16-C4-1B at 1.8 mg/kg, 16-C4-DUP4 at 1.8 mg/kg, 16-C4-MW-17B at 8.1 mg/kg, 16-C4-MW-18A at 1.9 mg/kg, 16-C4-MW18B at 1.9 mg/kg, 16-C4-2A at 2.2 mg/kg, 16-C4-2B at 3.0 mg/kg, 16-C4-3A at 2.5 mg/kg, and 16-C4-3B at 5.0 mg/kg. Four of those samples (16-C4-MW-17B, 16-C4-2B, 16-C4-3A, and 16-C4-3B) were also reported above the background concentration of 2.4 mg/kg. Notably, the concentration of As in soil sample 16-C4-MW-17B was above the baseline plus three standard deviations..
Mercury (Hg)	All soil samples reported either non-detect concentrations or were below both background and baseline concentrations for Hg.
PCBs (Total)	All soil samples reported non-detect concentrations for PCBs.
F1 (C_6-C_{10})	All soil samples reported non-detect concentrations for F1
F2 (C_{10}-C_{16})	All soil samples reported non-detect concentrations for F2
F3 (C_{16}-C_{34})	All soil samples reported non-detect concentrations for F3 with the exception of sample 16-C4-MW-17B at 58 mg/kg.
F4 (C_{34}- C_{50})	All soil samples reported non-detect concentrations of F4.
Modified TPH (C_6-C_{34})	All soil samples reported concentrations of modified TPH below both the background concentration (38 kg/mg) and baseline concentration (162 kg/mg) with the exception of sample 16-C4-17B, which reported a Modified TPH concentration of 69 mg/kg.

7.3.2.3 Soil Trend Analysis by Parameter & Discussion of Trends

A soil chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison to background, baseline and historical concentrations using differentiating colours (See Appendix E). The following Table 7-11 provides a summary of soil trend analysis findings and presents a discussion of the observed trends by parameter.

Table 7-11: Discussion of Trends – Lower Site Landfill

Lower Site Landfill	
Parameter	Discussion of Trends
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend. The current monitoring event reported one anomalous elevated Ni concentration at downgradient sample station C4-3; however, there is insufficient data to draw any further trend assessment.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend. The current monitoring event reported one anomalous elevated Co concentration at downgradient sample station C4-3; however, there is insufficient data to draw any further trend assessment.
Cadmium (Cd)	Based on mostly non-detect concentrations, Cd has no observable trend.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend.
Zinc (Zn)	Based on mostly non-detect concentrations, Zn has no observable trend.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend. The current monitoring event reported one anomalous elevated Cd concentration at downgradient sample station C4-3; however, there is insufficient data to draw any further trend assessment.
Arsenic (As)	Based on current and historical results, As generally has no observable trend.
Mercury (Hg)	Based on mostly non-detect concentrations, Hg has no observable trend.
PCBs (Total)	Based on mostly non-detect concentrations, PCBs has no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, Modified TPH concentrations has no observable trend.

The trend analyses presented are based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

7.3.3 Groundwater Sampling

Four groundwater monitoring wells (MW-17, MW-18, MW-19 and MW-20) are present at the Lower Site Landfill. Groundwater sampling of the Lower Site Landfill was conducted on August 21 to 22, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following 7.3.3.1 to 7.3.3.5.

7.3.3.1 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

Table 7-12: CAM-4 Monitoring Well Log for MW-17

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Landfill
Monitoring Well ID:	MW-17	UTM Coordinates:	North 20590.5 East 18795.2
Sample Number(s) (include dups.):	CAM4-MW17		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 21/16	Time:	4:45 PM
Weather:	Clear, 12°C		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	380	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	83	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=		71	
Static water level (cm) from top of pipe =		149.0	
Static water level (cm) (below ground surface) calculated =		78	
Measured well refusal depth (cm) (measure after sampling) =		250.8	
Thickness of water column (cm)=	101.8	Static volume of water in well (mL)=	2000
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	3.5 L over 20 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.57	7.38	7.29	
Conductivity (uS/cm)	273	269	268	
Turbidity (NTU)				
Temperature (degC)	4.85	4.95	5.10	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox and distilled water - dedicated sampling train

Number washes: 1 Number rinses: 1

Other Relevant Comments:

Table 7-13: CAM-4 Monitoring Well Log for MW-18

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Landfill
Monitoring Well ID:	MW-18	UTM Coordinates:	North 20523.2 East 18727.9
Sample Number(s) (include dups.):	CAM4-MW18		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)		
Date of Sampling Event:	Aug 22/16	Time:	10:20 AM
Weather:	Clear, Windy 12-14 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (some ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	380	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	81	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		71	
Static water level (cm) from top of pipe =		84.4	
Static water level (cm) (below ground surface) calculated =		13	
Measured well refusal depth (cm) (measure after sampling) =		218.4	
Thickness of water column (cm)=	134.0	Static volume of water in well (mL)=	2700
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	4.5 L over 30 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.53	6.94	6.96	
Conductivity (uS/cm)	325	323	334	
Turbidity (NTU)				
Temperature (degC)	2.44	2.8	3.61	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): clear, slightly sandy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 7-14: CAM-4 Monitoring Well Log for MW-19

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Landfill
Monitoring Well ID:	MW-19	UTM Coordinates:	North 20440.8 East 18700.3
Sample Number(s) (include dups.):	CAM4-MW19		
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB) ï same for all		
Date of Sampling Event:	Aug 21/16	Time:	5:30 PM
Weather:	Clear, 12ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (marshy and ponding water)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	380	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	84	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		67	
Static water level (cm) from top of pipe =		645	
Static water level (cm) (below ground surface) calculated =		-2.5	
Measured well refusal depth (cm) (measure after sampling) =		215.2	
Thickness of water column (cm)=	156.7	Static volume of water in well (mL)=	3000
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	4 L over 20 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	6.86	6.83	9.82	
Conductivity (uS/cm)	490	440	434	
Turbidity (NTU)				
Temperature (degC)	4.94	4.75	4.83	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, yellow, sandy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

Table 7-15: CAM-4 Monitoring Well Log for MW-20

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Landfill
Monitoring Well ID:	MW-20	UTM Coordinates:	North 20469.7 East 18822.7
Sample Number(s) (include dups.):	CAM4-MW20		
Bottles filled (by parameter type):	8 (4 PHC, 3 Metals, 1 PCB) ï same for all		
Date of Sampling Event:	Aug 22/16	Time:	11:10 AM
Weather:	Clear, Windy 12-14 ºC		
Names of Samplers:	Keith Coulthart		
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (No ponding)		
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR		

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	340	Diameter of well (cm)=	5.1
*Depth to top of screen (cm)=	30	Length screened section (cm)=	210

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =	82		
Static water level (cm) from top of pipe =	244.6		
Static water level (cm) (below ground surface) calculated =	162.6		
Measured well refusal depth (cm) (measure after sampling) =	275.4		
Thickness of water column (cm)=	162.6	Static volume of water in well (mL)=	600
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	3 L over 20 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	7.65	7.74	7.79	
Conductivity (uS/cm)	269	272	275	
Turbidity (NTU)				
Temperature (degC)	6.68	6.35	6.30	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): clear, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments: Clear purge water

Table 7-16: Summary of Groundwater Field Chemistry ï Lower Site Landfill

Lower Site Landfill						
	Time (min)	Temperature (ºC)	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)
Upgradient						
MW-20						
	5	6.68	269	13.32	7.65	29.5
	10	6.55	211	7.3	7.68	21.8
	15	6.35	273	4.24	7.78	8.9
	20	6.30	275	4.0	7.79	7.0
	25	Sampled				
Downgradient						
MW-17						
	5	4.85	273	18.50	7.57	60.6
	10	4.95	264	11.09	7.38	51.6
	15	5.05	289	10.69	7.30	53.6
	20	5.10	268	9.00	7.29	53.9
	25	Sampled				
MW-18						
	5	2.44	325	24.00	7.53	1.6
	10	2.8	321	13.90	7.04	21.0
	15	2.8	322	10.23	6.94	26.1
	20	3.47	327	8.08	6.98	30.0
	25	3.52	330	7.00	6.96	33.0
	30	3.61	334	6.91	6.96	34.0
	35	Sampled				
MW-19						
	5	4.54	490	15.48	5.86	75.4
	10	4.75	440	13.00	6.83	75.8
	15	4.83	454	9.8	6.92	75.3
	20	Sampled				

7.3.3.2 Water Levels/Groundwater Flow

Groundwater levels were collected and are presented in the Table below.

Table 7-17: Summary of Groundwater Levels - Lower Site Landfill

Lower Site Landfill				
Monitoring Well ID	Water Level (TOC) (m)	Water Level (from ground surface) (m)	Water Elevation (masl)	Comments
MW-17	1.490	0.78	118.9	Sufficient recharge ï sample collected
MW-18	0.844	0.13	124.4	Sufficient recharge ï sample collected
MW-19	0.645	-0.025	128.5	Minimal recharge ï sample collected
MW-20	2.446	1.5	133.0	Sufficient recharge ï sample collected

At the Lower Site Landfill, shallow groundwater has a northwest flow direction based on linear interpolation and assuming homogenous substrate.

7.3.3.3 Groundwater Laboratory Analytical Results

Four groundwater sample were collected and analysed from the Lower Site Landfill. Table 7-18 and Table 7-19 presents the groundwater analytical results. Figure CAM-4.6C presents a summary of significant groundwater analytical results.

Table 7-18: Groundwater Chemical Analysis Results ï Lower Site Landfill

Lower Site Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
Comparison Values																
Background			0.19	0.15	0.06	0.0005	0.08	0.44	0.31	0.03	0.0007	0.00001				0.58
Baseline			**0.30**	**0.24**	**0.11**	**0.0010**	**0.20**	**0.97**	**0.40**	**0.046**	**0.00040**	**0.00002**				**1.00**
Baseline +3 Standard Deviations			1.9	1.5	0.8	0.02	1.7	7.6	2.4	0.3	0.0006	0.00002				3.8
Upgradient																
MW-20																
MW-20	MW-20	2008	0.0029	<0.0010	<0.00030	0.000024	<0.00050	<0.0050	<0.0010	<0.00050	<0.000020	<0.0010	-	-	-	**2.7**
MW-20	MW-20	2008	0.0035	<0.0010	<0.00030	0.000028	<0.00050	<0.0050	<0.0010	<0.00050	<0.000020	<0.0010	-	-	-	**3.1**
C409-20W	MW-20	2009	0.019	0.013	0.00070	0.00019	0.0023	0.029	0.012	<0.00020	0.000029	<0.000050	-	-	-	
C410-20W	MW-20	2010	0.012	0.0050	0.00080	0.00016	0.0015	0.015	0.0020	0.00060	0.000005	<0.000050	-	-	-	**1.5**
C4 11-20W	MW-20	2011	0.039	0.012	0.0011	<0.00020	0.0054	0.024	0.010	<0.0010	0.000017	<0.000050	-	-	-	**4.0**
insufficient water	MW-20	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CAM4-MW20	MW-20	2016	0.0013	0.00052	<0.00030	<0.000020	<0.00020	<0.0030	<0.0010	0.00055	<0.0000020	<0.000050	0.46	1.9	<0.20	**2.5**
Downgradient																
MW-17																
07-24936	MW-17	2007	0.011	0.019	0.0037	<0.0010	<0.010	0.021	0.041	<0.0030	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-17	MW-17	2008	0.0069	0.0024	0.0029	0.000056	<0.00050	<0.0050	0.0014	0.00062	<0.000020	<0.0010	-	-	-	0.33
C409-17W	MW-17	2009	0.026	0.026	0.0074	0.00012	0.0085	0.032	0.043	0.0060	0.000027	<0.000050	-	-	-	<0.10
C410-17W	MW-17	2010	0.0098	0.0056	0.0023	0.00017	0.0018	0.015	0.0030	0.00080	0.000002	<0.000050	-	-	-	<0.10
C4 11-17W	MW-17	2011	0.019	0.0073	0.0046	<0.00020	0.0042	0.0090	0.0070	0.0010	0.000034	<0.000050	-	-	-	<2.0
2013-C4-MW-17	MW-17	2013	0.0068	0.0064	0.0019	0.00012	0.00020	<0.0030	<0.0010	0.00060	0.0000068	<0.000050	-	-	-	<0.10
CAM4-MW17	MW-17	2016	0.0081	0.0076	0.0018	0.00017	0.0097	0.044	0.013	0.0034	0.000010	<0.000050	<0.1	<0.10	<0.20	0.20
MW-18																
07-24940/41	MW-18	2007	0.022	0.022	0.0070	<0.0010	0.011	0.075	0.035	0.0038	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-18	MW-18	2008	0.0023	0.0014	<0.00030	0.000025	<0.00050	0.0081	<0.0010	<0.00050	<0.000020	<0.0010	-	-	-	<0.30
C409-18W	MW-18	2009	0.010	0.010	0.0019	0.00019	0.0042	0.041	0.013	<0.00020	0.000007	<0.000050	-	-	-	<0.10
C410-18W	MW-18	2010	0.0042	0.0028	0.00040	0.00016	0.0015	0.029	0.0040	0.00050	0.000003	<0.000050	-	-	-	<0.10
C410-BDW1	MW-18	2010	0.014	0.0081	0.0020	0.00019	0.0076	0.040	0.011	0.0015	0.000003	<0.000050	-	-	-	<0.10
C4 11-18W	MW-18	2011	0.0067	0.0047	0.00090	<0.00020	0.0028	0.025	0.016	<0.0010	0.000011	<0.000050	-	-	-	<2.0
2013-C4-MW-18	MW-18	2013	0.0016	0.0012	<0.00030	0.00011	<0.00020	<0.0030	<0.0010	<0.00020	<0.0000020	<0.000050	-	-	-	<0.10

Lower Site Landfill																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
CAM4-MW18	MW-18	2016	0.0044	0.0037	0.00043	0.000029	0.00063	0.018	0.0049	0.00056	0.0000021	<0.000050	<0.1	<0.10	<0.20	0.20
MW-19																
07-24934	MW-19	2007	0.045	0.044	0.020	<0.0010	0.027	0.15	0.063	0.0089	<0.00040	<0.000020	<0.05	<0.5	<1.0	0.78
MW-19	MW-19	2008	0.0033	0.0041	0.0020	0.00021	<0.00050	0.086	0.0014	<0.00050	<0.000020	<0.0010	-	-	-	0.32
C409-19W	MW-19	2009	**1.3**	**1.4**	**0.61**	**0.0085**	**1.0**	**3.5**	**2.3**	**0.27**	0.000048	<0.000050	-	-	-	<0.10
C410-19W	MW-19	2010	0.13	0.11	0.047	**0.0016**	0.085	0.030	0.066	0.015	0.000004	<0.000050	-	-	-	<0.10
C4 11-19W	MW-19	2011	0.042	0.029	0.018	0.00060	0.027	0.089	0.022	0.0050	0.000016	<0.000050	-	-	-	<2.0
2013-C4-MW-19	MW-19	2013	0.0029	0.0049	0.0015	0.00040	<0.00020	<0.0030	<0.0010	0.00040	<0.0000020	<0.000050	-	-	-	<0.10
CAM4-MW19	MW-19	2016	0.016	0.028	0.0063	0.00045	0.0097	0.052	0.057	0.0033	<0.000020	<0.000050	0.14	<0.10	<0.20	0.29

Notes:

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline + 3 standard deviations*

**** All units in mg/L**

Table 7-19: PHC F4 Groundwater Chemical Analysis Results ï Lower Site Landfill

Lower Site Landfill	
Monitoring Well ID	**PHC F4 (mg/L)**
MW-20	<0.20
MW-17	<0.20
MW-18	<0.20
MW-19	<0.20

7.3.3.4 Discussion of Groundwater Results by Parameter

Analytical results were compared against historical data and baseline data. The following Table 7-20 summarizes the comparison of results.

Table 7-20: Evaluation of Groundwater Analytical Results ï Lower Site Landfill Site

Lower Site Landfill Site	
Parameter	**Discussion of Results**
Copper (Cu)	Cu was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Nickel (Ni)	Ni was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cobalt (Co)	Co was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Cadmium (Cd)	Cd was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Lead (Pb)	Pb was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Zinc (Zn)	Zn was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Chromium (Cr)	Cr was reported at non-detect concentrations or below the background and baseline concentration for all 2016 site-specific groundwater samples.
Arsenic (As)	As was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
Mercury (Hg)	Hg was reported below the background and baseline concentration for all 2016 site-specific groundwater samples.
PCBs (Total)	PCBs was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F1 (C_6-C_{10})	All groundwater samples reported non-detect concentrations for F1 with the exception of sample CAM4-MW20 at 0.46 mg/L and CAM4-MW19 at 0.14 mg/L.
F2 (C_{10}-C_{16})	All groundwater samples reported non-detect concentrations for F2 with the exception of sample CAM4-MW20 at 1.9 mg/L.

Lower Site Landfill Site	
Parameter	**Discussion of Results**
F3 (C_{16}-C_{34})	F3 was reported at non-detect concentrations for all 2016 site-specific groundwater samples.
F4 (C_{34}- C_{50})	All 2016 site-specific groundwater samples reported non-detect concentrations for PHC F4.
Modified TPH (C_6-C_{34})	All 2016 site-specific groundwater samples reported concentrations of Modified TPH below both the background concentration (0.58 mg/L) and baseline concentration (1.00 mg/L) with the exception of sample CAM-MW20, which reported a Modified TPH concentration of 2.5 mg/L.

7.3.3.5 Groundwater Trend Analysis by Parameter and Discussion of Trends

A groundwater chemistry trend analysis was conducted based on the current and historical analytical results collected at the site. A series of graphs were generated including a visual comparison with respect to baseline and historical concentrations using differentiating colours (See Appendix F). The following Table 7-21 provides a summary of groundwater trend analysis findings and presents a discussion of the observed trends by parameter.

Table 7-21: Evaluation of Groundwater Chemistry Trends

Lower Site Landfill	
Parameter	**Discussion of Trends**
Copper (Cu)	Based on current and historical results, it appears that Cu has no observable trend.
Nickel (Ni)	Based on current and historical results, it appears that Ni has no observable trend.
Cobalt (Co)	Based on current and historical results, it appears that Co has no observable trend.
Cadmium (Cd)	Based on current and historical results, it appears that Cd has no observable trend.
Lead (Pb)	Based on current and historical results, it appears that Pb has no observable trend.
Zinc (Zn)	Based on current and historical results, it appears that Zn has no observable trend.
Chromium (Cr)	Based on current and historical results, it appears that Cr has no observable trend.
Arsenic (As)	Based on current and historical results, it appears that As has no observable trend.
Mercury (Hg)	Based on current and historical results, it appears that Hg has no observable trend.
PCBs (Total)	Based on all non-detect concentrations, the PCB parameter has no observable trend.
Modified TPH (C_6-C_{34})	Based on current and historical results, it appears that Modified TPH has no observable trend.

The trend analyses presented are based on the data available at the time of the investigation and any interpreted increasing or decreasing trends may be a result of natural variation in the data due to analytical methods. There is currently insufficient information to establish reliable trends; therefore, additional data points are required to be able to confidently determine if trends are present.

7.3.4 Thermal Monitoring

7.3.4.1 Thermistor Annual Maintenance Reports

As per Section 5.4.3 of the TOR, thermistor inspection logs were filled out for thermistors as provided below.

Table 7-21: CAM-4 Thermistor Log for VT-9

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Lower Site Landfill						
Thermistor Number:	**VT-9**		Inclination:	Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**29-Sep-06**		First Date Event	**27-Aug-07**		Last Date Event		**03-Sep-13**		
*Coordinates and Elevation		N	**20544.8**	E	**18760.1**		Elev	**131.966**		
Length of Cable (m)	**0.63 m**	Cable Lead Above Ground (m)			1.16m (casing height)					
Datalogger Serial #	**02020165**	Nodal Points	10							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X							
	Cover		X							
	Data Logger			X	No ground screw					
	Cable		X							
	Beads			X	Most beads not responding					
	Lock condition		X		New Lock					
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V		Aux		13.63 then 13.75 V		
		NEW Batteries:		11.34 V				13.38 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	0.0000	381.0742		9	0.8041		4.6958
2	0.0000	381.0742		10	0.7788		-5.5780
3	0.0000	381.0742		11	0.0000		381.0742
4	0.0000	381.0742		12	0.0000		381.0742
5	0.9757	1.0925		13	0.0000		381.0742
6	0.0000	381.0742		14	0.0000		381.0742
7	0.8753	-2.2554		15	0.0000		381.0742
8	0.0000	381.0742		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48 hr frequency

Observations and Proposed Maintenance

No grounding cable screw present. Most beads are malfunctioning, may require repair or replacement if temperature data is required for this location moving forward.

Table 7-22: CAM-4 Thermistor Log for VT-10

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Lower Site Landfill						
Thermistor Number:	**VT-10**		Inclination:	Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**29-Sep-06**		First Date Event	**27-Aug-07**		Last Date Event		**03-Sep-13**		
*Coordinates and Elevation		N	**20505.9**	E	**18769.1**		Elev	**129.924**		
Length of Cable (m)	**0.46 m**	Cable Lead Above Ground (m)				1.15m (casing height)				
Datalogger Serial #	**108060**	Nodal Points	10							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing	X								
	Cover	X								
	Data Logger	X								
	Cable	X								
	Beads	X								
	Lock condition	X				New Lock				
	Battery Installation Date	19-Aug-16								
	Battery Levels	Main	11.34 V			Aux	13.63 V			
	NEW Batteries:		11.34 V				12.90 V			

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.1999	8.4456		9	0.8006		-4.8178
2	1.0774	4.9304		10	0.7823		-5.4574
3	1.0959	5.0367		11	0.0000		381.0742
4	1.0340	3.0093		12	0.0000		381.0742
5	0.9451	0.0797		13	0.0000		381.0742
6	0.9114	-1.0442		14	0.0000		381.0742
7	0.8798	-2.1059		15	0.0000		381.0742
8	0.8479	-3.1884		16	0.0000		381.0742

Battery Information						
Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					
Datalogger Programming (Describe programming completed; beads and frequency)						
Reprogrammed to 48 hr frequency						
Observations and Proposed Maintenance						
None required.						

Table 7-23: CAM-4 Thermistor Log for VT-11

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16			
Inspector Signature / Prepared By:	S. Borcsok								

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	**CAM-4**	Landfill:	Lower Site Landfill					
Thermistor Number:	**VT-11**	Inclination:	Vertical					
Datalogger model no:	**RX-16**	Datalogger cable download model:				CCUSB		
*Install Date:	**29-Sep-06**	First Date Event	**27-Aug-07**	Last Date Event	**03-Sep-13**			
*Coordinates and Elevation	N	**20523.5**	E	**18778.4**	Elev	**131.86**		
Length of Cable (m)	**0.39 m**	Cable Lead Above Ground (m)		1.11m (casing height)				
Datalogger Serial #	**111070**	Nodal Points	10					

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	X		
Cover	X		
Data Logger		X	No cover on COM port
Cable	X		
Beads	X		
Lock condition	X		New Lock
Battery Installation Date	19-Aug-16		
Battery Levels	Main	11.34 V	Aux 13.87 V
NEW Batteries:		11.34 V	13.50 V

Manual Ground Temperature Readings

Bead	Volts	Degrees C	Bead	Volts	Degrees C
1	1.2246	9.2614	9	0.8186	-4.1939
2	1.0774	4.4304	10	0.8557	-2.9206
3	1.1417	6.5344	11	0.0000	381.0742
4	1.0884	4.7897	12	0.0000	381.0742
5	0.9828	1.3292	13	0.0000	381.0742
6	0.9236	-0.6363	14	0.0000	381.0742
7	0.8786	-2.1446	15	0.0000	381.0742
8	0.8436	-3.3344	16	0.0000	381.0742

Battery Information

Batteries changed ?	Yes	X	No		Monitoring Year:	10
Battery model number installed or model of battery in place:					UBL15, ULB1	
Expected remaining battery life (years):	7 years - July 2023					

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48 hr frequency

Observations and Proposed Maintenance

None required. Install cover on exterior COM port during next monitoring event.

Table 7-24: CAM-4 Thermistor Log for VT-12

ANNEX M: Thermistor Inspection Template

Inspector Name:	S. Borcsok				Inspection Date:	19-Aug-16				
Inspector Signature / Prepared By:	S. Borcsok									
Thermistor Information (*Some Information can be pre-populated from thermistor logs)										
Site Name:	**CAM-4**		Landfill:	Lower Site Landfill						
Thermistor Number:	**VT-12**		Inclination:	Vertical						
Datalogger model no:	**RX-16**		Datalogger cable download model:					CCUSB		
*Install Date:	**29-Sep-06**		First Date Event	**27-Aug-07**		Last Date Event		**03-Sep-13**		
*Coordinates and Elevation		N	**20514.1**	E	**18787.1**		Elev	**131.966**		
Length of Cable (m)	**0.46 m**	Cable Lead Above Ground (m)				1.23m (casing height)				
Datalogger Serial #	**02020150**	Nodal Points	11							
Thermistor Inspection										
		Good		Needs Maintenance		Description				
	Casing		X		I					
	Cover		X		I					
	Data Logger		X		I					
	Cable		X		I					
	Beads		I		X	Beads 5, 6, 7 not working				
	Lock condition		X		I	New Lock				
	Battery Installation Date		19-Aug-16							
	Battery Levels		Main	11.34 V			Aux	13.75 V		
		NEW Batteries:		11.34 V				13.38 V		

Manual Ground Temperature Readings

Bead	Volts	Degrees C		Bead	Volts		Degrees C
1	1.2275	9.3548		9	0.8194		-4.1650
2	1.1154	5.6730		10	0.7835		-5.4146
3	1.1354	6.3295		11	0.7835		-5.4146
4	1.1135	5.6131		12	0.0000		381.0742
5	0.0005	-101.4553		13	0.0000		381.0742
6	0.0000	381.0742		14	0.0000		381.0742
7	0.0000	381.0742		15	0.0000		381.0742
8	0.8609	-2.7468		16	0.0000		381.0742

Battery Information							
Batteries changed ?	Yes	X	No		Monitoring Year:	10	
Battery model number installed or model of battery in place:					UBL15, ULB1		
Expected remaining battery life (years):	7 years - July 2023						
Datalogger Programming (Describe programming completed; beads and frequency)							
Reprogrammed to 48 hr frequency							
Observations and Proposed Maintenance							
Three beads malfunctioning. No maintenance required.							

7.3.4.2 Summary of Findings from Annual DEW Line Thermal Reports

Results, conclusions and recommendations from the DEW Line thermal reports are to be provided by DND for incorporation into the monitoring reports. No analysed data was provided to Arcadis for inclusion into the 2016 monitoring report at the time of report finalization. The summary of findings for thermal reporting (including 2016 monitoring year data) will be provided under separate cover.

7.4 Conclusions and Overall Landfill Performance

Based on the results of the 2016 monitoring program, the overall performance of the Lower Site Landfill is acceptable.

7.5 Recommendations and Conclusions

Based on review and analysis of chemical data, it appears that the soil concentrations for the parameters tested have no observable trend. Although some anomalous elevated metal concentrations were detected at downgradient sample station C4-3, there is insufficient analytical data to draw any further trend assessment. Based on this review, it is recommended to continue the long-term monitoring of soils as planned.

Based on review and analysis of chemical data, it appears that the groundwater concentrations for the parameters tested have no observable trend with no obvious groundwater parameter concentration increases over time. Based on this review, it is recommended to continue the long-term monitoring of groundwater as planned.

Based on the results of the visual inspection, the landfill performance is acceptable. No remedial work or deviations from the monitoring plan are recommended at this time. However, if current erosion trends magnify on the East Lobe, some mitigation measures (i.e. regrading or placement of boulders in erosion channels) may be required.

8 CAM-4: BACKGROUND SAMPLES

8.1 Description

As stated in Annex G, section G.7 of the Terms of Reference, dated November 2015, two monitoring wells (BMW-3 and BMW-4) were installed at CAM-4 for the collection of site background groundwater and soil samples due to the potential for naturally elevated concentrations of metals at the site.

One background monitoring well (BMW-3) is located in the Upper Site Area, west of the Tier II Soil Disposal Facility and Upper Site Landfill, while the second background monitoring well (BMW-4) is located in the Lower Site Area, southwest of the Lower Site Landfill. The approximate locations for the collection of soil and groundwater samples at the background monitoring locations are identified on Figure CAM-4.1.

8.2 Summary of Work Conducted

8.2.1 Soil Sampling

Soil sampling at the two background locations was conducted on August 20 and 22, 2016 and consisted of the collection of five soil samples (including one duplicate) from two soil sample stations (BMW-3 and BMW-4). No depth restrictions were encountered.

The following Table 8-1 outlines the soil sampling activities conducted at the two background locations.

Table 8-1: Summary of Work Conducted by Soil Sampling Location

Sample Location	Sample ID	Sample Depth (m bgs)	Notes
BMW-3	16-C4-BMW-3A	0 - 0.15	SAND ï brown, fine, some silt, moist, trace gravel
	16-C4-BMW-3B	0.4 - 0.5	SAND ï brown, fine, some silt, wet, trace gavel
BMW-4	16-C4-BMW-4A	0 - 0.15	GRAVELLY SAND ï brown, damp, trace rootlets
	16-C4-DUP5	0 - 0.15	GRAVELLY SAND ï brown, damp, trace rootlets
	16-C4-BMW-4B	0.4 ï 0.5	GRAVELLY SAND ï brown, damp, trace rootlets

8.3 Results of the Monitoring Program

The following sections summarize the results of the CAM-4 Monitoring program at the background sampling locations.

8.3.1.1 Photographic Records

Photographic records of the soil sampling locations were completed as shown below in Table 8-2.

Table 8-2: Photographic Records ï Background Samples

Photo Identification	Figure ID	View Direction	Photo Location and Direction	Feature Identification	Feature of Note	Other Comments
Sample Station Photographs						
C4-BMW3-1	BG3	E	Sample station BMW-3	BMW-3 soil	BMW-3	Test pit location
C4-BMW3-2	BG3	N/A	Sample station BMW-3	BMW-3 soil	BMW-3	Test pit close-up
C4-BMW3-3	BG3	N/A	Sample station BMW-3	BMW-3 soil	BMW-3	Test pit backfilled
C4-BMW4-1	BG4	N	Sample station BMW-4	BMW-4 soil	BMW-4	Test pit location
C4-BMW4-2	BG4	N/A	Sample station BMW-4	BMW-4 soil	BMW-4	Test pit close-up
C4-BMW4-3	BG4	N/A	Sample station BMW-4	BMW-4 soil	BMW-4	Test pit backfilled

8.3.2 Soil Sampling

Soil sampling at the two background soil sample stations was conducted on August 20 and 22, 2016. The soil sampling was conducted in compliance with Section 5.3.1 and 5.3.2 of the Terms of Reference and details are provided below in the following Sections.

8.3.2.1 Laboratory Analytical Results

A total of five soil samples (including one duplicate) were analysed from two background soil sample locations (BMW-3 and BMW-4). Table 8-3 and Table 8-4 present the soil analytical results.

Table 8-3: Soil Chemical Analysis Results ï CAM-4 Background

CAM-4 Background																	
Sample ID	Sampling Station	Monitoring Year	Depth (m bgs)	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
BMW-3 Surface																	
03-17981/82	BMW-3	2003	0	25	24	14	<1.0	12	84	45	2.2	<0.10	<0.0030	-	-	-	-
05-21358/59	BMW-3	2005	0	8.7	12	7.8	<1.0	<10	48	23	1.3	<0.10	0.0081	<10	11	66	82
06-12056/57	BMW-3	2006	0	10	12	6.9	<1.0	<10	34	27	3.2	<0.10	<0.0030	<10	6.1	<9.0	16
07-24800/01	BMW-3	2007	0	10	16	9.6	<1.0	<10	46	32	2.0	<0.10	<0.0030	<10	4.9	15	25
BMW-3-15	BMW-3	2008	0 ï 0.15	13.9	15.7	8.5	<0.50	9.3	44.0	31.8	<5.0	<0.0050	<0.050	<10	<30	<50	45
C410 ï BMW3A	BMW-3	2010	0 ï 0.15	45	32	15	<0.1	13	91	64	4	<0.05	<0.01	<12	<10	<10	16
C4 11 ï BMW3A	BMW-3	2011	0 ï 0.15	10	20	7	<0.1	7	39	41	2	<0.05	<0.01	<12	<10	<10	16
2013-C4-BMW-3-A	BMW-3	2013	0 - 0.15	9.5	14	7.2	<0.10	6.6	35	27	2.2	<0.050	<0.010	<12	<10	<50	36
16-C4-BMW-3A	BMW-3	2016	0 - 0.15	11	14	7.1	<0.050	6.3	41	28	2.2	<0.050	<0.010	<12	<10	<50	36
Average				**16**	**17**	**9**	**-**	**9**	**51**	**35**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
BMW-3 Depth																	
03-17983/84	BMW-3	2003	30	15	15	9.0	<1.0	<10	44	35	1.7	<0.10	<0.0030	-	-	-	-
05-36000/01	BMW-3	2005	30	18	22	13	<1.0	10	77	44	3.3	<0.10	0.060	<10	12	36	53
06-12058/59	BMW-3	2006	30	13	14	8.3	<1.0	<10	39	29	3.5	<0.10	<0.0030	<10	12	9.1	26
07-24802/03	BMW-3	2007	30	8.0	13	8.1	<1.0	<10	38	28	<1.0	<0.10	<0.0030	<10	4.2	10	19
BMW-3-40	BMW-3	2008	0.4 ï 0.5	16.8	17.5	9.0	<0.50	10.9	53.7	35.0	<5.0	0.0086	<0.050	<10	<30	<50	45
C410 ï BMW3B	BMW-3	2010	0.4 ï 0.5	34	20	9	<0.1	8	55	38	3	<0.05	<0.01	<12	<10	<10	16

CAM-4 Background																	
Sample ID	Sampling Station	Monitoring Year	Depth (m bgs)	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
C4 11 ï BMW3B	BMW-3	2011	0.4 ï 0.5	7	14	6	<0.1	5	29	28	2	<0.05	<0.01	<12	<10	<10	16
2013-C4-BMW-3-B	BMW-3	2013	0.4 ï 0.5	6.6	10	5.0	<0.10	4.7	27	22	1.7	<0.050	<0.010	<12	<10	<50	36
16-C4-BMW-3B	BMW-3	2016	0.4 - 0.5	6.7	10	5.6	<0.050	4.9	26	19	1.3	<0.050	<0.010	<12	<10	<50	36
Average				**14**	**15**	**8**	**-**	**8**	**43**	**31**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
BMW-4 Surface																	
03-17976/77	BMW-4	2003	0	9.0	7.6	<5.0	<1.0	<10	24	<20	<1.0	<0.10	<0.0030	-	-	-	-
05-21340/41	BMW-4	2005	0	6.9	7.1	<5.0	<1.0	<10	33	<20	<0.1	<0.10	0.014	<10	6.0	96	107
06-11948/49	BMW-4	2006	0	<5.0	5.9	<5.0	<1.0	<10	22	<20	1.7	<0.10	0.16	<10	340	23	368
07-24888/89	BMW-4	2007	0	5.2	7.3	5.0	<1.0	<10	20	<20	1.9	<0.10	<0.0030	<10	7.4	<9.0	17
C410 ï BMW4A	BMW-4	2010	0 ï 0.15	9	7	4	<0.1	5	21	12	1	<0.05	<0.01	<12	<10	<10	16
C4 11 ï BMW4A	BMW-4	2011	0 ï 0.15	5	12	4	<0.1	4	20	34	2	<0.05	<0.01	<12	<10	<10	16
2013-C4-BMW-4-A	BMW-4	2013	0 - 0.15	7.1	6.0	3.6	<0.10	4.0	23	11	<1.0	<0.050	<0.010	<12	<10	<50	36
16-C4-BMW-4A	BMW-4	2016	0 - 0.15	5.1	6.8	3.6	<0.050	4.0	19	10	<1.0	<0.050	<0.010	<12	<10	<50	36
16-C4-DUP5	BMW-4	2016	0 - 0.15	6.4	7.5	3.8	<0.050	4.1	20	12	1.0	<0.050	<0.010	<12	<10	<50	36
Average				**7**	**8**	**4**	**-**	**7**	**22**	**16**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
BMW-4 Depth																	
03-17978/79	BMW-4	2003	30	12	9.0	5.3	<1.0	<10	26	<20	<1.0	<0.10	<0.0030	-	-	-	-
05-21340/41	BMW-4	2005	30	<5.0	6.3	,5.0	<1.0	<10	22	<20	<0.1	<0.10	<0.0099	<10	<4.0	9.0	16
06-11950/51	BMW-4	2006	30	7.9	8.0	<5.0	<1.0	<10	26	<20	1.7	<0.10	<0.0030	<10	8.2	<9.0	18

CAM-4 Background																	
Sample ID	Sampling Station	Monitoring Year	Depth (m bgs)	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
07-24890/91	BMW-4	2007	30	5.7	7.6	<5.0	<1.0	<10	21	<20	1.4	<0.10	<0.0030	<10	4.8	62	72
C410 ï BMW4B	BMW-4	2010	0.4 ï 0.5	12	7	4	<0.1	5	22	13	1	<0.06	<0.01	<12	<10	<10	16
C4 11 ï BMW4B	BMW-4	2011	0.4 ï 0.5	5	24	4	<0.1	4	16	50	<1	<0.05	<0.01	<12	<10	<10	16
2013-C4-BMW-4-B	BMW-4	2013	0.4 ï 0.5	7.7	7.5	3.8	<0.10	5.5	22	14	1.4	<0.050	<0.010	<12	<10	<50	36
16-C4-BMW-4B	BMW-4	2016	0.4 - 0.5	4.9	6.2	3.8	<0.050	4.3	19	9.5	2.0	<0.050	<0.010	<12	<10	<50	36
Average				**8**	**10**	**4**	**-**	**7**	**22**	**22**	**1**	**-**	**-**	**-**	**-**	**-**	**-**

**** All units in mg/kg**

Table 8-4: PHC F4 Soil Chemical Analysis Results ï CAM-4 Background

CAM-4 Background			
Sample Location	Sample ID	Sample Depth (m bgs)	PHC F4 (mg/kg)
BMW-3	16-C4-BMW-3A	0 - 0.15	<50
	16-C4-BMW-3B	0.4 - 0.5	<50
BMW-4	16-C4-BMW-4A	0 - 0.15	<50
	16-C4-BMW-4B	0.4 - 0.5	<50

8.3.2.2 Discussion of Results ï Comparison to Background

Analytical results were compared against average background concentrations. Table 8-5 summarizes the comparison of results.

Table 8-5. Evaluation of Results by Parameter ï CAM-4 Background

CAM-4 Background	
Parameter	**Discussion of Results**
Copper (Cu)	All 2016 soil samples are below average background concentrations for Cu.
Nickel (Ni)	All 2016 soil samples are below average background concentrations for Ni.
Cobalt (Co)	All 2016 soil samples are below average background concentrations for Co.
Cadmium (Cd)	All 2016 soil samples reported non-detect concentrations for Cd.
Lead (Pb)	All 2016 soil samples are below average background concentrations for Pb.
Zinc (Zn)	All 2016 soil samples are below average background concentrations for Zn.
Chromium (Cr)	All 2016 soil samples are below average background concentrations for Cr.
Arsenic (As)	All 2016 soil samples are below average background concentrations for As (1 mg/kg) with the exception of soil sample16-C4-BMW-4B (2 mg/kg).
Mercury (Hg)	All 2016 soil samples reported non-detect concentrations for Hg.
PCBs (Total)	All 2016 soil samples reported non-detect concentrations for Total PCBs.
F1 (C_6-C_{10})	All 2016 soil samples reported non-detect concentrations for PHC F1.
F2 (C_{10}-C_{16})	All 2016 soil samples reported non-detect concentrations for PHC F2.
F3 (C_{16}-C_{34})	All 2016 soil samples reported non-detect concentrations for PHC F3.
F4 (C_{34}- C_{50})	All 2016 soil samples reported non-detect concentrations for PHC F4.
Modified TPH (C_6-C_{34})	Modified TPH concentrations were calculated in 2016 based on concentration of PHC F1, F2, and F3 that were all non-detect. All 2010, 2011, and 2013 soil samples also reported non-detect concentrations for F1, F2, and F3.

Groundwater Sampling

Groundwater sampling of the two background groundwater monitoring wells (BMW-3 and BMW-4) present at CAM-4 was conducted on August 21 to 22, 2016. The groundwater sampling was conducted in compliance with Section 5.3.1 and 5.3.3 of the Terms of Reference and details are provided below in the following Sections.

8.3.2.3 Monitoring Well Sampling/Inspection Logs

As per Section 5.3.3.2 of the TOR, groundwater monitoring logs were filled out for each monitoring well as provided on the following pages.

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Table 8-6: CAM-4 Monitoring Well Log for BMW-3

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Station Area	
Monitoring Well ID:	BMW-3	UTM Coordinates:	North 9898.7	East 9808.4
Sample Number(s) (include dups.):	CAM4-BMW3			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)			
Date of Sampling Event:	Aug 21/16	Time:	9:50 AM	
Weather:	Clear, 15ºC			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (no ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	420	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	120	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe)=		73	
Static water level (cm) from top of pipe =		107.8	
Static water level (cm) (below ground surface) calculated =		34.8	
Measured well refusal depth (cm) (measure after sampling) =		233.9	
Thickness of water column (cm)=	126.1	Static volume of water in well (mL)=	2500
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	6 L over 20 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH			7.52	
Conductivity (uS/cm)			325	
ORP (mV)			70.5	
Temperature (degC)			2.74	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): cloudy, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox and distilled water - dedicated sampling train

Number washes: 1 Number rinses: 1

Other Relevant Comments:

Table 8-7: CAM-4 Monitoring Well Log for BMW-4

Monitoring Well Sampling Log

Site Name:	CAM-4	Landfill Name:	Lower Site Area	
Monitoring Well ID:	BMW-4	UTM Coordinates:	North 20365.9	East 18677.3
Sample Number(s) (include dups.):	CAM4-BMW4			
Bottles filled (by parameter type):	9 (4 PHC, 3 Metals, 2 PCB)			
Date of Sampling Event:	Aug 22/16	Time:	2:30 AM	
Weather:	Clear, Windy 11 ºC			
Names of Samplers:	Keith Coulthart			
Description of Well Condition and Surrounding ground conditions (note ponding of water):	Good Condition (some ponding)			
Lock (condition, presence, model, manufacturer):	Cut and replaced as per TOR			

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)=	380	Diameter of well (cm)=	5.08
*Depth to top of screen (cm)=	81	Length screened section (cm)=	200

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):	Interface probe		
Well pipe height above ground (cm) (to top of pipe) =		71	
Static water level (cm) from top of pipe =		164.2	
Static water level (cm) (below ground surface) calculated =		93.2	
Measured well refusal depth (cm) (measure after sampling) =		295.0	
Thickness of water column (cm)=	130.8	Static volume of water in well (mL)=	2700
Free product thickness (mm)=	No Free Product	Evidence of sludge or siltation:	No

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:	Low flow peristaltic pump		
Well purged (Y/N):	Y	Recharge Rate:	NC
Volume Purged (L) (note multiple purging events if applicable):	4 L over 20-25 min		

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH	8.27	8.21	8.2	
Conductivity (uS/cm)	145	144	147	
ORP (mV)	56.8	60.7	61.0	
Temperature (degC)	4.33	3.91	3.86	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltationé): slightly cloudy - becoming clear, trace sand, no odour, no sheen

Decontamination of sampling equipment

Type of decontamination fluid (s):	Alconox and distilled water - dedicated sampling train		
Number washes:	1	Number rinses:	1

Other Relevant Comments:

8.3.2.4 Groundwater Laboratory Analytical Results

Two background groundwater samples were collected and analysed from the CAM-4 site. Table 8-8 and Table 8-9 present the groundwater analytical results.

Table 8-8: Groundwater Chemical Analysis Results ï CAM-4 Background

CAM-4 Background																
	Sampling Station	Monitoring Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg (ug/L)	Total PCB	F1 C6-C10	F2 C10-C16	F3 C16-C34	Modified TPH Total C6-C34
BMW-3																
03-17985	BMW-3	2003	1.1	1.6	0.95	<0.040	0.81	5.2	3.0	0.12	<0.40	<0.000020	-	-	-	-
05-21186	BMW-3	2005	0.018	0.028	0.0060	<0.0010	<0.010	0.053	0.059	0.0080	<4.0	<0.000020	<0.050	<0.50	<1.0	0.8
06-12023	BMW-3	2006	0.10	0.17	0.068	<0.0010	0.047	0.36	0.34	0.014	<0.40	<0.000020	8.2	<0.50	<1.0	9
07-24938	BMW-3	2007	0.090	0.11	0.065	<0.0010	0.040	0.36	0.21	0.010	<0.40	<0.000020	<0.050	<0.50	<1.0	0.8
BMW-3	BMW-3	2008	0.0155	0.0180	0.00817	0.000061	0.0091	0.0513	0.0437	0.00230	<0.020	<0.0010	<0.10	<0.30	<0.30	0.4
C410-BMW3	BMW-3	2010	0.0084	0.0041	0.0018	0.000044	0.0037	0.022	0.008	0.0011	0.009	<0.05	<0.1	<0.1	<0.1	0.2
C4 11-BMW3	BMW-3	2011	0.062	0.043	0.024	0.0005	0.020	0.10	0.042	0.007	0.018	<0.00050	-	-	-	-
2013-C4-BMW-3	BMW-3	2013	<0.00020	<0.00050	<0.00030	<0.000050	<0.00020	<0.0030	<0.0010	0.00020	<0.002	<0.000050	<0.10	<0.20	<0.20	0.3
CAM4-BMW3	BMW-3	2016	0.016	0.022	0.0094	0.000040	0.0096	0.11	0.038	0.0028	<0.020	<0.00005	<0.1	<0.10	<0.20	0.2
Average			**0.039**	**0.049**	**0.023**	**0.0005**	**0.017**	**0.13**	**0.093**	**0.0057**	**-**	**-**	**-**	**-**	**-**	**1.7**
BMW-4																
03-17980	BMW-4	2003	0.43	0.35	0.17	<0.0010	0.21	0.83	0.81	0.076	<0.40	<0.000020	-	-	-	-
05-21189	BMW-4	2005	0.20	0.10	0.039	<0.0010	0.054	0.45	0.16	0.016	<4.0	<0.000020	<0.050	<0.50	<1.0	0.8
06-12027	BMW-4	2006	0.056	0.071	0.013	<0.0010	0.014	0.15	0.14	0.0052	<0.00040	<0.000020	1.6	<0.50	<1.0	2
07-24935	BMW-4	2007	0.030	0.020	<0.0030	<0.0010	<0.010	0.098	0.029	0.0032	<0.40	<0.000020	<0.050	<0.50	<1.0	0.8
C410-BMW4	BMW-4	2010	0.11	0.037	0.0045	0.00026	0.033	0.41	0.045	0.0066	<0.002	<0.05	<0.1	<0.1	<0.1	0.2
C4 11-BMW4	BMW-4	2011	0.084	0.038	0.0048	<0.0002	0.029	0.57	0.036	0.005	0.044	<0.000050	-	-	-	-
2013-C4-BMW-4	BMW-4	2013	0.0013	<0.00050	<0.00030	0.00015	<0.00020	<0.0030	<0.0010	<0.00020	<0.002	<0.000050	<0.10	<0.20	<0.20	0.3
CAM4-BMW4	BMW-4	2016	0.015	0.015	0.0024	0.000089	0.0091	0.18	0.023	0.0031	0.0099	<0.00005	<0.1	<0.10	<0.20	0.2
Average			**0.12**	**0.079**	**0.030**	**0.0006**	**0.045**	**0.34**	**0.16**	**0.015**	**0.56**	**-**	**-**	**-**	**-**	**0.8**

**** Unless otherwise stated, all units in mg/L**

Table 8-9: PHC F4 Groundwater Chemical Analysis Results ï CAM-4 Background

CAM-4 Background	
Monitoring Well ID	**PHC F4 (mg/L)**
BMW-3	<0.20
BMW-4	<0.20

8.3.2.5 Discussion of Results ï Comparison to Background

Analytical results were compared against average background concentrations. Table 8-10 summarizes the comparison of results.

Table 8-10 Evaluation of Results by Parameter ï CAM-4 Background

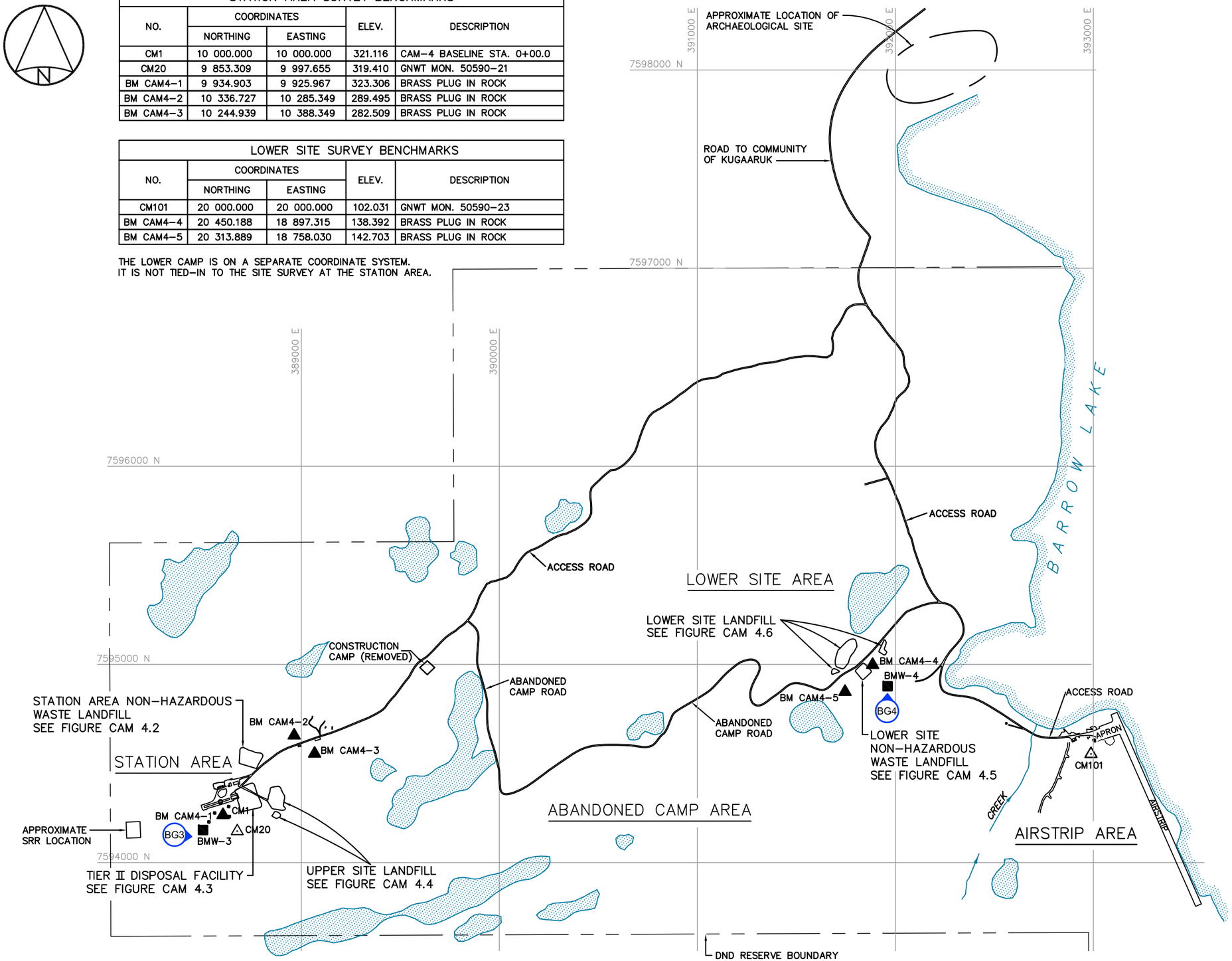
CAM-4 Background	
Parameter	**Discussion of Results**
Copper (Cu)	All 2016 groundwater samples are below average background concentrations for Cu.
Nickel (Ni)	All 2016 groundwater samples are below average background concentrations for Ni.
Cobalt (Co)	All 2016 groundwater samples are below average background concentrations for Co.
Cadmium (Cd)	All 2016 groundwater samples are below average background concentrations for Cd.
Lead (Pb)	All 2016 groundwater samples are below average background concentrations for Pb.
Zinc (Zn)	All 2016 groundwater samples are below average background concentrations for Zn.
Chromium (Cr)	All 2016 groundwater samples are below average background concentrations for Cr.
Arsenic (As)	All 2016 groundwater samples are below average background concentrations for As.
Mercury (Hg)	All 2016 soil samples either reported non-detect concentration for Hg or were below average background concentration for As.
PCBs (Total)	All 2016 groundwater samples reported non-detect concentrations for Total PCBs.
F1 (C_6-C_{10})	All 2016 groundwater samples reported non-detect concentrations for PHC F1.
F2 (C_{10}-C_{16})	All 2016 groundwater samples reported non-detect concentrations for PHC F2.
F3 (C_{16}-C_{34})	All 2016 groundwater samples reported non-detect concentrations for PHC F3.
F4 (C_{34}- C_{50})	All 2016 groundwater samples reported non-detect concentrations for PHC F4.
Modified TPH (C_6-C_{34})	All 2016 groundwater samples are below average background concentrations for Modified TPH.

FIGURES

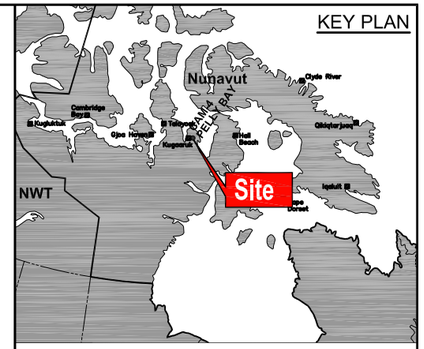
STATION AREA SURVEY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	10 000.000	10 000.000	321.116	CAM-4 BASELINE STA. 0+00.0
CM20	9 853.309	9 997.655	319.410	GNWT MON. 50590-21
BM CAM4-1	9 934.903	9 925.967	323.306	BRASS PLUG IN ROCK
BM CAM4-2	10 336.727	10 285.349	289.495	BRASS PLUG IN ROCK
BM CAM4-3	10 244.939	10 388.349	282.509	BRASS PLUG IN ROCK

LOWER SITE SURVEY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM101	20 000.000	20 000.000	102.031	GNWT MON. 50590-23
BM CAM4-4	20 450.188	18 897.315	138.392	BRASS PLUG IN ROCK
BM CAM4-5	20 313.889	18 758.030	142.703	BRASS PLUG IN ROCK

THE LOWER CAMP IS ON A SEPARATE COORDINATE SYSTEM.
IT IS NOT TIED-IN TO THE SITE SURVEY AT THE STATION AREA.



KEY PLAN



LEGEND:

- CM1 — SURVEY CONTROL MONUMENT
- BM-2 — PERMANENT BENCHMARK LOCATION
- SOIL SAMPLE LOCATION
- BG3 — BACKGROUND MONITORING WELL PHOTO VIEWPOINT

0 400 800 metres
SCALE 1:20,000

ARCADIS

DEPARTMENT OF NATIONAL DEFENCE

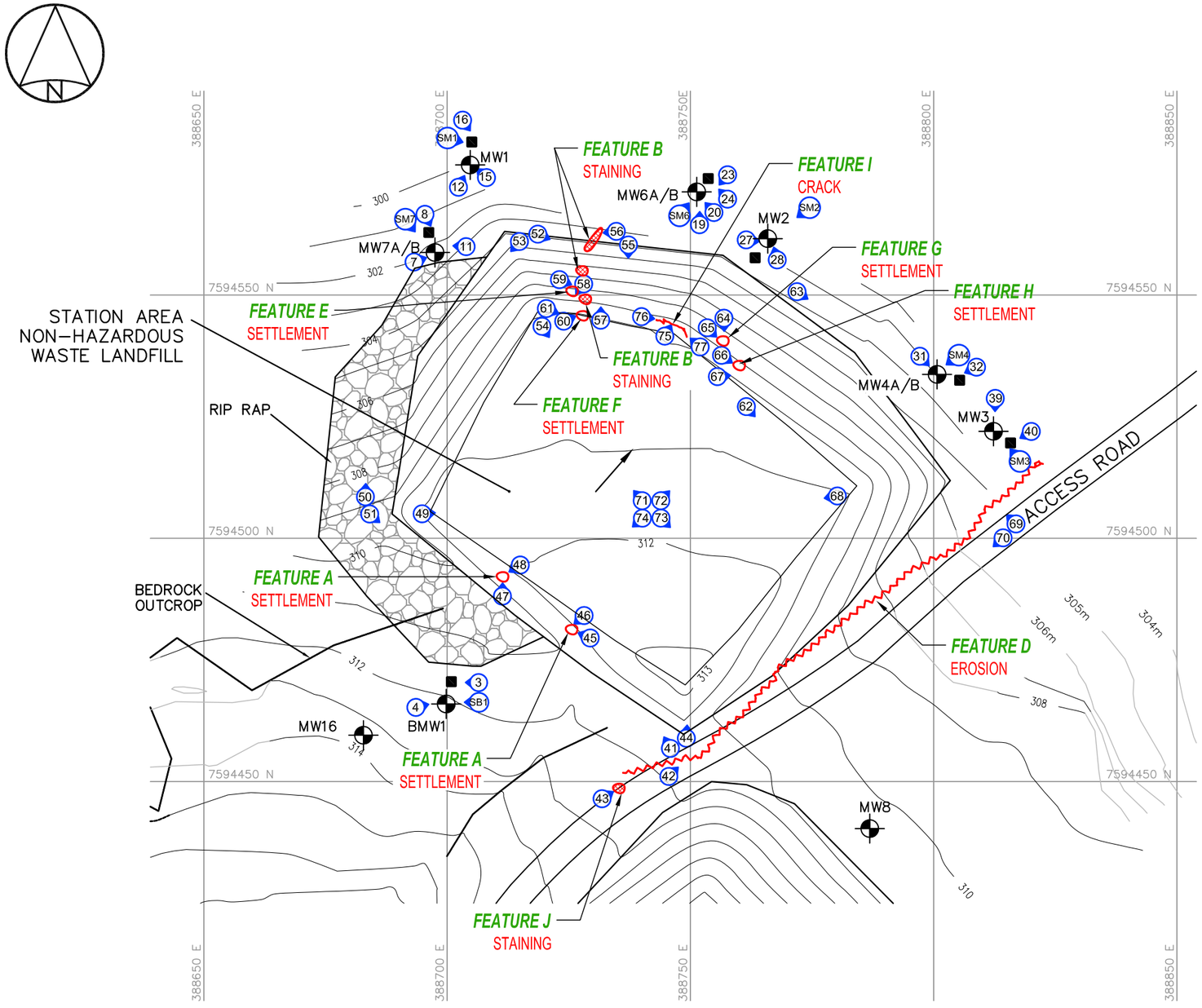
COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

OVERALL SITE PLAN

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.1	

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_1.dwg LAYOUT: 4-1 SAVED: 3/30/2017 3:50 PM BY: IZABELA ZIBA PLOTTED: 3/30/2017 3:50 PM



LEGEND:

- MONITORING WELL LOCATION
- SOIL SAMPLE LOCATION
- APPROX. PHOTOGRAPHIC VIEWPOINT
- SETTLEMENT
- STAINING/DISCOLOURATION
- CRACK
- EROSION
- RIPRAP
- SURFACE WATER FLOW DIRECTION

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

STATION AREA NON-HAZARDOUS WASTE LANDFILL
PLAN/MONITORING POINTS/
LANDFILL OBSERVATIONS

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.2A	

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_2.dwg LAYOUT: 4.2A SAVED: 3/22/2017 3:54 PM PLOTTED: 3/30/2017 4:04 PM BY: IZABELA ZIBA

Sample ID	Stn.	Year	Depth	Ni	Co	Cr	As	Modified TPH^ - Total C6-C34
MW-6 Surface								
24864/65	MW-6	2007	0	7.9	**5.2**	<20	**1.4**	31
C409-6WA	MW-6	2009	0-15	8.0	3.0	15	<1.0	37
C4 11-6WA	MW-6	2011	0-15	**12**	4.0	**20**	1.0	16
2013-C4-MW-6-A	MW-6	2013	0-15	9.5	4.6	16	<1.0	142
16-C4-MW6AA	MW-6	2016	0-15	9.8	3	**20.0**	<1.0	36
MW-6 Depth								
24866/67	MW-6	2007	30	7.5	<5.0	<20	<1.0	26
C409-6WB	MW-6	2009	40-50	**13**	4.0	**28**	<1.0	40
C4 11-6WB	MW-6	2011	40-50	9.0	4.0	**20**	<1.0	114
2013-C4-MW-6-B	MW-6	2013	40-50	8.3	4.2	16	<1.0	36
16-C4-MW6AB	MW-6	2016	40-50	6.8	2.9	15.0	<1.0	36

Sample ID	Stn.	Year	Depth	Ni	Co	Cr	As
MW-2 Surface							
24860/61	MW-2	2007	0	7.7	<5.0	<20	**1.8**
C409-2WA	MW-2	2009	0-15	**16**	**5.0**	**33**	1.0
C4 11-2WA	MW-2	2011	0-15	**12**	**5.0**	**21**	1.0
2013-C4-MW-2-A	MW-2	2013	0-15	9.6	**5.8**	17	1.3
16-C4-MW2A	MW-2	2016	0-15	7.8	3.4	14.0	<1.0
MW-2 Depth							
24862/63	MW-2	2007	30	6.2	<5.0	<20	1.2
C409-2WB	MW-2	2009	40-50	**12**	4.0	**23**	<1.0
C4 11-2WB	MW-2	2011	40-50	**13**	**6.0**	**25**	**2.0**
2013-C4-MW-2-B	MW-2	2013	40-50	9.4	**5.5**	16	**1.4**
16-C4-MW2B	MW-2	2016	40-50	7.1	3	14.0	<1.0

LEGEND:

- MONITORING WELL LOCATION
- SOIL SAMPLE LOCATION

Sample ID	Stn.	Year	Depth	Ni	Cr	As	Modified TPH^ - Total C6-C34
MW-4 Surface							
24856/57	MW-4	2007	0	6.8	<20	**1.4**	14
C409-4WA	MW-4	2009	0-15	7.0	13	<1.0	31
C4 11-4WA	MW-4	2011	0-15	8.0	14	1.0	31
2013-C4-MW-4-A	MW-4	2013	0-15	6.9	13	<1.0	68
16-C4-MW4AA	MW-4	2016	0-15	5.3	10.0	<1.0	36
MW-4 Depth							
24858/59	MW-4	2007	30	7.6	<20	1.1	14
C409-4WB	MW-4	2009	40-50	**11**	**21**	<1.0	16
C4 11-4WB	MW-4	2011	40-50	**17**	**38**	1.0	16
2013-C4-MW-4-B	MW-4	2013	40-50	6.4	12	<1.0	53
16-C4-MW4AB	MW-4	2016	40-50	7.7	16.0	<1.0	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-3 Surface												
24852/53	MW-3	2007	0	10	**13**	**8.3**	**<10**	**40**	**26**	**1.5**	<0.0030	108
C409-3WA	MW-3	2009	0-15	**11**	**18**	**6.0**	7.0	**40**	**36**	**2.0**	**<0.010**	70
C4 11-3WA	MW-3	2011	0-15	7.0	**12**	**5.0**	8.0	33	**23**	**2.0**	**<0.010**	16
2013-C4-MW-3-A	MW-3	2013	0-15	**20**	**17**	**9.6**	**21**	**76**	**29**	**2.9**	**<0.010**	**511**
16-C4-MW3A	MW-3	2016	0-15	**14**	**20**	**7.7**	7.9	**48**	**38.0**	**2.1**	**0.013**	36
MW-3 Depth												
24854/55	MW-3	2007	30	10	**14**	**7.5**	**<10**	39	**27**	**1.7**	**0.0056**	46
C409-3WB	MW-3	2009	40-50	9.0	**15**	**5.0**	5.0	30	**30**	1.0	**<0.010**	32
C4 11-3WB	MW-3	2011	40-50	9.0	**12**	**6.0**	6.0	31	**24**	**2.0**	**<0.010**	16
2013-C4-MW-3-B	MW-3	2013	40-50	**15**	**15**	**7.3**	**10**	**49**	**26**	**2.2**	**<0.010**	131
16-C4-MW3B	MW-3	2016	40-50	8.3	**14**	**4.9**	5.2	30	**27.0**	**1.5**	**<0.010**	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-7 Surface												
24872/73	MW-7	2007	0	8.9	**13**	**7.9**	**<10**	**40**	**25**	**1.5**	<0.0030	36
C409-7WA	MW-7	2009	0-15	9.0	**12**	**5.0**	5.0	33	**22**	1.0	**<0.010**	63
C4 11-7WA	MW-7	2011	0-15	8.0	**13**	**6.0**	5.0	31	**25**	1.0	**<0.010**	89
2013-C4-MW-7-A	MW-7	2013	0-15	**11**	**13**	**6.9**	6.3	**47**	**20**	**1.6**	**<0.010**	36
16-C4-MW7AA	MW-7	2016	0-15	**12**	**25**	**7.8**	6.8	**47**	**53.0**	**1.7**	**<0.010**	36
MW-7 Depth												
24874/75	MW-7	2007	30	4.8	8.9	**5.7**	<10	25	<20	1.3	<0.0030	14
C409-7WB	MW-7	2009	40-50	6.0	9.0	4.0	4.0	21	16	<1.0	**<0.010**	16
C4 11-7WB	MW-7	2011	40-50	<5.0	**14**	**5.0**	4.0	22	**29**	<1.0	**<0.010**	16
2013-C4-MW-7-B	MW-7	2013	40-50	10	**12**	**7.2**	6.1	**40**	**22**	**1.7**	**<0.010**	36
16-C4-MW7AB	MW-7	2016	40-50	8	**30**	**5.5**	4.2	29	**64.0**	1.0	**<0.010**	36

Sample ID	Stn.	Year	Depth	Ni	Co	Cr	As
MW-1 Surface							
24868/69	MW-1	2007	0	9.2	**6.3**	**22**	<1.0
C409-1WA	MW-1	2009	0-15	**12**	**5.0**	**24**	<1.0
C4 11-1WA	MW-1	2011	0-15	**20**	**6.0**	**41**	**2.0**
2013-C4-MW-1-A	MW-1	2013	0-15	8.2	4.0	12	<1.0
16-C4-MW1A	MW-1	2016	0-15	8.7	4.4	18.0	<1.0
MW-1 Depth							
24870/71	MW-1	2007	30	8.9	**6.3**	**20**	<1.0
C409-1WB	MW-1	2009	40-50	**12**	**5.0**	**25**	<1.0
C4 11-1WB	MW-1	2011	40-50	**14**	**6.0**	**28**	**2.0**
2013-C4-MW-1-A	MW-1	2013	40-50	**12**	**5.0**	17	1.1
16-C4-MW1B	MW-1	2016	40-50	**16**	4.4	**34.0**	1.1

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
BM-1 Surface												
24848/49	BMW-1	2007	0	**13**	**17**	**11**	**<10**	**47**	**34**	**2.9**	<0.0030	18
C409-B1MWA	BMW-1	2009	0-15	8.0	**24**	**5.0**	5.0	31	**50**	1.0	**<0.010**	55
C4 11-BMW1A	BMW-1	2011	0-15	6.0	10	**5.0**	4.0	31	18	**2.0**	**<0.010**	16
2013-C4-BMW-1-A	BMW-1	2013	0-15	8.2	9.6	**5.9**	5.9	37	17	**1.8**	**<0.010**	67
16-C4-BMW1A	BMW-1	2016	0-15	**31**	**41**	**19**	**14**	**110**	**69.0**	**7.7**	**<0.020**	436
BM-1 Depth												
24850/51	BMW-1	2007	30	6.3	9.7	**6.9**	**<10**	29	<20	**1.4**	**0.0053**	109
C409-B1MWB	BMW-1	2009	40-50	8.0	**15**	**5.0**	5.0	30	**31**	1.0	**<0.010**	28
C4 11-BMW1B	BMW-1	2011	40-50	**13**	**20**	**8.0**	8.0	**46**	**46**	**3.0**	**<0.010**	16
2013-C4-BMW-1-B	BMW-1	2013	40-50	8.0	**12**	**5.9**	5.7	35	**22**	**1.8**	**<0.010**	36
16-C4-BMW-1B	BMW-1	2016	30-40	**19**	**27**	**11**	9.2	**64**	**50.0**	**3.4**	**<0.010**	192

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012	38
Baseline Data - Arithmetic Mean corrected for Detection limit	**10**	**10**	**4.9**	**1.00**	**10**	**39**	**20**	**1.3**	**0.100**	**0.003**	**495**
Baseline Data + 3x Standard Deviation	26	24	14	1.00	108	107	52	3.6	0.0	0.67	5605

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/kg

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

STATION AREA NON-HAZARDOUS WASTE LANDFILL

SOIL CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.2B	

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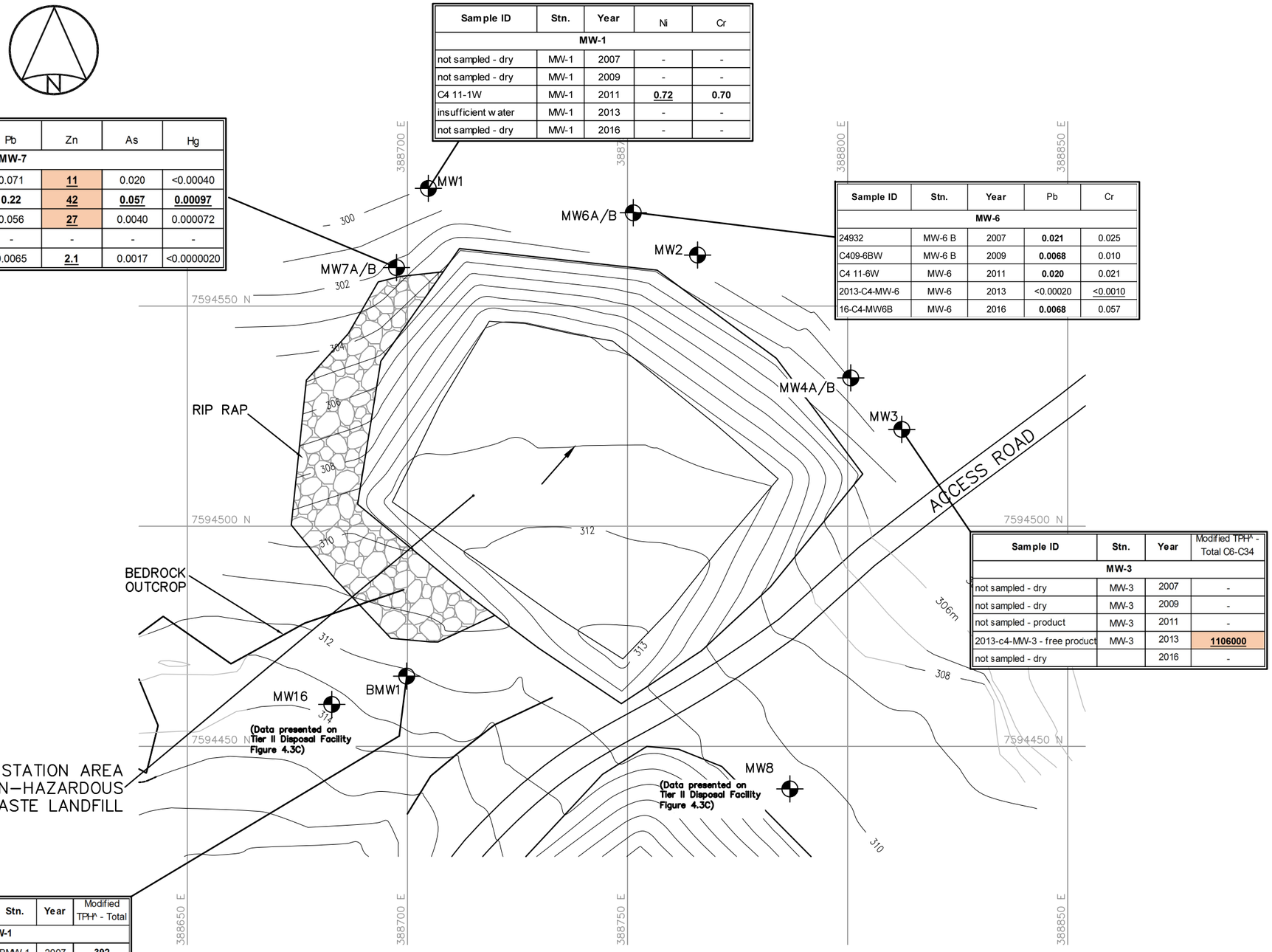

Sample ID	Stn.	Year	Pb	Zn	As	Hg
MW-7						
24928	MW-7 B	2007	0.071	**11**	0.020	<0.00040
C409-7BW	MW-7	2009	**0.22**	**42**	**0.057**	**0.00097**
C4 11-7W	MW-7	2011	0.056	**27**	0.0040	0.000072
insufficient w at	MW-7	2013	-	-	-	-
16-C4-MW7B	MW-7	2016	0.0065	**2.1**	0.0017	<0.0000020

Sample ID	Stn.	Year	Ni	Cr
MW-1				
not sampled - dry	MW-1	2007	-	-
not sampled - dry	MW-1	2009	-	-
C4 11-1W	MW-1	2011	**0.72**	**0.70**
insufficient w ater	MW-1	2013	-	-
not sampled - dry	MW-1	2016	-	-

Sample ID	Stn.	Year	Pb	Cr
MW-6				
24932	MW-6 B	2007	**0.021**	0.025
C409-6BW	MW-6 B	2009	**0.0068**	0.010
C4 11-6W	MW-6	2011	**0.020**	0.021
2013-C4-MW-6	MW-6	2013	<0.00020	<0.0010
16-C4-MW6B	MW-6	2016	**0.0068**	0.057

Sample ID	Stn.	Year	Modified TPH^ - Total C6-C34
MW-3			
not sampled - dry	MW-3	2007	-
not sampled - dry	MW-3	2009	-
not sampled - product	MW-3	2011	-
2013-c4-MW-3 - free product	MW-3	2013	**1106000**
not sampled - dry		2016	-

Sample ID	Stn.	Year	Modified TPH^ - Total
BMW-1			
24943	BMW-1	2007	**392**
C409-BMW1	BMW-1	2009	65
insufficient sample volume	BMW-1	2011	-
2013-C4-BMW-1	BMW-1	2013	**1069**
16-C4-BMW1- phc encountere	BMW-1	2016	**1994**

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	0.43	0.50	0.14	0.11	5.66	0.94	0.98	0.02	0.00066	0.11	43.81
Baseline Data - Arithmetic Mean corrected for Detection limit	**0.20**	**0.31**	**0.15**	**0.0033**	**0.13**	**1.04**	**0.55**	**0.02**	**0.00071**	**0.000010**	**100**
Baseline Data + 3x Standard Deviation	1.38	1.98	1.20	0.03	1.02	6.55	3.78	0.15	0.0033	0.0	958

LEGEND:

MONITORING WELL LOCATION

XX	sample exceeds background
XX	**sample exceeds baseline**
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/L

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

STATION AREA NON-HAZARDOUS WASTE LANDFILL GROUNDWATER CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.2C	

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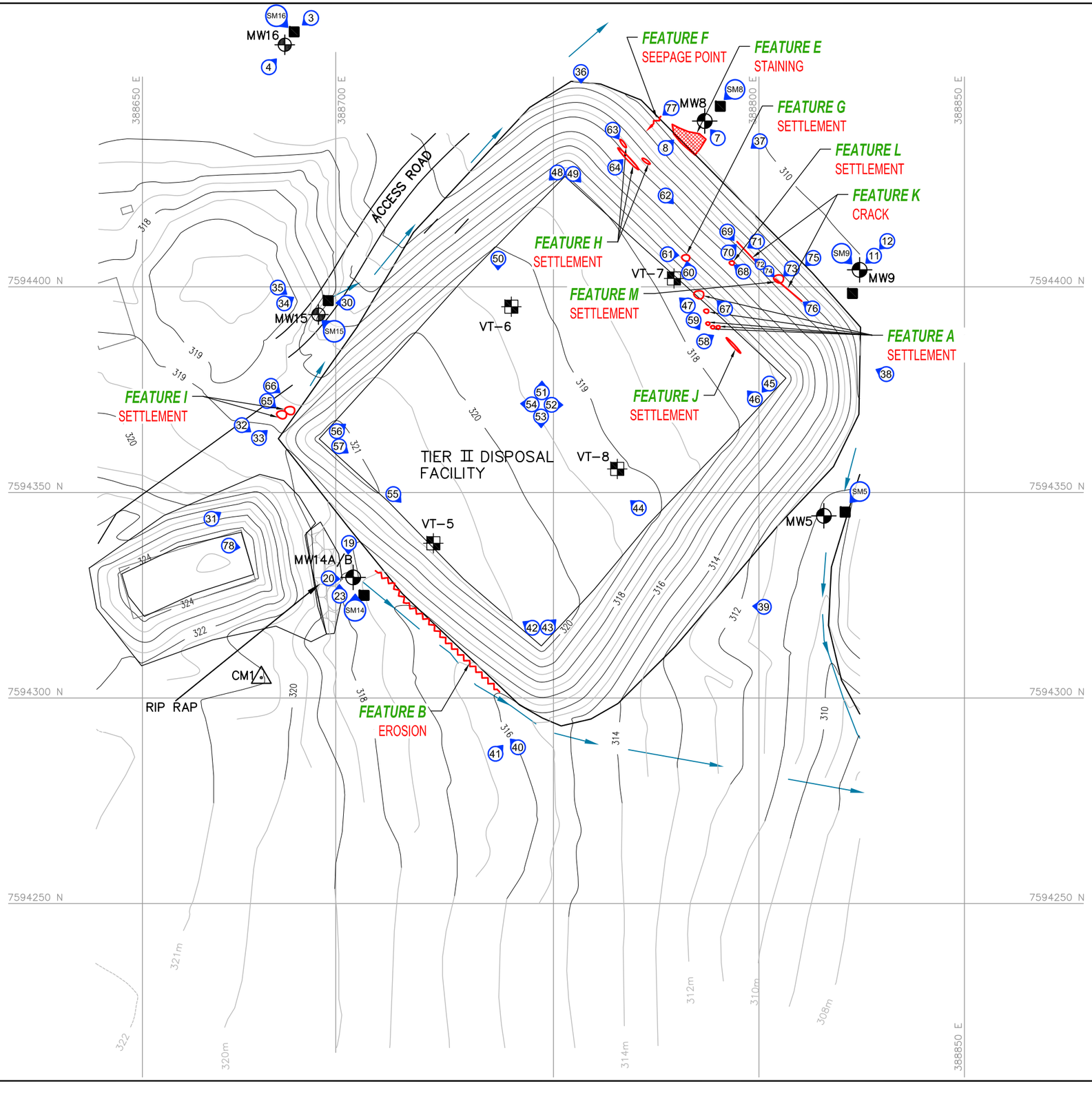

LEGEND:

- CM1 — SURVEY CONTROL MONUMENT
- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- VERTICAL THERMISTOR LOCATION
- 1 — APPROX. PHOTOGRAPHIC VIEWPOINT
- SETTLEMENT
- STAINING
- EROSION
- CRACK
- SEEPAGE
- RIPRAP

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

TIER II DISPOSAL FACILITY

PLAN/MONITORING POINTS/ LANDFILL OBSERVATIONS

Drawn By: I.S.Z.	Approved By: S.B.	Project No:	102012-1
Date: FEB. 2017	Scale: AS SHOWN	Figure No:	CAM-4.3A

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_3.dwg LAYOUT: 4.3A SAVED: 3/30/2017 4:58 PM PLOTTED: 4/11/2017 7:07 PM BY: IZABELA ZIBA

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-16 Surface												
24844	MW-16	2007	0	**20**	**26**	**15**	11	**82**	**47**	**3.4**		**1725**
MW-16-15	MW-16	2008	15	**14**	**16**	**7.8**	8.4	43	**32**	<5.0		424
C409-16WA	MW-16	2009	0-15	8.0	11	5.0	5.0	29	22	1.0		33
C410-16WA	MW-16	2010	0-15	**26**	11	6.0	5.0	33	22	2.00		16
C4 11-16WA	MW-16	2011	0-15	11	12	6.0	5.0	35	23	2.0		16
2013-C4-MW-16A	MW-16	2013	0-15	14	**34**	**8.4**	8.4	48	**66**	**2.2**		36
16-C4-MW16A	MW-16	2016	0-15	10.0	**54**	6.2	5	39	**120**	1.8		**12730**
MW-16 Depth												
24846	MW-16	2007	30	9.7	**14**	**9.0**	<10	39	**29**	2.0		156
MW-16-40	MW-16	2008	40	12	**15**	**7.8**	8.0	39	**30**	<5.0		79
C409-16WB	MW-16	2009	40-50	**17**	**21**	**8.0**	8.0	54	**40**	2.0		50
C410-16WB	MW-16	2010	40-50	**18**	12	**7.0**	6.0	36	25	2.0		241
C4 11-16WB	MW-16	2011	40-50	11	**16**	**7.0**	8.0	41	**29**	2.0		16
2013-C4-MW-16B	MW-16	2013	40-50	7.0	11	5.5	4.8	27	20	1.3		**3166**
16-C4-MW16B	MW-16	2016	40-50	7.2	11	5.6	4.7	32	23	**6.8**		**10050**

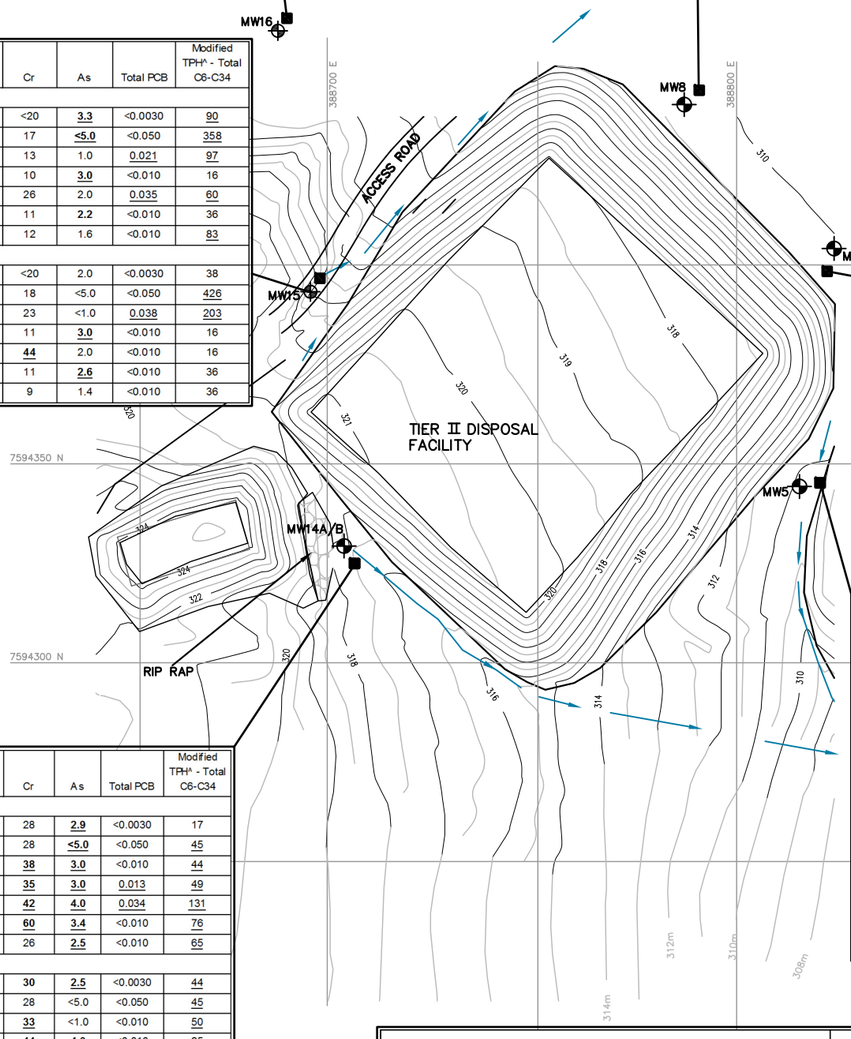
Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-8 Surface												
24836	MW-8	2007	0	9.5	11	**9.2**	<10	46	23	**2.2**	<0.0030	67
MW-8-10	MW-8	2008	10	12	11	6.8	7.9	41	20	**<5.0**	<0.050	45
C409-8WA	MW-8	2009	0-15	8.0	12	5.0	12	34	24	1.0	0.015	52
C410-8WA	MW-8	2010	0-15	**59**	11	**7.0**	8.0	**89**	21	2.0	<0.010	16
C4 11-8WA	MW-8	2011	0-15	7.0	**20**	5.0	6.0	33	**40**	2.0	0.013	16
2013-C4-MW-8A	MW-8	2013	0-15	**15**	10	6.6	7.5	44	19	**2.1**	<0.010	36
16-C4-8A	MW-8	2016	0-15	11	13	5.6	6.5	34	25	1.8	<0.010	64
MW-8 Depth												
24838	MW-8	2007	30	7.3	12	**8.5**	<10	35	26	1.6	<0.0030	**1549**
MW-8-20	MW-8	2008	20	12	11	6.4	14	39	23	<5.0	<0.050	422
C409-8WB	MW-8	2009	40-50	10	12	6.0	6.0	34	25	1.0	<0.010	367
C410-8WB	MW-8	2010	40-50	**38**	**15**	**8.0**	7.0	42	**31**	2.0	<0.010	675
C4 11-8WB	MW-8	2011	40-50	**17**	**17**	**7.0**	7.0	44	**33**	2.0	<0.020	**7230**
2013-C4-MW-8B	MW-8	2013	40-50	11	9.5	**8.0**	8.0	49	17	**2.2**	<0.010	82
16-C4-8B	MW-8	2016	40-50	9.8	**31**	6.2	5.6	35	**67.0**	2.0	<0.010	**3020**

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-15 Surface												
24840/41	MW-15	2007	0	8.7	9.0	**7.3**	12	56	<20	**3.3**	<0.0030	90
MW-15-15	MW-15	2008	15	9.8	9.4	6.5	8.0	41	17	**<5.0**	<0.050	358
C409-15WA	MW-15	2009	0-15	8.0	9.0	6.0	4.0	32	13	1.0	0.021	97
C410-15WA	MW-15	2010	0-15	**35**	6.0	6.0	9.0	42	10	**3.0**	<0.010	16
C4 11-15WA	MW-15	2011	0-15	12	13	**7.0**	11	46	26	2.0	0.035	60
2013-C4-MW-15A	MW-15	2013	0-15	7.5	6.2	6.0	4.3	41	11	**2.2**	<0.010	36
16-C4-MW15A	MW-15	2016	0-15	9.8	6	5.4	4.4	37	12	1.6	<0.010	83
MW-15 Depth												
24842	MW-15	2007	30	7.6	10	**8.3**	<10	47	<20	2.0	<0.0030	38
MW-15-25	MW-15	2008	25	11	9.3	**7.0**	7.4	44	18	<5.0	<0.050	426
C409-15WB	MW-15	2009	40-50	6.0	12	5.0	4.0	30	23	<1.0	0.038	203
C410-15WB	MW-15	2010	40-50	**36**	6.0	6.0	3.0	41	11	**3.0**	<0.010	16
C4 11-15WB	MW-15	2011	40-50	9.0	**22**	**7.0**	6.0	42	**44**	2.0	<0.010	16
2013-C4-MW-15B	MW-15	2013	40-50	7.5	6.7	6.6	3.9	48	11	**2.6**	<0.010	36
16-C4-MW15B	MW-15	2016	40-50	6.1	5	5.1	3.2	36	9	1.4	<0.010	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-9 Surface												
24832	MW-9	2007	0	9.3	9.6	**8.1**	<10	37	<20	**2.4**	<0.0030	28
MW-9-15	MW-9	2008	15	10	8.9	6.4	12	36	18	<5.0	<0.050	89
C409-9WA	MW-9	2009	0-15	10	12	6.0	6.0	29	23	1.0	<0.010	31
C410-9WA	MW-9	2010	0-15	**41**	10	**7.0**	**54**	52	19	2.0	0.094	131
C4 11-9WA	MW-9	2011	0-15	9.0	**24**	**7.0**	8.0	40	**49**	2.0	0.013	16
2013-C4-MW-9A	MW-9	2013	0-15	13	9.4	6.4	6.0	34	18	1.9	<0.010	36
16-C4-9A	MW-9	2016	0-15	11	**27**	**7.7**	6.8	45	**56**	**2.2**	<0.010	36
MW-9 Depth												
24834	MW-9	2007	30	10	10	**8.5**	<10	40	<20	**2.3**	0.0041	39
MW-9-25	MW-9	2008	25	10	7.9	6.2	9.7	36	17	<5.0	<0.050	45
C409-9WB	MW-9	2009	40-50	8.0	10	5.0	9.0	34	19	<1.0	0.010	437
C410-9WB	MW-9	2010	40-50	**44**	11	**7.0**	**22**	53	22	2.0	0.045	526
C4 11-9WB	MW-9	2011	40-50	12	**15**	**7.0**	7.0	43	**29**	2.0	<0.010	16
2013-C4-MW-9B	MW-9	2013	40-50	10	8.7	5.8	6.3	36	16	1.9	<0.010	36
16-C4-9B	MW-9	2016	40-50	**20**	**31**	**9.9**	7.6	62	**59**	**3.1**	<0.010	51

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-14 Surface												
24808	MW-14	2007	0	8.3	13	**8.5**	<10	36	28	**2.9**	<0.0030	17
MW-14-A-15	MW-14	2008	15	11	13	6.2	8.0	33	28	**<5.0**	<0.050	45
C409-14WA	MW-14	2009	0-15	13	**20**	**8.0**	8.0	45	**38**	**3.0**	<0.010	44
C410-14WA	MW-14	2010	0-15	**28**	**19**	**9.0**	15	50	**35**	**3.0**	0.013	49
C4 11-14WA	MW-14	2011	0-15	13	**19**	**8.0**	9.0	56	**42**	**4.0**	0.034	131
2013-C4-MW-14A	MW-14	2013	0-15	13	**30**	**8.0**	10	47	**60**	**3.4**	<0.010	76
16-C4-MW14A A	MW-14	2016	0-15	9.5	13	6.3	7.9	39	26	**2.5**	<0.010	65
MW-14 Depth												
24810	MW-14	2007	30	10	**15**	**11**	<10	48	**30**	**2.5**	<0.0030	44
MW-14-A-30	MW-14	2008	30	12	**14**	6.4	8.2	35	28	<5.0	<0.050	45
C409-14WB	MW-14	2009	40-50	9.0	**16**	6.0	8.0	38	**33**	<1.0	<0.010	50
C410-14WB	MW-14	2010	40-50	**62**	**25**	**10**	11	67	**44**	**4.0**	<0.010	25
C4 11-14WB	MW-14	2011	40-50	**16**	**23**	**9.0**	9.0	56	**42**	**3.0**	<0.010	16
2013-C4-MW-14B	MW-14	2013	40-50	11	**43**	**7.6**	7.0	40	**89**	**2.8**	0.014	56
16-C4-MW14A B	MW-14	2016	40-50	12	**15**	**7.0**	7.4	42	27	**3.1**	<0.010	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Cr	As	Hg	Modified TPH^ - Total C6-C34
MW-5 Surface											
24828	MW-5	2007	0	9.9	10	**8.7**	<10	21	**2.2**	<0.10	32
MW-5-10	MW-5	2008	10	12	9.4	6.6	6.6	18	**<5.0**	<0.0050	45
C409-5WA	MW-5	2009	0-15	7.0	9.0	5.0	4.0	18	2.0	<0.050	29
C410-5WA	MW-5	2010	0-15	**46**	9.0	**8.0**	7.0	16	**3.0**	0.060	16
C4 11-5WA	MW-5	2011	0-15	8.0	11	6.0	5.0	21	2.0	<0.050	16
2013-C4-MW-5A	MW-5	2013	0-15	**31**	**15**	6.4	6.9	17	1.9	<0.050	36
16-C4-5A	MW-5	2016	0-15	**15.0**	**24**	**7.0**	4.9	**50**	1.9	<0.050	36
MW-5 Depth											
24830	MW-5	2007	30	7.9	8.1	**7.2**	<10	<20	1.7	<0.10	29
MW-5-25	MW-5	2008	25	12	9.0	6.3	6.8	19	<5.0	0.0051	45
C409-5WB	MW-5	2009	40-50	**16**	10	**7.0**	5.0	19	2.0	<0.050	16
C410-5WB	MW-5	2010	40-50	**39**	7.0	**8.0**	5.0	11	2.0	0.050	16
C4 11-5WB	MW-5	2011	40-50	**20**	10	**7.0**	5.0	20	2.0	<0.050	16
2013-C4-MW-5B	MW-5	2013	40-50	9.2	**65**	**7.5**	4.1	**130**	1.3	<0.050	36
16-C4-5B	MW-5	2016	40-50	12	**21**	4.7	4	**44**	2.0	<0.050	36



Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012	38
Baseline Data - Arithmetic Mean corrected for Detection limit	**14**	**14**	**6.8**	**1.00**	**22**	**79**	**28**	**2.0**	**0.100**	**0.16**	**1029**
Baseline Data + 3x Standard Deviation	32	29	17	1.6	101	227	66	5.0	0.38	1.3	10635

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/kg

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 30 60 metres

SCALE 1:1500

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

TIER II DISPOSAL FACILITY

SOIL CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.3B	

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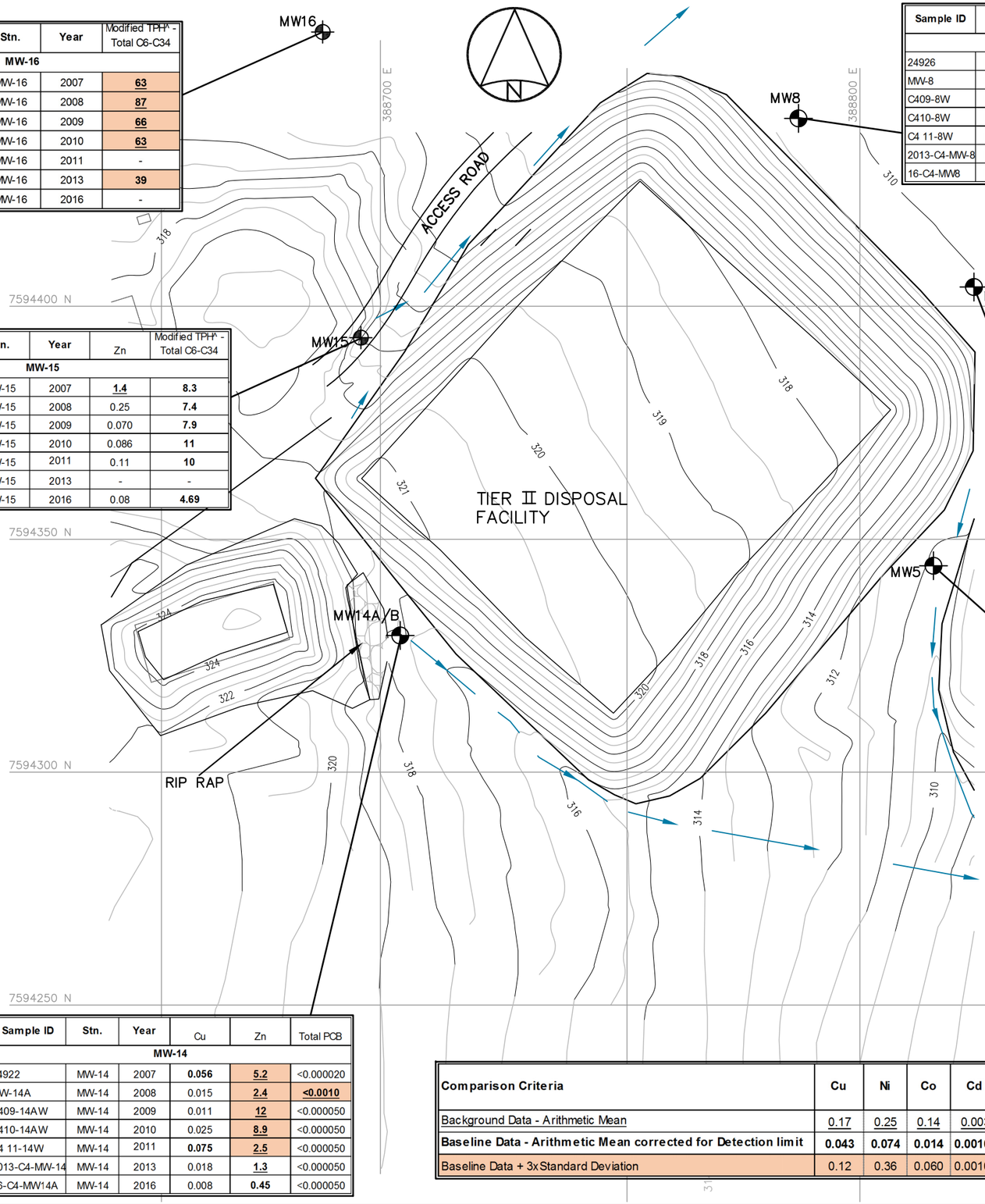

Sample ID	Stn.	Year	Modified TPH^ - Total C6-C34
MW-16			
24942	MW-16	2007	**63**
MW-16	MW-16	2008	**87**
C409-16W	MW-16	2009	**66**
C410-16W	MW-16	2010	**63**
not sampled - dry	MW-16	2011	-
2013-C4-MW-16	MW-16	2013	**39**
not sampled - dry	MW-16	2016	-

Sample ID	Stn.	Year	Cu	Ni	Co	Cr	As	Modified TPH^ - Total C6-C34
MW-8								
24926	MW-8	2007	**0.056**	**0.18**	**0.021**	**0.33**	**0.016**	**3.9**
MW-8	MW-8	2008	0.023	0.027	0.0031	<0.0050	<0.0025	**13**
C409-8W	MW-8	2009	<0.0010	0.026	0.0030	0.011	**0.0080**	**4.1**
C410-8W	MW-8	2010	0.014	0.012	0.0045	0.016	0.0018	**5.9**
C4 11-8W	MW-8	2011	0.0090	0.058	0.0042	0.022	0.0020	**3.0**
2013-C4-MW-8	MW-8	2013	0.0015	0.015	0.0012	<0.0010	0.0017	**47**
16-C4-MW8	MW-8	2016	0.004	0.0160	0.0025	0.007	0.0019	**7.86**

Sample ID	Stn.	Year	Zn	Modified TPH^ - Total C6-C34
MW-15				
24939	MW-15	2007	**1.4**	**8.3**
MW-15	MW-15	2008	0.25	**7.4**
C409-15W	MW-15	2009	0.070	**7.9**
C410-15W	MW-15	2010	0.086	**11**
C4 11-15W	MW-15	2011	0.11	**10**
inaccessible	MW-15	2013	-	-
16-C4-MW15	MW-15	2016	0.08	**4.69**

Sample ID	Stn.	Year	Cu	Zn	As	Modified TPH^ - Total C6-C34
MW-9						
24927	MW-9	2007	**0.056**	**5.2**	<0.0030	**3.9**
MW-9	MW-9	2008	0.0071	0.038	<0.0025	**1.1**
C409-9W	MW-9	2009	0.0037	0.0050	0.0042	0.45
C410-9W	MW-9	2010	0.0050	0.015	0.0027	0.20
C4 11-9W	MW-9	2011	0.014	0.020	**0.0060**	**3.0**
2013-C4-MW-9	MW-9	2013	0.0013	<0.0030	0.00062	<0.10
16-C4-MW9	MW-9	2016	0.0067	0.028	0.0019	0.42

Sample ID	Stn.	Year	Cu	Ni	Co	Zn	As
MW-5							
24923	MW-5	2007	**0.045**	**0.12**	**0.022**	0.32	**0.0051**
MW-5	MW-5	2008	0.0043	0.0086	0.00030	0.037	<0.00050
C409-5W	MW-5	2009	0.012	0.029	0.0011	**0.56**	0.00070
C410-5W	MW-5	2010	0.016	**0.089**	0.0017	**0.47**	0.00060
CW 11-5W	MW-5	2011	0.011	0.032	0.0011	0.082	<0.0010
not sampled	MW-5	2013	-	-	-	-	-
16-C4-MW5	MW-5	2016	0.0029	0.0057	<0.00030	0.023	0.00026

Sample ID	Stn.	Year	Cu	Zn	Total PCB
MW-14					
24922	MW-14	2007	**0.056**	**5.2**	<0.000020
MW-14A	MW-14	2008	0.015	**2.4**	**<0.0010**
C409-14AW	MW-14	2009	0.011	**12**	<0.000050
C410-14AW	MW-14	2010	0.025	**8.9**	<0.000050
C4 11-14W	MW-14	2011	**0.075**	**2.5**	<0.000050
2013-C4-MW-14	MW-14	2013	0.018	**1.3**	<0.000050
16-C4-MW14A	MW-14	2016	0.008	**0.45**	<0.000050

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	0.17	0.25	0.14	0.003	0.1	0.75	0.5	0.021	0.00040	0.00002	44
Baseline Data - Arithmetic Mean corrected for Detection limit	**0.043**	**0.074**	**0.014**	**0.00100**	**0.010**	**0.35**	**0.13**	**0.0049**	**0.00040**	**0.000020**	**1.0**
Baseline Data + 3x Standard Deviation	0.12	0.36	0.060	0.00100	0.040	2.2	0.69	0.017	0.0004	0.000020	13

LEGEND:

MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/L

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

TIER II DISPOSAL FACILITY

GROUNDWATER CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.3C	

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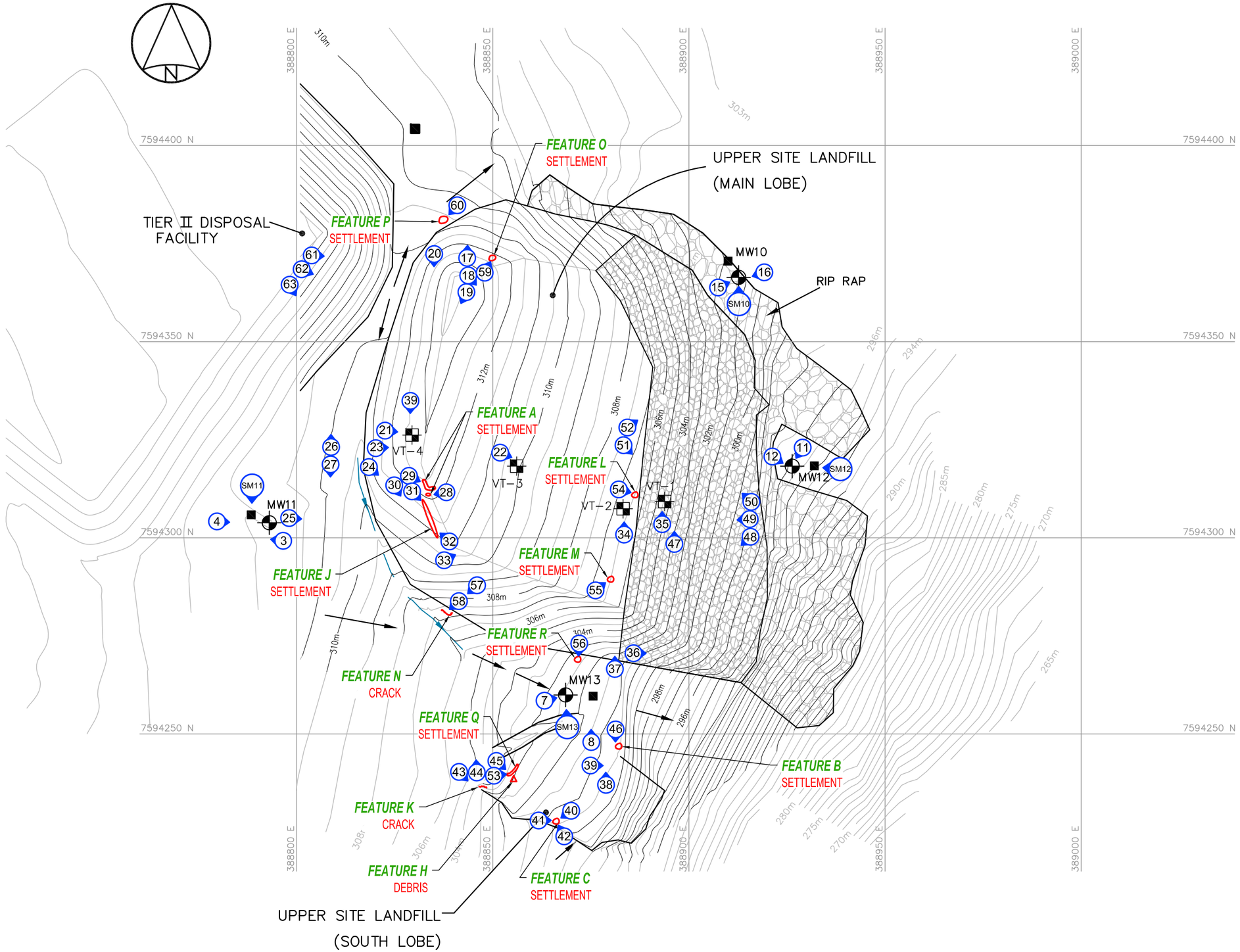

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- VERTICAL THERMISTOR LOCATION
- APPROX. PHOTOGRAPHIC VIEWPOINT
- SETTLEMENT
- EROSION
- CRACK
- DEBRIS (N.T.S.)
- RIPRAP
- SURFACE WATER FLOW DIRECTION

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

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CAM-4, PELLY BAY, NUNAVUT

UPPER SITE LANDFILL

PLAN/MONITORING POINTS/ LANDFILL OBSERVATIONS

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.4A

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_4.dwg LAYOUT: 4.4A SAVED: 3/22/2017 4:32 PM PLOTTED: 4/11/2017 7:16 PM BY: IZABELA ZIBA

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-11 Surface												
24812	MW-11	2007	0	**14**	**18**	**10**	<10	**66**	**36**	**2.6**	<0.0030	**48585**
MW-11-10	MW-11	2008	10	11	**12**	**7.0**	**19**	44	**28**	<5.0	<0.050	**1250**
C409-11WA	MW-11	2009	0-15	11	**13**	**6.0**	6.0	36	**26**	1.0	<0.010	**1511**
C410-11WA	MW-11	2010	0-15	**13**	**12**	**7.0**	6.0	36	**25**	2.0	<0.010	**1211**
C4 11-11WA	MW-11	2011	0-15	10	**16**	**7.0**	8.0	42	**33**	2.0	<0.10	**11146**
2013-C4-MW-11-A	MW-11	2013	0-15	**30**	**15**	**8.3**	9.6	60	**28**	2.3	<0.10	**5238**
16-C4-MW11A	MW-11	2016	0-15	12	**20**	**7.2**	**11**	52	**40.0**	**2.6**	0.015	500
MW-11 Depth												
24814	MW-11	2007	30	9.2	**12**	**7.3**	<10	39	**25**	1.2	<0.0030	**4152**
MW-11-40	MW-11	2008	40	10	**12**	**6.5**	8.1	33	23	<5.0	<0.050	**1170**
C409-11WB	MW-11	2009	40-50	8.0	10	5.0	5.0	26	20	1.0	<0.010	**801**
C410-11WB	MW-11	2010	40-50	**31**	**14**	**7.0**	6.0	39	**29**	2.0	<0.010	**1311**
C4 11-11WB	MW-11	2011	40-50	11	**15**	**7.0**	7.0	38	**28**	2.0	**<0.50**	**10194**
2013-C4-MW-11-B	MW-11	2013	40-50	**22**	**21**	**9.6**	**10**	**65**	**39**	**3.0**	<0.10	**1016**
16-C4-MW11B	MW-11	2016	40-50	9.3	**16**	**6.9**	9	40	**31.0**	2.0	<0.010	87

Sample ID	Stn.	Year	Depth	Ni	Co	Cr	As	Modified TPH^ - Total C6-C34
MW-10 Surface								
24824	MW-10	2007	0	6.6	<5.0	<20	1.1	29.2
MW-10-15	MW-10	2008	15	11	5.0	22	<5.0	45
C409-10WA	MW-10	2009	0-15	**14**	**7.0**	**27**	1.0	37
C410-10WA	MW-10	2010	0-15	8.0	4.0	15	1.0	16
C4 11-10WA	MW-10	2011	0-15	**14**	4.0	**29**	1.0	16
2013-C4-MW-10-A	MW-10	2013	0-15	**11**	**5.8**	22	1.5	36
16-C4-MW10A	MW-10	2016	0-15	7.2	3.6	12.0	<1.0	36
MW-10 Depth								
24826	MW-10	2007	30	7.7	5.2	<20	1.2	42.3
MW-10-35	MW-10	2008	35	**20**	**9.0**	**25**	**94**	45
C409-10WB	MW-10	2009	40-50	**11**	5.0	22	<1.0	47
C410-10WB	MW-10	2010	40-50	9.0	5.0	20	2.0	16
C4 11-10WB	MW-10	2011	40-50	7.0	4.0	16	1.0	16
2013-C4-MW-10-B	MW-10	2013	40-50	**11**	4.9	19	1.2	36
16-C4-MW10B	MW-10	2016	40-50	9.1	5	17.0	1.6	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Total PCB	Modified TPH^ - Total C6-C34
MW-12 Surface												
24820/21	MW-12	2007	0	4.1	7.2	**5.8**	<10	22	<20	1.6	<0.0030	48
MW-12-15	MW-12	2008	15	6.0	6.8	3.6	4.9	23	17	<5.0	<0.050	45
C409-12WA	MW-12	2009	0-15	6.0	9.0	5.0	4.0	22	18	<1.0	<0.010	36
C410-12WA	MW-12	2010	0-15	**25**	10	5.0	8.0	**77**	23	1.0	0.087	**776**
C4 11-12WA	MW-12	2011	0-15	**13**	**13**	**6.0**	**21**	**94**	**30**	1.0	<0.10	171
2013-C4-MW-12-A	MW-12	2013	0-15	10	**11**	**5.9**	**15**	53	21	1.4	<0.010	36
16-C4-MW12A	MW-12	2016	0-15	12	**13**	**7.3**	8.9	48	23.0	2.2	<0.010	71
MW-12 Depth												
24822	MW-12	2007	30	4.0	7.6	**5.9**	<10	21	<20	1.6	<0.0030	35
MW-12-30	MW-12	2008	30	5.4	6.9	3.8	4.9	21	15	<5.0	<0.050	45
C409-12WB	MW-12	2009	40-50	7.0	**11**	5.0	5.0	26	22	**3.0**	<0.010	46
C410-12WB	MW-12	2010	40-50	**27**	**12**	**7.0**	7.0	51	**28**	2.0	0.079	**1516**
C4 11-12WB	MW-12	2011	40-50	6.0	**13**	5.0	5.0	26	**26**	1.0	<0.050	505
2013-C4-MW-12-B	MW-12	2013	40-50	7.7	9.6	4.9	5.0	31	19	1.3	<0.010	36
16-C4-MW12B	MW-12	2016	40-50	**14**	**13**	**7.2**	**15**	**73**	**25.0**	2.3	<0.030	**823**

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Cr	Modified TPH^ - Total C6-C34
MW-13 Surface								
24816	MW-13	2007	0	4.2	8.8	**5.7**	<20	19
MW-13-15	MW-13	2008	15	7.1	8.6	5.1	18	96
C409-13WA	MW-13	2009	0-15	8.0	**11**	5.0	22	62
C410-13WA	MW-13	2010	0-15	**17**	9.0	5.0	19	58
C411-13WA	MW-13	2011	0-15	<5.0	9.0	4.0	22	22
2013-C4-MW-13-A	MW-13	2013	0-15	9.3	**36**	**6.2**	**79**	36
16-C4-MW13A	MW-13	2016	0-15	7.1	8.3	4.6	17.0	36
MW-13 Depth								
24818	MW-13	2007	30	3.2	6.3	<5.0	<20	28
MW-13-30	MW-13	2008	30	3.5	6.6	3.6	15	45
C409-13WB	MW-13	2009	40-50	<5.0	**11**	3.0	22	32
C410-13WB	MW-13	2010	40-50	**18**	**11**	**6.0**	**26**	16
C4 11-13WB	MW-13	2011	40-50	<5.0	**12**	3.0	**24**	16
2013-C4-MW-13-B	MW-13	2013	40-50	8.0	8.4	5.4	16	36
16-C4-MW13B	MW-13	2016	40-50	7.2	**17**	4.9	**36.0**	36

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	14	16	8.3	1.00	10.0	50	32	2.4	0.100	0.003	38
Baseline Data - Arithmetic Mean corrected for Detection limit	**13**	**11**	**5.5**	**1.00**	**10**	**63**	**23**	**2.5**	**0.100**	**0.100**	**608**
Baseline Data + 3xStandard Deviation	52	25	18	1.8	61	250	60	26	0.100	0.32	5046

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/kg

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

ARCADIS

DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

UPPER SITE LANDFILL

SOIL CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.4B	

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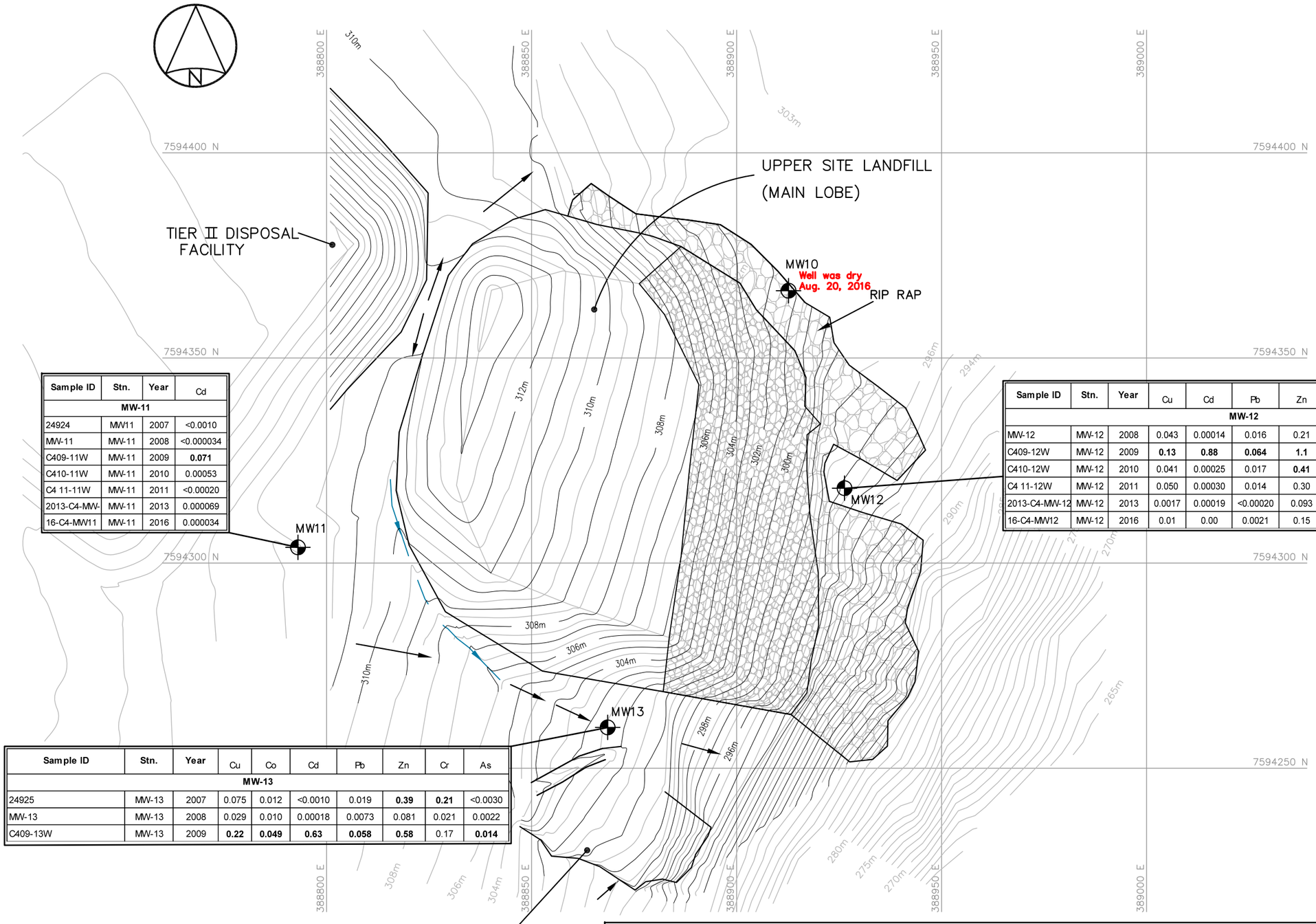

Sample ID	Stn.	Year	Cd
MW-11			
24924	MW11	2007	<0.0010
MW-11	MW-11	2008	<0.000034
C409-11W	MW-11	2009	**0.071**
C410-11W	MW-11	2010	0.00053
C4 11-11W	MW-11	2011	<0.00020
2013-C4-MW-	MW-11	2013	0.000069
16-C4-MW11	MW-11	2016	0.000034

Sample ID	Stn.	Year	Cu	Co	Cd	Pb	Zn	Cr	As
MW-13									
24925	MW-13	2007	0.075	0.012	<0.0010	0.019	**0.39**	**0.21**	<0.0030
MW-13	MW-13	2008	0.029	0.010	0.00018	0.0073	0.081	0.021	0.0022
C409-13W	MW-13	2009	**0.22**	**0.049**	**0.63**	**0.058**	**0.58**	0.17	**0.014**

Sample ID	Stn.	Year	Cu	Cd	Pb	Zn	Cr	As	Modified TPH^ - Total C6-C34
MW-12									
MW-12	MW-12	2008	0.043	0.00014	0.016	0.21	0.054	0.0051	**3.3**
C409-12W	MW-12	2009	**0.13**	**0.88**	**0.064**	**1.1**	**0.22**	**0.019**	0.3
C410-12W	MW-12	2010	0.041	0.00025	0.017	**0.41**	0.026	0.0040	<0.10
C4 11-12W	MW-12	2011	0.050	0.00030	0.014	0.30	0.060	0.0050	<2.0
2013-C4-MW-12	MW-12	2013	0.0017	0.00019	<0.00020	0.093	<0.0010	<0.00020	<0.10
16-C4-MW12	MW-12	2016	0.01	0.00	0.0021	0.15	0.009	0.00083	0.20000

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ - Total C6-C34
Background Data - Arithmetic Mean	0.17	0.25	0.14	0.003	0.11	0.75	0.48	0.02	0.0004	0.0000	44
Baseline Data - Arithmetic Mean corrected for Detection limit	**0.10**	**0.12**	**0.05**	**0.001**	**0.04**	**0.33**	**0.19**	**0.01**	**0.0004**	**0.00002**	**1.8**
Baseline Data + 3xStandard Deviation	0.55	0.70	0.34	0.00	0.30	1.89	1.12	0.08	0.00040	0.00002	11

LEGEND:

MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/L

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

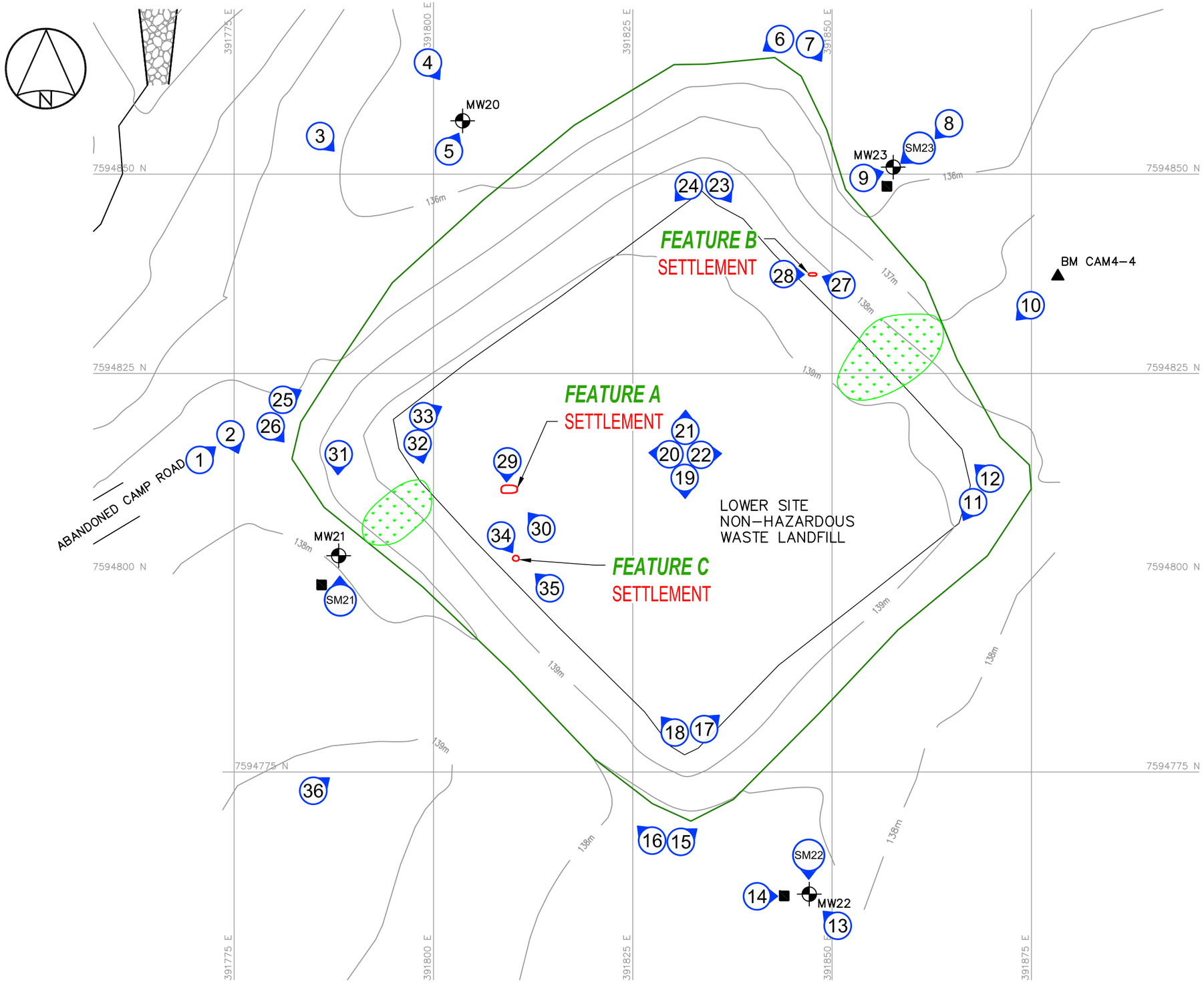
CAM-4, PELLY BAY, NUNAVUT

UPPER SITE LANDFILL

GROUNDWATER CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.4C	

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_4.dwg LAYOUT: 4.4C SAVED: 3/22/2017 4:32 PM PLOTTED: 4/11/2017 7:22 PM BY: IZABELA ZIBA



LEGEND:

- BM-1 — PERMANENT BENCHMARK
- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- VERTICAL THERMISTOR LOCATION
- 1 — APPROX. PHOTOGRAPHIC VIEWPOINT
- SETTLEMENT
- VEGETATION

0 10 20 metres

SCALE 1:500

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE NON-HAZARDOUS LANDFILL

PLAN/MONITORING POINTS/ LANDFILL OBSERVATIONS

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.5A	

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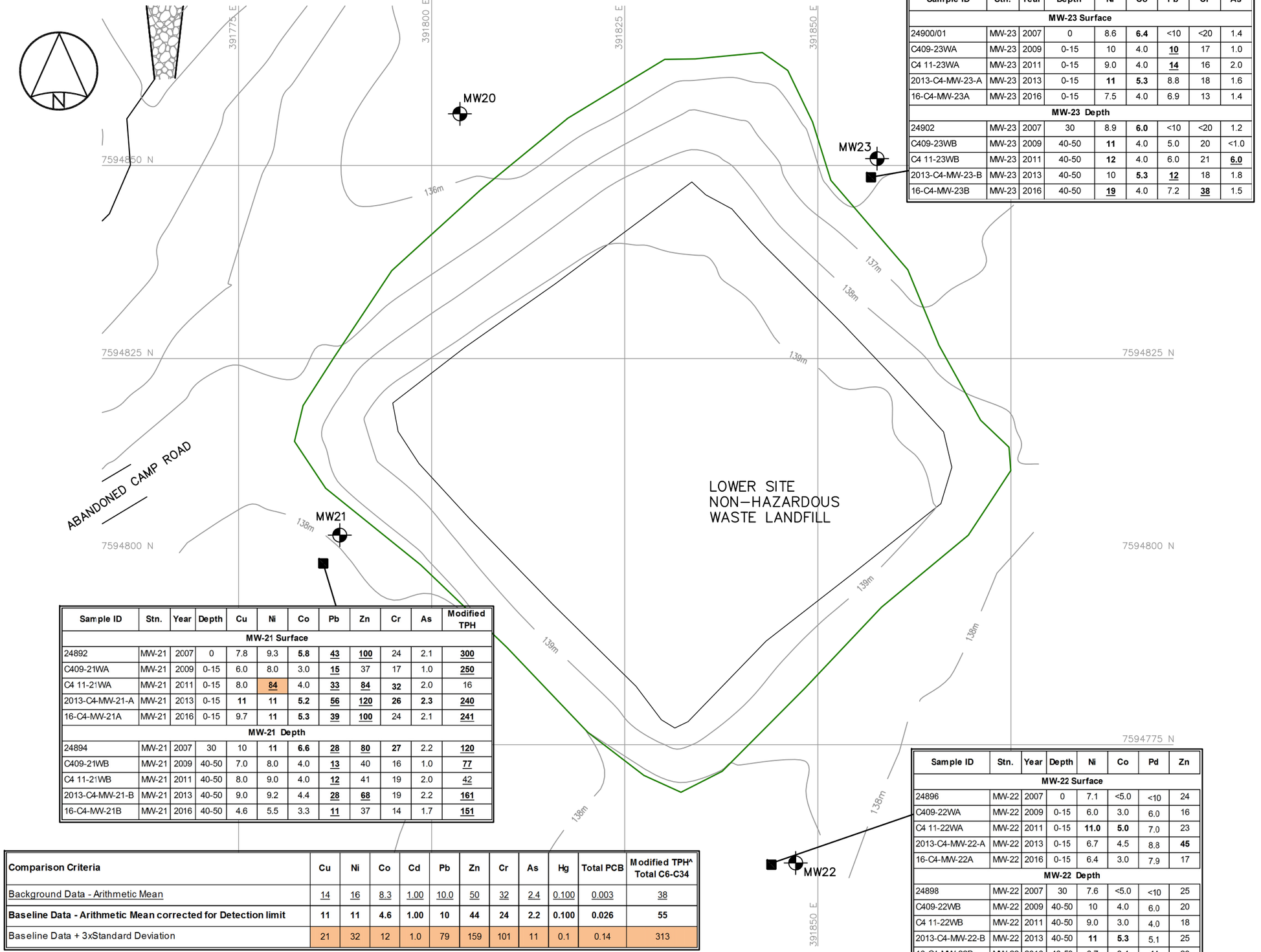

Sample ID	Stn.	Year	Depth	Ni	Co	Pb	Cr	As
MW-23 Surface								
24900/01	MW-23	2007	0	8.6	**6.4**	<10	<20	1.4
C409-23WA	MW-23	2009	0-15	10	4.0	**10**	17	1.0
C4 11-23WA	MW-23	2011	0-15	9.0	4.0	**14**	16	2.0
2013-C4-MW-23-A	MW-23	2013	0-15	**11**	**5.3**	8.8	18	1.6
16-C4-MW-23A	MW-23	2016	0-15	7.5	4.0	6.9	13	1.4
MW-23 Depth								
24902	MW-23	2007	30	8.9	**6.0**	<10	<20	1.2
C409-23WB	MW-23	2009	40-50	**11**	4.0	5.0	20	<1.0
C4 11-23WB	MW-23	2011	40-50	**12**	4.0	6.0	21	**6.0**
2013-C4-MW-23-B	MW-23	2013	40-50	10	**5.3**	**12**	18	1.8
16-C4-MW-23B	MW-23	2016	40-50	**19**	4.0	7.2	**38**	1.5

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Modified TPH
MW-21 Surface											
24892	MW-21	2007	0	7.8	9.3	**5.8**	**43**	**100**	24	2.1	**300**
C409-21WA	MW-21	2009	0-15	6.0	8.0	3.0	**15**	37	17	1.0	**250**
C4 11-21WA	MW-21	2011	0-15	8.0	**84**	4.0	**33**	**84**	**32**	2.0	16
2013-C4-MW-21-A	MW-21	2013	0-15	**11**	**11**	**5.2**	**56**	**120**	**26**	**2.3**	**240**
16-C4-MW-21A	MW-21	2016	0-15	9.7	**11**	**5.3**	**39**	**100**	24	2.1	**241**
MW-21 Depth											
24894	MW-21	2007	30	10	**11**	**6.6**	**28**	**80**	**27**	2.2	**120**
C409-21WB	MW-21	2009	40-50	7.0	8.0	4.0	**13**	40	16	1.0	**77**
C4 11-21WB	MW-21	2011	40-50	8.0	9.0	4.0	**12**	41	19	2.0	42
2013-C4-MW-21-B	MW-21	2013	40-50	9.0	9.2	4.4	**28**	**68**	19	2.2	**161**
16-C4-MW-21B	MW-21	2016	40-50	4.6	5.5	3.3	**11**	37	14	1.7	**151**

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ Total C6-C34
Background Data - Arithmetic Mean	14	16	8.3	1.00	10.0	50	32	2.4	0.100	0.003	38
Baseline Data - Arithmetic Mean corrected for Detection limit	**11**	**11**	**4.6**	**1.00**	**10**	**44**	**24**	**2.2**	**0.100**	**0.026**	**55**
Baseline Data + 3xStandard Deviation	21	32	12	1.0	79	159	101	11	0.1	0.14	313

Sample ID	Stn.	Year	Depth	Ni	Co	Pd	Zn
MW-22 Surface							
24896	MW-22	2007	0	7.1	<5.0	<10	24
C409-22WA	MW-22	2009	0-15	6.0	3.0	6.0	16
C4 11-22WA	MW-22	2011	0-15	**11.0**	**5.0**	7.0	23
2013-C4-MW-22-A	MW-22	2013	0-15	6.7	4.5	8.8	**45**
16-C4-MW-22A	MW-22	2016	0-15	6.4	3.0	7.9	17
MW-22 Depth							
24898	MW-22	2007	30	7.6	<5.0	<10	25
C409-22WB	MW-22	2009	40-50	10	4.0	6.0	20
C4 11-22WB	MW-22	2011	40-50	9.0	3.0	4.0	18
2013-C4-MW-22-B	MW-22	2013	40-50	**11**	**5.3**	5.1	25
16-C4-MW-22B	MW-22	2016	40-50	6.7	3.4	**11**	20

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/kg

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 10 20 metres

SCALE 1:500

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE NON-HAZARDOUS LANDFILL

SOIL CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.5B

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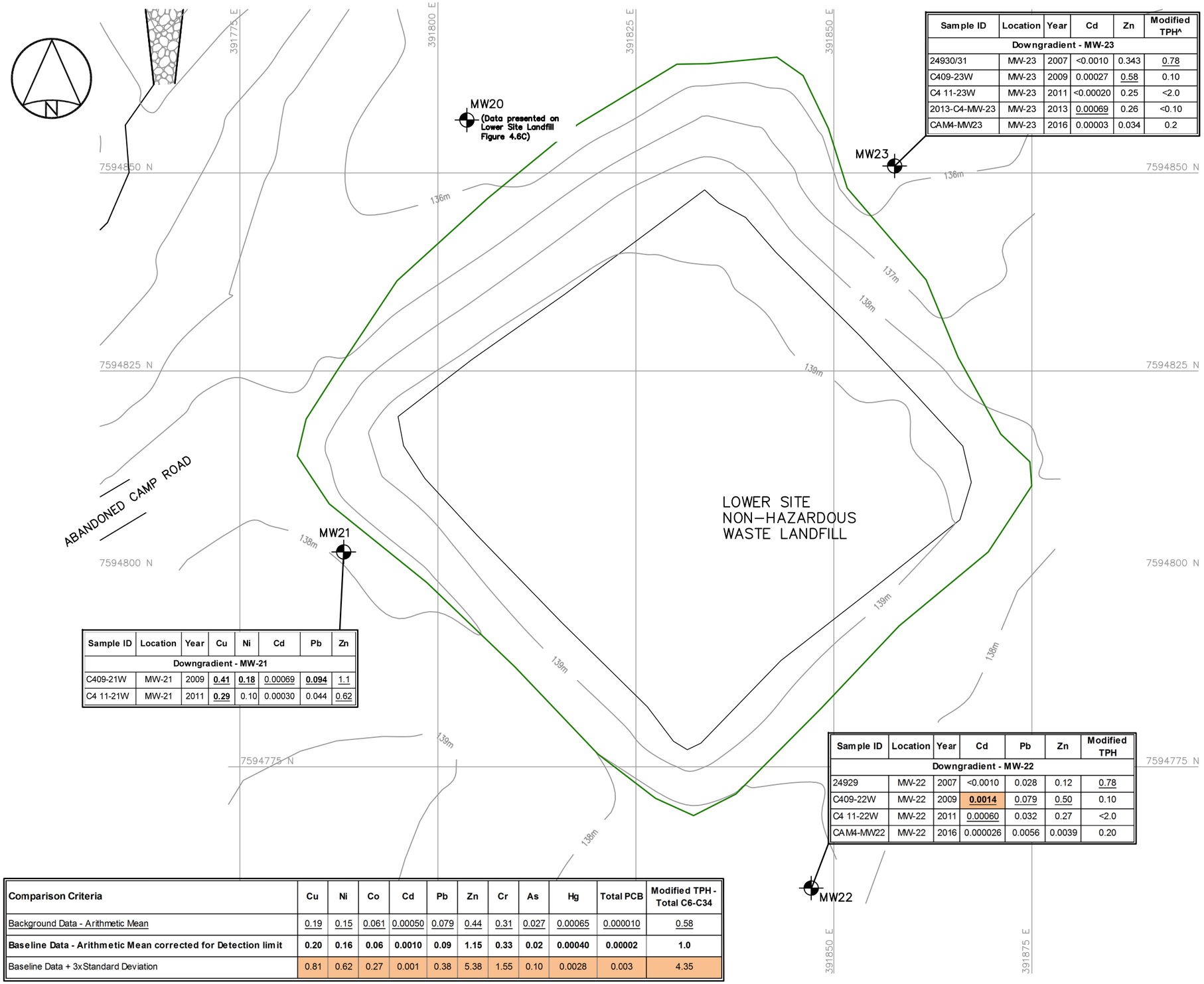

Sample ID	Location	Year	Cd	Zn	Modified TPH^
Downgradient - MW-23					
24930/31	MW-23	2007	<0.0010	0.343	0.78
C409-23W	MW-23	2009	0.00027	0.58	0.10
C4 11-23W	MW-23	2011	<0.00020	0.25	<2.0
2013-C4-MW-23	MW-23	2013	0.00069	0.26	<0.10
CAM4-MW23	MW-23	2016	0.00003	0.034	0.2

Sample ID	Location	Year	Cu	Ni	Cd	Pb	Zn
Downgradient - MW-21							
C409-21W	MW-21	2009	**0.41**	**0.18**	0.00069	**0.094**	1.1
C4 11-21W	MW-21	2011	**0.29**	0.10	0.00030	0.044	0.62

Sample ID	Location	Year	Cd	Pb	Zn	Modified TPH
Downgradient - MW-22						
24929	MW-22	2007	<0.0010	0.028	0.12	0.78
C409-22W	MW-22	2009	**0.0014**	0.079	0.50	0.10
C4 11-22W	MW-22	2011	0.00060	0.032	0.27	<2.0
CAM4-MW22	MW-22	2016	0.000026	0.0056	0.0039	0.20

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH - Total C6-C34
Background Data - Arithmetic Mean	0.19	0.15	0.061	0.00050	0.079	0.44	0.31	0.027	0.00065	0.000010	0.58
Baseline Data - Arithmetic Mean corrected for Detection limit	**0.20**	**0.16**	**0.06**	**0.0010**	**0.09**	**1.15**	**0.33**	**0.02**	**0.00040**	**0.00002**	**1.0**
Baseline Data + 3xStandard Deviation	0.81	0.62	0.27	0.001	0.38	5.38	1.55	0.10	0.0028	0.003	4.35

LEGEND:

MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/L

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 10 20 metres

SCALE 1:500

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DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE NON-HAZARDOUS LANDFILL

GROUNDWATER CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.5C

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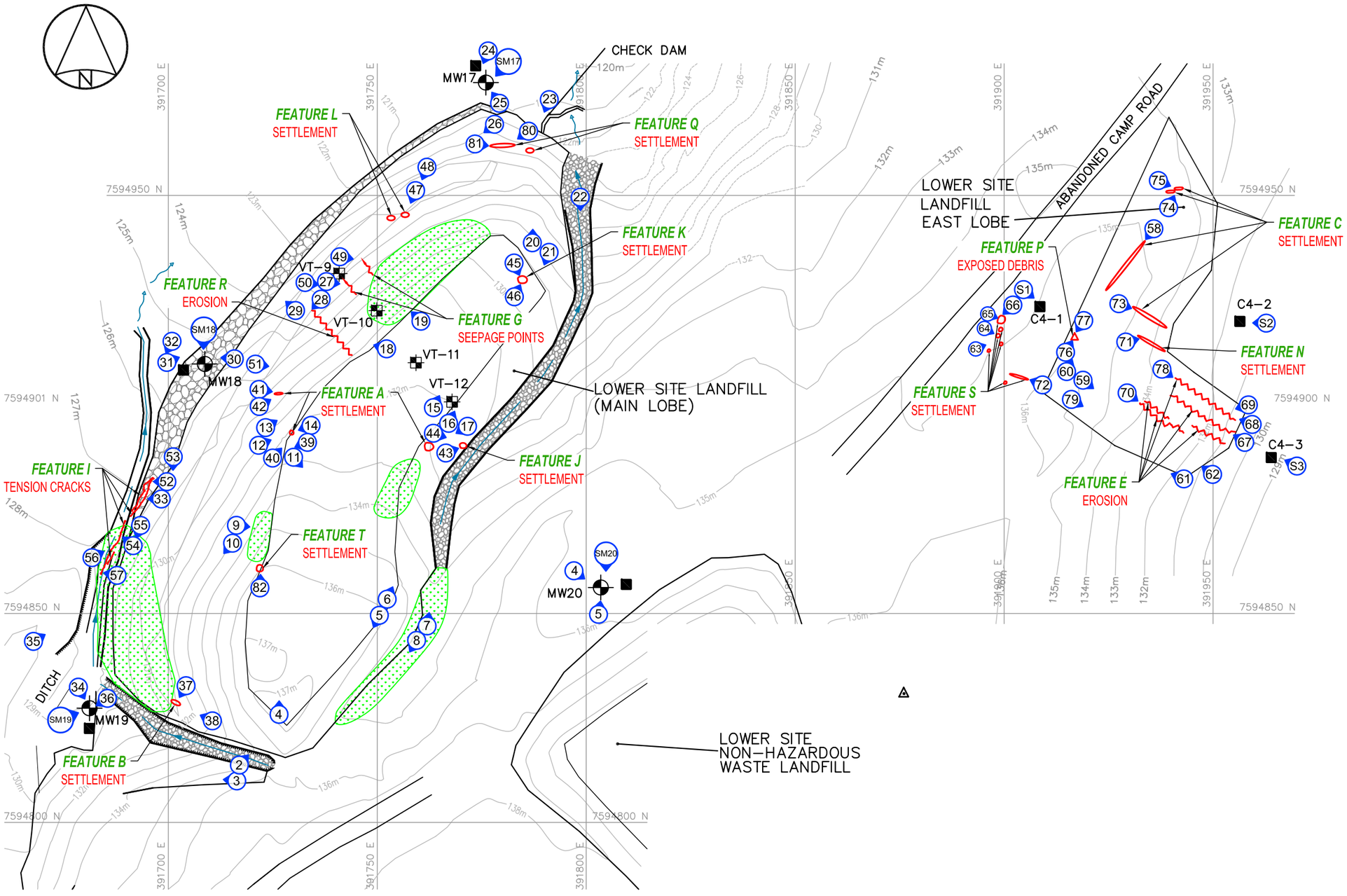

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- VERTICAL THERMISTOR LOCATION
- APPROX. PHOTOGRAPHIC VIEWPOINT
- SETTLEMENT (N.T.S.)
- EROSION
- CRACK
- SEEPAGE
- EXPOSED DEBRIS (N.T.S.)
- VEGETATION
- RIPRAP
- SURFACE WATER FLOW DIRECTION

0 20 40 metres

SCALE 1:1000

ARCADIS

DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE LANDFILL

PLAN/MONITORING POINTS/ LANDFILL OBSERVATIONS

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.6A	

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Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Cr	As	Modified TPH^
MW-17 Surface										
24876	MW-17	2007	0	5.5	7.4	<5.0	<10	<20	1.5	28
MW-17-15	MW-17	2008	15	6.6	6.6	3.8	5.4	14	<5.0	45
C409-17WA	MW-17	2009	0-15	6.0	9.0	4.0	5.0	17	1.0	80
C410-17WA	MW-17	2010	0-15	7.0	8.0	4.0	5.0	16	**2.0**	16
C4 11-17WA	MW-17	2011	0-15	<5.0	**10**	4.0	4.0	**21**	<1.0	33
2013-C4-MW-17-A	MW-17	2013	0-15	9.8	**10**	**5.3**	7.1	19	**1.6**	71
16-C4-MW-17A	MW-17	2016	0-15	5.3	4.5	2.6	3.4	3.2	<1.0	36
MW-17 Depth										
24878	MW-17	2007	30	6.5	8.7	**5.5**	<10	<20	**1.7**	12
MW-17-40	MW-17	2008	40	**14**	**10**	**5.5**	8.7	**21**	<5.0	45
C409-17WB	MW-17	2009	40-50	7.0	**11**	4.0	6.0	**22**	**2.0**	36
C410-17WB	MW-17	2010	40-50	11	8.0	4.0	6.0	16	**2.0**	16
C4 11-17WB	MW-17	2011	40-50	5.0	**13**	4.0	5.0	**26**	1.0	16
2013-C4-MW-17-B	MW-17	2013	40-50	10	**11**	**5.1**	7.0	18	**1.6**	36
16-C4-MW-17B	MW-17	2016	40-50	4.6	5.7	2.8	3.7	9.7	8.1	69

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Hg	Modified TPH^
C4-1 Surface												
24916	C4-1	2007	0	10	8.6	**5.7**	<10	35	<20	1.2	<0.10	12
C409-1A	C4-1	2009	0-15	**18**	**16**	**5.0**	**19**	**150**	**29**	**2.0**	<0.050	45
C410-1A	C4-1	2010	0-15	**15**	**12**	**6.0**	**21**	54	**20**	**2.0**	0.050	16
2013-C4-1-A	C4-1	2013	0-15	**24**	**19**	**9.8**	**36**	**110**	**36**	**4.6**	<0.050	69
16-C4-1A	C4-1	2016	0-15	9.0	7.9	**4.4**	**11**	36	14	1.6	<0.050	36
C4-1 Depth												
24918	C4-1	2007	30	8.1	8.2	**5.4**	<10	28	<20	**1.7**	<0.10	14
C409-1B	C4-1	2009	30	**22**	**11**	**5.0**	**100**	**350**	**22**	**4.0**	<0.050	110
C410-1B	C4-1	2010	40-50	**13**	9.0	**5.0**	**18**	39	17	**2.0**	<0.050	16
2013-C4-1-B	C4-1	2013	40-50	**14**	8.8	**4.9**	**13**	39	15	1.2	<0.050	36
16-C4-1B	C4-1	2016	40-50	**16**	**12**	**6.2**	8.4	36	**21**	**1.8**	<0.050	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Hg	Modified TPH^
MW-18 Surface												
24880/81	MW-18	2007	0	7.3	8.0	<5.0	**10**	54	<20	**2.7**	<0.10	50
MW-18-15	MW-18	2008	15	9.5	8.0	3.8	7.2	31	16	<5.0	0.012	45
C409-18WA	MW-18	2009	0-15	10	9.0	4.0	**10**	43	17	**2.0**	<0.050	55
C410-18WA	MW-18	2010	0-15	7.0	7.0	3.0	6.0	23	14	**2.0**	<0.050	16
C4 11-18WA	MW-18	2011	0-15	8.0	**21**	**5.0**	6.0	34	**43**	**2.0**	<0.050	16
2013-C4-MW-18-	MW-18	2013	0-15	**34**	**17**	**9.1**	**19**	**64**	**35**	**2.6**	**0.11**	36
16-C4-MW-18A	MW-18	2016	0-15	6.0	7.0	3.0	5.1	25	14	**1.9**	<0.050	36
MW-18 Depth												
24882	MW-18	2007	30	**13**	**12**	**12**	**18**	**69**	**24**	**3.9**	<0.10	44
MW-18-30	MW-18	2008	30	10	8.7	3.8	8.9	36	18	<5.0	0.0085	45
C409-18WB	MW-18	2009	40-50	**18**	**17**	**7.0**	**16**	**84**	**26**	**2.0**	<0.050	108
C410-18WB	MW-18	2010	40-50	7.0	6.0	3.0	5.0	22	14	**2.0**	<0.050	16
C4 11-18WB	MW-18	2011	40-50	<5.0	**10**	4.0	4.0	23	19	**2.0**	<0.050	16
2013-C4-MW-18-	MW-18	2013	40-50	**13**	**13**	**7.2**	**12**	**59**	**26**	**3.1**	0.10	36
16-C4-MW-18B	MW-18	2016	40-50	4.5	4.7	2.8	4.3	23	9.7	**1.9**	<0.050	36

Sample ID	Stn.	Year	Depth	Ni	Pb	Cr	As	Modified TPH^
MW-19 Surface								
24884	MW-19	2007	0	7.9	<10	<20	1.4	**223**
MW-19-20	MW-19	2008	20	7.2	6.4	15	<5.0	45
C409-19WA	MW-19	2009	0-15	6.0	3.0	11	<1.0	29
C410-19WA	MW-19	2010	0-15	9.0	7.0	17	**2.0**	16
C4 11-19WA	MW-19	2011	0-15	**10**	5.0	**20**	1.0	16
2013-C4-MW-19-A	MW-19	2013	0-15	7.1	5.4	14	1.1	36
16-C4-MW-19A	MW-19	2016	0-15	4.0	3.6	8.0	<1.0	36
MW-19 Depth								
24886	MW-19	2007	30	9.1	<10	<20	8.0	26
MW-19-50	MW-19	2008	50	6.6	7.8	12	<5.0	45
C409-19WB	MW-19	2009	40-50	**10**	3.0	**20**	<1.0	25
C410-19WB	MW-19	2010	40-50	7.0	6.0	15	1.0	16
C4 11-19WB	MW-19	2011	40-50	**10**	5.0	18	1.0	16
2013-C4-MW-19-B	MW-19	2013	40-50	8.0	5.8	15	**2.2**	36
16-C4-MW-19B	MW-19	2016	40-50	7.8	5.6	14	1.2	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Modified TPH^
MW-20 Surface											
24904	MW-20	2007	0-15	10	**9.7**	**6.5**	**17**	30	**21**	**2.4**	20
MW-20-15	MW-20	2008	15	12	**9.6**	**5.9**	**11**	37	18	<5.0	45
C409-20WA	MW-20	2009	0-15	9.0	9.0	4.0	8.0	23	17	**2.0**	42
C410-20WA	MW-20	2010	0-15	**29**	**10**	**6.0**	5.0	41	**21**	**2.0**	16
C4 11-20WA	MW-20	2011	0-15	**15**	**21**	**8.0**	**14**	53	**41**	**3.0**	16
2013-C4-MW-20-A	MW-20	2013	0-15	12	**11**	**5.9**	8.7	39	18	**2.0**	36
16-C4-MW-20A	MW-20	2016	0-15	9.7	9.0	**5.6**	5.3	37	16	1.5	36
MW-20 Depth											
24906	MW-20	2007	20	6.7	6.9	<5.0	<10	19	<20	1.2	0
MW-20-35	MW-20	2008	35	10	**9.5**	**4.9**	**11**	26	19	<5.0	45
C409-20WB	MW-20	2009	40-50	8.0	9.0	4.0	5.0	19	16	1.0	29
C410-20WB	MW-20	2010	40-50	8.0	8.0	4.0	5.0	26	16	**2.0**	16
C4-11-20WB	MW-20	2011	40-50	9.0	**11**	**5.0**	9.0	28	**21**	1.0	16
2013-C4-MW-20-B	MW-20	2013	40-50	**14**	**9.5**	**4.8**	8.1	34	16	**1.7**	36
16-C4-MW-20B	MW-20	2016	40-50	10	**9.9**	**4.8**	6.9	26	18	1.5	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Hg	Modified TPH^
C4-2 Surface												
24908	C4-2	2007	0	5.8	**11**	**9.5**	<10	48	**27**	1.2	<0.10	**171**
C409-2A	C4-2	2009	0-15	5.0	**13**	**7.0**	8.0	40	**28**	**2.0**	<0.050	59
C410-2A	C4-2	2010	0-15	12	**13**	**6.0**	8.0	33	**34**	**3.0**	0.070	52
2013-C4-2-A	C4-2	2013	0-15	9.4	8.3	**4.6**	5.6	27	14	**8.9**	<0.050	36
16-C4-2A	C4-2	2016	0-15	11	**14**	**8.9**	**10**	50	**32**	**2.2**	<0.050	36
C4-2 Depth												
24910	C4-2	2007	30	8.4	**18**	**13**	<10	50	**45**	**1.8**	<0.10	56
C409-2B	C4-2	2009	40-50	<5.0	**10**	**5.0**	4.0	17	19	**2.0**	<0.050	63
C410-2B	C4-2	2010	40-50	7.0	**11**	**7.0**	6.0	38	**24**	**2.0**	0.090	43
2013-C4-2-B	C4-2	2013	40-50	8.0	8.2	3.9	6.2	25	13	**2.8**	<0.050	36
16-C4-2B	C4-2	2016	40-50	**13**	**14**	**10**	**12**	49	**31**	**3.0**	<0.050	36

Sample ID	Stn.	Year	Depth	Cu	Ni	Co	Pb	Zn	Cr	As	Hg	Modified TPH^
C4-3 Surface												
24912	C4-3	2007	0	**13**	**11**	**7.6**	<10	43	**23**	**2.0**	<0.10	31
C409-3A	C4-3	2009	0-15	5.0	**10**	3.0	6.0	25	**22**	**2.0**	<0.050	161
C410-3A	C4-3	2010	0-15	**20**	**13**	**7.0**	9.0	36	**28**	**3.0**	<0.050	16
2013-C4-3-A	C4-3	2013	0-15	**16**	**15**	**7.6**	**12**	**64**	**40**	**6.5**	0.079	36
16-C4-3A	C4-3	2016	0-15	12	**23**	**16**	8.2	**110**	**45**	**2.5**	<0.050	36
C4-3 Depth												
24914	C4-3	2007	30	7.2	7.0	<5.0	<10	21	<20	1.3	<0.10	14
C409-3B	C4-3	2009	40-50	<5.0	8.0	3.0	4.0	18	18	1.0	<0.050	78
C410-3B	C4-3	2010	40-50	**19**	**12**	**6.0**	9.0	35	**27**	**3.0**	<0.050	16
2013-C4-3-B	C4-3	2013	40-50	**24**	**20**	**10**	**15**	**79**	**56**	**7.4**	0.062	82
16-C4-3B	C4-3	2016	30-40	**23**	**47**	**19**	**14**	**120**	**99**	**5.0**	<0.050	36

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ Total C6-C34
Background Data - Arithmetic Mean	14	16	8.3	0.50	6.4	50	32	2.4	0.050	0.012	38
Baseline Data - Arithmetic Mean corrected for Detection limit	**12**	**9.4**	**4.2**	**1.00**	**10**	**58**	**20**	**1.6**	**0.100**	**0.100**	**162**
Baseline Data + 3xStandard Deviation	42	25	11	1.0	431	401	63	7.6	0.10	0.20	1182

LEGEND:

- SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/kg

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

ARCADIS

DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE LANDFILL

SOIL CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No:	102012-1
Date: FEB. 2017	Scale: AS SHOWN	Figure No:	CAM-4.6B

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_6.dwg LAYOUT: 4.6B SAVED: 4/11/2017 7:36 PM PLOTTED: 4/11/2017 7:36 PM BY: IZABELA ZIBA

Sample ID	Location	Year	Modified TPH^
Downgradient - MW-18			
07-24940/41	MW-18	2007	0.78
MW-18	MW-18	2008	<0.30
C409-18W	MW-18	2009	<0.10
C410-18W	MW-18	2010	<0.10
C410-BDW1	MW-18	2010	<0.10
C4 11-18W	MW-18	2011	<2.0
2013-C4-MW-18	MW-18	2013	<0.10
CAM4-MW18	MW-18	2016	0.2

Sample ID	Location	Year	Modified TPH^
Downgradient - MW-17			
07-24936	MW-17	2007	0.78
MW-17	MW-17	2008	0.33
C409-17W	MW-17	2009	<0.10
C410-17W	MW-17	2010	<0.10
C4 11-17W	MW-17	2011	<2.0
2013-C4-MW-17	MW-17	2013	<0.10
CAM4-MW17	MW-17	2016	0.2

Sample ID	Location	Year	Modified TPH^
Upgradient - MW-20			
MW-20	MW-20	2008	2.7
MW-20	MW-20	2008	3.1
C410-20W	MW-20	2010	1.5
C4 11-20W	MW-20	2011	4.0
CAM4-MW20	MW-20	2016	2.5

Sample ID	Location	Year	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Modified TPH^
Downgradient - MW-19											
07-24934	MW-19	2007	0.045	0.044	0.020	<0.0010	0.027	0.15	0.063	0.0089	0.78
MW-19	MW-19	2008	0.0033	0.0041	0.0020	0.00021	<0.00050	0.086	0.0014	<0.00050	0.32
C409-19W	MW-19	2009	1.3	1.4	0.61	0.0085	1.0	3.5	2.3	0.27	<0.10
C410-19W	MW-19	2010	0.13	0.11	0.047	0.0016	0.085	0.030	0.066	0.015	<0.10
C4 11-19W	MW-19	2011	0.042	0.029	0.018	0.00060	0.027	0.089	0.022	0.0050	<2.0
2013-C4-MW-19	MW-19	2013	0.0029	0.0049	0.0015	0.00040	<0.00020	<0.0030	<0.0010	0.00040	<0.10
CAM4-MW19	MW-19	2016	0.016	0.028	0.0063	0.00045	0.0097	0.052	0.057	0.0033	0.29

Comparison Criteria	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	Modified TPH^ Total C6-C34
Background Data - Arithmetic Mean	0.19	0.15	0.06	0.0005	0.08	0.44	0.31	0.03	0.0007	0.00001	0.58
Baseline Data - Arithmetic Mean corrected for Detection limit	**0.30**	**0.24**	**0.11**	**0.0010**	**0.20**	**0.97**	**0.40**	**0.046**	**0.00040**	**0.00002**	**1.00**
Baseline Data + 3x Standard Deviation	1.9	1.5	0.8	0.02	1.7	7.6	2.4	0.3	0.0006	0.00002	3.8

LEGEND:

MONITORING WELL LOCATION

XX	sample exceeds background
XX	***sample exceeds baseline***
XX	*sample exceeds baseline + 3x Standard Deviation*

All units in mg/L

^ Modifed TPH - Total C6-C34 is the sum of the F1, F2 and F3 fraction PHC concentrations

0 20 40 metres

SCALE 1:1000

ARCADIS

DEPARTMENT OF NATIONAL DEFENCE

COLLECTION OF LANDFILL MONITORING DATA

CAM-4, PELLY BAY, NUNAVUT

LOWER SITE LANDFILL

GROUNDWATER CHEMISTRY

Drawn By: I.S.Z.	Approved By: S.B.	Project No: 102012-1	
Date: FEB. 2017	Scale: AS SHOWN	Figure No: CAM-4.6C	

Z:\100000 Series\102012 DEW Line\CAM-4\102012 CAM-4_6.dwg LAYOUT: 4.6C SAVED: 4/11/2017 7:36 PM PLOTTED: 4/11/2017 7:42 PM BY: IZABELA ZIBA

APPENDIX A

Range of the Report and Limitations of Responsibilities

This report has been prepared exclusively for the Department of National Defence (DND) Canada. Any other person or entity may not rely upon the report without express written consent from Department of National Defence (DND) Canada.

Any use, which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Arcadis Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Some of the information presented in this report was provided through existing documents. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, Arcadis Canada Inc., in certain instances, has been required to assume that the information provided is accurate.

The conclusions presented represent the best judgment of the assessors based on current environmental standards and on the site conditions observed on August 13, 14, and 15th, 2016. Due to the nature of the investigation and the limited data available, the assessors cannot warrant against undiscovered environmental liabilities.

Should additional information become available, Arcadis Canada Inc. requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

There is no warranty, expressed or implied that the work reported herein has uncovered all potential environmental liabilities, nor does the report preclude the possibility of contamination outside of the areas of investigation. The findings of this report were developed in a manner consistent with a level of care and skill normally exercised by members of the environmental science and engineering profession currently practicing under similar conditions in the area.

A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface contamination. Any evidence of such potential site contamination would require appropriate surface and sub-surface exploration and testing.

If new information is developed in future work (which may include excavations, borings, or other studies), Arcadis Canada Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

APPENDIX B

Laboratory QA/QC Reports and Certificates of Analysis

Your Project #: 102012-000, Kitikmeot DEW Lin
Site#: CAM 4 Pelly Bay

Attention:ANDREW HENDERSON

ARCADIS Canada
329 CHURCHILL AVE NORTH
SUITE 2000
OTTAWA, ON
CANADA K1Z 5B8

Your C.O.C. #: 501541-03-01, 501541-01-01, 501541-02-01, 501541-04-01, 501541-05-01, 501541-06-01, 501541-07-01

Report Date: 2016/09/07
Report #: R2255295
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B673300
Received: 2016/08/25, 10:00

Sample Matrix: Soil
Samples Received: 64

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS/FID (MeOH extract)	2	2016/08/29	2016/08/30	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 by HS GC/MS/FID (MeOH extract)	2	2016/08/29	2016/09/01	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 by HS GC/MS/FID (MeOH extract)	13	2016/08/29	2016/09/02	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 by HS GC/MS/FID (MeOH extract)	7	2016/08/30	2016/09/01	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 by HS GC/MS/FID (MeOH extract)	40	2016/08/30	2016/09/02	AB SOP-00039	CCME CWS/EPA 8260c m
CCME Hydrocarbons (F2-F4 in soil) (1)	17	2016/08/29	2016/08/30	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons (F2-F4 in soil) (1)	47	2016/09/02	2016/09/02	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Elements by ICPMS - Soils	21	2016/09/02	2016/09/02	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	6	2016/09/03	2016/09/03	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Soils	37	2016/09/04	2016/09/05	AB SOP-00001 / AB SOP-00043	EPA 200.8 R5.4 m
Moisture	17	N/A	2016/08/31	AB SOP-00002	CCME PHC-CWS m
Moisture	47	N/A	2016/09/02	AB SOP-00002	CCME PHC-CWS m

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 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.

Your Project #: 102012-000, Kitikmeot DEW Lin
Site#: CAM 4 Pelly Bay

Attention:ANDREW HENDERSON

ARCADIS Canada
329 CHURCHILL AVE NORTH
SUITE 2000
OTTAWA, ON
CANADA K1Z 5B8

Your C.O.C. #: 501541-03-01, 501541-01-01, 501541-02-01, 501541-04-01, 501541-05-01, 501541-06-01, 501541-07-01

Report Date: 2016/09/07
Report #: R2255295
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B673300
Received: 2016/08/25, 10:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parminder Virk, Project Manager
Email: PVirk@maxxam.ca
Phone# (780) 577-7100
==========
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 #: B673300
Report Date: 2016/09/07

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ3995	PJ3996	PJ3997	PJ3998	PJ3999		
Sampling Date		2016/08/21 13:35	2016/08/21 13:40	2016/08/22 14:50	2016/08/22 14:55	2016/08/21 15:10		
COC Number		501541-03-01	501541-03-01	501541-03-01	501541-03-01	501541-03-01		
	UNITS	16-C4-BMW-1A	16-C4-BMW-1B	16-C4-MW-1A	16-C4-MW-1B	16-C4-MW-2A	RDL	QC Batch
Physical Properties								
Moisture	%	5.2	6.4	4.1	5.8	5.1	0.30	8380052
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	120	66	<10	<10	<10	10	8381458
F3 (C16-C34 Hydrocarbons)	mg/kg	310	120	<50	<50	<50	50	8381458
F4 (C34-C50 Hydrocarbons)	mg/kg	68	<50	<50	<50	<50	50	8381458
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	8381458
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	8384337
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	8384337
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	8384337
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	102	101	101	100	98	N/A	8384337
4-Bromofluorobenzene (sur.)	%	93	94	94	94	93	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	87	90	98	95	104	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	102	100	98	100	100	N/A	8384337
O-TERPHENYL (sur.)	%	103	93	103	105	108	N/A	8381458

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B673300
Report Date: 2016/09/07

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4000	PJ4001	PJ4002	PJ4003	PJ4004		
Sampling Date		2016/08/21 15:15	2016/08/21 14:10	2016/08/21 14:15	2016/08/21 14:40	2016/08/21 14:45		
COC Number		501541-03-01	501541-03-01	501541-03-01	501541-03-01	501541-03-01		
	UNITS	**16-C4-MW-2B**	**16-C4-MW-3A**	**16-C4-MW-3B**	**16-C4-MW-4AA**	**16-C4-MW-4AB**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	5.7	5.4	5.4	4.1	4.4	0.30	8380052
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	8381458
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	8381458
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	8381458
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	8381458
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	8384337
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	8384337
F1 (C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	8384337
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	100	99	101	101	100	N/A	8384337
4-Bromofluorobenzene (sur.)	%	93	93	94	95	93	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	94	92	94	91	96	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	97	102	103	100	100	N/A	8384337
O-TERPHENYL (sur.)	%	99	124	109	100	117	N/A	8381458

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B673300
Report Date: 2016/09/07

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4019		PJ4020		PJ4021	PJ4022		
Sampling Date		2016/08/21 15:30		2016/08/21 15:35		2016/08/22 15:05	2016/08/22 15:10		
COC Number		501541-01-01		501541-01-01		501541-01-01	501541-01-01		
	UNITS	16-C4-MW-6AA	QC Batch	16-C4-MW-6AB	QC Batch	16-C4-MW-7AA	16-C4-MW-7AB	RDL	QC Batch
Physical Properties									
Moisture	%	4.6	8380052	6.5	8380052	3.3	5.4	0.30	8380052
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8381458	<10	8381458	<10	<10	10	8381458
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8381458	<50	8381458	<50	<50	50	8381458
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8381458	<50	8381458	<50	<50	50	8381458
Reached Baseline at C50	mg/kg	Yes	8381458	Yes	8381458	Yes	Yes	N/A	8381458
Volatiles									
Benzene	mg/kg	<0.0050	8384337	<0.0050	8381606	<0.0050	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	8384337	<0.020	8381606	<0.020	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	8384337	<0.010	8381606	<0.010	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	8384337	<0.040	8381606	<0.040	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	8384337	<0.040	8381606	<0.040	<0.040	0.040	8384337
o-Xylene	mg/kg	<0.020	8384337	<0.020	8381606	<0.020	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	<12	8384337	<12	8381606	<12	<12	12	8384337
F1 (C6-C10)	mg/kg	<12	8384337	<12	8381606	<12	<12	12	8384337
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	8384337	100	8381606	102	101	N/A	8384337
4-Bromofluorobenzene (sur.)	%	93	8384337	100	8381606	92	94	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	95	8384337	103	8381606	101	94	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	102	8384337	104	8381606	100	105	N/A	8384337
O-TERPHENYL (sur.)	%	109	8381458	101	8381458	98	102	N/A	8381458

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B673300
Report Date: 2016/09/07

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4023		PJ4024		PJ4025	PJ4026		
Sampling Date		2016/08/20 16:30		2016/08/20 16:35		2016/08/21 11:30	2016/08/21 11:35		
COC Number		501541-01-01		501541-01-01		501541-01-01	501541-01-01		
	UNITS	16-C4-MW-5A	QC Batch	16-C4-MW-5B	QC Batch	16-C4-MW-8A	16-C4-MW-8B	RDL	QC Batch
Physical Properties									
Moisture	%	5.2	8380052	14	8385770	5.6	5.3	0.30	8380052
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8381458	<10	8386057	33	2700	10	8381458
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8381458	<50	8386057	<50	200	50	8381458
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8381458	<50	8386057	<50	<50	50	8381458
Reached Baseline at C50	mg/kg	Yes	8381458	Yes	8386057	Yes	Yes	N/A	8381458
Volatiles									
Benzene	mg/kg	<0.0050	8381606	0.011	8382279	<0.0050	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	8381606	<0.020	8382279	<0.020	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	8381606	<0.010	8382279	<0.010	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	8381606	<0.040	8382279	<0.040	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	8381606	<0.040	8382279	<0.040	<0.040	0.040	8384337
o-Xylene	mg/kg	<0.020	8381606	<0.020	8382279	<0.020	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	<12	8381606	<12	8382279	<12	120	12	8384337
F1 (C6-C10)	mg/kg	<12	8381606	<12	8382279	<12	120	12	8384337
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	8381606	100	8382279	105	95	N/A	8384337
4-Bromofluorobenzene (sur.)	%	97	8381606	95	8382279	97	108	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	101	8381606	111	8382279	102	89	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	106	8381606	99	8382279	99	105	N/A	8384337
O-TERPHENYL (sur.)	%	105	8381458	122	8386057	94	112	N/A	8381458

RDL = Reportable Detection Limit
N/A = Not Applicable

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ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4027	PJ4028		PJ4029		PJ4030		
Sampling Date		2016/08/21 10:20	2016/08/21 10:25		2016/08/20 14:50		2016/08/20 14:55		
COC Number		501541-01-01	501541-01-01		501541-02-01		501541-02-01		
	UNITS	16-C4-MW-9A	16-C4-MW-9B	RDL	16-C4-MW-14AA	QC Batch	16-C4-MW-14AB	RDL	QC Batch
Physical Properties									
Moisture	%	9.6	17	0.30	13	8385765	17	0.30	8385770
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	20	10	<10	8386057	<10	10	8386057
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	50	54	8386057	<50	50	8386057
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	50	<50	8386057	<50	50	8386057
Reached Baseline at C50	mg/kg	Yes	Yes	N/A	Yes	8386057	Yes	N/A	8386057
Volatiles									
Benzene	mg/kg	0.0077 (1)	0.0071 (1)	0.0064	<0.0050	8384294	<0.0050	0.0050	8384294
Toluene	mg/kg	<0.020	<0.020	0.020	<0.020	8384294	<0.020	0.020	8384294
Ethylbenzene	mg/kg	<0.010	<0.010	0.010	<0.010	8384294	<0.010	0.010	8384294
Xylenes (Total)	mg/kg	<0.040	<0.040	0.040	<0.040	8384294	<0.040	0.040	8384294
m & p-Xylene	mg/kg	<0.040	<0.040	0.040	<0.040	8384294	<0.040	0.040	8384294
o-Xylene	mg/kg	<0.020	<0.020	0.020	<0.020	8384294	<0.020	0.020	8384294
F1 (C6-C10) - BTEX	mg/kg	<12	<12	12	<12	8384294	<12	12	8384294
F1 (C6-C10)	mg/kg	<12	<12	12	<12	8384294	<12	12	8384294
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	100	N/A	100	8384294	100	N/A	8384294
4-Bromofluorobenzene (sur.)	%	92	95	N/A	93	8384294	93	N/A	8384294
D10-ETHYLBENZENE (sur.)	%	127	105	N/A	122	8384294	105	N/A	8384294
D4-1,2-Dichloroethane (sur.)	%	99	108	N/A	99	8384294	103	N/A	8384294
O-TERPHENYL (sur.)	%	127	125	N/A	121	8386057	122	N/A	8386057

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised due to interferent.

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4031		PJ4032		PJ4033		
Sampling Date		2016/08/21 12:05		2016/08/21 12:10		2016/08/21		
COC Number		501541-02-01		501541-02-01		501541-02-01		
	UNITS	16-C4-MW-15A	QC Batch	16-C4-MW-15B	QC Batch	16-C4-MW-16A	RDL	QC Batch
Physical Properties								
Moisture	%	8.6	8385770	10	8385770	15	0.30	8385762
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386057	<10	8386057	11000	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	72	8386057	<50	8386057	1500	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386057	<50	8386057	50	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386057	Yes	8386057	Yes	N/A	8386049
Volatiles								
Benzene	mg/kg	<0.0050	8382279	<0.0050	8384337	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	8382279	<0.020	8384337	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8382279	<0.010	8384337	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8382279	<0.040	8384337	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8382279	<0.040	8384337	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8382279	<0.020	8384337	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8382279	<12	8384337	230	12	8384302
F1 (C6-C10)	mg/kg	<12	8382279	<12	8384337	230	12	8384302
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	101	8382279	100	8384337	100	N/A	8384302
4-Bromofluorobenzene (sur.)	%	94	8382279	95	8384337	106	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	107	8382279	108	8384337	100	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	101	8382279	99	8384337	102	N/A	8384302
O-TERPHENYL (sur.)	%	130	8386057	111	8386057	106	N/A	8386049

RDL = Reportable Detection Limit
N/A = Not Applicable

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4034		PJ4035		PJ4036		
Sampling Date		2016/08/21		2016/08/22 15:40		2016/08/22 15:45		
COC Number		501541-02-01		501541-02-01		501541-02-01		
	UNITS	16-C4-MW-16B	QC Batch	16-C4-MW-10A	QC Batch	16-C4-MW-10B	RDL	QC Batch
Physical Properties								
Moisture	%	13	8385770	6.9	8385765	6.1	0.30	8385770
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	8700	8386057	<10	8386057	<10	10	8386057
F3 (C16-C34 Hydrocarbons)	mg/kg	1200	8386057	<50	8386057	<50	50	8386057
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386057	<50	8386057	<50	50	8386057
Reached Baseline at C50	mg/kg	Yes	8386057	Yes	8386057	Yes	N/A	8386057
Volatiles								
Benzene	mg/kg	<0.0050	8384337	<0.0050	8384294	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	8384337	<0.020	8384294	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	8384337	<0.010	8384294	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	8384337	<0.040	8384294	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	8384337	<0.040	8384294	<0.040	0.040	8384337
o-Xylene	mg/kg	0.035	8384337	<0.020	8384294	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	150	8384337	<12	8384294	<12	12	8384337
F1 (C6-C10)	mg/kg	150	8384337	<12	8384294	<12	12	8384337
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	89	8384337	101	8384294	101	N/A	8384337
4-Bromofluorobenzene (sur.)	%	121	8384337	93	8384294	92	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	94	8384337	117	8384294	107	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	141 (1)	8384337	100	8384294	97	N/A	8384337
O-TERPHENYL (sur.)	%	126	8386057	126	8386057	121	N/A	8386057

RDL = Reportable Detection Limit

N/A = Not Applicable

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4037		PJ4038		PJ4039	PJ4040		
Sampling Date		2016/08/20 16:00		2016/08/20 16:05		2016/08/22 15:55	2016/08/22 16:00		
COC Number		501541-02-01		501541-02-01		501541-04-01	501541-04-01		
	UNITS	16-C4-MW-11A	QC Batch	16-C4-MW-11B	QC Batch	16-C4-MW-12A	16-C4-MW-12B	RDL	QC Batch
Physical Properties									
Moisture	%	12	8385765	11	8385770	7.2	16	0.30	8385762
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	14	8386057	<10	8386057	11	57	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	480	8386057	76	8386057	54	760	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	280	8386057	<50	8386057	<50	100	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386057	Yes	8386057	Yes	Yes	N/A	8386049
Volatiles									
Benzene	mg/kg	<0.0050	8384294	<0.0050	8384294	0.015	0.031	0.0050	8384302
Toluene	mg/kg	<0.020	8384294	<0.020	8384294	<0.020	0.028	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8384294	<0.010	8384294	<0.010	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8384294	<0.040	8384294	<0.040	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8384294	<0.040	8384294	<0.040	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8384294	<0.020	8384294	<0.020	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8384294	<12	8384294	<12	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	8384294	<12	8384294	<12	<12	12	8384302
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	8384294	102	8384294	99	102	N/A	8384302
4-Bromofluorobenzene (sur.)	%	94	8384294	93	8384294	93	94	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	102	8384294	104	8384294	100	98	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	101	8384294	102	8384294	100	101	N/A	8384302
O-TERPHENYL (sur.)	%	117	8386057	121	8386057	102	99	N/A	8386049

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4041		PJ4042	PJ4043		PJ4044		
Sampling Date		2016/08/22 16:20		2016/08/22 16:25	2016/08/21 17:15		2016/08/21 17:20		
COC Number		501541-04-01		501541-04-01	501541-04-01		501541-04-01		
	UNITS	16-C4-MW-13A	QC Batch	16-C4-MW-13B	16-C4-MW-21A	QC Batch	16-C4-MW-21B	RDL	QC Batch
Physical Properties									
Moisture	%	11	8385762	9.1	6.9	8385770	7.9	0.30	8385762
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386049	<10	<10	8386057	<10	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8386049	<50	230	8386057	140	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386049	<50	130	8386057	57	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386049	Yes	Yes	8386057	Yes	N/A	8386049
Volatiles									
Benzene	mg/kg	<0.0050	8384302	<0.0050	<0.0050	8384294	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	8384302	<0.020	<0.020	8384294	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8384302	<0.010	<0.010	8384294	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8384302	<0.040	<0.040	8384294	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8384302	<0.040	<0.040	8384294	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8384302	<0.020	<0.020	8384294	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8384302	<12	<12	8384294	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	8384302	<12	<12	8384294	<12	12	8384302
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	101	8384302	101	101	8384294	100	N/A	8384302
4-Bromofluorobenzene (sur.)	%	92	8384302	95	94	8384294	93	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	104	8384302	102	101	8384294	104	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	99	8384302	102	102	8384294	100	N/A	8384302
O-TERPHENYL (sur.)	%	99	8386049	117	113	8386057	100	N/A	8386049

RDL = Reportable Detection Limit
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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4045		PJ4046		PJ4047		
Sampling Date		2016/08/22 11:35		2016/08/22 11:40		2016/08/21 16:20		
COC Number		501541-04-01		501541-04-01		501541-04-01		
	UNITS	16-C4-MW-22A	QC Batch	16-C4-MW-22B	QC Batch	16-C4-MW-23A	RDL	QC Batch
Physical Properties								
Moisture	%	3.0	8385762	5.6	8385765	8.0	0.30	8385762
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386049	<10	8386065	<10	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8386049	<50	8386065	<50	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386049	<50	8386065	<50	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386049	Yes	8386065	Yes	N/A	8386049
Volatiles								
Benzene	mg/kg	<0.0050	8384302	<0.0050	8384294	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8384302	<0.010	8384294	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8384302	<12	8384294	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	8384302	<12	8384294	<12	12	8384302
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	100	8384302	102	8384294	101	N/A	8384302
4-Bromofluorobenzene (sur.)	%	93	8384302	93	8384294	94	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	101	8384302	104	8384294	103	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	100	8384302	103	8384294	100	N/A	8384302
O-TERPHENYL (sur.)	%	106	8386049	101	8386065	101	N/A	8386049

RDL = Reportable Detection Limit
N/A = Not Applicable

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4048		PJ4049	PJ4050	PJ4051	PJ4052		
Sampling Date		2016/08/21 16:25		2016/08/22 09:55	2016/08/22 10:00	2016/08/22 10:10	2016/08/22 10:15		
COC Number		501541-04-01		501541-05-01	501541-05-01	501541-05-01	501541-05-01		
	UNITS	16-C4-MW-23B	QC Batch	16-C4-MW-17A	16-C4-MW-17B	16-C4-MW-18A	16-C4-MW-18B	RDL	QC Batch
Physical Properties									
Moisture	%	6.9	8385765	9.1	17	17	13	0.30	8385762
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386065	<10	<10	<10	<10	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8386065	<50	58	<50	<50	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386065	<50	<50	<50	<50	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386065	Yes	Yes	Yes	Yes	N/A	8386049
Volatiles									
Benzene	mg/kg	<0.0050	8384294	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	8384294	<0.020	<0.020	<0.020	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8384294	<0.010	<0.010	<0.010	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8384294	<0.040	<0.040	<0.040	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8384294	<0.040	<0.040	<0.040	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8384294	<0.020	<0.020	<0.020	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8384294	<12	<12	<12	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	8384294	<12	<12	<12	<12	12	8384302
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	102	8384294	102	102	100	101	N/A	8384302
4-Bromofluorobenzene (sur.)	%	94	8384294	91	93	93	94	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	102	8384294	106	108	100	106	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	102	8384294	108	105	103	105	N/A	8384302
O-TERPHENYL (sur.)	%	99	8386065	102	103	109	104	N/A	8386049

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B673300
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ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4053			PJ4054		PJ4055		
Sampling Date		2016/08/22 10:30			2016/08/22 10:35		2016/08/21 16:45		
COC Number		501541-05-01			501541-05-01		501541-05-01		
	UNITS	16-C4-MW-19A	RDL	QC Batch	16-C4-MW-19B	QC Batch	16-C4-MW-20A	RDL	QC Batch
Physical Properties									
Moisture	%	9.3	0.30	8385770	8.1	8385762	6.5	0.30	8385765
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	8386057	<10	8386049	<10	10	8386065
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	8386057	<50	8386049	<50	50	8386065
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8386057	<50	8386049	<50	50	8386065
Reached Baseline at C50	mg/kg	Yes	N/A	8386057	Yes	8386049	Yes	N/A	8386065
Volatiles									
Benzene	mg/kg	0.022 (1)	0.0064	8384294	<0.0050	8384302	<0.0050	0.0050	8384294
Toluene	mg/kg	<0.020	0.020	8384294	<0.020	8384302	<0.020	0.020	8384294
Ethylbenzene	mg/kg	0.012	0.010	8384294	<0.010	8384302	<0.010	0.010	8384294
Xylenes (Total)	mg/kg	<0.040	0.040	8384294	<0.040	8384302	<0.040	0.040	8384294
m & p-Xylene	mg/kg	<0.040	0.040	8384294	<0.040	8384302	<0.040	0.040	8384294
o-Xylene	mg/kg	<0.020	0.020	8384294	<0.020	8384302	<0.020	0.020	8384294
F1 (C6-C10) - BTEX	mg/kg	<12	12	8384294	<12	8384302	<12	12	8384294
F1 (C6-C10)	mg/kg	<12	12	8384294	<12	8384302	<12	12	8384294
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	N/A	8384294	101	8384302	99	N/A	8384294
4-Bromofluorobenzene (sur.)	%	93	N/A	8384294	95	8384302	94	N/A	8384294
D10-ETHYLBENZENE (sur.)	%	104	N/A	8384294	102	8384302	98	N/A	8384294
D4-1,2-Dichloroethane (sur.)	%	106	N/A	8384294	107	8384302	102	N/A	8384294
O-TERPHENYL (sur.)	%	113	N/A	8386057	103	8386049	98	N/A	8386065

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limit raised due to interferent.

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4056		PJ4057	PJ4058	PJ4059	PJ4060		
Sampling Date		2016/08/21 16:50		2016/08/22 13:30	2016/08/22 13:35	2016/08/22 10:50	2016/08/22 11:00		
COC Number		501541-05-01		501541-05-01	501541-05-01	501541-06-01	501541-06-01		
	UNITS	**16-C4-MW-20B**	**QC Batch**	**16-C4-1A**	**16-C4-1B**	**16-C4-2A**	**16-C4-2B**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	5.0	8385765	2.6	2.4	6.5	13	0.30	8385762
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386065	<10	<10	<10	<10	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8386065	<50	<50	<50	<50	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386065	<50	<50	<50	<50	50	8386049
Reached Baseline at C50	mg/kg	Yes	8386065	Yes	Yes	Yes	Yes	N/A	8386049
Volatiles									
Benzene	mg/kg	<0.0050	8384294	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	8384294	<0.020	<0.020	<0.020	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	8384294	<0.010	<0.010	<0.010	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	8384294	<0.040	<0.040	<0.040	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	8384294	<0.040	<0.040	<0.040	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	8384294	<0.020	<0.020	<0.020	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	8384294	<12	<12	<12	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	8384294	<12	<12	<12	<12	12	8384302
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	8384294	100	104	105	103	N/A	8384302
4-Bromofluorobenzene (sur.)	%	95	8384294	95	94	93	95	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	102	8384294	109	112	115	105	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	104	8384294	109	104	100	106	N/A	8384302
O-TERPHENYL (sur.)	%	103	8386065	101	102	105	103	N/A	8386049

RDL = Reportable Detection Limit
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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4061		PJ4062		PJ4063		
Sampling Date		2016/08/22 12:20		2016/08/22 12:25		2016/08/20 14:20		
COC Number		501541-06-01		501541-06-01		501541-06-01		
	UNITS	16-C4-3A	QC Batch	16-C4-3B	QC Batch	16-C4-BMW-3A	RDL	QC Batch
Physical Properties								
Moisture	%	11	8385762	13	8385765	15	0.30	8385765
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386049	<10	8386057	<10	10	8386065
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	8386049	<50	8386057	<50	50	8386065
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386049	<50	8386057	<50	50	8386065
Reached Baseline at C50	mg/kg	Yes	8386049	Yes	8386057	Yes	N/A	8386065
Volatiles								
Benzene	mg/kg	<0.0050	8384302	<0.0050	8384294	<0.0050	0.0050	8384294
Toluene	mg/kg	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384294
Ethylbenzene	mg/kg	<0.010	8384302	<0.010	8384294	<0.010	0.010	8384294
Xylenes (Total)	mg/kg	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384294
m & p-Xylene	mg/kg	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384294
o-Xylene	mg/kg	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384294
F1 (C6-C10) - BTEX	mg/kg	<12	8384302	<12	8384294	<12	12	8384294
F1 (C6-C10)	mg/kg	<12	8384302	<12	8384294	<12	12	8384294
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	100	8384302	100	8384294	101	N/A	8384294
4-Bromofluorobenzene (sur.)	%	94	8384302	93	8384294	92	N/A	8384294
D10-ETHYLBENZENE (sur.)	%	106	8384302	103	8384294	101	N/A	8384294
D4-1,2-Dichloroethane (sur.)	%	106	8384302	103	8384294	104	N/A	8384294
O-TERPHENYL (sur.)	%	105	8386049	114	8386057	99	N/A	8386065

RDL = Reportable Detection Limit
N/A = Not Applicable

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4064	PJ4065		PJ4066		PJ4067		
Sampling Date		2016/08/20 14:25	2016/08/21 10:55		2016/08/21 11:00		2016/08/21 10:20		
COC Number		501541-06-01	501541-06-01		501541-06-01		501541-06-01		
	UNITS	16-C4-BMW-3B	16-C4-BMW-4A	QC Batch	16-C4-BMW-4B	QC Batch	16-C4-DUP1	RDL	QC Batch
Physical Properties									
Moisture	%	8.4	5.1	8385762	3.7	8385765	9.4	0.30	8385762
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	8386049	<10	8386065	<10	10	8386049
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	8386049	<50	8386065	<50	50	8386049
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	8386049	<50	8386065	<50	50	8386049
Reached Baseline at C50	mg/kg	Yes	Yes	8386049	Yes	8386065	Yes	N/A	8386049
Volatiles									
Benzene	mg/kg	<0.0050	<0.0050	8384302	<0.0050	8384294	<0.0050	0.0050	8384302
Toluene	mg/kg	<0.020	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384302
Ethylbenzene	mg/kg	<0.010	<0.010	8384302	<0.010	8384294	<0.010	0.010	8384302
Xylenes (Total)	mg/kg	<0.040	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384302
m & p-Xylene	mg/kg	<0.040	<0.040	8384302	<0.040	8384294	<0.040	0.040	8384302
o-Xylene	mg/kg	<0.020	<0.020	8384302	<0.020	8384294	<0.020	0.020	8384302
F1 (C6-C10) - BTEX	mg/kg	<12	<12	8384302	<12	8384294	<12	12	8384302
F1 (C6-C10)	mg/kg	<12	<12	8384302	<12	8384294	<12	12	8384302
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	100	101	8384302	106	8384294	100	N/A	8384302
4-Bromofluorobenzene (sur.)	%	94	95	8384302	93	8384294	94	N/A	8384302
D10-ETHYLBENZENE (sur.)	%	123	109	8384302	108	8384294	105	N/A	8384302
D4-1,2-Dichloroethane (sur.)	%	108	107	8384302	99	8384294	109	N/A	8384302
O-TERPHENYL (sur.)	%	103	103	8386049	103	8386065	108	N/A	8386049

RDL = Reportable Detection Limit
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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4068		PJ4069		PJ4070		PJ4071		
Sampling Date		2016/08/21 14:10		2016/08/21 16:45		2016/08/21 14:40		2016/08/22 10:55		
COC Number		501541-06-01		501541-07-01		501541-07-01		501541-07-01		
	UNITS	16-C4-DUP2	QC Batch	16-C4-DUP3	QC Batch	16-C4-DUP4	QC Batch	16-C4-DUP5	RDL	QC Batch
Physical Properties										
Moisture	%	15	8385770	7.6	8385770	6.0	8385765	6.1	0.30	8385770
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	8386057	<10	8386057	<10	8386065	<10	10	8386057
F3 (C16-C34 Hydrocarbons)	mg/kg	100	8386057	<50	8386057	<50	8386065	<50	50	8386057
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	8386057	<50	8386057	<50	8386065	<50	50	8386057
Reached Baseline at C50	mg/kg	Yes	8386057	Yes	8386057	Yes	8386065	Yes	N/A	8386057
Volatiles										
Benzene	mg/kg	<0.0050	8384337	<0.0050	8384294	<0.0050	8384294	<0.0050	0.0050	8384337
Toluene	mg/kg	<0.020	8384337	<0.020	8384294	<0.020	8384294	<0.020	0.020	8384337
Ethylbenzene	mg/kg	<0.010	8384337	<0.010	8384294	<0.010	8384294	<0.010	0.010	8384337
Xylenes (Total)	mg/kg	<0.040	8384337	<0.040	8384294	<0.040	8384294	<0.040	0.040	8384337
m & p-Xylene	mg/kg	<0.040	8384337	<0.040	8384294	<0.040	8384294	<0.040	0.040	8384337
o-Xylene	mg/kg	<0.020	8384337	<0.020	8384294	<0.020	8384294	<0.020	0.020	8384337
F1 (C6-C10) - BTEX	mg/kg	<12	8384337	<12	8384294	<12	8384294	<12	12	8384337
F1 (C6-C10)	mg/kg	<12	8384337	<12	8384294	<12	8384294	<12	12	8384337
Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	100	8384337	99	8384294	100	8384294	102	N/A	8384337
4-Bromofluorobenzene (sur.)	%	93	8384337	94	8384294	94	8384294	93	N/A	8384337
D10-ETHYLBENZENE (sur.)	%	113	8384337	105	8384294	99	8384294	113	N/A	8384337
D4-1,2-Dichloroethane (sur.)	%	99	8384337	106	8384294	105	8384294	100	N/A	8384337
O-TERPHENYL (sur.)	%	117	8386057	119	8386057	105	8386065	122	N/A	8386057

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AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		PJ4072		
Sampling Date		2016/08/22 11:35		
COC Number		501541-07-01		
	UNITS	16-C4-DUP6	RDL	QC Batch
Physical Properties				
Moisture	%	3.2	0.30	8385765
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	8386057
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	8386057
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	8386057
Reached Baseline at C50	mg/kg	Yes	N/A	8386057
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	8384294
Toluene	mg/kg	<0.020	0.020	8384294
Ethylbenzene	mg/kg	<0.010	0.010	8384294
Xylenes (Total)	mg/kg	<0.040	0.040	8384294
m & p-Xylene	mg/kg	<0.040	0.040	8384294
o-Xylene	mg/kg	<0.020	0.020	8384294
F1 (C6-C10) - BTEX	mg/kg	<12	12	8384294
F1 (C6-C10)	mg/kg	<12	12	8384294
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	102	N/A	8384294
4-Bromofluorobenzene (sur.)	%	92	N/A	8384294
D10-ETHYLBENZENE (sur.)	%	107	N/A	8384294
D4-1,2-Dichloroethane (sur.)	%	104	N/A	8384294
O-TERPHENYL (sur.)	%	114	N/A	8386057

RDL = Reportable Detection Limit
N/A = Not Applicable

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ3995	PJ3996	PJ3997		PJ3998	PJ3999		
Sampling Date		2016/08/21 13:35	2016/08/21 13:40	2016/08/22 14:50		2016/08/22 14:55	2016/08/21 15:10		
COC Number		501541-03-01	501541-03-01	501541-03-01		501541-03-01	501541-03-01		
	UNITS	16-C4-BMW-1A	16-C4-BMW-1B	16-C4-MW-1A	QC Batch	16-C4-MW-1B	16-C4-MW-2A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	7.7	3.4	<1.0	8387795	1.1	<1.0	1.0	8387618
Total Cadmium (Cd)	mg/kg	0.092	0.062	<0.050	8387795	<0.050	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	69	50	18	8387795	34	14	1.0	8387618
Total Cobalt (Co)	mg/kg	19	11	4.4	8387795	4.4	3.4	0.50	8387618
Total Copper (Cu)	mg/kg	31	19	4.2	8387795	6.1	4.7	1.0	8387618
Total Lead (Pb)	mg/kg	14	9.2	3.5	8387795	4.4	3.4	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	8387795	<0.050	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	41	27	8.7	8387795	16	7.8	1.0	8387618
Total Zinc (Zn)	mg/kg	110	64	20	8387795	24	18	10	8387618
RDL = Reportable Detection Limit									

Maxxam ID		PJ4000	PJ4001		PJ4002		PJ4003		
Sampling Date		2016/08/21 15:15	2016/08/21 14:10		2016/08/21 14:15		2016/08/21 14:40		
COC Number		501541-03-01	501541-03-01		501541-03-01		501541-03-01		
	UNITS	16-C4-MW-2B	16-C4-MW-3A	QC Batch	16-C4-MW-3B	QC Batch	16-C4-MW-4AA	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	<1.0	2.1	8387795	1.5	8387618	<1.0	1.0	8387795
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	8387795	<0.050	8387618	<0.050	0.050	8387795
Total Chromium (Cr)	mg/kg	14	38	8387795	27	8387618	10	1.0	8387795
Total Cobalt (Co)	mg/kg	3.0	7.7	8387795	4.9	8387618	2.8	0.50	8387795
Total Copper (Cu)	mg/kg	3.0	14	8387795	8.3	8387618	2.7	1.0	8387795
Total Lead (Pb)	mg/kg	3.2	7.9	8387795	5.2	8387618	2.6	0.50	8387795
Total Mercury (Hg)	mg/kg	<0.050	<0.050	8387795	<0.050	8387618	<0.050	0.050	8387795
Total Nickel (Ni)	mg/kg	7.1	20	8387795	14	8387618	5.3	1.0	8387795
Total Zinc (Zn)	mg/kg	16	48	8387795	30	8387618	13	10	8387795
RDL = Reportable Detection Limit									

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4004	PJ4019	PJ4020	PJ4021	PJ4022		
Sampling Date		2016/08/21 14:45	2016/08/21 15:30	2016/08/21 15:35	2016/08/22 15:05	2016/08/22 15:10		
COC Number		501541-03-01	501541-01-01	501541-01-01	501541-01-01	501541-01-01		
	UNITS	16-C4-MW-4AB	16-C4-MW-6AA	16-C4-MW-6AB	16-C4-MW-7AA	16-C4-MW-7AB	RDL	QC Batch
Elements								
Total Arsenic (As)	mg/kg	<1.0	<1.0	<1.0	1.7	1.0	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	16	20	15	53	64	1.0	8387618
Total Cobalt (Co)	mg/kg	3.3	3.0	2.9	7.8	5.5	0.50	8387618
Total Copper (Cu)	mg/kg	4.4	3.5	3.2	12	8.0	1.0	8387618
Total Lead (Pb)	mg/kg	3.0	2.9	3.2	6.8	4.2	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	7.7	9.8	6.8	25	30	1.0	8387618
Total Zinc (Zn)	mg/kg	15	15	15	47	29	10	8387618
RDL = Reportable Detection Limit								

Maxxam ID		PJ4023		PJ4024		PJ4025		PJ4026		
Sampling Date		2016/08/20 16:30		2016/08/20 16:35		2016/08/21 11:30		2016/08/21 11:35		
COC Number		501541-01-01		501541-01-01		501541-01-01		501541-01-01		
	UNITS	16-C4-MW-5A	QC Batch	16-C4-MW-5B	QC Batch	16-C4-MW-8A	QC Batch	16-C4-MW-8B	RDL	QC Batch
Elements										
Total Arsenic (As)	mg/kg	1.9	8387795	2.0	8387618	1.8	8387795	2.0	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	8387795	<0.050	8387618	<0.050	8387795	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	50	8387795	44	8387618	25	8387795	67	1.0	8387618
Total Cobalt (Co)	mg/kg	7.0	8387795	4.7	8387618	5.6	8387795	6.2	0.50	8387618
Total Copper (Cu)	mg/kg	15	8387795	12	8387618	11	8387795	9.8	1.0	8387618
Total Lead (Pb)	mg/kg	4.9	8387795	4.0	8387618	6.5	8387795	5.6	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	8387795	<0.050	8387618	<0.050	8387795	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	24	8387795	21	8387618	13	8387795	31	1.0	8387618
Total Zinc (Zn)	mg/kg	33	8387795	23	8387618	34	8387795	35	10	8387618
RDL = Reportable Detection Limit										

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4027	PJ4028		PJ4029		PJ4030		
Sampling Date		2016/08/21 10:20	2016/08/21 10:25		2016/08/20 14:50		2016/08/20 14:55		
COC Number		501541-01-01	501541-01-01		501541-02-01		501541-02-01		
	UNITS	16-C4-MW-9A	16-C4-MW-9B	QC Batch	16-C4-MW-14AA	QC Batch	16-C4-MW-14AB	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	2.2	3.1	8387795	2.5	8386064	3.1	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	8387795	<0.050	8386064	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	56	59	8387795	26	8386064	27	1.0	8387618
Total Cobalt (Co)	mg/kg	7.7	9.9	8387795	6.3	8386064	7.0	0.50	8387618
Total Copper (Cu)	mg/kg	11	20	8387795	9.5	8386064	12	1.0	8387618
Total Lead (Pb)	mg/kg	6.8	7.6	8387795	7.9	8386064	7.4	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	<0.050	8387795	<0.050	8386064	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	27	31	8387795	13	8386064	15	1.0	8387618
Total Zinc (Zn)	mg/kg	45	62	8387795	39	8386064	42	10	8387618
RDL = Reportable Detection Limit									

Maxxam ID		PJ4031		PJ4032		PJ4033		
Sampling Date		2016/08/21 12:05		2016/08/21 12:10		2016/08/21		
COC Number		501541-02-01		501541-02-01		501541-02-01		
	UNITS	16-C4-MW-15A	QC Batch	16-C4-MW-15B	QC Batch	16-C4-MW-16A	RDL	QC Batch
Elements								
Total Arsenic (As)	mg/kg	1.6	8387795	1.4	8387183	1.8	1.0	8387659
Total Cadmium (Cd)	mg/kg	<0.050	8387795	<0.050	8387183	<0.050	0.050	8387659
Total Chromium (Cr)	mg/kg	12	8387795	9.3	8387183	120	1.0	8387659
Total Cobalt (Co)	mg/kg	5.4	8387795	5.1	8387183	6.2	0.50	8387659
Total Copper (Cu)	mg/kg	9.8	8387795	6.1	8387183	10	1.0	8387659
Total Lead (Pb)	mg/kg	4.4	8387795	3.2	8387183	5.0	0.50	8387659
Total Mercury (Hg)	mg/kg	<0.050	8387795	<0.050	8387183	<0.050	0.050	8387659
Total Nickel (Ni)	mg/kg	6.1	8387795	5.4	8387183	54	1.0	8387659
Total Zinc (Zn)	mg/kg	37	8387795	36	8387183	39	10	8387659
RDL = Reportable Detection Limit								

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4034	PJ4035	PJ4036		PJ4037		
Sampling Date		2016/08/21	2016/08/22 15:40	2016/08/22 15:45		2016/08/20 16:00		
COC Number		501541-02-01	501541-02-01	501541-02-01		501541-02-01		
	UNITS	16-C4-MW-16B	16-C4-MW-10A	16-C4-MW-10B	QC Batch	16-C4-MW-11A	RDL	QC Batch
Elements								
Total Arsenic (As)	mg/kg	6.8	<1.0	1.6	8386064	2.6	1.0	8387659
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	<0.050	8386064	0.10	0.050	8387659
Total Chromium (Cr)	mg/kg	23	12	17	8386064	40	1.0	8387659
Total Cobalt (Co)	mg/kg	5.6	3.6	5.0	8386064	7.2	0.50	8387659
Total Copper (Cu)	mg/kg	7.2	3.6	5.6	8386064	12	1.0	8387659
Total Lead (Pb)	mg/kg	4.7	3.2	4.5	8386064	11	0.50	8387659
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	8386064	<0.050	0.050	8387659
Total Nickel (Ni)	mg/kg	11	7.2	9.1	8386064	20	1.0	8387659
Total Zinc (Zn)	mg/kg	32	17	23	8386064	52	10	8387659
RDL = Reportable Detection Limit								

Maxxam ID		PJ4038		PJ4039		PJ4040	PJ4041		
Sampling Date		2016/08/20 16:05		2016/08/22 15:55		2016/08/22 16:00	2016/08/22 16:20		
COC Number		501541-02-01		501541-04-01		501541-04-01	501541-04-01		
	UNITS	16-C4-MW-11B	QC Batch	16-C4-MW-12A	QC Batch	16-C4-MW-12B	16-C4-MW-13A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	2.0	8386064	2.2	8387183	2.3	1.4	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	8386064	0.086	8387183	0.33	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	31	8386064	23	8387183	25	17	1.0	8387618
Total Cobalt (Co)	mg/kg	6.9	8386064	7.3	8387183	7.2	4.6	0.50	8387618
Total Copper (Cu)	mg/kg	9.3	8386064	12	8387183	14	7.1	1.0	8387618
Total Lead (Pb)	mg/kg	9.0	8386064	8.9	8387183	15	4.5	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	8386064	<0.050	8387183	<0.050	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	16	8386064	13	8387183	13	8.3	1.0	8387618
Total Zinc (Zn)	mg/kg	40	8386064	48	8387183	73	28	10	8387618
RDL = Reportable Detection Limit									

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4042		PJ4043		PJ4044	PJ4045		
Sampling Date		2016/08/22 16:25		2016/08/21 17:15		2016/08/21 17:20	2016/08/22 11:35		
COC Number		501541-04-01		501541-04-01		501541-04-01	501541-04-01		
	UNITS	16-C4-MW-13B	QC Batch	16-C4-MW-21A	QC Batch	16-C4-MW-21B	16-C4-MW-22A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	1.7	8387659	2.1	8387183	1.7	12	1.0	8387659
Total Cadmium (Cd)	mg/kg	<0.050	8387659	0.16	8387183	0.059	<0.050	0.050	8387659
Total Chromium (Cr)	mg/kg	36	8387659	24	8387183	14	8.2	1.0	8387659
Total Cobalt (Co)	mg/kg	4.9	8387659	5.3	8387183	3.3	3.0	0.50	8387659
Total Copper (Cu)	mg/kg	7.2	8387659	9.7	8387183	4.6	7.0	1.0	8387659
Total Lead (Pb)	mg/kg	4.7	8387659	39	8387183	11	7.9	0.50	8387659
Total Mercury (Hg)	mg/kg	<0.050	8387659	<0.050	8387183	<0.050	<0.050	0.050	8387659
Total Nickel (Ni)	mg/kg	17	8387659	11	8387183	5.5	6.4	1.0	8387659
Total Zinc (Zn)	mg/kg	31	8387659	100	8387183	37	17	10	8387659
RDL = Reportable Detection Limit									

Maxxam ID		PJ4046	PJ4047		PJ4048		PJ4049		
Sampling Date		2016/08/22 11:40	2016/08/21 16:20		2016/08/21 16:25		2016/08/22 09:55		
COC Number		501541-04-01	501541-04-01		501541-04-01		501541-05-01		
	UNITS	16-C4-MW-22B	16-C4-MW-23A	QC Batch	16-C4-MW-23B	QC Batch	16-C4-MW-17A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	5.1	1.4	8387618	1.5	8387659	<1.0	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	8387618	0.079	8387659	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	9.4	13	8387618	38	8387659	8.2	1.0	8387618
Total Cobalt (Co)	mg/kg	3.4	4.0	8387618	4.0	8387659	2.6	0.50	8387618
Total Copper (Cu)	mg/kg	8.0	7.4	8387618	8.2	8387659	5.3	1.0	8387618
Total Lead (Pb)	mg/kg	11	6.9	8387618	7.2	8387659	3.4	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	<0.050	8387618	<0.050	8387659	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	6.7	7.5	8387618	19	8387659	4.5	1.0	8387618
Total Zinc (Zn)	mg/kg	20	26	8387618	27	8387659	15	10	8387618
RDL = Reportable Detection Limit									

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4050		PJ4051		PJ4052	PJ4053		
Sampling Date		2016/08/22 10:00		2016/08/22 10:10		2016/08/22 10:15	2016/08/22 10:30		
COC Number		501541-05-01		501541-05-01		501541-05-01	501541-05-01		
	UNITS	16-C4-MW-17B	QC Batch	16-C4-MW-18A	QC Batch	16-C4-MW-18B	16-C4-MW-19A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	8.1	8387618	1.9	8387183	1.9	<1.0	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	8387618	<0.050	8387183	<0.050	<0.050	0.050	8387618
Total Chromium (Cr)	mg/kg	9.7	8387618	14	8387183	9.7	8.0	1.0	8387618
Total Cobalt (Co)	mg/kg	2.8	8387618	3.0	8387183	2.8	1.8	0.50	8387618
Total Copper (Cu)	mg/kg	4.6	8387618	6.0	8387183	4.5	5.3	1.0	8387618
Total Lead (Pb)	mg/kg	3.7	8387618	5.1	8387183	4.3	3.6	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	8387618	<0.050	8387183	<0.050	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	5.7	8387618	7.0	8387183	4.7	4.0	1.0	8387618
Total Zinc (Zn)	mg/kg	14	8387618	25	8387183	23	15	10	8387618
RDL = Reportable Detection Limit									

Maxxam ID		PJ4054	PJ4055		PJ4056		PJ4057		
Sampling Date		2016/08/22 10:35	2016/08/21 16:45		2016/08/21 16:50		2016/08/22 13:30		
COC Number		501541-05-01	501541-05-01		501541-05-01		501541-05-01		
	UNITS	16-C4-MW-19B	16-C4-MW-20A	QC Batch	16-C4-MW-20B	QC Batch	16-C4-1A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	1.2	1.5	8386064	1.5	8387183	1.6	1.0	8387618
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	8386064	<0.050	8387183	0.072	0.050	8387618
Total Chromium (Cr)	mg/kg	14	16	8386064	18	8387183	14	1.0	8387618
Total Cobalt (Co)	mg/kg	3.8	5.6	8386064	4.8	8387183	4.4	0.50	8387618
Total Copper (Cu)	mg/kg	9.6	9.7	8386064	10	8387183	9.0	1.0	8387618
Total Lead (Pb)	mg/kg	5.6	5.3	8386064	6.9	8387183	11	0.50	8387618
Total Mercury (Hg)	mg/kg	<0.050	<0.050	8386064	<0.050	8387183	<0.050	0.050	8387618
Total Nickel (Ni)	mg/kg	7.8	9.0	8386064	9.9	8387183	7.9	1.0	8387618
Total Zinc (Zn)	mg/kg	27	37	8386064	26	8387183	36	10	8387618
RDL = Reportable Detection Limit									

Maxxam Job #: B673300
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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4058		PJ4059	PJ4060	PJ4061	PJ4062		
Sampling Date		2016/08/22 13:35		2016/08/22 10:50	2016/08/22 11:00	2016/08/22 12:20	2016/08/22 12:25		
COC Number		501541-05-01		501541-06-01	501541-06-01	501541-06-01	501541-06-01		
	UNITS	16-C4-1B	QC Batch	16-C4-2A	16-C4-2B	16-C4-3A	16-C4-3B	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	1.8	8386261	2.2	3.0	2.5	5.0	1.0	8386064
Total Cadmium (Cd)	mg/kg	<0.050	8386261	0.068	0.074	0.051	<0.050	0.050	8386064
Total Chromium (Cr)	mg/kg	21	8386261	32	31	45	99	1.0	8386064
Total Cobalt (Co)	mg/kg	6.2	8386261	8.9	10	16	19	0.50	8386064
Total Copper (Cu)	mg/kg	16	8386261	11	13	12	23	1.0	8386064
Total Lead (Pb)	mg/kg	8.4	8386261	10	12	8.2	14	0.50	8386064
Total Mercury (Hg)	mg/kg	<0.050	8386261	<0.050	<0.050	<0.050	<0.050	0.050	8386064
Total Nickel (Ni)	mg/kg	12	8386261	14	14	23	47	1.0	8386064
Total Zinc (Zn)	mg/kg	36	8386261	50	49	110	120	10	8386064
RDL = Reportable Detection Limit									

Maxxam ID		PJ4063	PJ4064		PJ4065		PJ4066		
Sampling Date		2016/08/20 14:20	2016/08/20 14:25		2016/08/21 10:55		2016/08/21 11:00		
COC Number		501541-06-01	501541-06-01		501541-06-01		501541-06-01		
	UNITS	16-C4-BMW-3A	16-C4-BMW-3B	QC Batch	16-C4-BMW-4A	QC Batch	16-C4-BMW-4B	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/kg	2.2	1.3	8386064	<1.0	8387183	2.0	1.0	8386064
Total Cadmium (Cd)	mg/kg	<0.050	<0.050	8386064	<0.050	8387183	<0.050	0.050	8386064
Total Chromium (Cr)	mg/kg	28	19	8386064	10	8387183	9.5	1.0	8386064
Total Cobalt (Co)	mg/kg	7.1	5.6	8386064	3.6	8387183	3.8	0.50	8386064
Total Copper (Cu)	mg/kg	11	6.7	8386064	5.1	8387183	4.9	1.0	8386064
Total Lead (Pb)	mg/kg	6.3	4.9	8386064	4.0	8387183	4.3	0.50	8386064
Total Mercury (Hg)	mg/kg	<0.050	<0.050	8386064	<0.050	8387183	<0.050	0.050	8386064
Total Nickel (Ni)	mg/kg	14	10	8386064	6.8	8387183	6.2	1.0	8386064
Total Zinc (Zn)	mg/kg	41	26	8386064	19	8387183	19	10	8386064
RDL = Reportable Detection Limit									

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		PJ4067	PJ4068	PJ4069	PJ4070	PJ4071	PJ4072		
Sampling Date		2016/08/21 10:20	2016/08/21 14:10	2016/08/21 16:45	2016/08/21 14:40	2016/08/22 10:55	2016/08/22 11:35		
COC Number		501541-06-01	501541-06-01	501541-07-01	501541-07-01	501541-07-01	501541-07-01		
	UNITS	**16-C4-DUP1**	**16-C4-DUP2**	**16-C4-DUP3**	**16-C4-DUP4**	**16-C4-DUP5**	**16-C4-DUP6**	**RDL**	**QC Batch**
Elements									
Total Arsenic (As)	mg/kg	2.1	2.2	<1.0	1.8	1.0	1.3	1.0	8386064
Total Cadmium (Cd)	mg/kg	<0.050	0.072	<0.050	0.12	<0.050	<0.050	0.050	8386064
Total Chromium (Cr)	mg/kg	19	29	12	15	12	9.2	1.0	8386064
Total Cobalt (Co)	mg/kg	7.3	7.7	3.6	5.2	3.8	2.9	0.50	8386064
Total Copper (Cu)	mg/kg	12	14	3.9	8.6	6.4	7.4	1.0	8386064
Total Lead (Pb)	mg/kg	7.8	10	3.2	5.0	4.1	9.1	0.50	8386064
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	8386064
Total Nickel (Ni)	mg/kg	10	15	6.4	9.5	7.5	6.3	1.0	8386064
Total Zinc (Zn)	mg/kg	45	49	17	50	20	18	10	8386064
RDL = Reportable Detection Limit									

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GENERAL COMMENTS

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

Package 1	5.0°C
Package 2	2.7°C
Package 3	3.7°C
Package 4	4.3°C
Package 5	3.3°C
Package 6	2.0°C
Package 7	4.0°C
Package 8	2.3°C
Package 9	3.0°C

Samples extracted past 7 day hold time for BTEX/F1 analysis.

PCB results are attached to this report. The reference number for these results from Maxxam Campobello is B6I4865.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8381458	O-TERPHENYL (sur.)	2016/08/30	99	50 - 130	108	50 - 130	105	%				
8381606	1,4-Difluorobenzene (sur.)	2016/08/30	100	60 - 140	98	60 - 140	96	%				
8381606	4-Bromofluorobenzene (sur.)	2016/08/30	97	60 - 140	100	60 - 140	99	%				
8381606	D10-ETHYLBENZENE (sur.)	2016/08/30	114	60 - 130	106	60 - 130	124	%				
8381606	D4-1,2-Dichloroethane (sur.)	2016/08/30	103	60 - 140	108	60 - 140	107	%				
8382279	1,4-Difluorobenzene (sur.)	2016/08/31	101	60 - 140	100	60 - 140	98	%				
8382279	4-Bromofluorobenzene (sur.)	2016/08/31	94	60 - 140	96	60 - 140	92	%				
8382279	D10-ETHYLBENZENE (sur.)	2016/08/31	111	60 - 130	108	60 - 130	109	%				
8382279	D4-1,2-Dichloroethane (sur.)	2016/08/31	101	60 - 140	96	60 - 140	103	%				
8384294	1,4-Difluorobenzene (sur.)	2016/09/02	101	60 - 140	101	60 - 140	101	%				
8384294	4-Bromofluorobenzene (sur.)	2016/09/02	95	60 - 140	95	60 - 140	94	%				
8384294	D10-ETHYLBENZENE (sur.)	2016/09/02	109	60 - 130	110	60 - 130	119	%				
8384294	D4-1,2-Dichloroethane (sur.)	2016/09/02	103	60 - 140	99	60 - 140	100	%				
8384302	1,4-Difluorobenzene (sur.)	2016/09/02	100	60 - 140	99	60 - 140	100	%				
8384302	4-Bromofluorobenzene (sur.)	2016/09/02	92	60 - 140	95	60 - 140	91	%				
8384302	D10-ETHYLBENZENE (sur.)	2016/09/02	104	60 - 130	98	60 - 130	101	%				
8384302	D4-1,2-Dichloroethane (sur.)	2016/09/02	98	60 - 140	100	60 - 140	97	%				
8384337	1,4-Difluorobenzene (sur.)	2016/09/01	101	60 - 140	98	60 - 140	102	%				
8384337	4-Bromofluorobenzene (sur.)	2016/09/01	96	60 - 140	94	60 - 140	92	%				
8384337	D10-ETHYLBENZENE (sur.)	2016/09/01	88	60 - 130	101	60 - 130	102	%				
8384337	D4-1,2-Dichloroethane (sur.)	2016/09/01	103	60 - 140	101	60 - 140	99	%				
8386049	O-TERPHENYL (sur.)	2016/09/02	104	50 - 130	98	50 - 130	105	%				
8386057	O-TERPHENYL (sur.)	2016/09/02	104	50 - 130	101	50 - 130	105	%				
8386065	O-TERPHENYL (sur.)	2016/09/02	93	50 - 130	95	50 - 130	90	%				
8380052	Moisture	2016/08/31					<0.30	%	0	20		
8381458	F2 (C10-C16 Hydrocarbons)	2016/08/30	104	50 - 130	106	70 - 130	<10	mg/kg	28	50		
8381458	F3 (C16-C34 Hydrocarbons)	2016/08/30	105	50 - 130	105	70 - 130	<50	mg/kg	9.8	50		
8381458	F4 (C34-C50 Hydrocarbons)	2016/08/30	98	50 - 130	103	70 - 130	<50	mg/kg	NC	50		
8381606	Benzene	2016/08/30	113	60 - 140	99	60 - 140	<0.0050	mg/kg	NC	50		
8381606	Ethylbenzene	2016/08/30	114	60 - 140	96	60 - 140	<0.010	mg/kg	NC	50		
8381606	F1 (C6-C10) - BTEX	2016/08/30					<12	mg/kg	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8381606	F1 (C6-C10)	2016/08/30	100	60 - 140	102	60 - 140	<12	mg/kg	NC	50		
8381606	m & p-Xylene	2016/08/30	109	60 - 140	93	60 - 140	<0.040	mg/kg	NC	50		
8381606	o-Xylene	2016/08/30	107	60 - 140	92	60 - 140	<0.020	mg/kg	NC	50		
8381606	Toluene	2016/08/30	107	60 - 140	93	60 - 140	<0.020	mg/kg	NC	50		
8381606	Xylenes (Total)	2016/08/30					<0.040	mg/kg	NC	50		
8382279	Benzene	2016/08/31	108	60 - 140	99	60 - 140	<0.0050	mg/kg	NC	50		
8382279	Ethylbenzene	2016/08/31	99	60 - 140	94	60 - 140	<0.010	mg/kg	NC	50		
8382279	F1 (C6-C10) - BTEX	2016/08/31					<12	mg/kg	NC	50		
8382279	F1 (C6-C10)	2016/08/31	87	60 - 140	110	60 - 140	<12	mg/kg	NC	50		
8382279	m & p-Xylene	2016/08/31	96	60 - 140	92	60 - 140	<0.040	mg/kg	NC	50		
8382279	o-Xylene	2016/08/31	95	60 - 140	89	60 - 140	<0.020	mg/kg	NC	50		
8382279	Toluene	2016/08/31	96	60 - 140	89	60 - 140	<0.020	mg/kg	NC	50		
8382279	Xylenes (Total)	2016/08/31					<0.040	mg/kg	NC	50		
8384294	Benzene	2016/09/02	101	60 - 140	99	60 - 140	0.0064, RDL=0.0064 (1)	mg/kg	NC	50		
8384294	Ethylbenzene	2016/09/02	100	60 - 140	101	60 - 140	<0.010	mg/kg	NC	50		
8384294	F1 (C6-C10) - BTEX	2016/09/02					<12	mg/kg	NC	50		
8384294	F1 (C6-C10)	2016/09/02	99	60 - 140	96	60 - 140	<12	mg/kg	NC	50		
8384294	m & p-Xylene	2016/09/02	100	60 - 140	101	60 - 140	<0.040	mg/kg	NC	50		
8384294	o-Xylene	2016/09/02	97	60 - 140	97	60 - 140	<0.020	mg/kg	NC	50		
8384294	Toluene	2016/09/02	94	60 - 140	94	60 - 140	<0.020	mg/kg	NC	50		
8384294	Xylenes (Total)	2016/09/02					<0.040	mg/kg	NC	50		
8384302	Benzene	2016/09/02	87	60 - 140	85	60 - 140	<0.0050	mg/kg	NC	50		
8384302	Ethylbenzene	2016/09/02	90	60 - 140	91	60 - 140	<0.010	mg/kg	NC	50		
8384302	F1 (C6-C10) - BTEX	2016/09/02					<12	mg/kg	NC	50		
8384302	F1 (C6-C10)	2016/09/02	92	60 - 140	97	60 - 140	<12	mg/kg	NC	50		
8384302	m & p-Xylene	2016/09/02	88	60 - 140	89	60 - 140	<0.040	mg/kg	NC	50		
8384302	o-Xylene	2016/09/02	87	60 - 140	89	60 - 140	<0.020	mg/kg	NC	50		
8384302	Toluene	2016/09/02	83	60 - 140	82	60 - 140	<0.020	mg/kg	NC	50		
8384302	Xylenes (Total)	2016/09/02					<0.040	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8384337	Benzene	2016/09/01	84	60 - 140	95	60 - 140	<0.0050	mg/kg	NC	50		
8384337	Ethylbenzene	2016/09/01	87	60 - 140	99	60 - 140	<0.010	mg/kg	NC	50		
8384337	F1 (C6-C10) - BTEX	2016/09/01					<12	mg/kg	NC	50		
8384337	F1 (C6-C10)	2016/09/01	89	60 - 140	94	60 - 140	<12	mg/kg	NC	50		
8384337	m & p-Xylene	2016/09/01	85	60 - 140	97	60 - 140	<0.040	mg/kg	NC	50		
8384337	o-Xylene	2016/09/01	83	60 - 140	97	60 - 140	<0.020	mg/kg	NC	50		
8384337	Toluene	2016/09/01	79	60 - 140	90	60 - 140	<0.020	mg/kg	NC	50		
8384337	Xylenes (Total)	2016/09/01					<0.040	mg/kg	NC	50		
8385762	Moisture	2016/09/02					<0.30	%	0	20		
8385765	Moisture	2016/09/02					<0.30	%	0	20		
8385770	Moisture	2016/09/02					<0.30	%	12	20		
8386049	F2 (C10-C16 Hydrocarbons)	2016/09/02	124	50 - 130	117	70 - 130	<10	mg/kg	NC	50		
8386049	F3 (C16-C34 Hydrocarbons)	2016/09/02	123	50 - 130	119	70 - 130	<50	mg/kg	NC	50		
8386049	F4 (C34-C50 Hydrocarbons)	2016/09/02	120	50 - 130	116	70 - 130	<50	mg/kg	NC	50		
8386057	F2 (C10-C16 Hydrocarbons)	2016/09/02	120	50 - 130	123	70 - 130	<10	mg/kg	NC	50		
8386057	F3 (C16-C34 Hydrocarbons)	2016/09/02	124	50 - 130	124	70 - 130	<50	mg/kg	NC	50		
8386057	F4 (C34-C50 Hydrocarbons)	2016/09/02	123	50 - 130	124	70 - 130	<50	mg/kg	NC	50		
8386064	Total Arsenic (As)	2016/09/02	99	75 - 125	98	75 - 125	<1.0	mg/kg	NC	35	111	53 - 147
8386064	Total Cadmium (Cd)	2016/09/02	101	75 - 125	98	75 - 125	<0.050	mg/kg	NC	35		
8386064	Total Chromium (Cr)	2016/09/02	NC	75 - 125	99	75 - 125	<1.0	mg/kg	2.4	35	95	59 - 141
8386064	Total Cobalt (Co)	2016/09/02	100	75 - 125	98	75 - 125	<0.50	mg/kg	3.9	35	106	58 - 142
8386064	Total Copper (Cu)	2016/09/02	101	75 - 125	98	75 - 125	<1.0	mg/kg	2.2	35	104	83 - 117
8386064	Total Lead (Pb)	2016/09/02	86	75 - 125	102	75 - 125	<0.50	mg/kg	16	35	118	79 - 121
8386064	Total Mercury (Hg)	2016/09/02	90	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
8386064	Total Nickel (Ni)	2016/09/02	100	75 - 125	97	75 - 125	<1.0	mg/kg	0.45	35	108	79 - 121
8386064	Total Zinc (Zn)	2016/09/02	NC	75 - 125	98	75 - 125	<10	mg/kg	NC	35	117	79 - 121
8386065	F2 (C10-C16 Hydrocarbons)	2016/09/02	94	50 - 130	95	70 - 130	<10	mg/kg	NC	50		
8386065	F3 (C16-C34 Hydrocarbons)	2016/09/02	92	50 - 130	91	70 - 130	<50	mg/kg	NC	50		
8386065	F4 (C34-C50 Hydrocarbons)	2016/09/02	88	50 - 130	89	70 - 130	<50	mg/kg	NC	50		
8386261	Total Arsenic (As)	2016/09/02	94	75 - 125	97	75 - 125	<1.0	mg/kg	3.9	35	100	53 - 147
8386261	Total Cadmium (Cd)	2016/09/02	95	75 - 125	98	75 - 125	<0.050	mg/kg	2.5	35		

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QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8386261	Total Chromium (Cr)	2016/09/02	99	75 - 125	99	75 - 125	<1.0	mg/kg	9.3	35	82	59 - 141
8386261	Total Cobalt (Co)	2016/09/02	95	75 - 125	97	75 - 125	<0.50	mg/kg	2.4	35	97	58 - 142
8386261	Total Copper (Cu)	2016/09/02	94	75 - 125	99	75 - 125	<1.0	mg/kg	1.2	35	104	83 - 117
8386261	Total Lead (Pb)	2016/09/02	92	75 - 125	98	75 - 125	<0.50	mg/kg	2.2	35	107	79 - 121
8386261	Total Mercury (Hg)	2016/09/02	89	75 - 125	97	75 - 125	<0.050	mg/kg	NC	35		
8386261	Total Nickel (Ni)	2016/09/02	96	75 - 125	97	75 - 125	<1.0	mg/kg	3.5	35	108	79 - 121
8386261	Total Zinc (Zn)	2016/09/02	NC	75 - 125	97	75 - 125	<10	mg/kg	1.0	35	107	79 - 121
8387183	Total Arsenic (As)	2016/09/03	97	75 - 125	99	75 - 125	<1.0	mg/kg	9.4	35	107	53 - 147
8387183	Total Cadmium (Cd)	2016/09/03	98	75 - 125	97	75 - 125	<0.050	mg/kg	2.9	35		
8387183	Total Chromium (Cr)	2016/09/03	102	75 - 125	100	75 - 125	<1.0	mg/kg	12	35	91	59 - 141
8387183	Total Cobalt (Co)	2016/09/03	97	75 - 125	99	75 - 125	<0.50	mg/kg	6.1	35	99	58 - 142
8387183	Total Copper (Cu)	2016/09/03	95	75 - 125	99	75 - 125	<1.0	mg/kg	5.0	35	108	83 - 117
8387183	Total Lead (Pb)	2016/09/03	92	75 - 125	97	75 - 125	<0.50	mg/kg	4.8	35	105	79 - 121
8387183	Total Mercury (Hg)	2016/09/03	95	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
8387183	Total Nickel (Ni)	2016/09/03	NC	75 - 125	98	75 - 125	<1.0	mg/kg	5.8	35	118	79 - 121
8387183	Total Zinc (Zn)	2016/09/03	NC	75 - 125	100	75 - 125	<10	mg/kg	4.6	35	110	79 - 121
8387618	Total Arsenic (As)	2016/09/05	95	75 - 125	96	75 - 125	<1.0	mg/kg	NC	35	103	53 - 147
8387618	Total Cadmium (Cd)	2016/09/05	98	75 - 125	96	75 - 125	<0.050	mg/kg	NC	35		
8387618	Total Chromium (Cr)	2016/09/05	95	75 - 125	95	75 - 125	<1.0	mg/kg	0.94	35	85	59 - 141
8387618	Total Cobalt (Co)	2016/09/05	91	75 - 125	92	75 - 125	<0.50	mg/kg	2.0	35	92	58 - 142
8387618	Total Copper (Cu)	2016/09/05	92	75 - 125	95	75 - 125	<1.0	mg/kg	13	35	100	83 - 117
8387618	Total Lead (Pb)	2016/09/05	94	75 - 125	95	75 - 125	<0.50	mg/kg	0.27	35	105	79 - 121
8387618	Total Mercury (Hg)	2016/09/05	94	75 - 125	94	75 - 125	<0.050	mg/kg	NC	35		
8387618	Total Nickel (Ni)	2016/09/05	94	75 - 125	94	75 - 125	<1.0	mg/kg	0.37	35	106	79 - 121
8387618	Total Zinc (Zn)	2016/09/05	NC	75 - 125	94	75 - 125	<10	mg/kg	NC	35	103	79 - 121
8387659	Total Arsenic (As)	2016/09/05	68 (2)	75 - 125	100	75 - 125	<1.0	mg/kg	NC	35	92	53 - 147
8387659	Total Cadmium (Cd)	2016/09/05	73 (2)	75 - 125	98	75 - 125	<0.050	mg/kg	17	35		
8387659	Total Chromium (Cr)	2016/09/05	68 (2)	75 - 125	98	75 - 125	<1.0	mg/kg	NC	35	74	59 - 141
8387659	Total Cobalt (Co)	2016/09/05	65 (2)	75 - 125	95	75 - 125	<0.50	mg/kg	NC	35	81	58 - 142
8387659	Total Copper (Cu)	2016/09/05	62 (2)	75 - 125	97	75 - 125	<1.0	mg/kg	16	35	94	83 - 117
8387659	Total Lead (Pb)	2016/09/05	67 (2)	75 - 125	98	75 - 125	<0.50	mg/kg	NC	35	98	79 - 121

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QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8387659	Total Mercury (Hg)	2016/09/05	69 (2)	75 - 125	97	75 - 125	<0.050	mg/kg	NC	35		
8387659	Total Nickel (Ni)	2016/09/05	63 (2)	75 - 125	96	75 - 125	<1.0	mg/kg	21	35	93	79 - 121
8387659	Total Zinc (Zn)	2016/09/05	NC	75 - 125	96	75 - 125	<10	mg/kg	NC	35	95	79 - 121
8387795	Total Arsenic (As)	2016/09/05	101	75 - 125	101	75 - 125	<1.0	mg/kg	NC	35	105	53 - 147
8387795	Total Cadmium (Cd)	2016/09/05	102	75 - 125	99	75 - 125	<0.050	mg/kg	NC	35		
8387795	Total Chromium (Cr)	2016/09/05	NC	75 - 125	103	75 - 125	<1.0	mg/kg	0.10	35	91	59 - 141
8387795	Total Cobalt (Co)	2016/09/05	102	75 - 125	102	75 - 125	<0.50	mg/kg	4.3	35	102	58 - 142
8387795	Total Copper (Cu)	2016/09/05	102	75 - 125	101	75 - 125	<1.0	mg/kg	4.7	35	114	83 - 117
8387795	Total Lead (Pb)	2016/09/05	86	75 - 125	102	75 - 125	<0.50	mg/kg	4.5	35	111	79 - 121
8387795	Total Mercury (Hg)	2016/09/05	85	75 - 125	100	75 - 125	<0.050	mg/kg	NC	35		
8387795	Total Nickel (Ni)	2016/09/05	102	75 - 125	102	75 - 125	<1.0	mg/kg	0.54	35	112	79 - 121
8387795	Total Zinc (Zn)	2016/09/05	NC	75 - 125	101	75 - 125	<10	mg/kg	NC	35	111	79 - 121

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 spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of 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 (one or both samples < 5x RDL).

(1) Detection limit raised due to interferent.

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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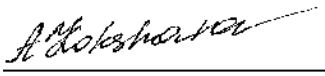
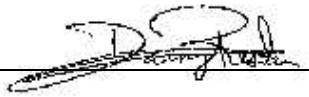
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Sampler Initials: SB

VALIDATION SIGNATURE PAGE

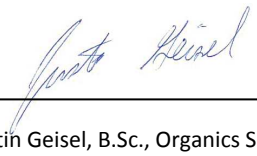
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anna Koksharova, M.Sc., Organics Senior Analyst



Daniel Reslan, cCT, QP, Organics Supervisor



Justin Geisel, B.Sc., Organics Supervisor

Maria Magdalena Florescu, Ph.D., P.Chem., QP, Inorganics Senior Analyst

Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

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 Analytics International Corporation o/a Maxxam Analytics
Unit 105 - 349 Old Airport Road, Yellowknife, North West Territories Canada X1A 3X6 Tel:(867) 445-2448 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

1284 (14)

Chain Of Custody Record Pg 1 of 7

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#3269 ARCADIS Canada	Company Name	Same	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	ANDREW HENDERSON	Contact Name		P.O. #		B673300 D_T	501541
Address	329 CHURCHILL AVE NORTH SUITE 2000	Address		Project #	102012-000, Kitikmeot DEW Lin	Chain Of Custody Record	Project Manager
	OTTAWA ON K1Z 5B8			Project Name		C#501541-03-01	Parminder Virk
Phone	(613) 721-0555 Fax: (613) 721-0029	Phone	Fax:	Site #	CAM 4 Pelly Bay		
Email	ahenderson@franzenvironmental.com, andrew.henders	Email	stephen.borcsok@arcadis.com	Sampled By	S. Borcsok		

Regulatory Criteria

Special Instructions

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

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

Analysis Requested

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenys IN WATER	# of Bottles	Comments
1		16-C4-BMW-1A	21-Aug/16	135pm	Soil			X	X		X					4	Metals in bags
2		16-C4-BMW-1B	21-Aug/16	140pm				X	X		X					4	3 jars, 1 bag
3		16-C4-MW-1A	22-Aug/16	250pm				X	X		X					4	RECEIVED IN YELLOWKNIFE
4		16-C4-MW-1B	22-Aug/16	255pm				X	X		X					4	By: Michelle Burke 10:00
5		16-C4-MW-2A	21-Aug/16	310pm				X	X		X					4	2016 -08- 25
6		16-C4-MW-2B	21-Aug/16	315pm				X	X		X					4	Temp: 5.1
7		16-C4-MW-3A	21-Aug/16	210pm				X	X		X					4	
8		16-C4-MW-3B	21-Aug/16	215pm				X	X		X					4	
9		16-C4-MW-4AA	21-Aug/16	240pm				X	X		X					4	
10		16-C4-MW-4AB	21-Aug/16	245pm				X	X		X					4	

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

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

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)*

Comments:
3-5-7
5-0-3
5 5 1
5 4 4
3-2-5
3-3-0
4-6-2
0-3-4
2-2-5

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
S. Borcsok	Aug 29/16	1030am	Jena Walter	20160826	1146	

Lab Use Only

Time Sensitive	Temperature (ºC) on Receipt	Custody Seal Intact on Cooler?
☐	See COC	☐ Yes ☐ No

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

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Maxxam Analytics International Corporation o/a Maxxam Analytics
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Chain Of Custody Record Pg 2 of 7

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#3269 ARCADIS Canada	Company Name	Same	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	ANDREW HENDERSON	Contact Name		P.O. #		B673900 D-T	501541
Address	329 CHURCHILL AVE NORTH SUITE 2000 OTTAWA ON K1Z 5B8	Address		Project #	102012-000, Kitikmeot DEW Lin	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 Fax: (613) 721-0029	Phone	Fax:	Project Name		C#501541-01-01	Parminder Virk
Email	ahenderson@franzenvironmental.com, andrew.henders	Email	stephen.borcsok@arcadis.com	Site #	CAM 4 Pelly Bay		
				Sampled By			

Regulatory Criteria

Special Instructions

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

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

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT (X)

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

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	Analysis Requested: AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, mickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenys IN WATER	# of Bottles	Comments
1		16-C4-MW-6AA	21-Aug/16	330pm	Soil			X	X		X					4	Metals in bags
2		16-C4-MW-6AB	21-Aug/16	335pm				X	X		X					4	3 jars 1 bag
3		16-C4-MW-7AA	22-Aug/16	305pm				X	X		X					4	
4		16-C4-MW-7AB	22-Aug/16	310pm				X	X		X					4	RECEIVED IN YELLOWKNIFE By: Michelle Gould 10:00 2016-08-25
5		16-C4-MW-5A	20-Aug/16	430pm				X	X		X					4	3-5-7 5-0-3
6		16-C4-MW-5B	20-Aug/16	435pm				X	X		X					4	Temp: 5.1 5.4.4
7		16-C4-MW-8A	21-Aug/16	1130am				X	X		X					4	3.2.5
8		16-C4-MW-8B	21-Aug/16	1135am				X	X		X					4	3-3-0 4-6-2
9		16-C4-MW-9A	21-Aug/16	1020am				X	X		X					4	0-3-4 2-2.5
10		16-C4-MW-9B	21-Aug/16	1025am	↓			X	X		X					4	

* * RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
Stephen Borcsok	24 Aug/16	1030am	Jenna Walter	20160826	1146		☐	see ACR	☐ Yes ☐ No

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

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A Bureau Veritas Group Company

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Chain Of Custody Record Pg 3 of 7 Page 2 of 11

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#3269 ARCADIS Canada	Company Name	Same	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	ANDREW HENDERSON	Contact Name		P.O. #		B673300 D-T	501541
Address	329 CHURCHILL AVE NORTH SUITE 2000 OTTAWA ON K1Z 5B8	Address		Project #	102012-000, Kitikmeot DEW Lin	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 Fax: (613) 721-0029	Phone	Fax:	Project Name		C#501541-02-01	Parminder Virk
Email	ahenderson@franzenvironmental.com, andrew.henders	Email	stephen.borcsok@arcadis.com	Site #	CAM 4 Pelly Bay		
				Sampled By			

Regulatory Criteria

Special Instructions

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

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

Analysis Requested

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, mickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenys IN WATER	# of Bottles	Comments
1		16-C4-MW-14AA	20-Aug/16	250pm	Soil			X	X		X					4	Metals in bags
2		16-C4-MW-14AB	20-Aug/16	255pm				X	X		X					4	3 jars, 1 bag
3		16-C4-MW-15A	21-Aug/16	1205pm				X	X		X					4	
4		16-C4-MW-15B	21-Aug/16	1210pm				X	X		X					4	
5		16-C4-MW-16A	21-Aug/16					X	X		X					4	
6		16-C4-MW-16B	21-Aug/16					X	X		X					4	
7		16-C4-MW-10A	22-Aug/16	340pm				X	X		X					4	
8		16-C4-MW-10B	22-Aug/16	345pm				X	X		X					4	
9		16-C4-MW-11A	20-Aug/16	400pm				X	X		X					4	
10		16-C4-MW-11B	20-Aug/16	405pm				X	X		X					4	

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

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

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

Comments

RECEIVED IN YELLOWKNIFE
By: Michelle Bude 10:00
2016 -08- 25
3-5-7
5-0-3
Temp: 5 1 5 4
5 4 4
3-2-5
3-3-0
4-6-2
0-3-4
2-2-5

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Stephen Borcsok	24 Aug/16	1030am	Jenna Walter	20160826	1146	

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	See ACTR	☐ Yes ☐ No

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Chain Of Custody Record B3 4 of 7 — Page 4 of 11

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#3269 ARCADIS Canada	Company Name	Same	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	ANDREW HENDERSON	Contact Name		P.O. #		B673300 D-T	501541
Address	329 CHURCHILL AVE NORTH SUITE 2000 OTTAWA ON K1Z 5B8	Address		Project #	102012-000, Kitikmeot DEW Lin	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 Fax: (613) 721-0029	Phone	Fax:	Project Name		C#501541-04-01	Parminder Virk
Email	ahenderson@franzenvironmental.com, andrew.henders	Email	stephen.borcsok@arcadis.com	Site #	CAM 4 Pelly Bay		
				Sampled By			

Regulatory Criteria

Special Instructions

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

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

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

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

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, mickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenyls IN WATER	# of Bottles	Comments
1		16-C4-MW-12A	22-Aug/16	355pm	Soil			X	X		X					4	Metals in bags
2		16-C4-MW-12B	22-Aug/16	400pm				X	X		X					4	3 jars, 1 bag
3		16-C4-MW-13A	22-Aug/16	420pm				X	X		X					4	
4		16-C4-MW-13B	22-Aug/16	425pm				X	X		X					4	
5		16-C4-MW-21A	21-Aug/16	515pm				X	X		X					4	
6		16-C4-MW-21B	21-Aug/16	520pm				X	X		X					4	
7		16-C4-MW-22A	22-Aug/16	1135pm				X	X		X					4	
8		16-C4-MW-22B	22-Aug/16	1140pm				X	X		X					4	
9		16-C4-MW-23A	21-Aug/16	420pm				X	X		X					4	
10		16-C4-MW-23B	21-Aug/16	425pm				X	X		X					4	

RECEIVED IN YELLOWKNIFE
By: Michelle Gould 10:00
2016 -08- 25

3-5-7
5-0-3
Temp: 5 1 5 11
5.4.4
3-2-5
3.3.0
4.6.2
0.3.4
2.2.5

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Stephen Borcsok	24Aug/16	1630	Jenna Lister	2016 08 25	1146	

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	See ACTR	☐ Yes ☐ No

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Chain Of Custody Record Pg 5 of 7 — Page 5 of 11

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#3269 ARCADIS Canada	Company Name		Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	ANDREW HENDERSON	Contact Name		P.O. #		B673300 D_T	501541
Address	329 CHURCHILL AVE NORTH SUITE 2000 OTTAWA ON K1Z 5B8	Address		Project #	102012-000, Kitikmeot DEW Lin	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 Fax: (613) 721-0029	Phone	Fax:	Project Name		C#501541-05-01	Parminder Virk
Email	ahenderson@franzenvironmental.com, andrew.henders	Email		Site #	CAM 4 Pelly Bay		
				Sampled By			

Regulatory Criteria

Special Instructions

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

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

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

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

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	Analysis Requested: AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenyls IN WATER	# of Bottles	Comments
1		16-C4-MW-17A	22-Aug/16	955 am	Soil			X	X		X					4	Metals in bags
2		16-C4-MW-17B	22-Aug/16	1000 am				X	X		X					4	3 jars, 1 bag
3		16-C4-MW-18A	22-Aug/16	1010 am				X	X		X					4	RECEIVED IN YELLOWKNIFE By: Michelle Lavoie 10:00 2016-08-25
4		16-C4-MW-18B	22-Aug/16	1015 am				X	X		X					4	
5		16-C4-MW-19A	22-Aug/16	1030 am				X	X		X					4	3-5-7-5 0 3
6		16-C4-MW-19B	22-Aug/16	1035 am				X	X		X					4	Temp: 5 1 5 1 5-4-4
7		16-C4-MW-20A	22-Aug/16	445 pm				X	X		X					4	3-2-5
8		16-C4-MW-20B	22-Aug/16	450 pm				X	X		X					4	3-3-0 4-6-2
9		16-C4-1A	22-Aug/16	130 pm				X	X		X					4	0-3-4 2-2-5
10		16-C4-1B	22-Aug/16	135	↓			X	X		X					4	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Stephen Borcsok	24Aug/16	1030	Jenna Lobb/TS	2016/08/26	1146	

Lab Use Only: Time Sensitive ☐ | Temperature (ºC) on Receipt: See ACTR | Custody Seal Intact on Cooler? ☐ Yes ☐ No

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Chain Of Custody Record Pg 6 of 7

INVOICE TO:
Company Name: #3269 ARCADIS Canada
Contact Name: ANDREW HENDERSON
Address: 329 CHURCHILL AVE NORTH SUITE 2000, OTTAWA ON K1Z 5B8
Phone: (613) 721-0555 Fax: (613) 721-0029
Email: ahenderson@franzenvironmental.com, andrew.henders

Report Information
Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information
Quotation #:
P.O. #:
Project #: 102012-000, Kitikmeot DEW Lin
Project Name:
Site #: CAM 4 Pelly Bay
Sampled By:

Laboratory Use Only
Maxxam Job #: B673300 D_T
Bottle Order #: 501541
Chain Of Custody Record: C#501541-06-01
Project Manager: Parminder Virk

Regulatory Criteria:
Special Instructions:

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

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

Turnaround Time (TAT) Required
Please provide advance notice for rush projects
Regular (Standard) TAT (X)
(will be applied if Rush TAT is not specified)
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Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.
Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required:
Rush Confirmation Number: *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, mickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenyls IN WATER	# of Bottles	Comments
1		16-C4-2A	22-Aug/16	105pm	Soil			X	X		X					4	Metals in bags
2		16-C4-2B	22-Aug/16	110pm				X	X		X					4	3 jars, 1 bag
3		16-C4-3A	22-Aug/16	1220pm				X	X		X					4	RECEIVED IN YELLOWKNIFE
4		16-C4-3B	22-Aug/16	1225pm				X	X		X					4	By: Miguela Michelle Bucle 10:00
5		16-C4-BMW-3A	20-Aug/16	220pm				X	X		X					4	2016 -08- 25
6		16-C4-BMW-3B	20-Aug/16	225pm				X	X		X					4	Temp: 3-5-7 5-0-3 5,5,1
7		16-C4-BMW-4A	22-Aug/16	1055am				X	X		X					4	5,4,4
8		16-C4-BMW-4B	22-Aug/16	1100am				X	X		X					4	3-2-5 3-3-0
9		16-C4-DUP1	21-Aug/16	1020am				X	X		X					4	4-6-2 0-3-4
10		16-C4-DUP2	21-Aug/16	210pm	↓			X	X		X					4	2-25

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Stephen Barsale	24 Aug/16	1030	Jenna Cutler	20160826	1146	

Lab Use Only
Time Sensitive: ☐
Temperature (°C) on Receipt: See ACTR
Custody Seal Intact on Cooler? ☐ Yes ☐ No

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

White: Maxxam Yellow: Client

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Chain Of Custody Record Pg 7 of 7

INVOICE TO:

Company Name: #3269 ARCADIS Canada
Contact Name: ANDREW HENDERSON
Address: 329 CHURCHILL AVE NORTH SUITE 2000
OTTAWA ON K1Z 5B8
Phone: (613) 721-0555 Fax: (613) 721-0029
Email: ahenderson@franzenvironmental.com, andrew.henders

Report Information

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

Project Information

Quotation #:
P.O. #:
Project #: 102012-000, Kitikmeot DEW Lin
Project Name:
Site #: CAM 4 Pelly Bay
Sampled By:

Laboratory Use Only

Maxxam Job #: B673300 D-7
Bottle Order #: 501541
Chain Of Custody Record: C#501541-07-01
Project Manager: Parminder Virk

Regulatory Criteria:

Special Instructions:

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

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

Turnaround Time (TAT) Required

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Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: Time Required: ☐
Rush Confirmation Number: *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	AT1 BTEX and F1-F4 in Soil	Polychlorinated Biphenyls	Elements by ICPMS - Soils	arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, and mercury	Mercury - Low Level (Total)	Total Hexavalent Chromium	AT1 BTEX and F1-F4 in Water	Polychlorinated Biphenyls IN WATER	# of Bottles	Comments
1		16-C4-DUP3	21-Aug/16	9:45pm	Soil			X	X		X						
2		16-C4-DUP4	21-Aug/16	2:40pm	↓			X	X		X						
3		16-C4-DUP5	22-Aug/16	10:55am	↓			X	X		X						
4		16-C4-DUP6	22-Aug/16	11:35am	↓			X	X		X						
5								X	X		X						
6								X	X		X						
7								X	X		X						
8								X	X		X						
9								X	X		X						
10								X	X		X						

RECEIVED IN YELLOWKNIFE
By: Michelle Smith 10:00
2016 -08- 25
3-5-7
5-0 3
Temp: 5 1 5 1
5 4 4
3-2-5
3-3-0
4-6-2
0-3-4
2-2-5

* * RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Stephen Barcsok	24Aug/16	1030	Jenna Walter	20160826	1146	

Lab Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
☐	See ACTR	☐ Yes ☐ No

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

White: Maxxam Yellow: Client

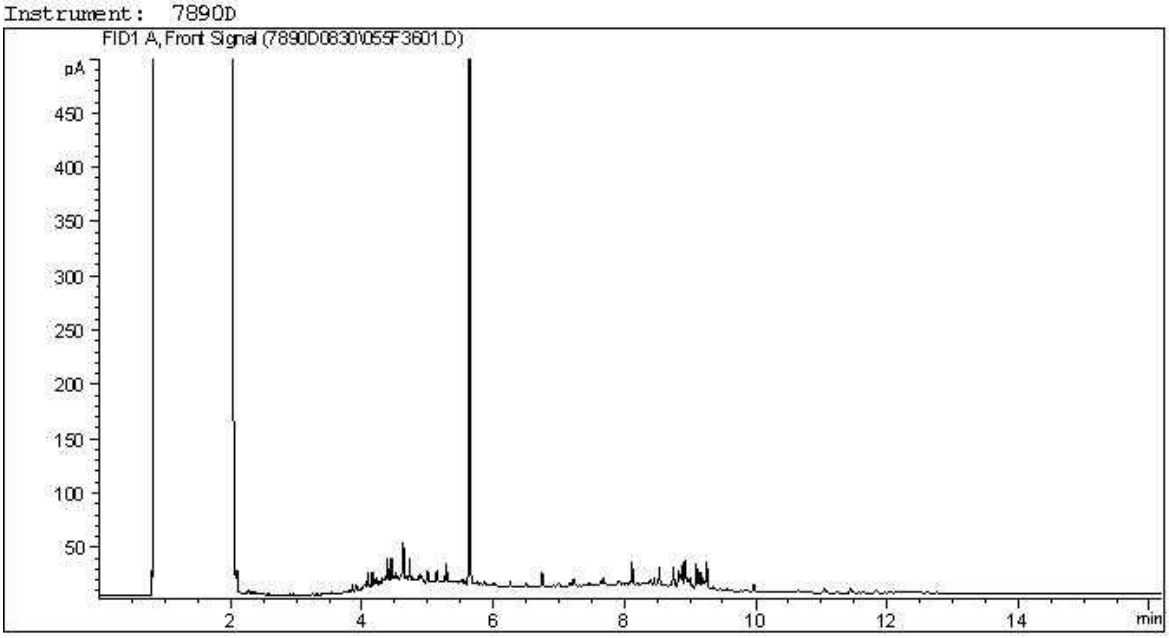
Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ3995

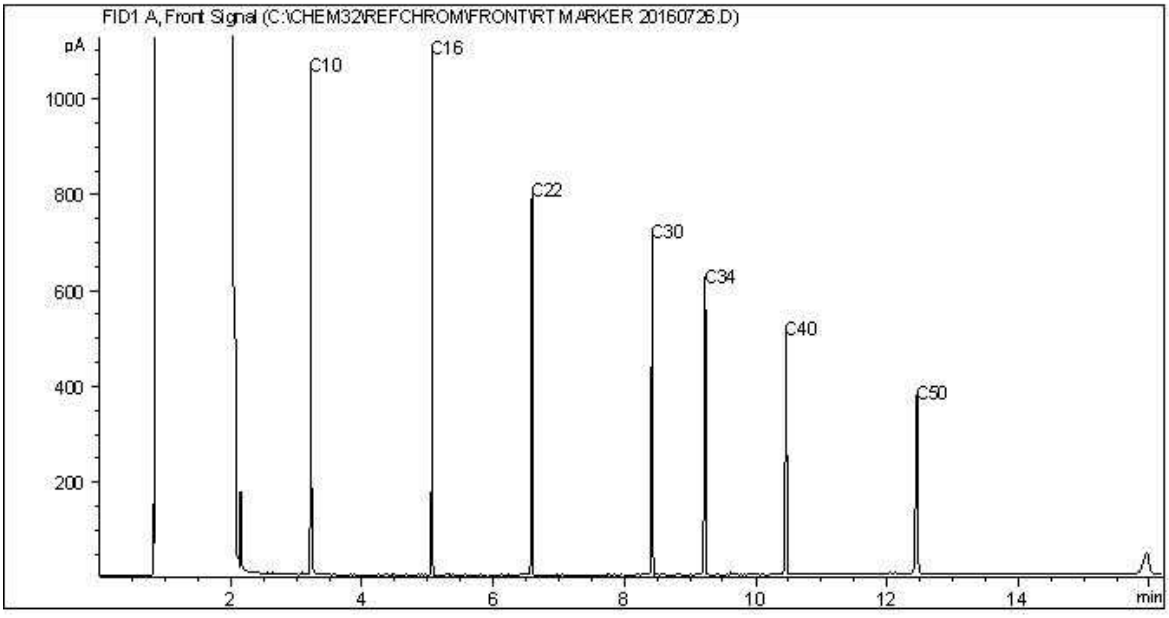
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-1A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

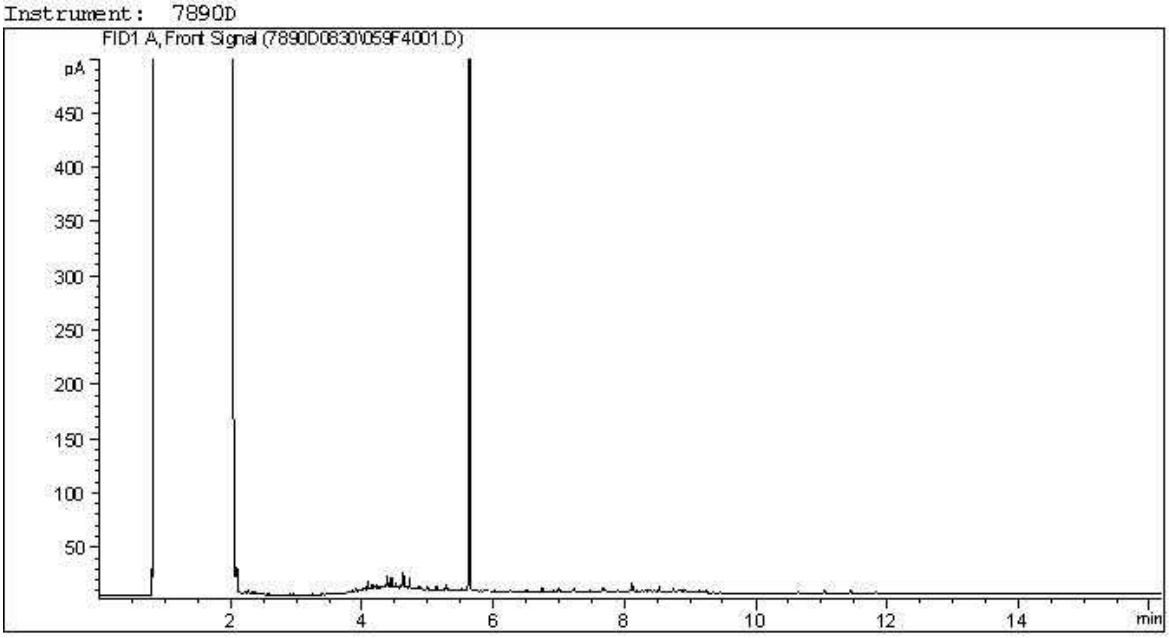
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ3996

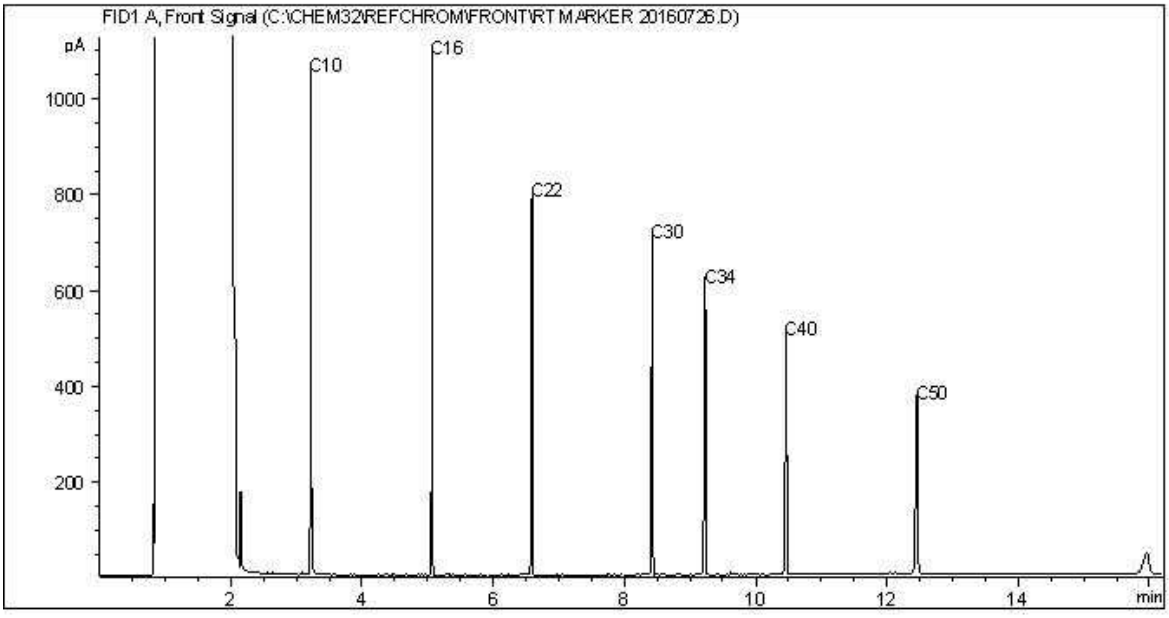
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-1B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

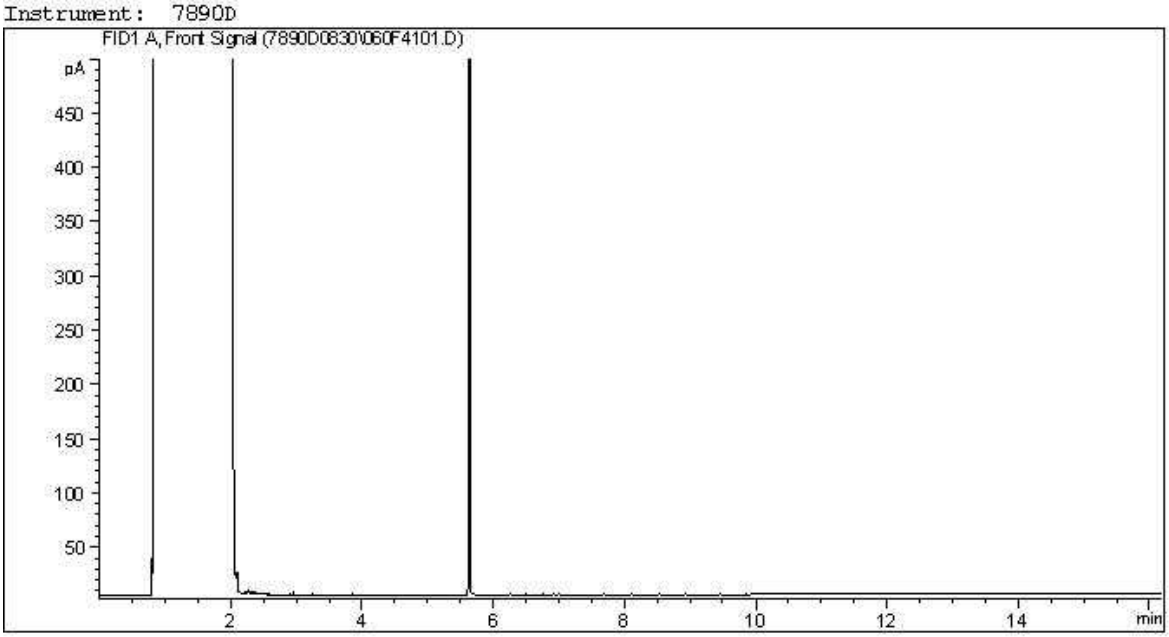
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ3997

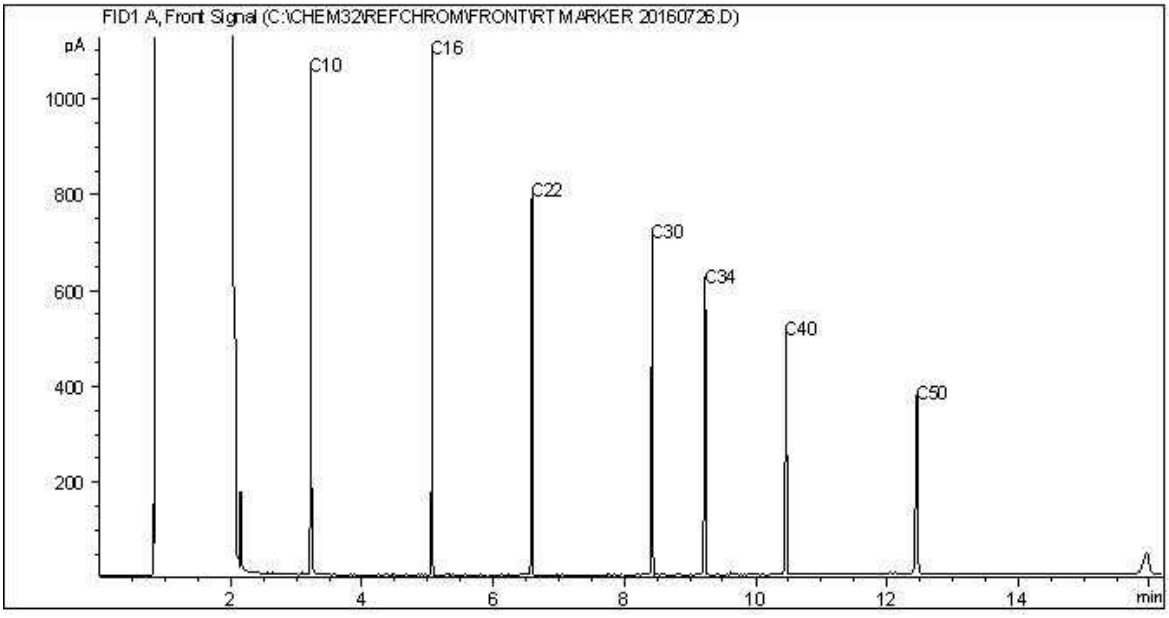
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-1A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

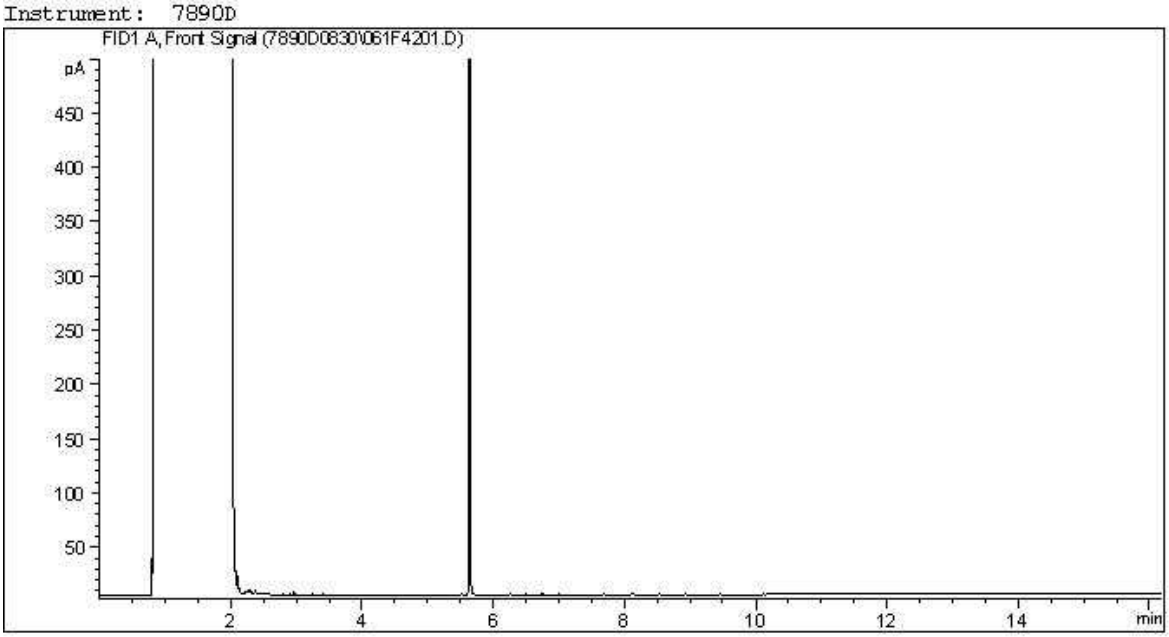
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ3998

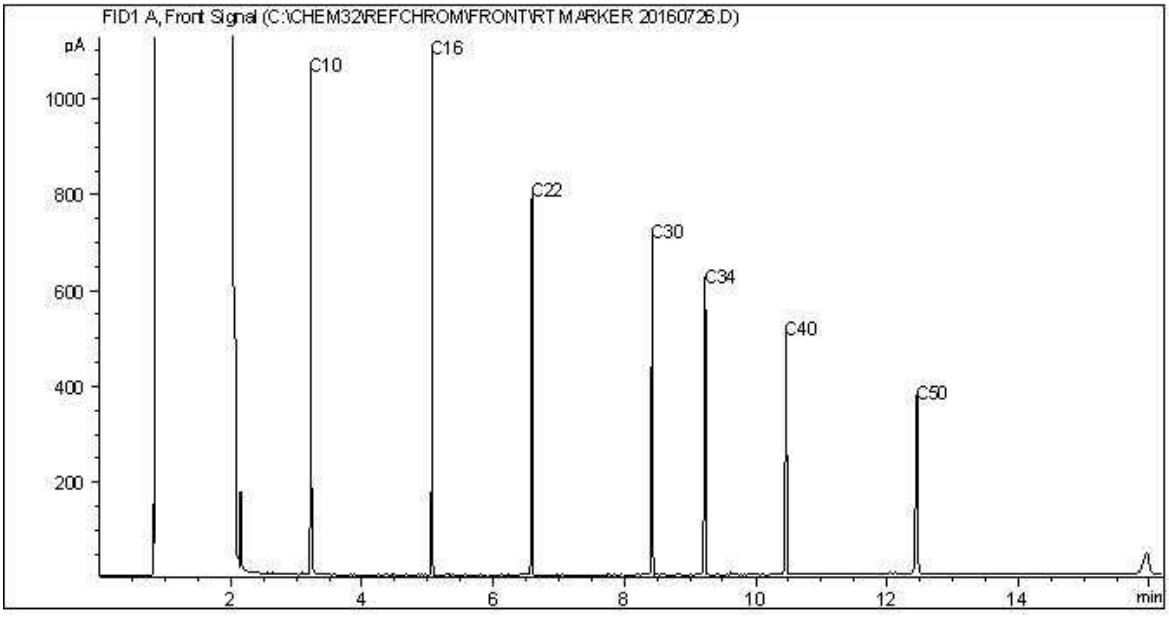
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-1B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

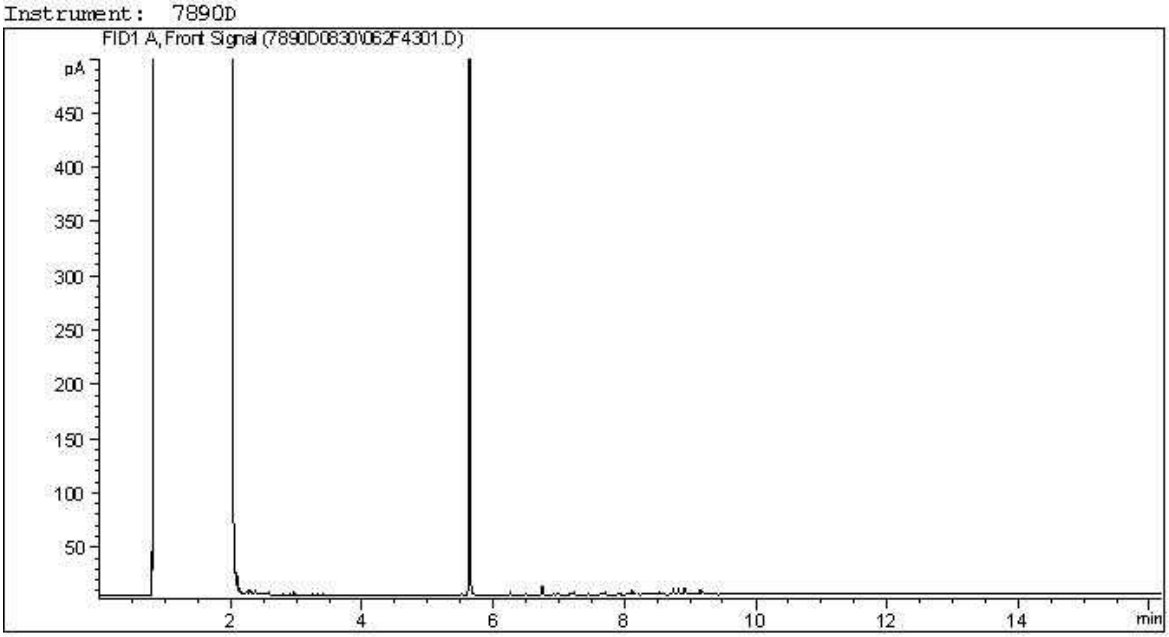
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ3999

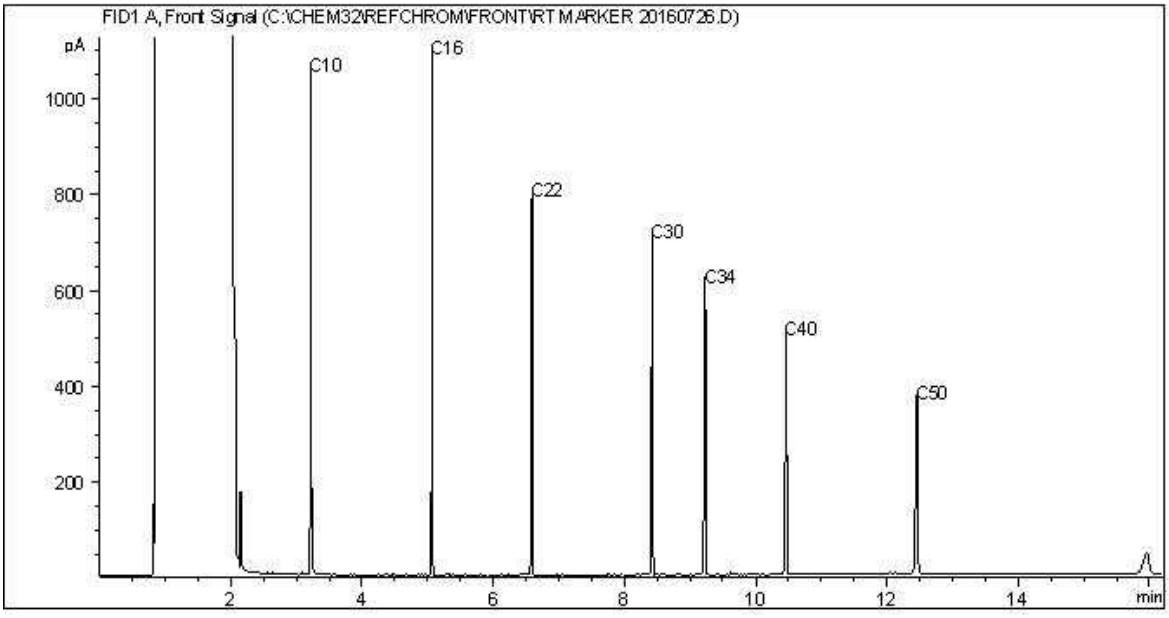
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-2A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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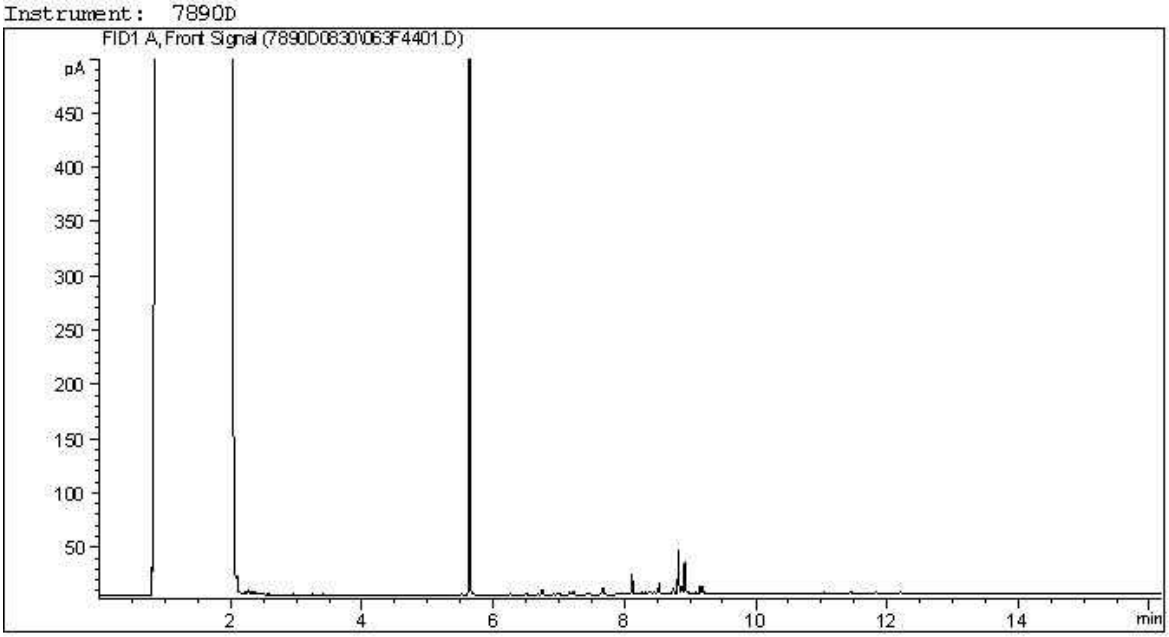
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4000

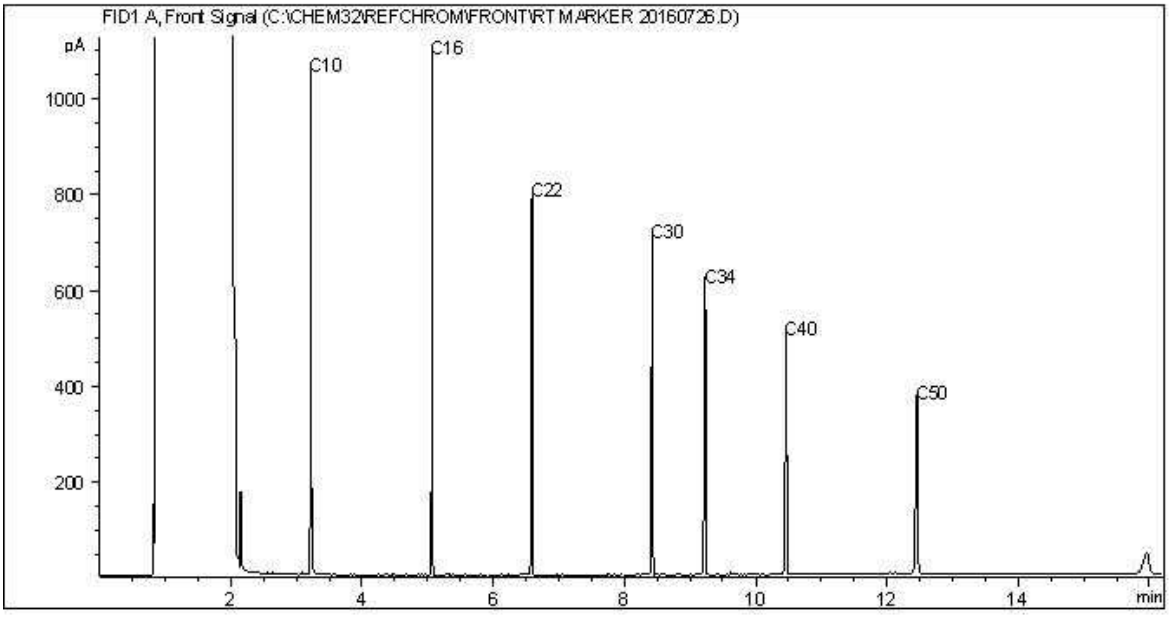
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-2B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

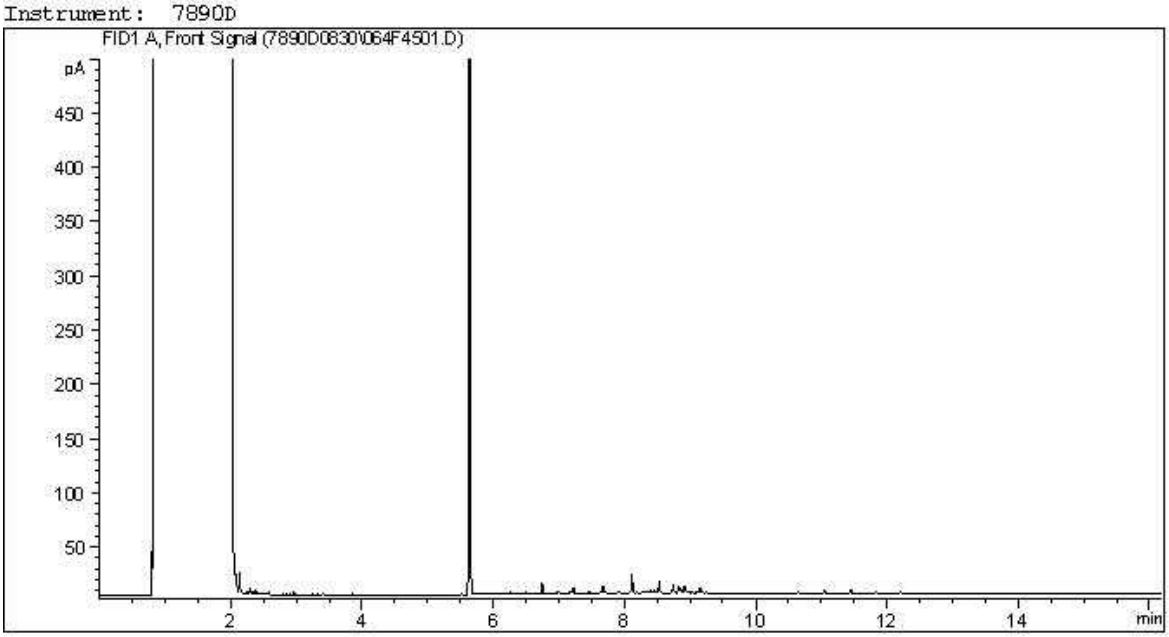
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4001

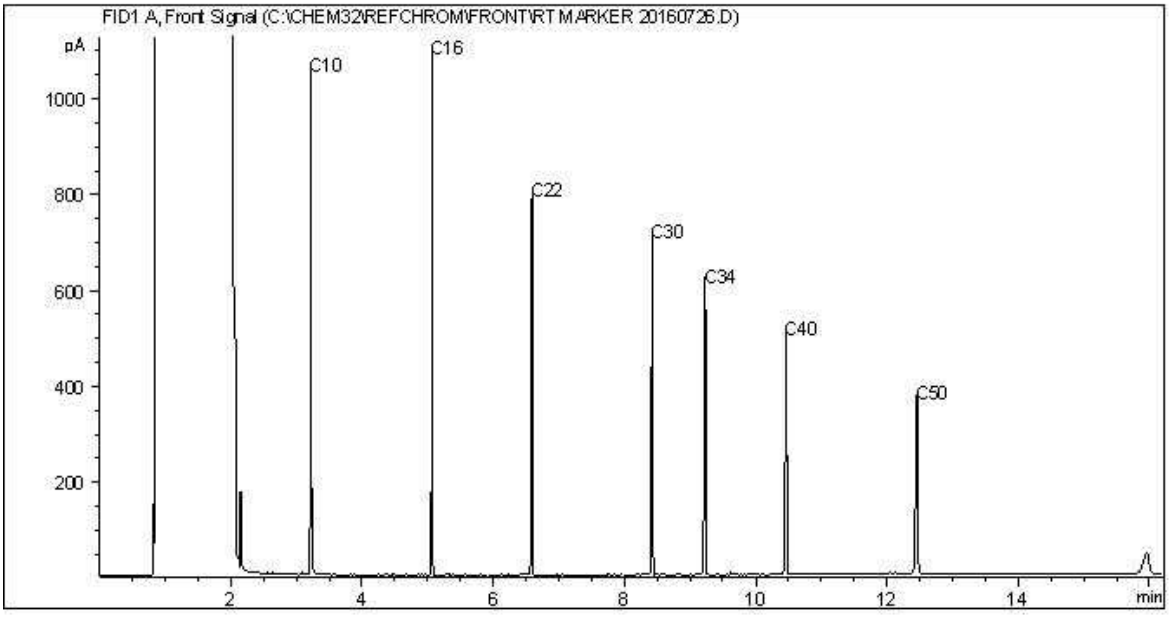
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-3A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

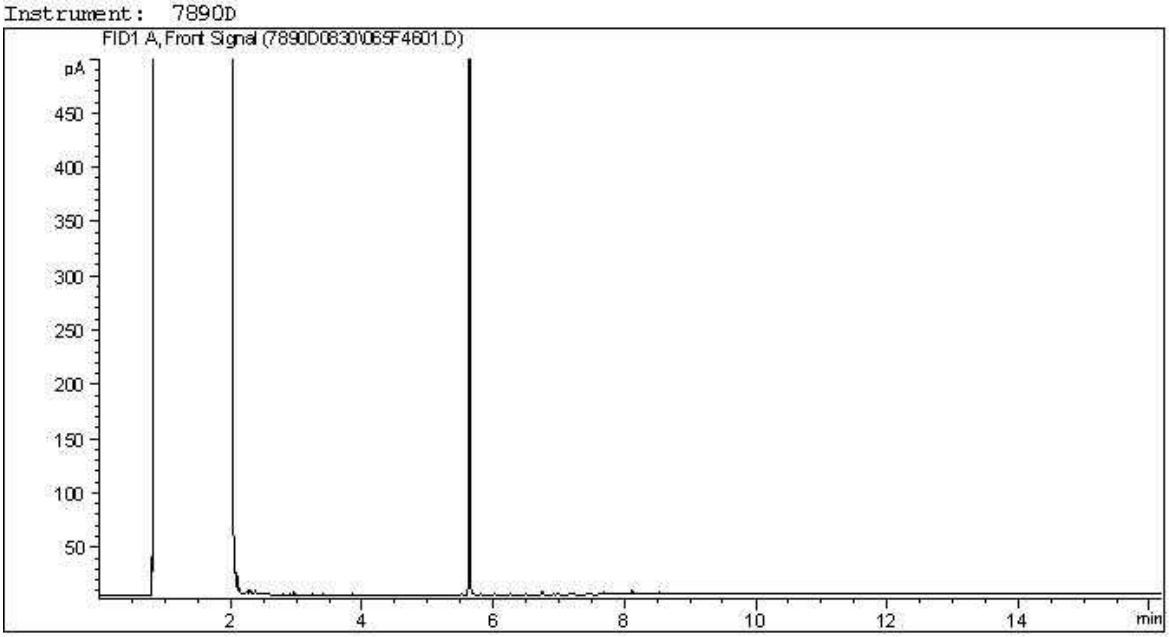
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4002

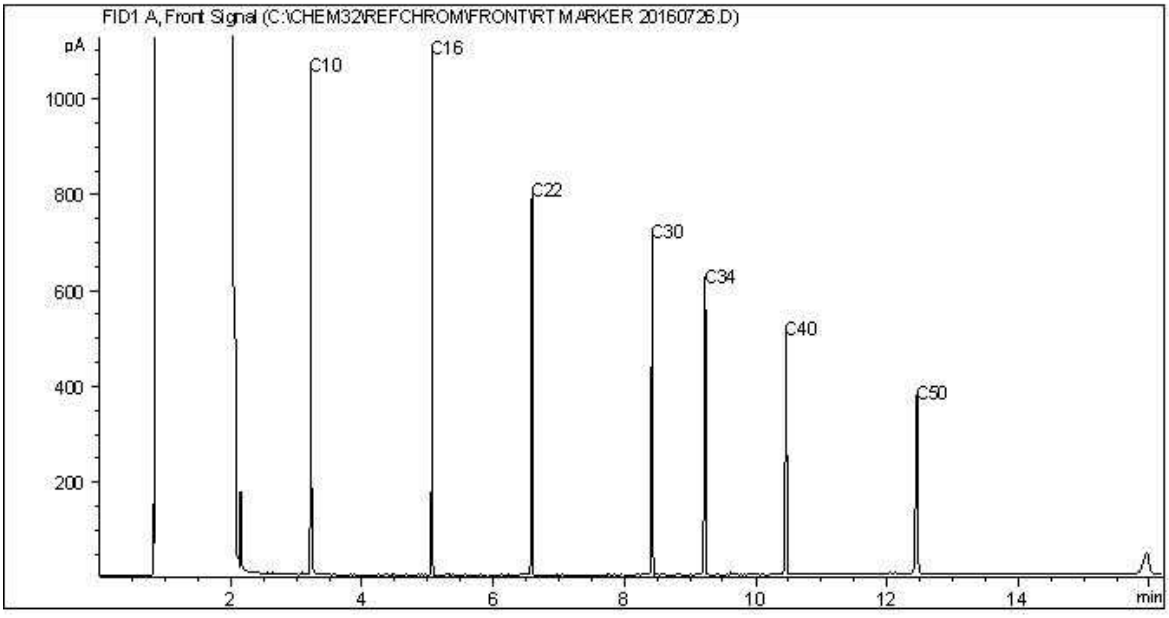
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-3B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

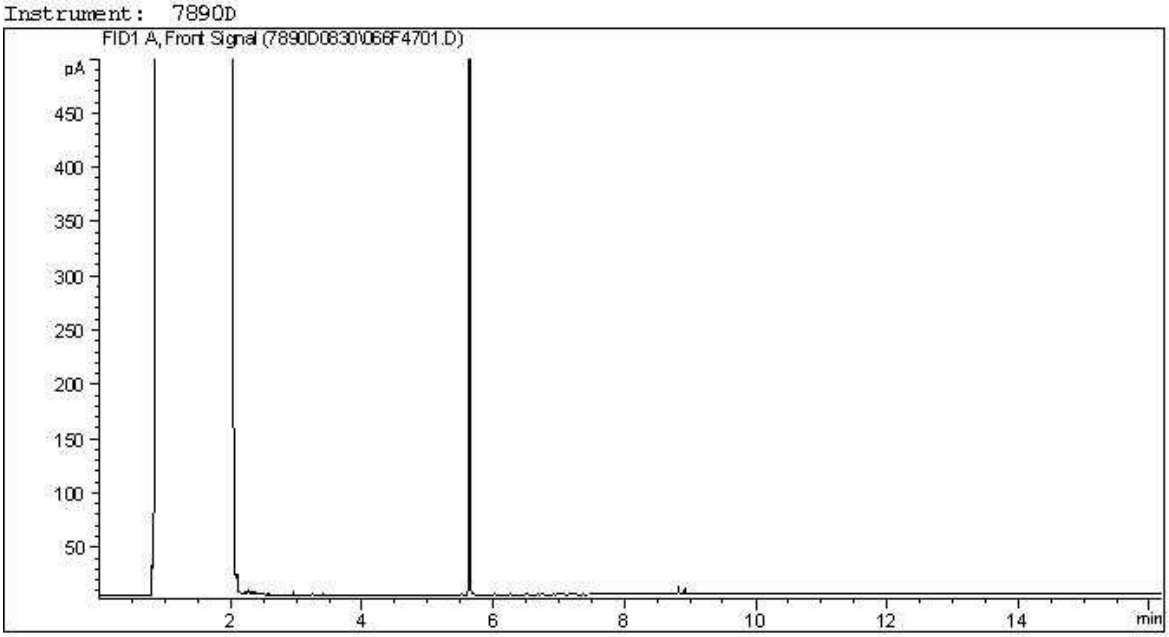
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

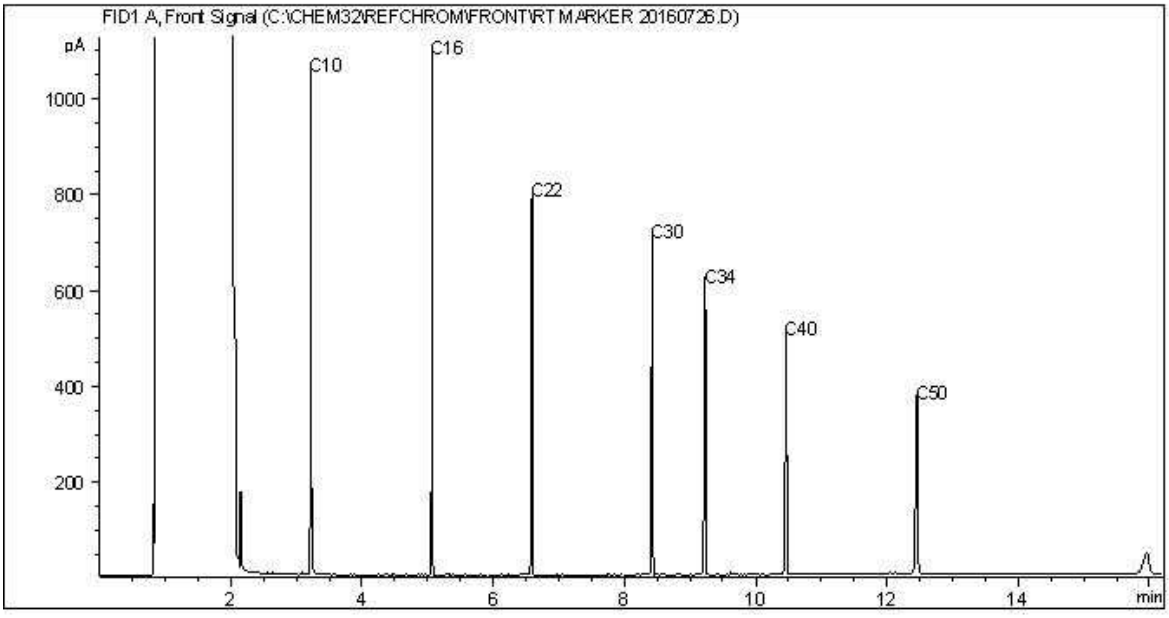
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

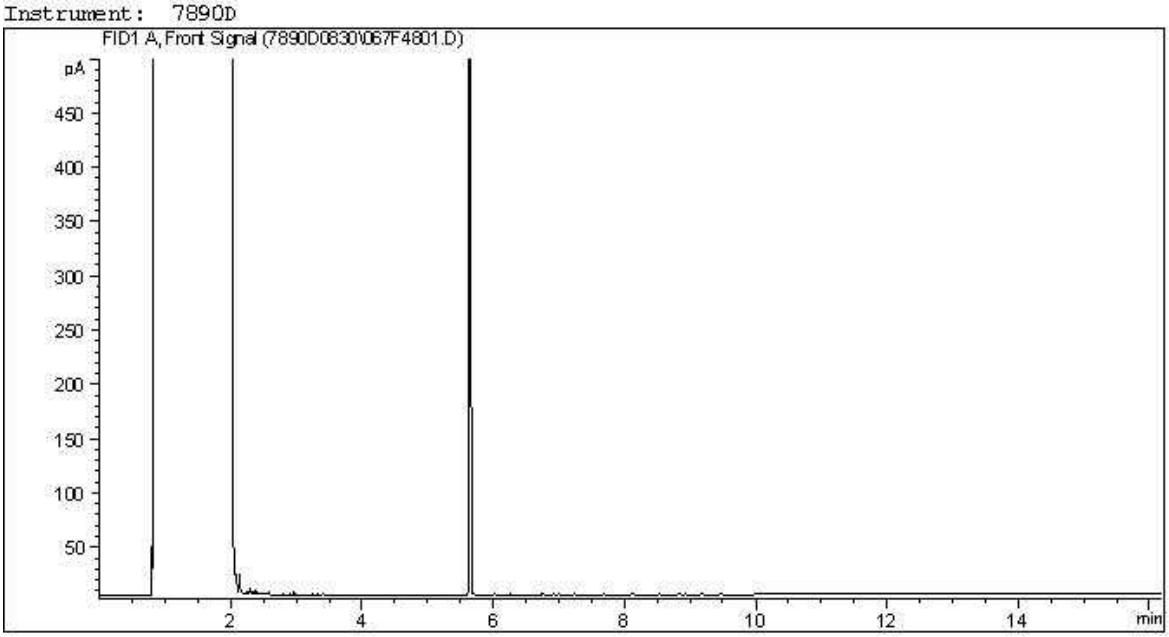
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

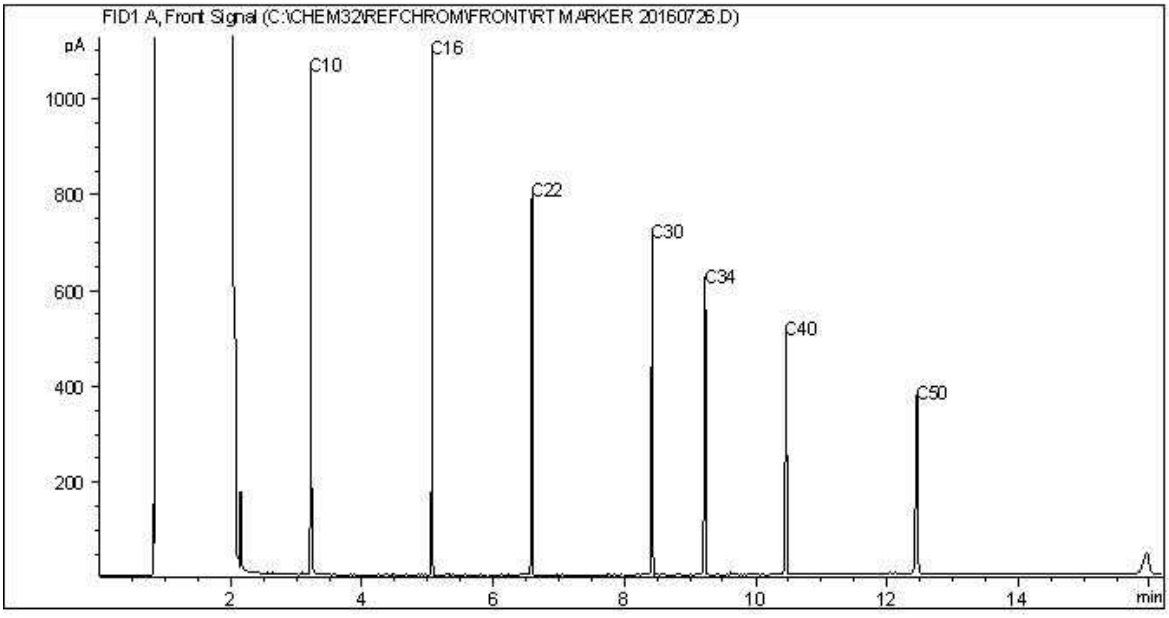
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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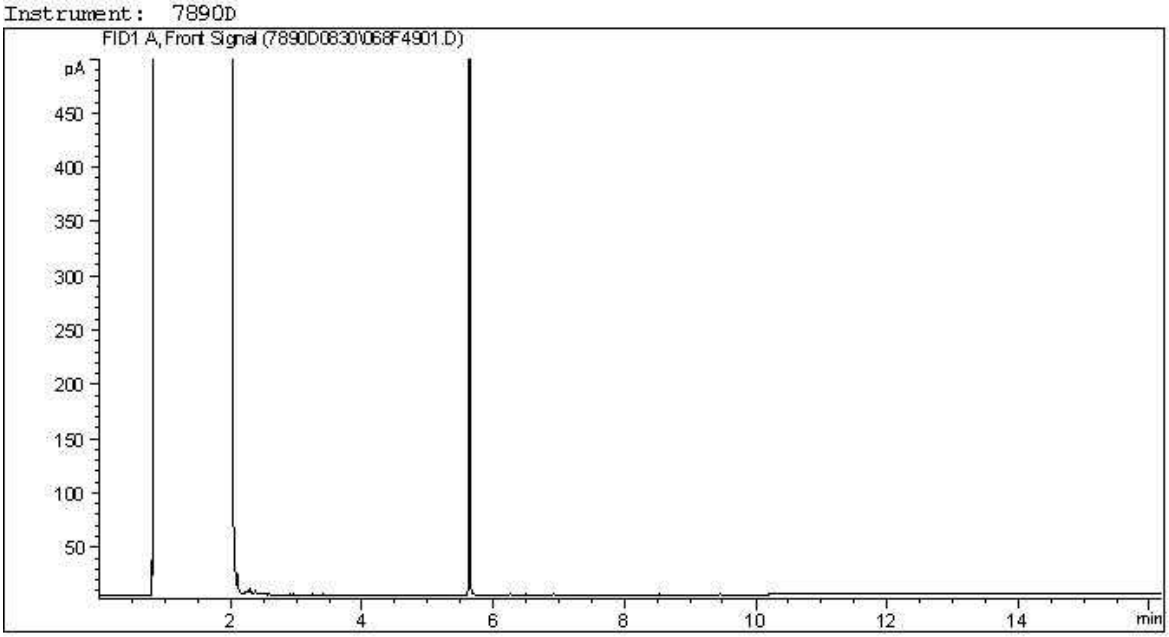
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4019

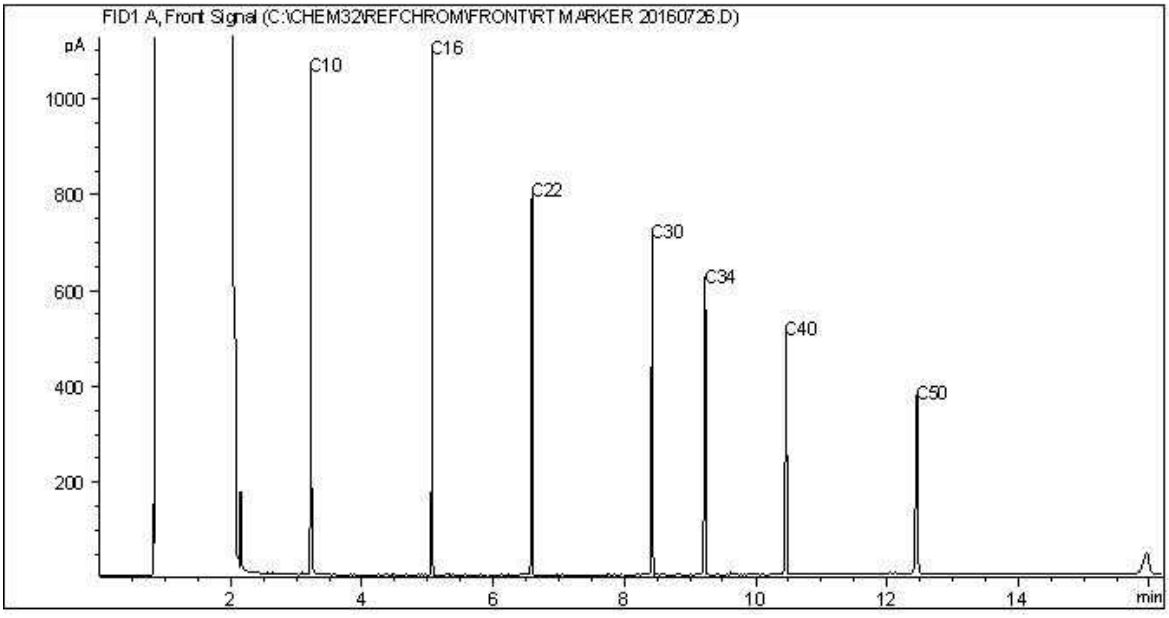
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-6AA

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

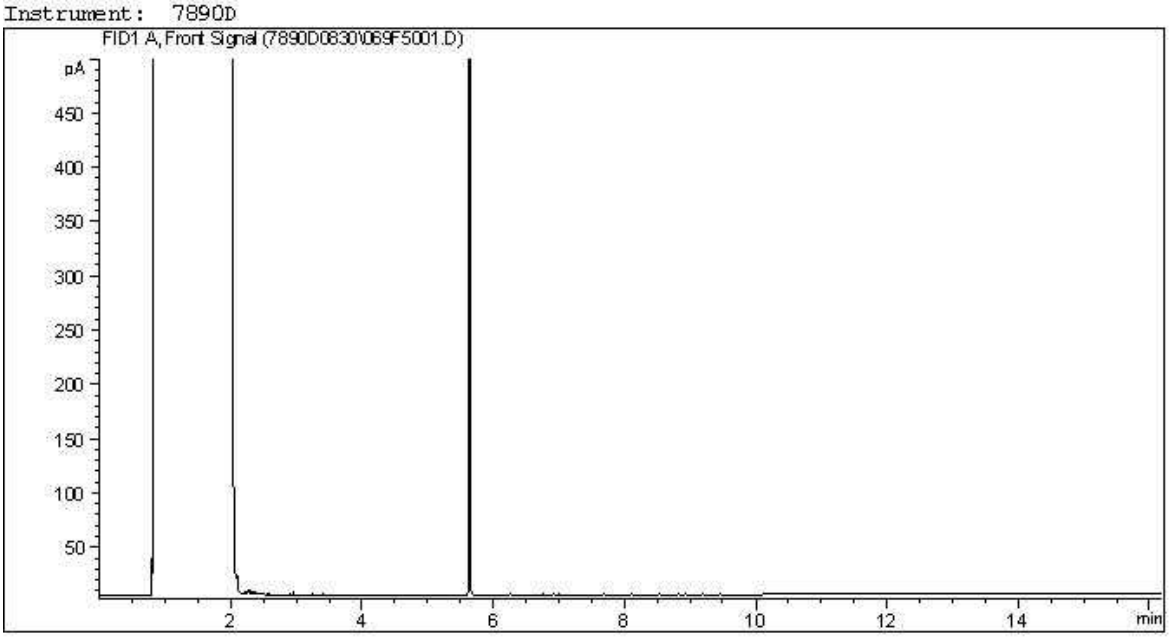
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4020

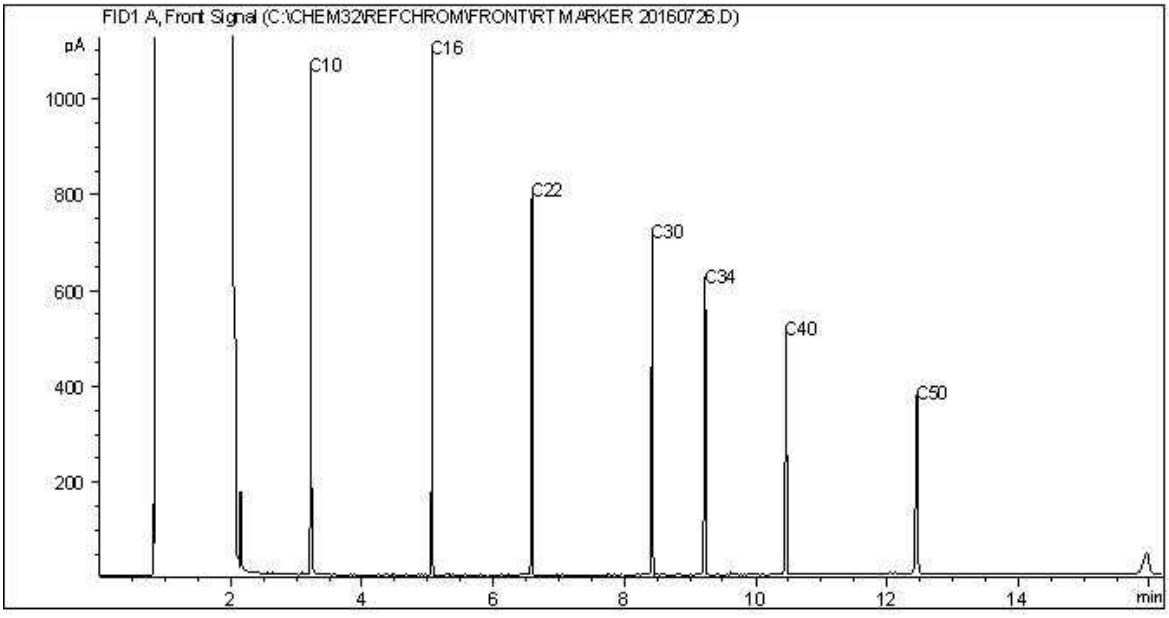
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-6AB

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

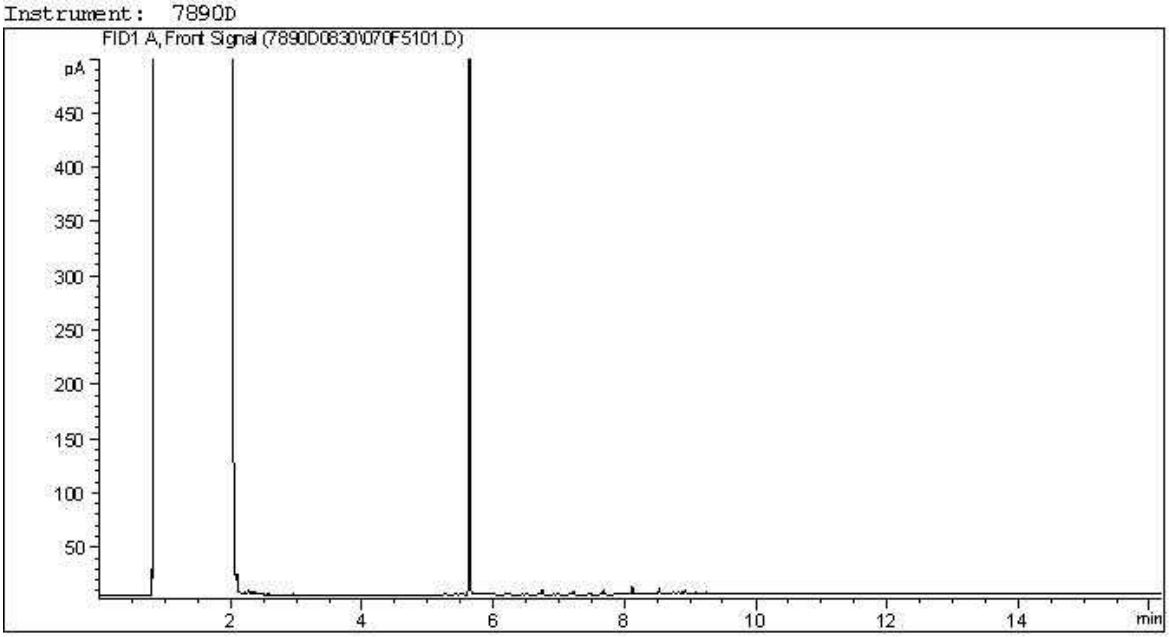
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4021

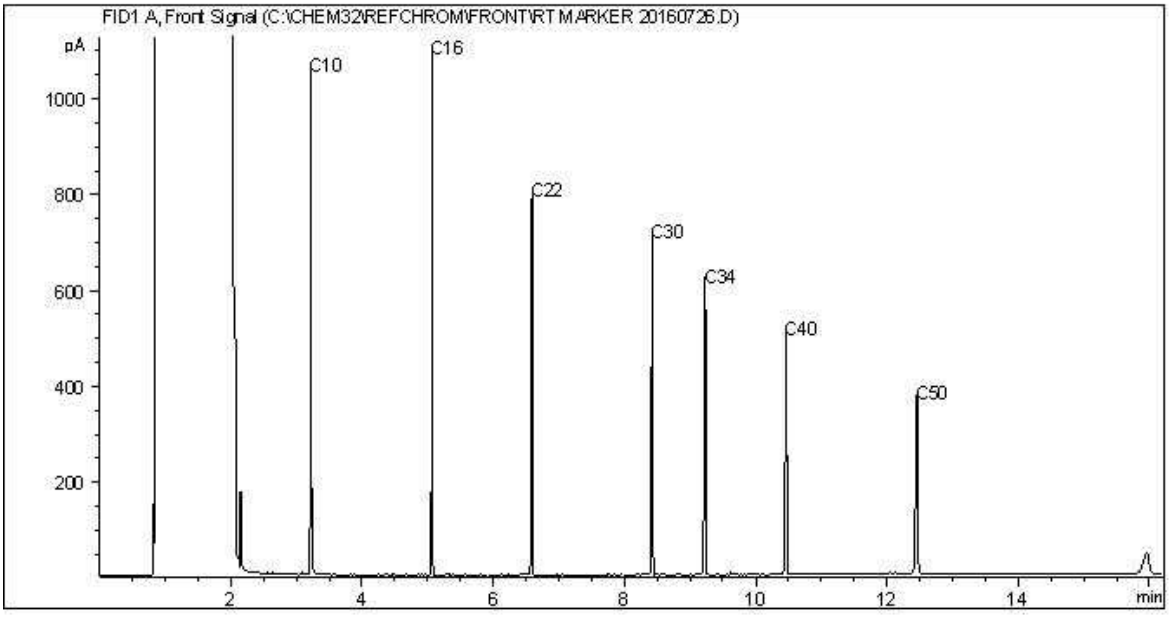
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-7AA

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

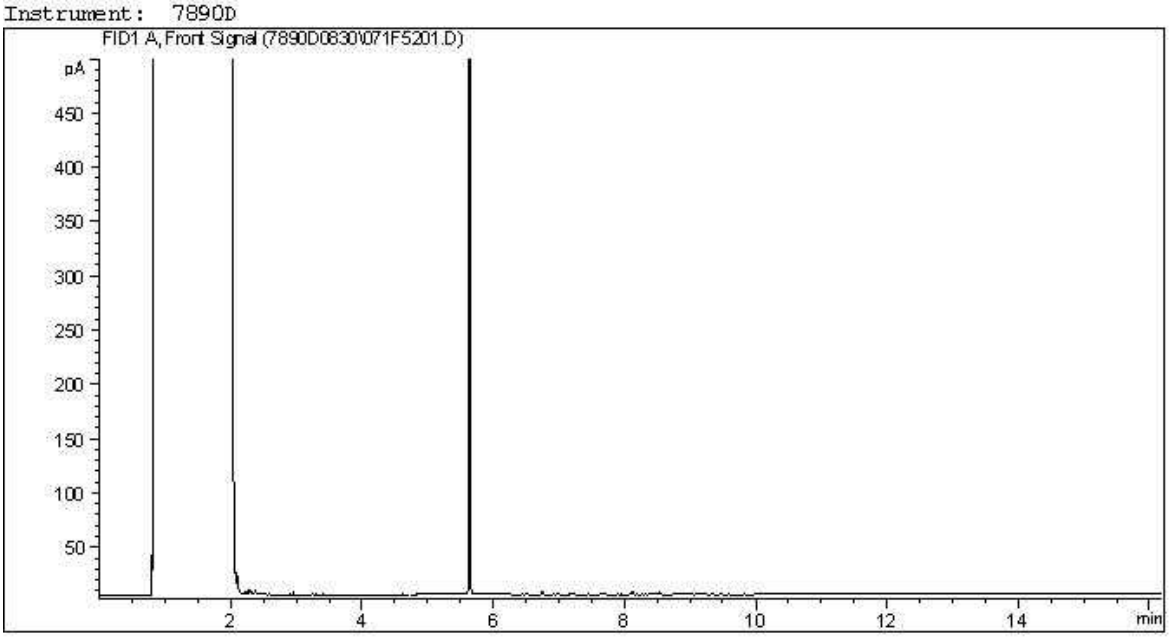
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4022

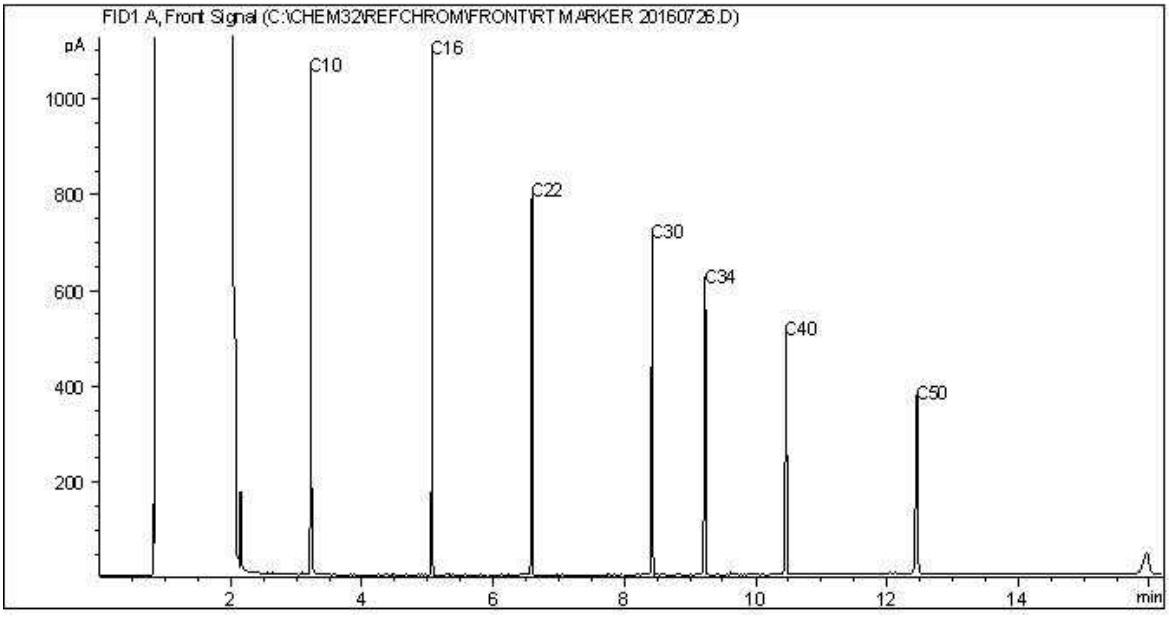
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-7AB

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

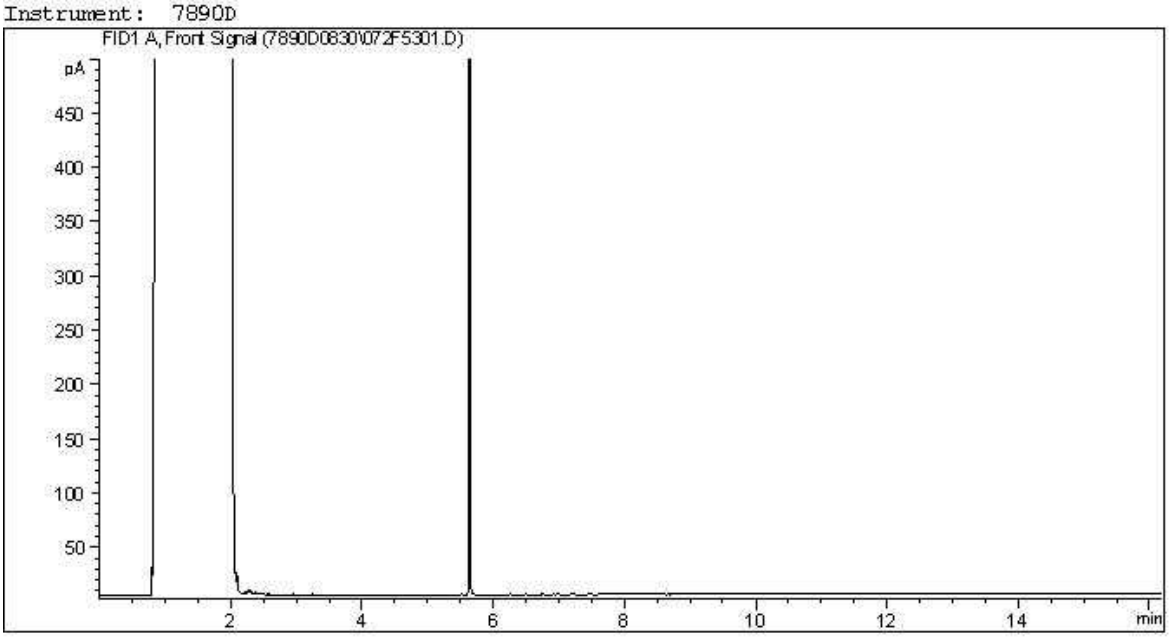
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4023

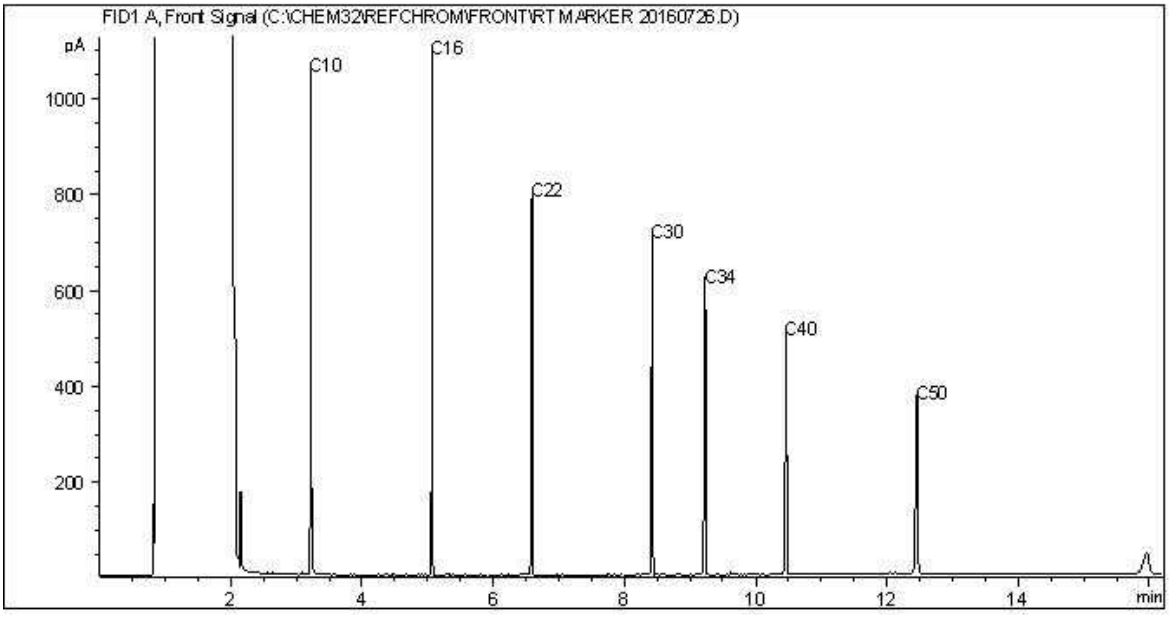
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-5A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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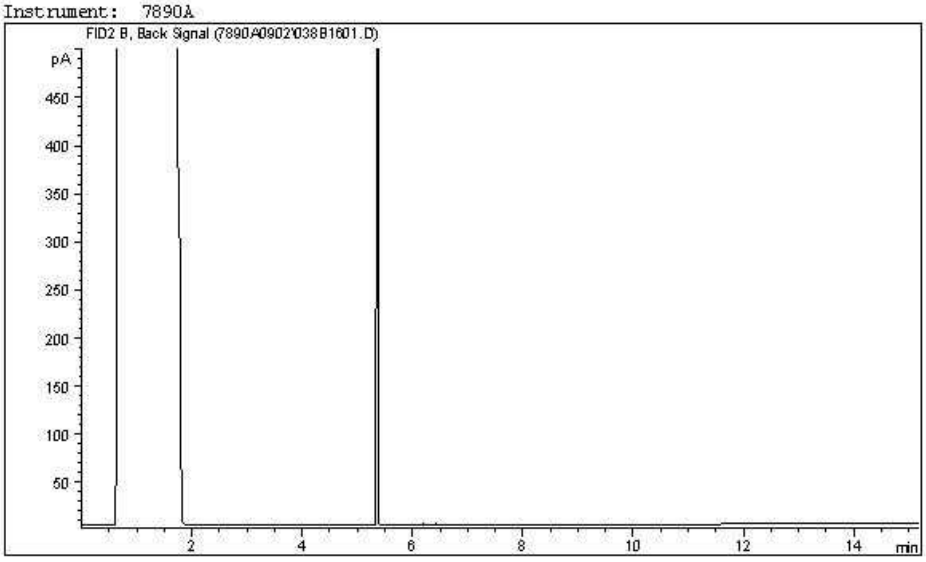
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4024

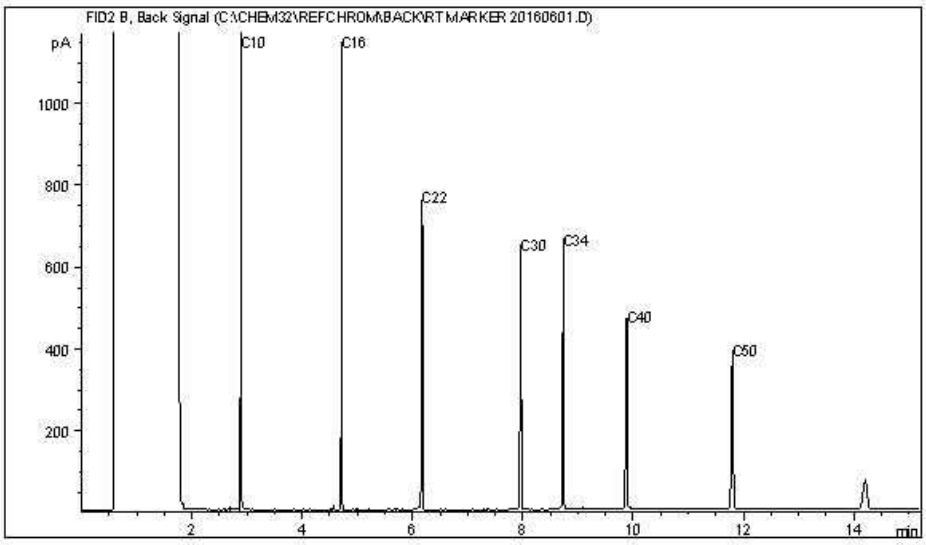
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-5B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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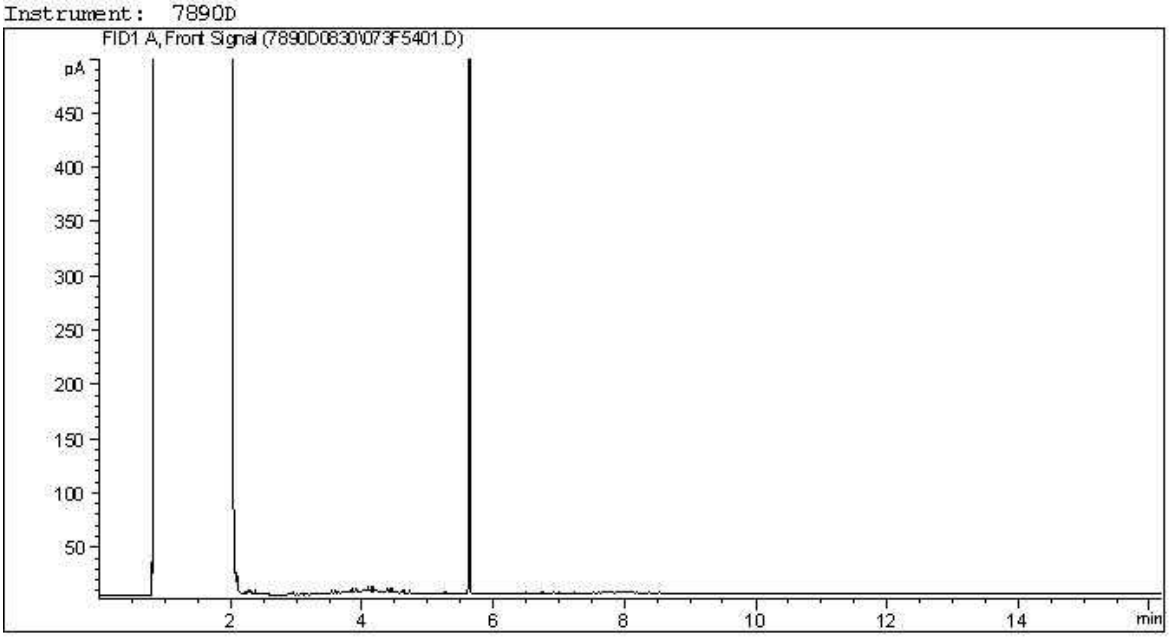
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4025

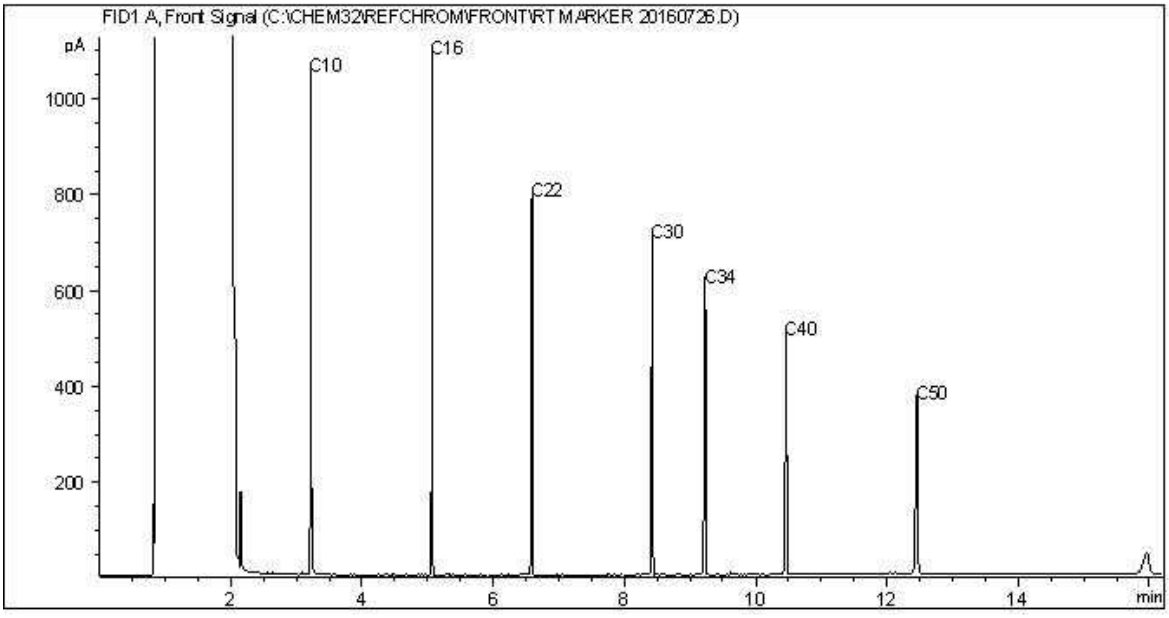
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-8A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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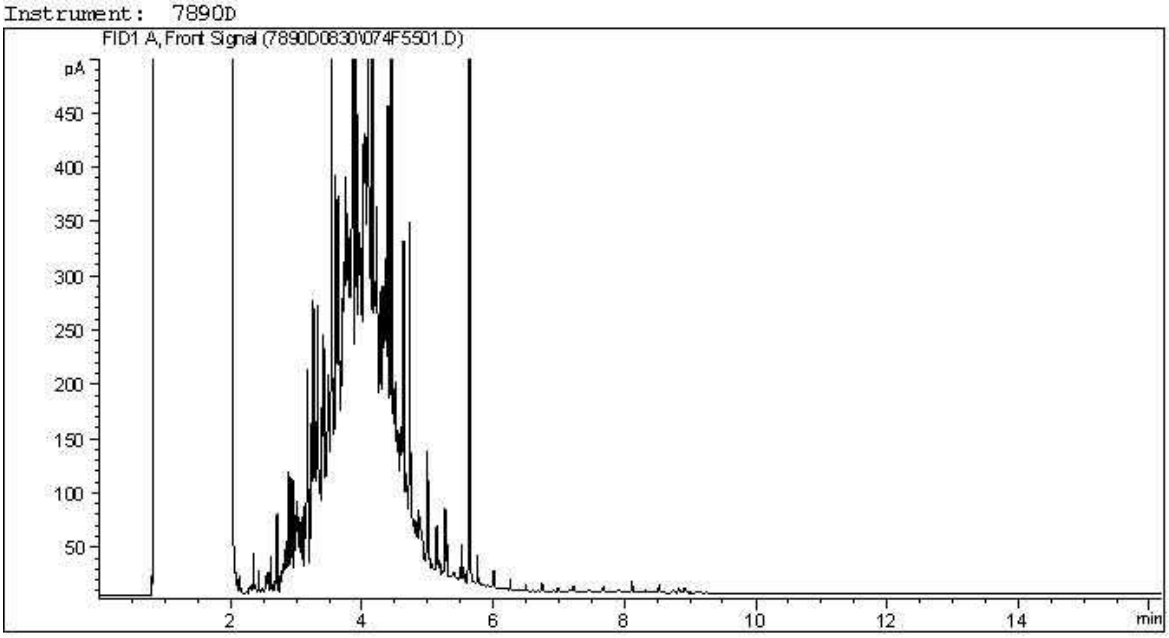
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4026

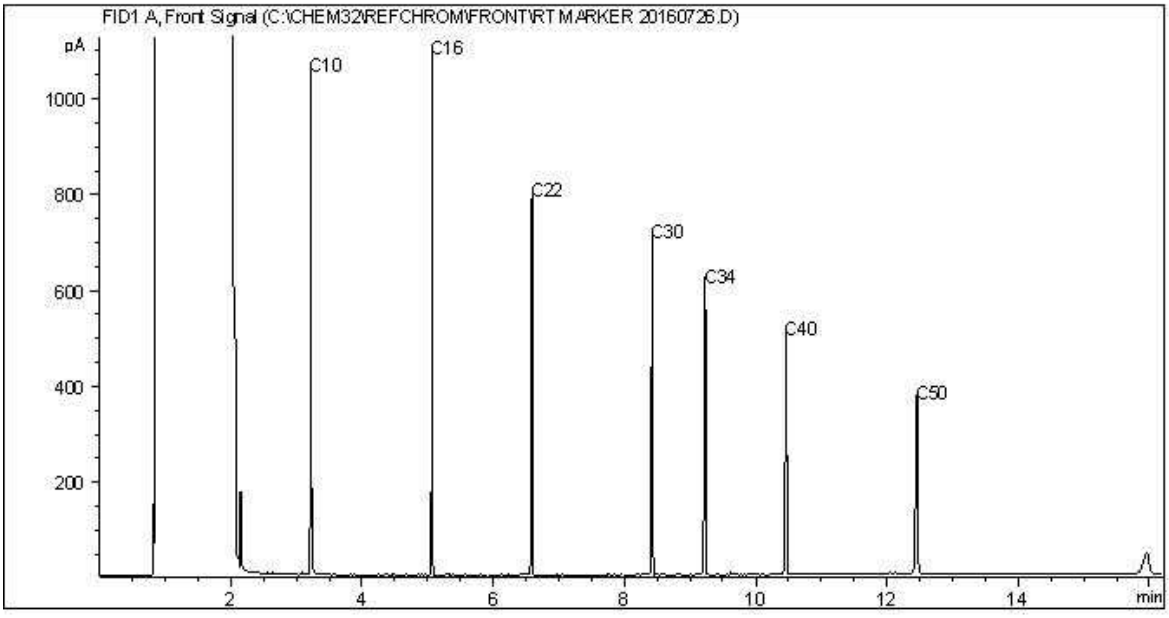
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-8B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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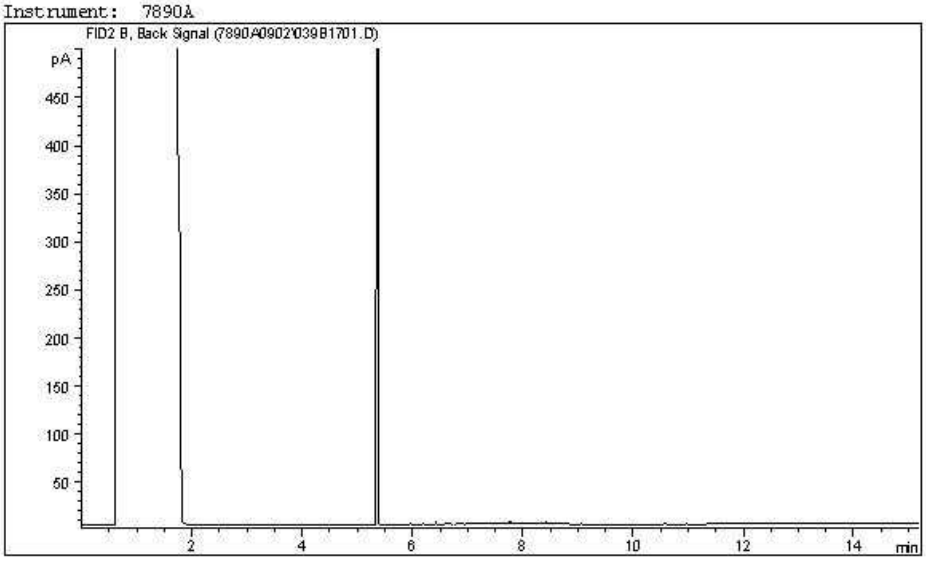
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4027

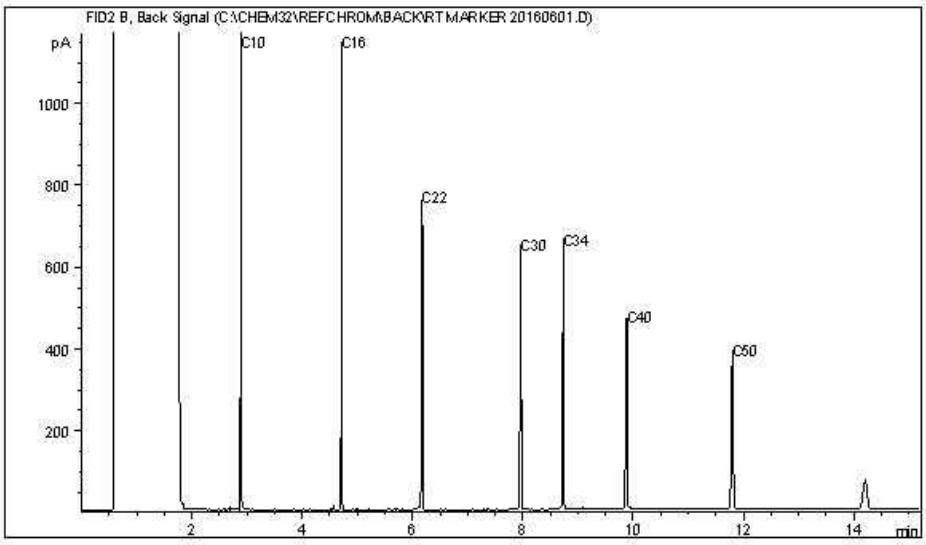
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-9A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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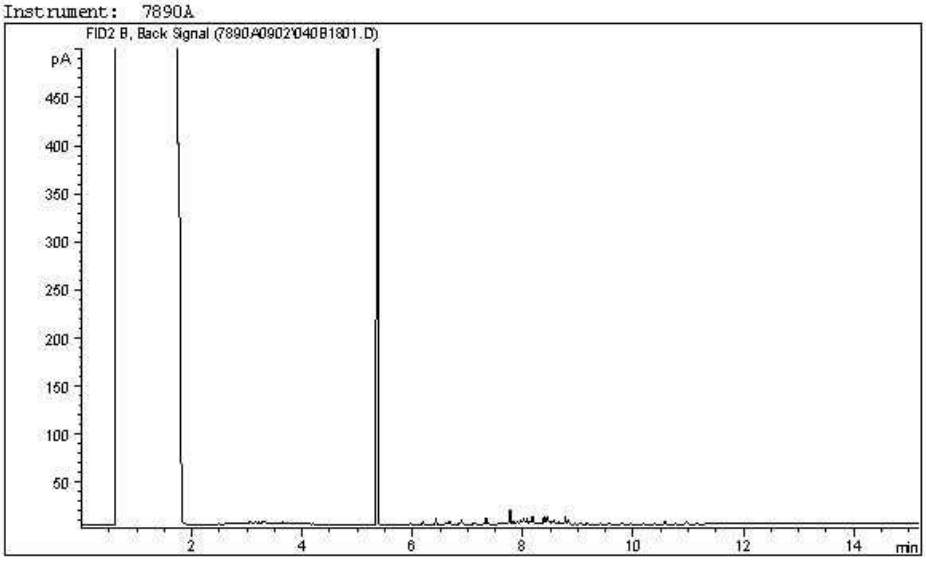
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4028

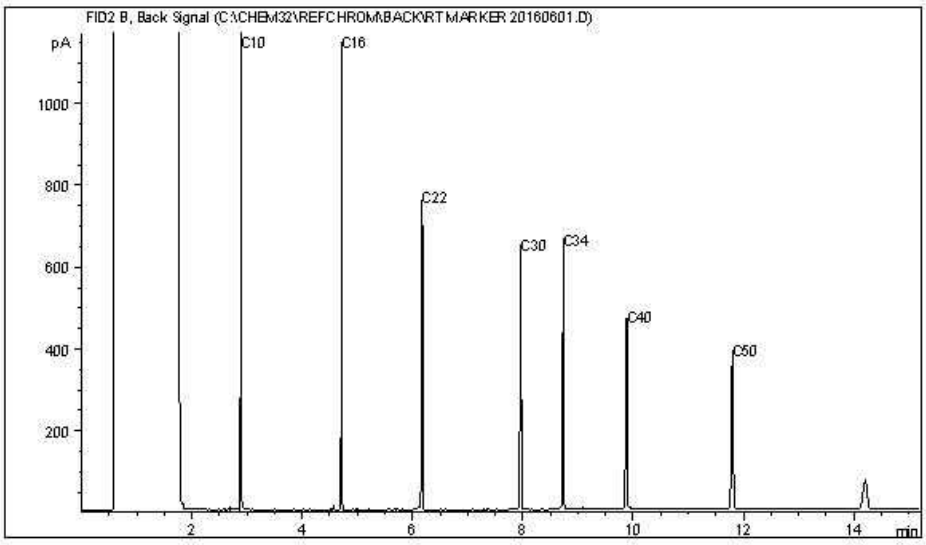
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-9B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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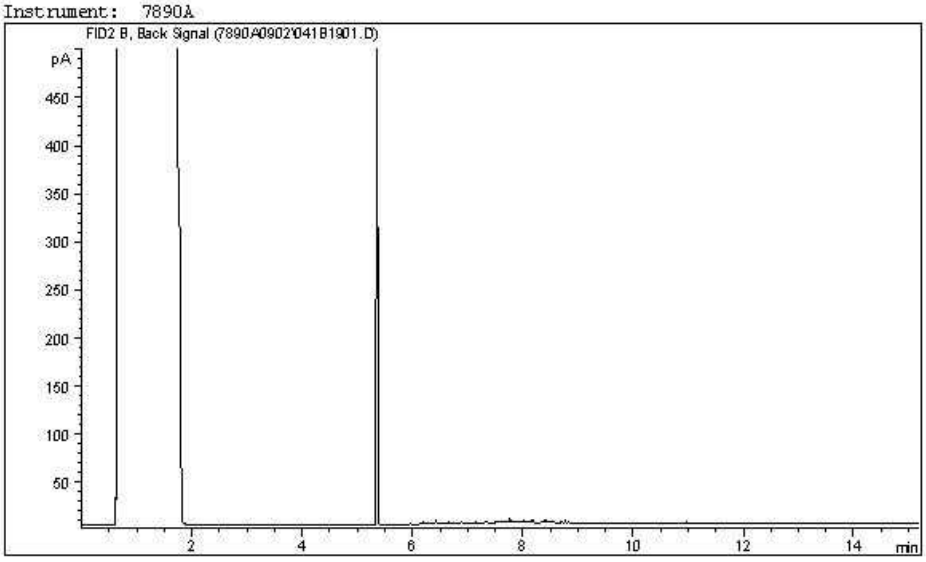
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4029

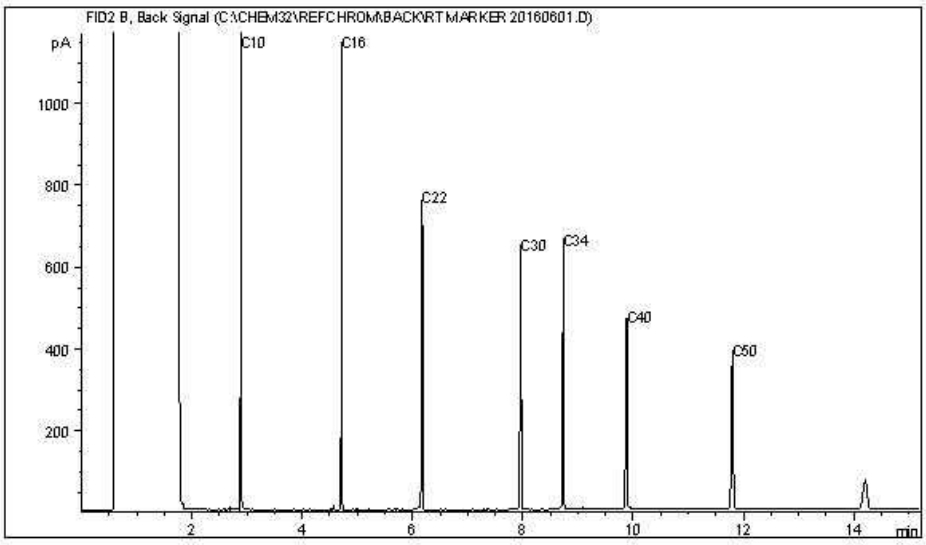
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-14AA

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



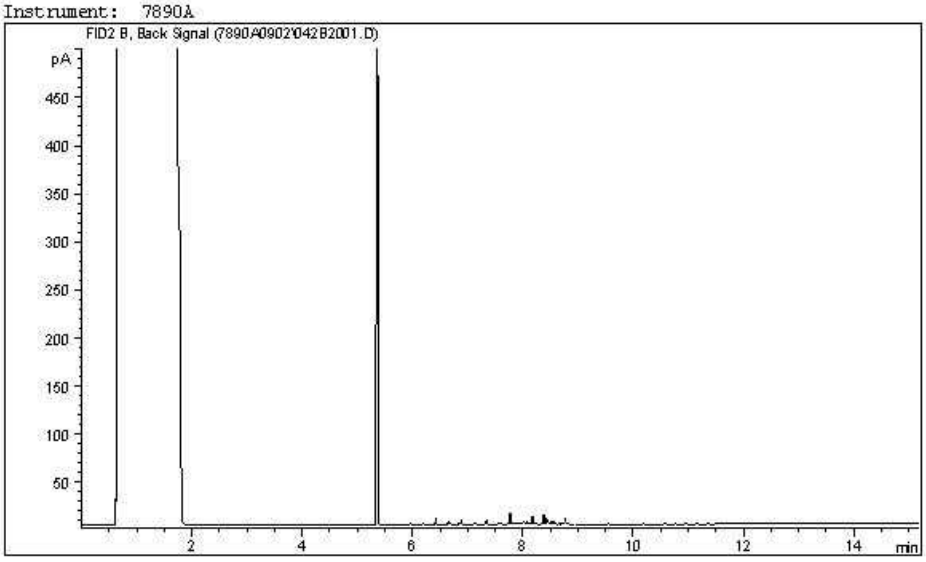
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

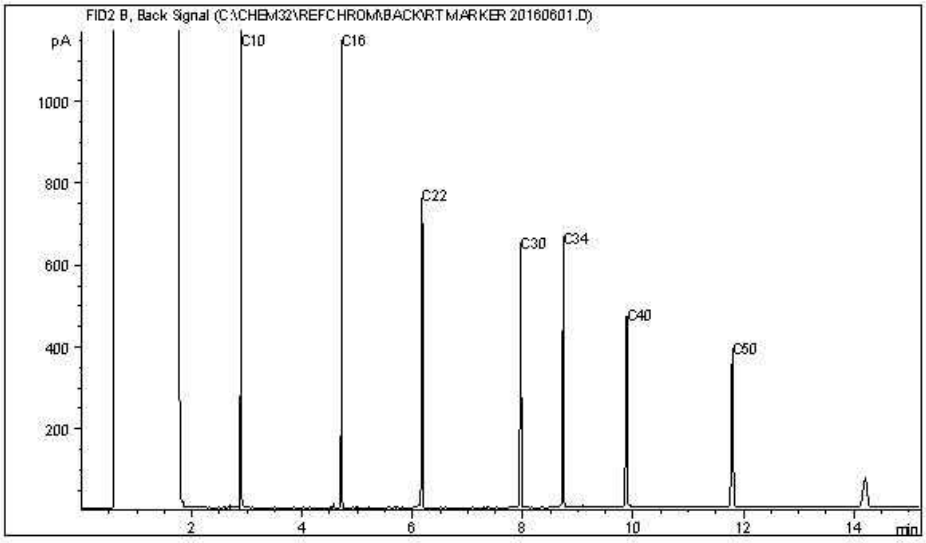
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

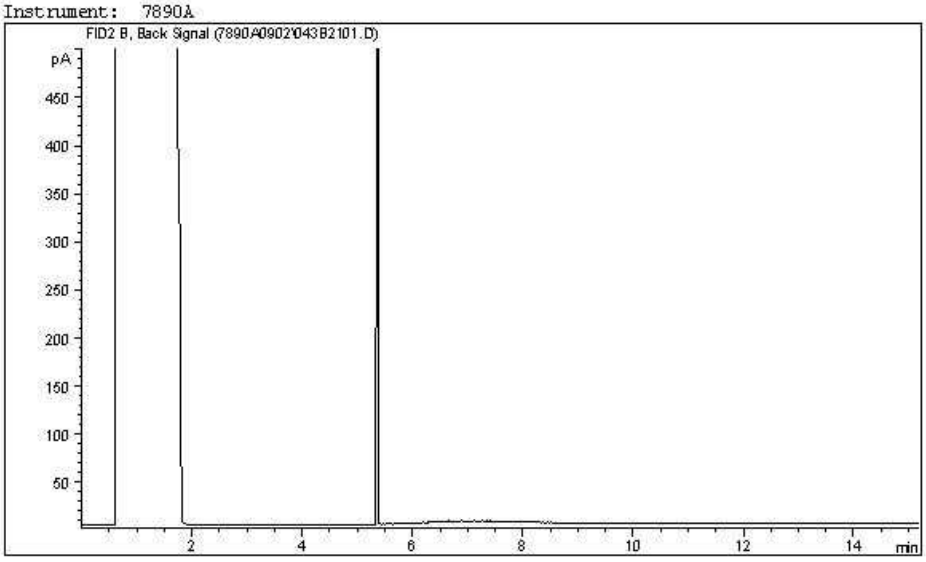
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4031

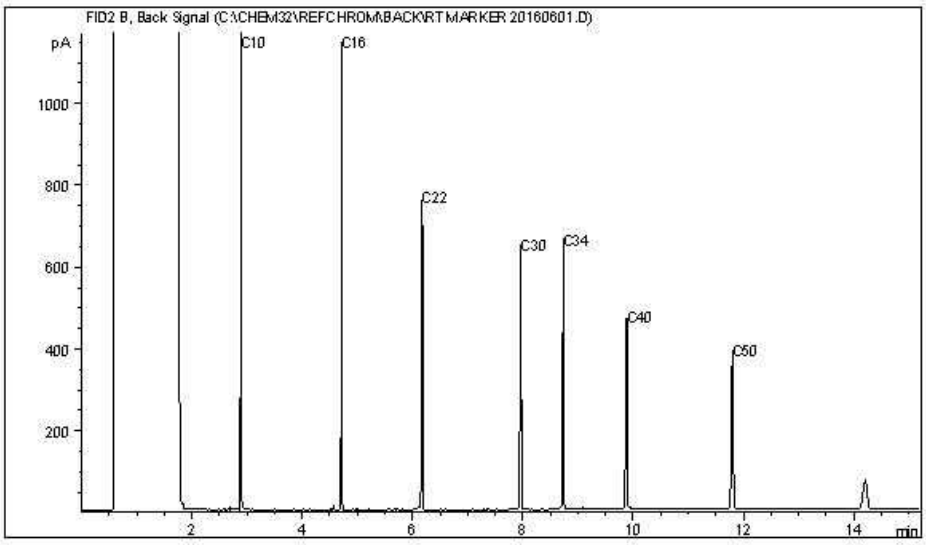
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-15A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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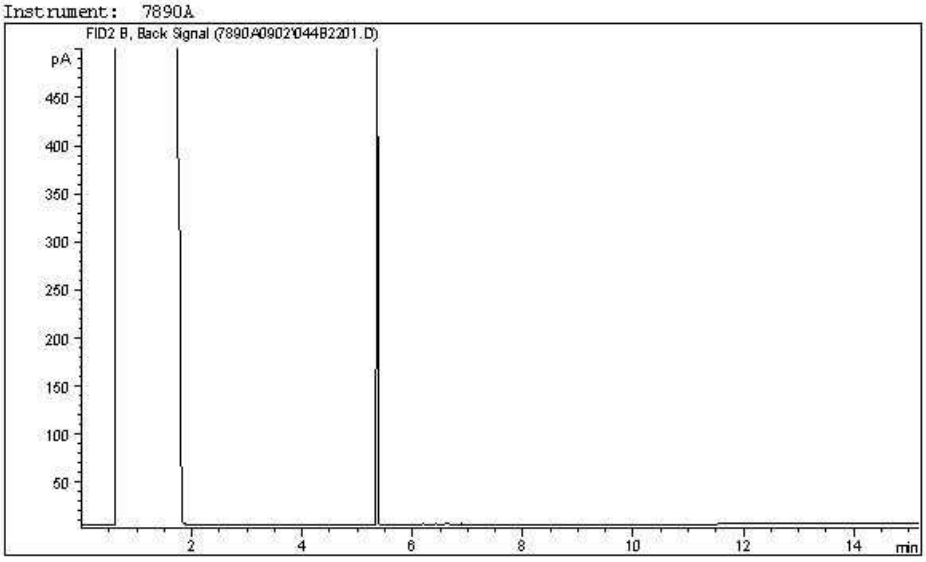
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4032

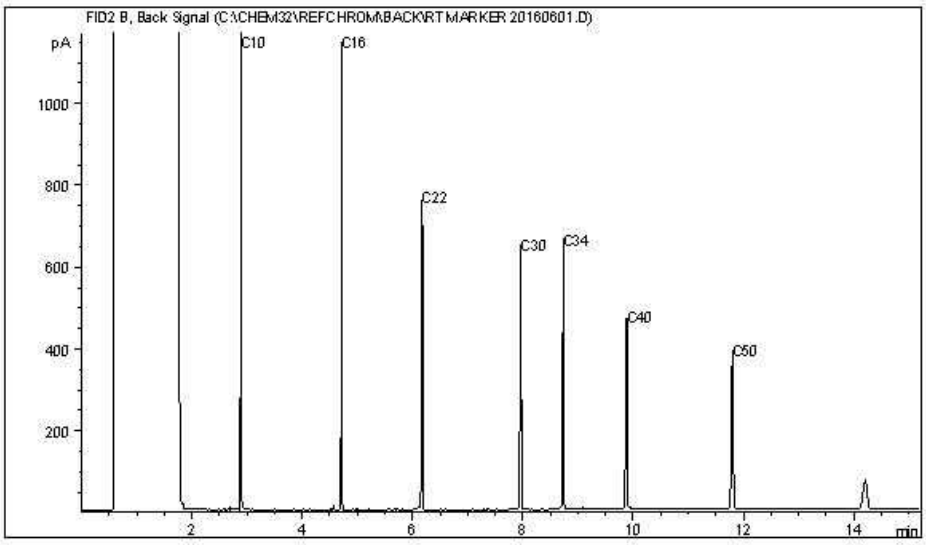
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-15B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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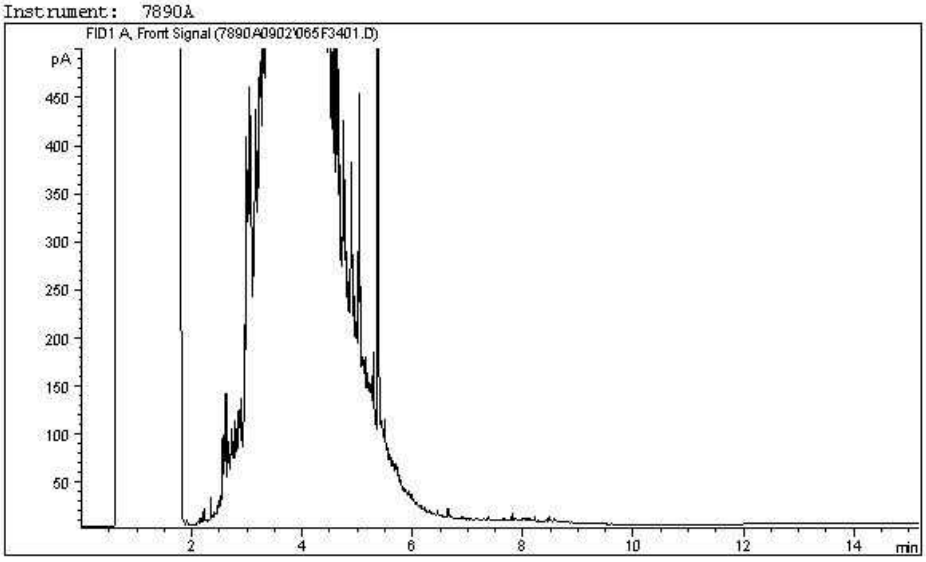
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4033

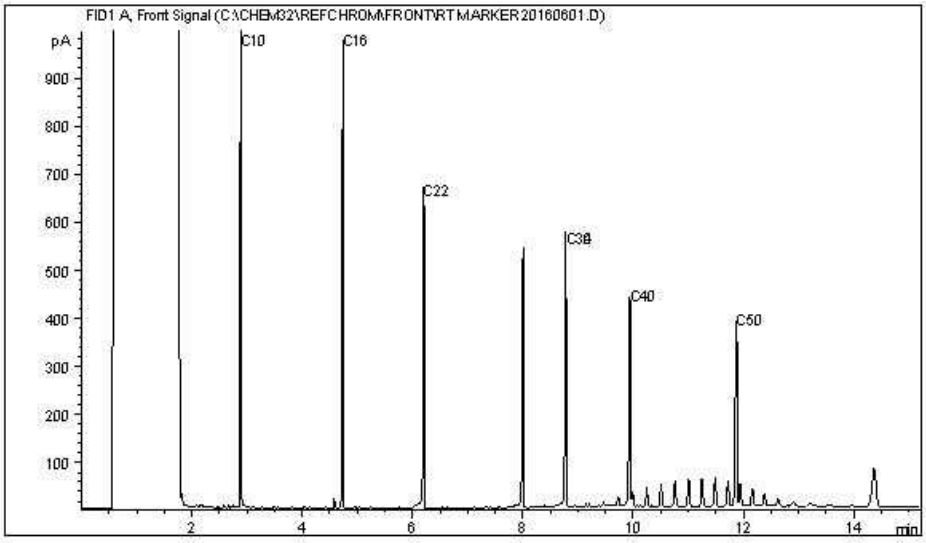
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-16A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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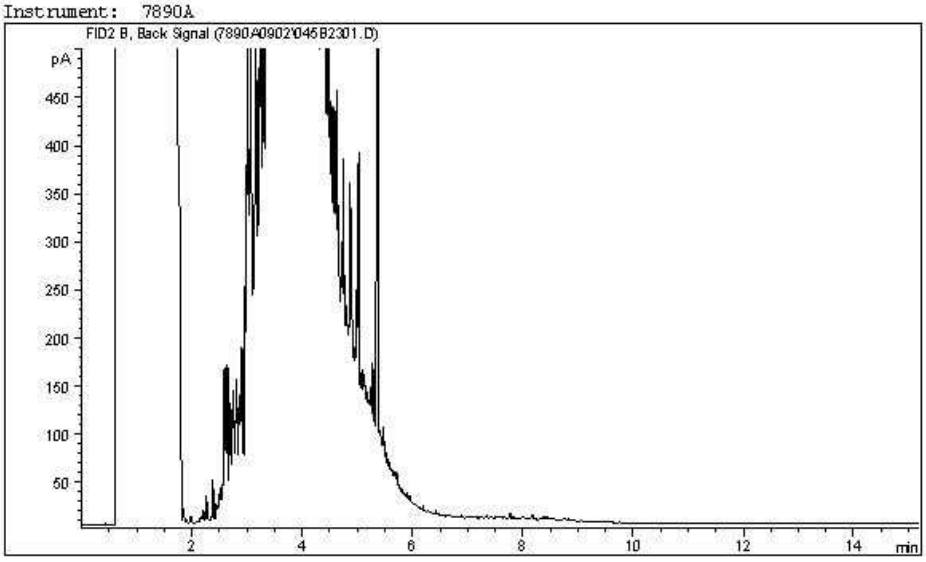
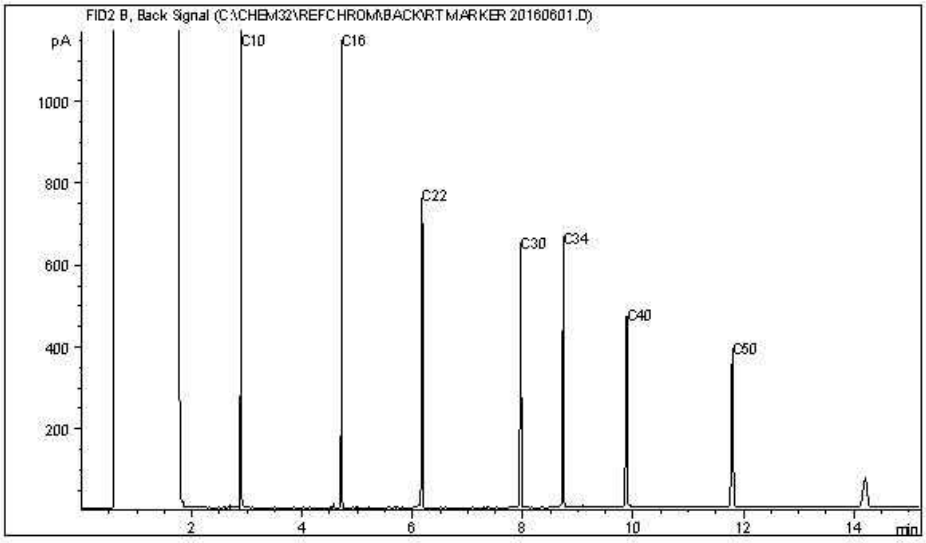
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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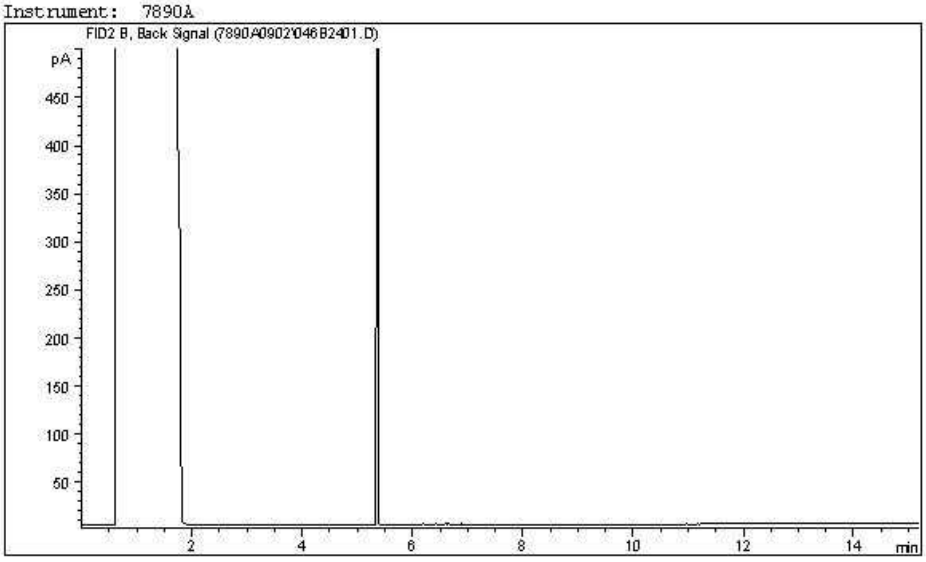
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4035

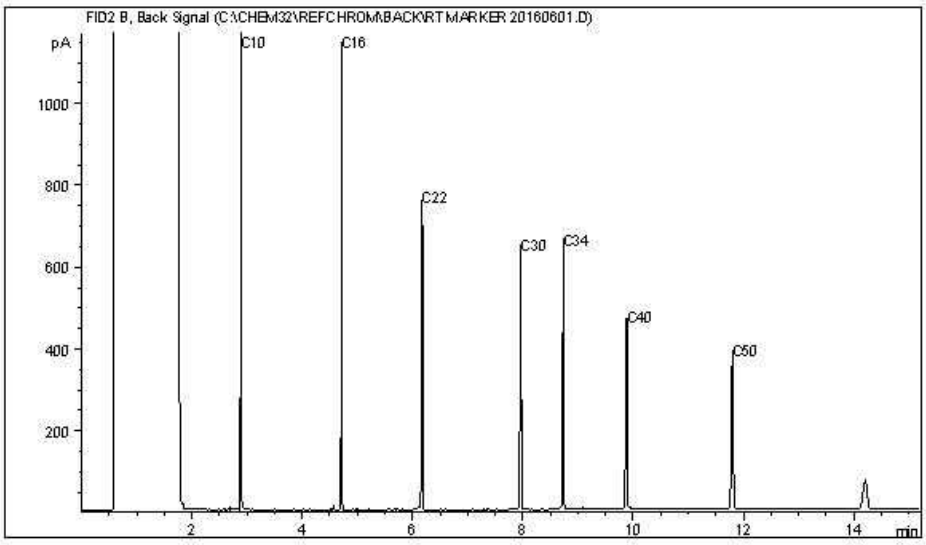
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-10A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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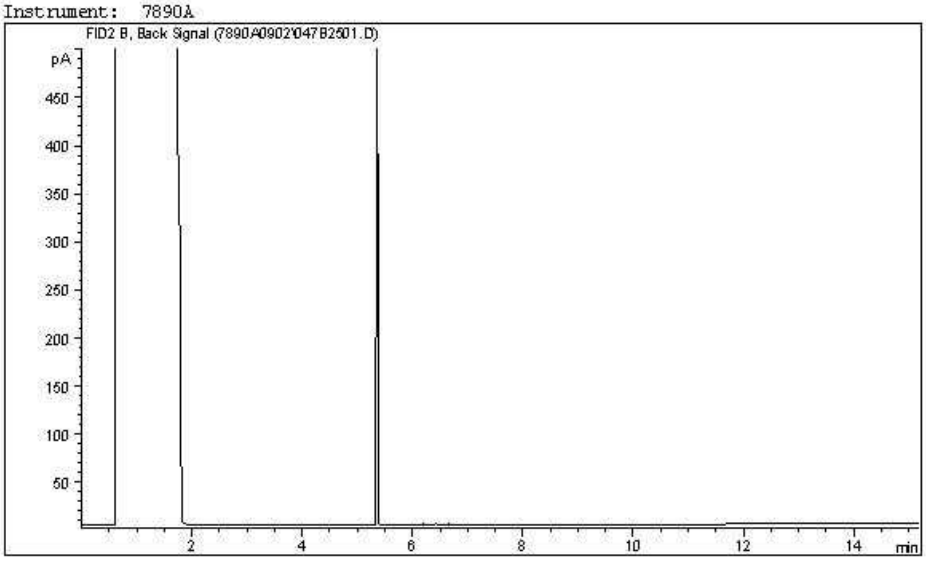
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4036

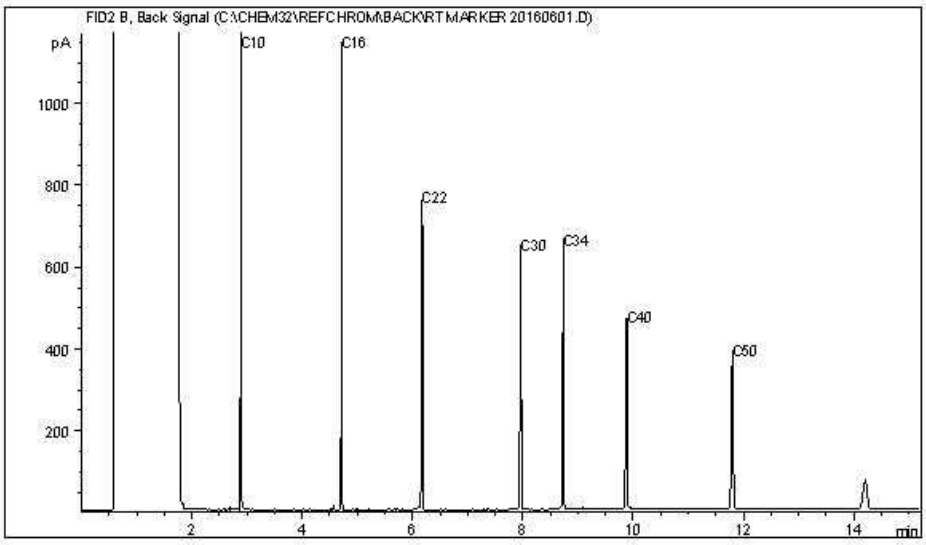
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-10B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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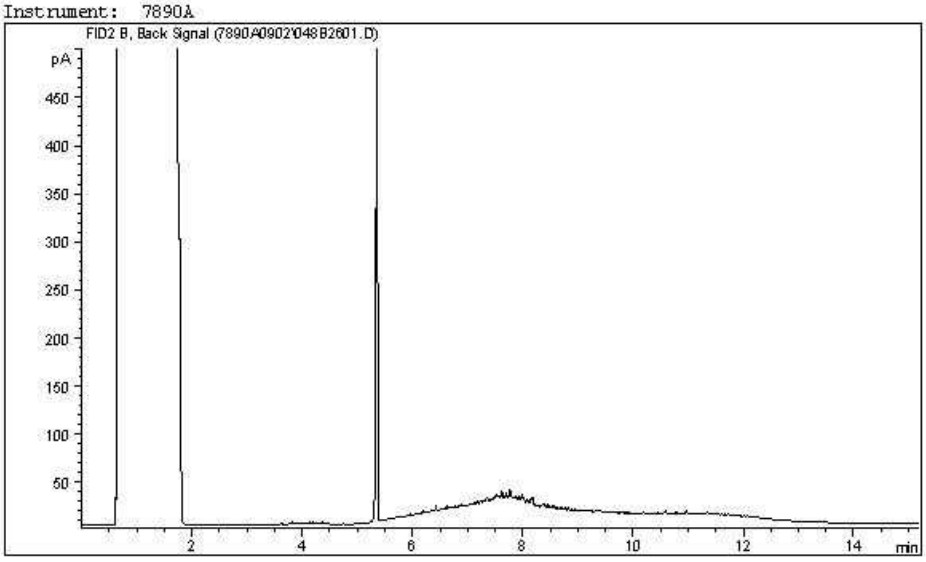
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4037

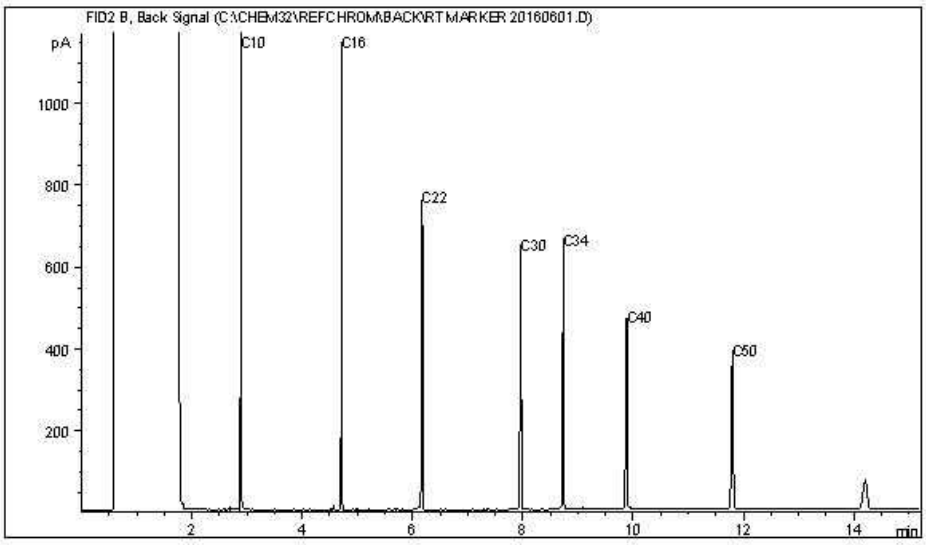
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-11A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

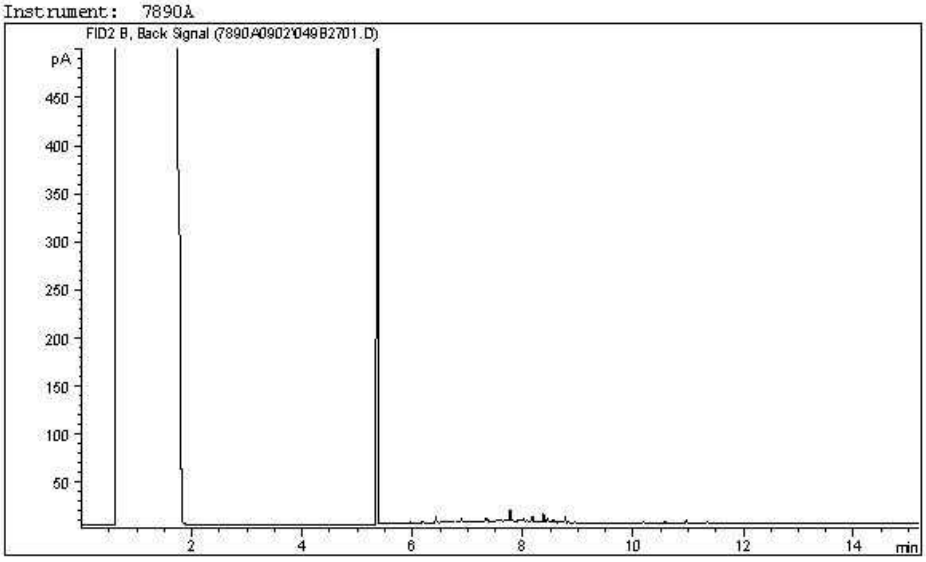
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4038

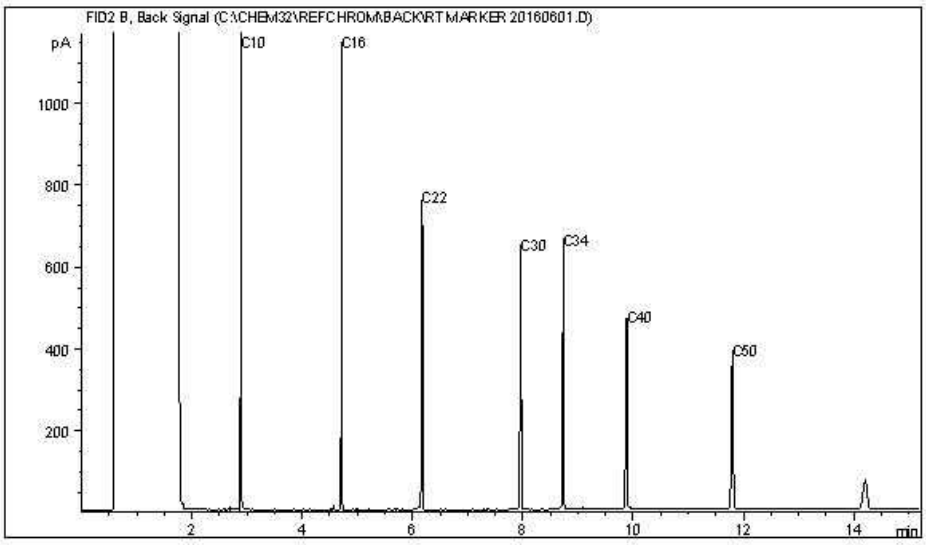
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-11B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

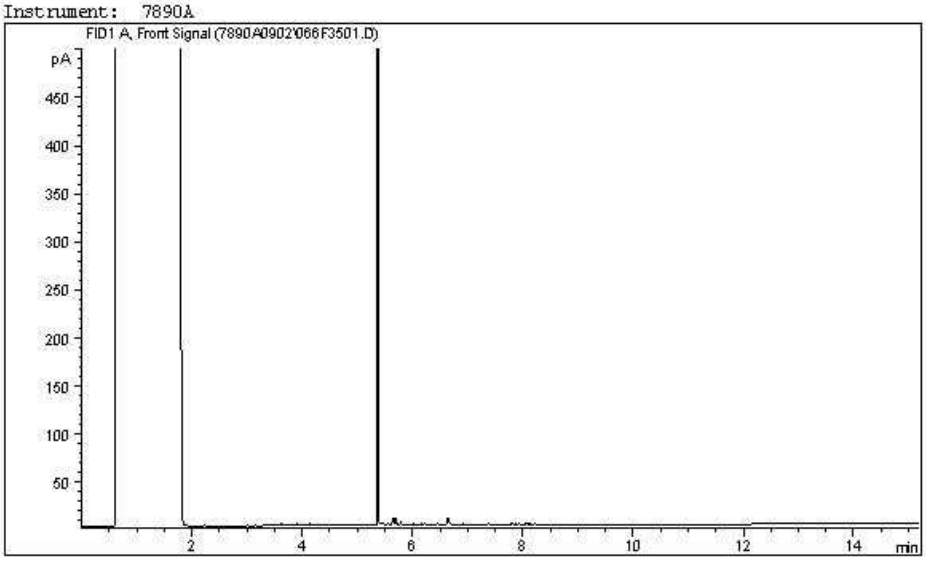
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4039

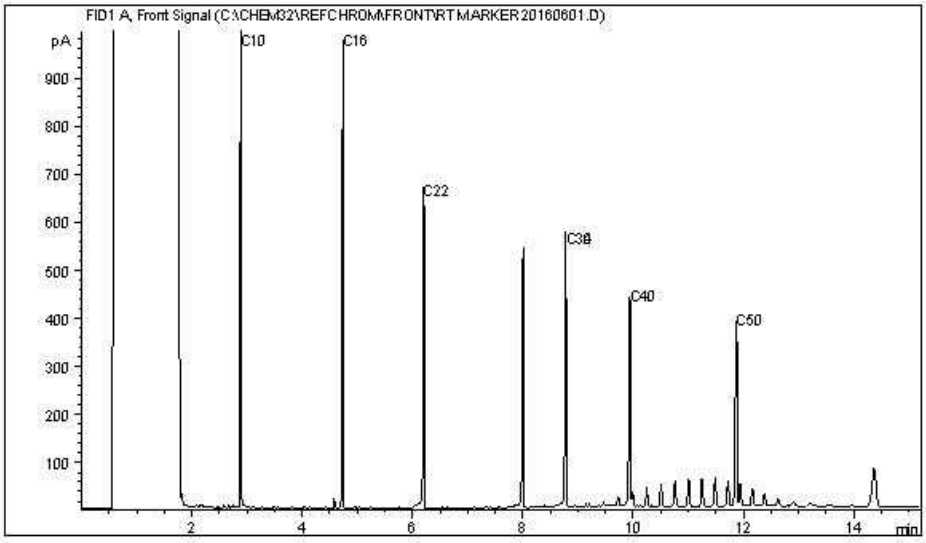
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-12A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

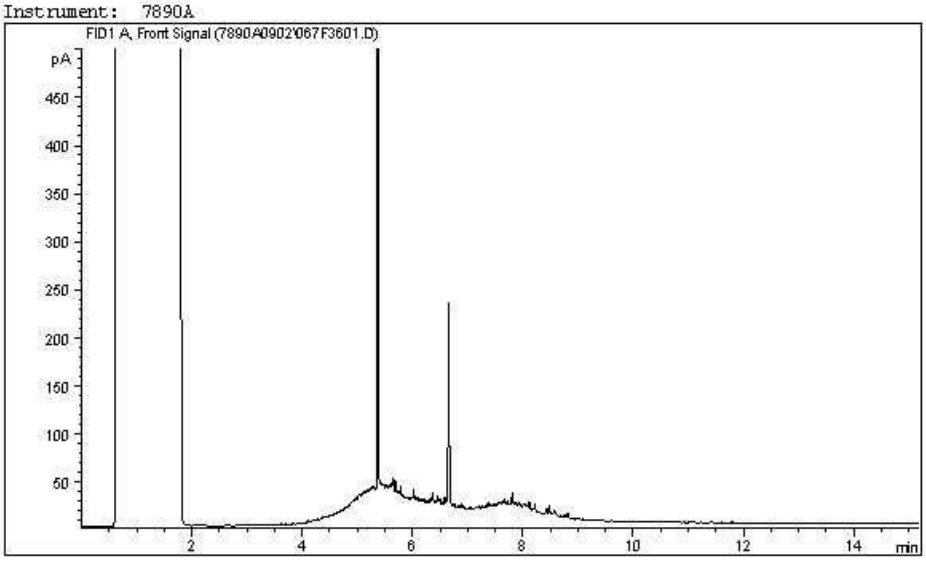
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4040

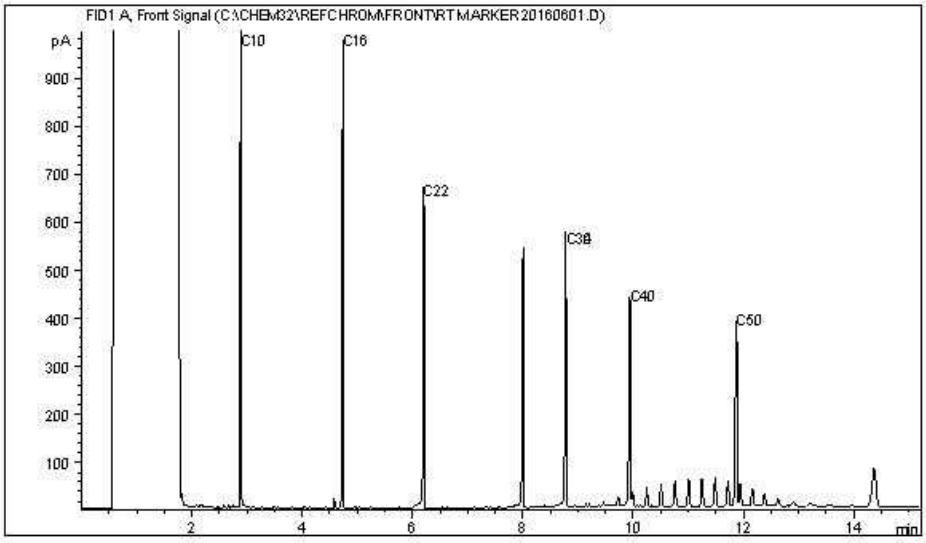
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-12B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

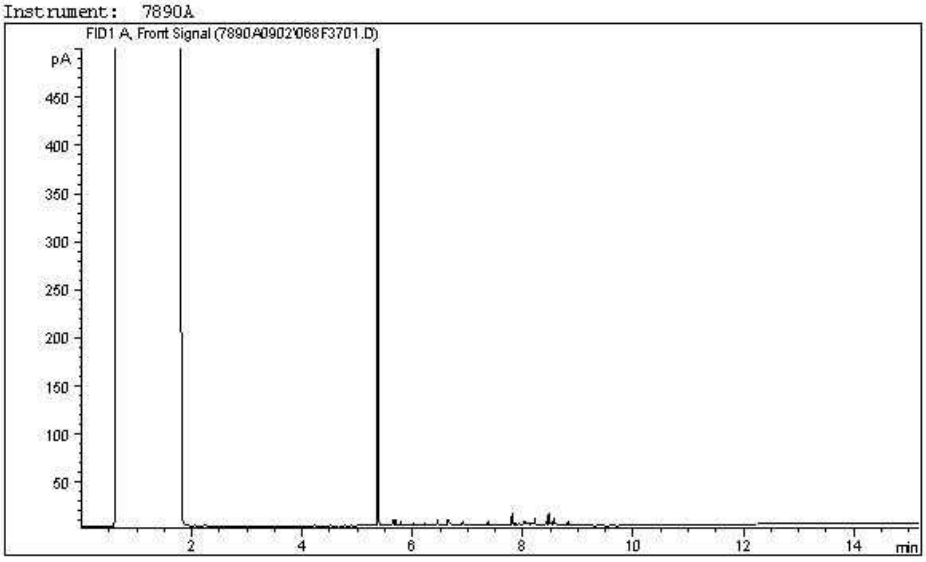
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4041

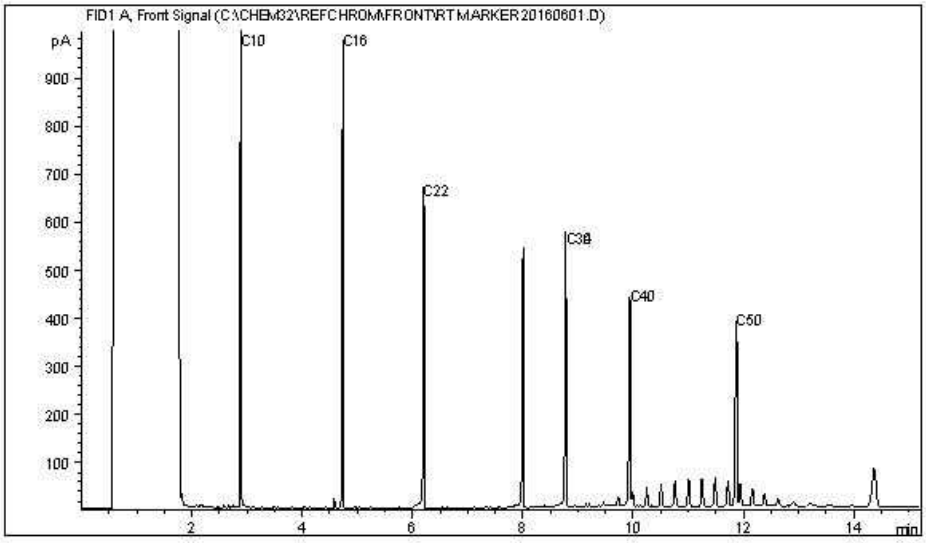
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-13A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

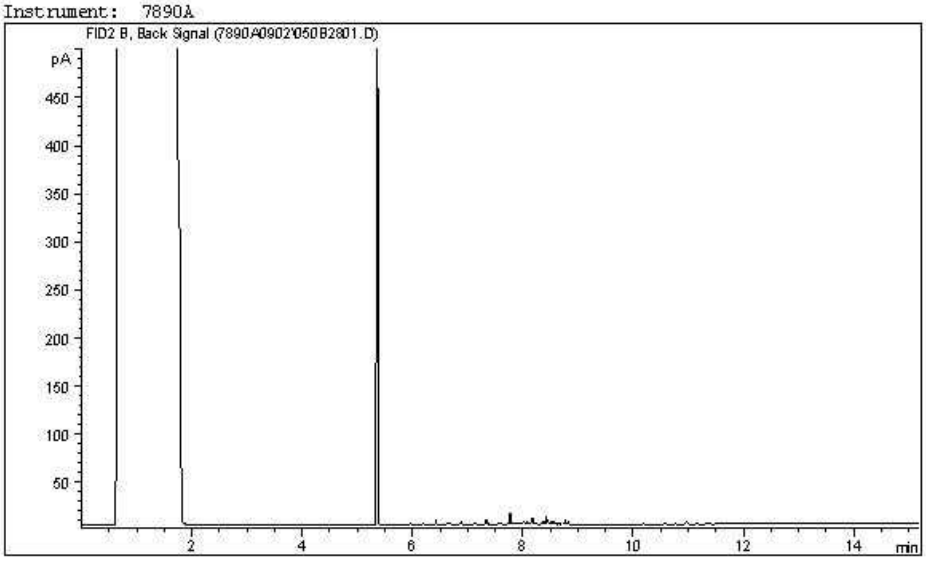
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4042

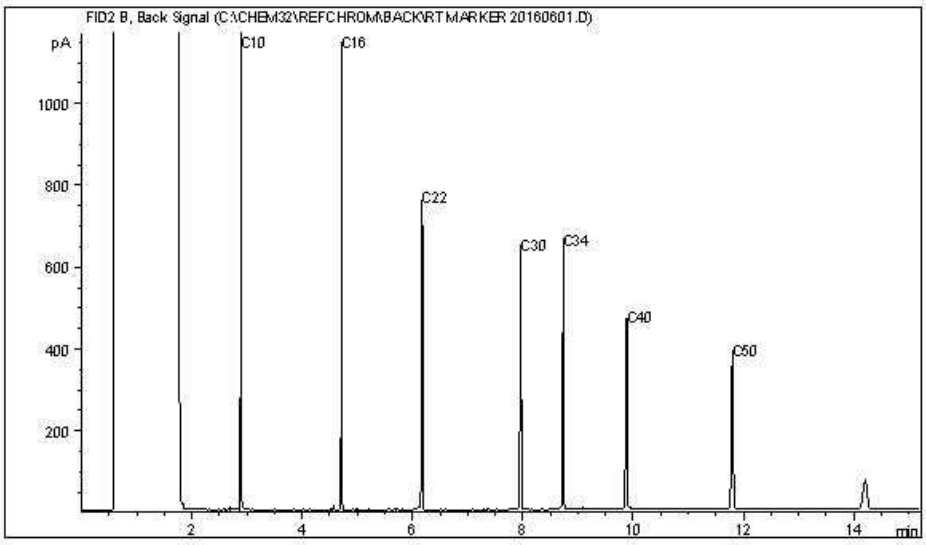
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-13B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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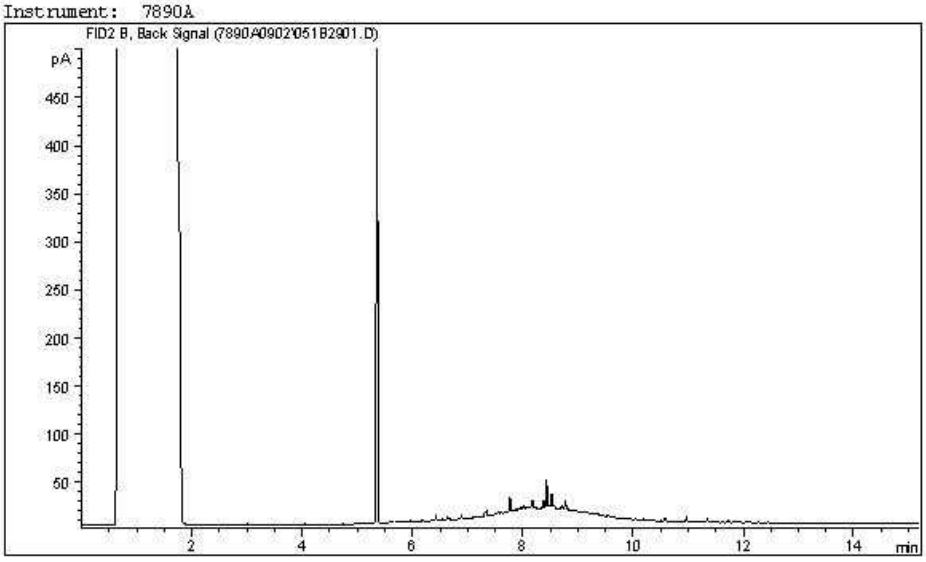
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4043

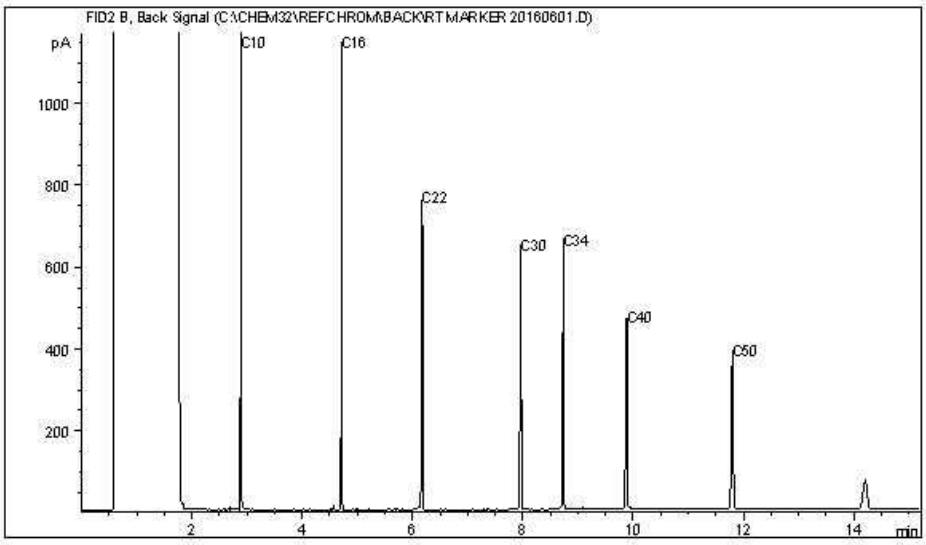
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-21A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

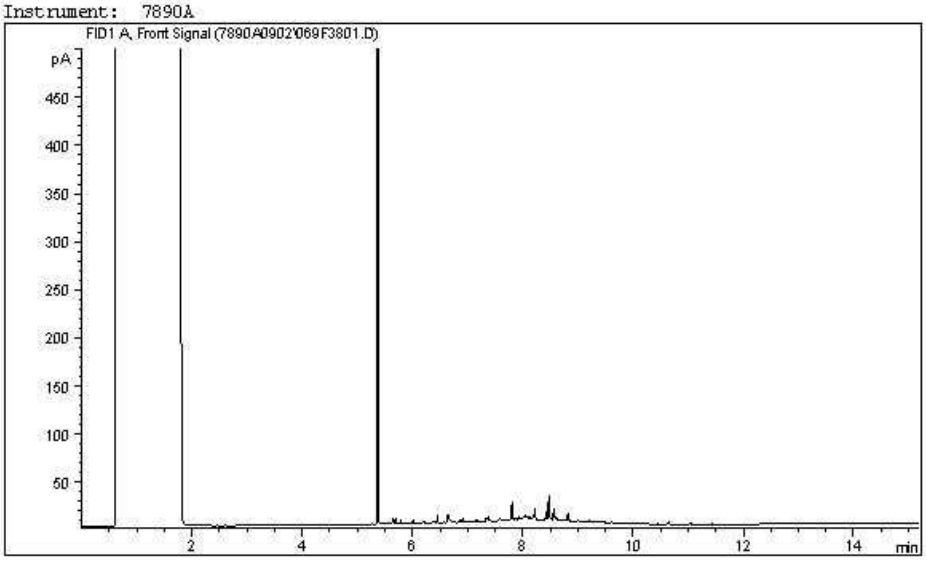
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4044

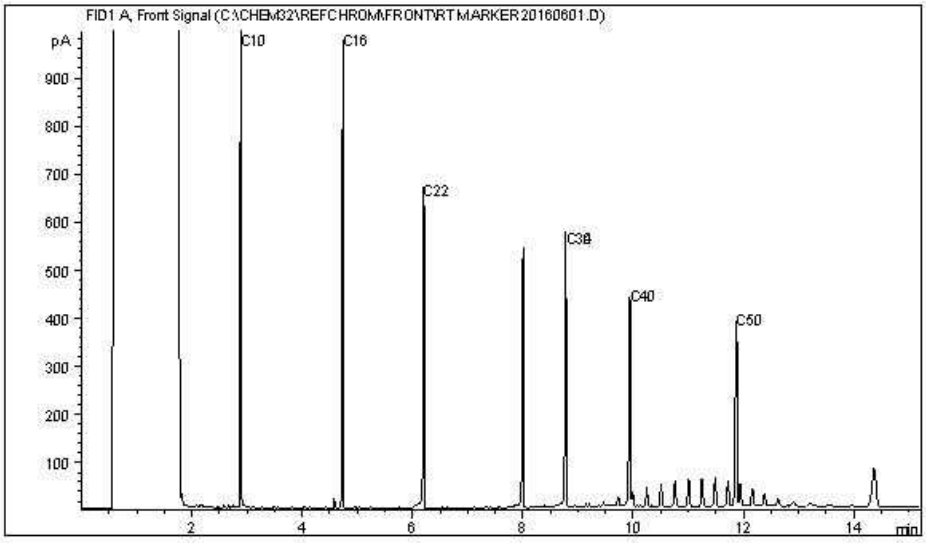
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-21B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

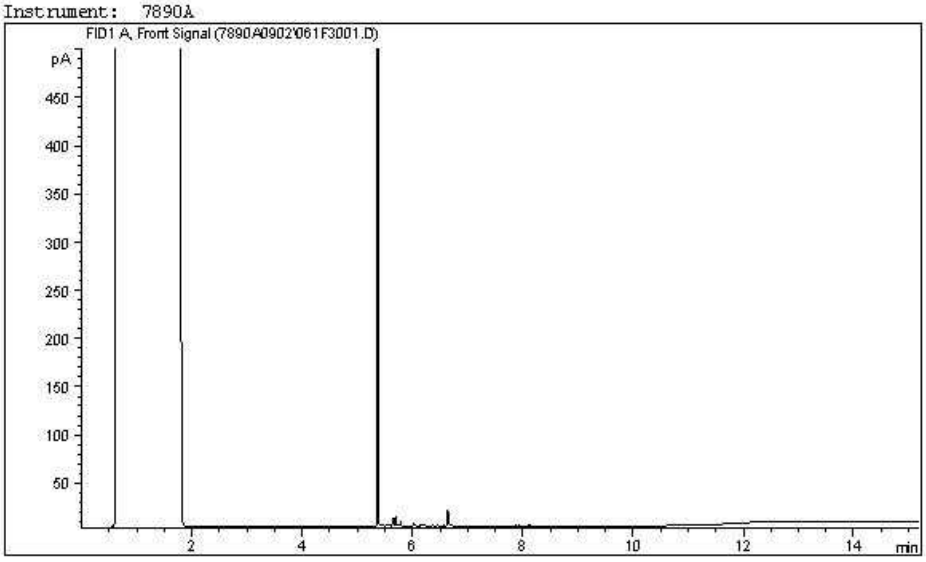
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4045

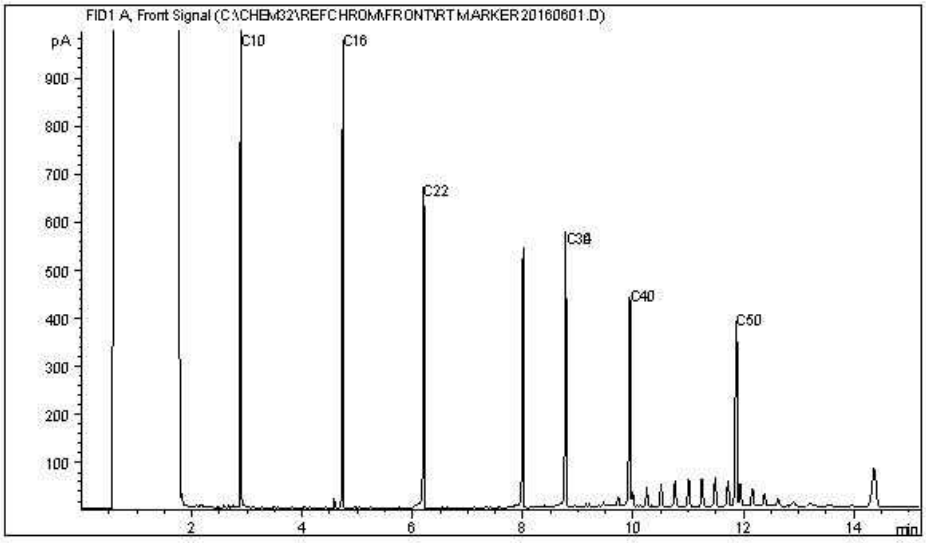
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-22A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

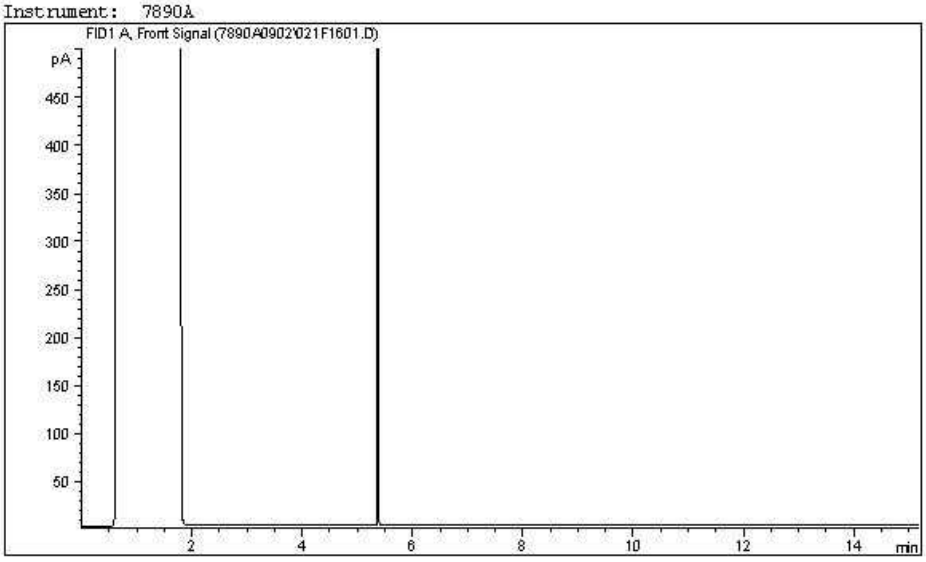
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4046

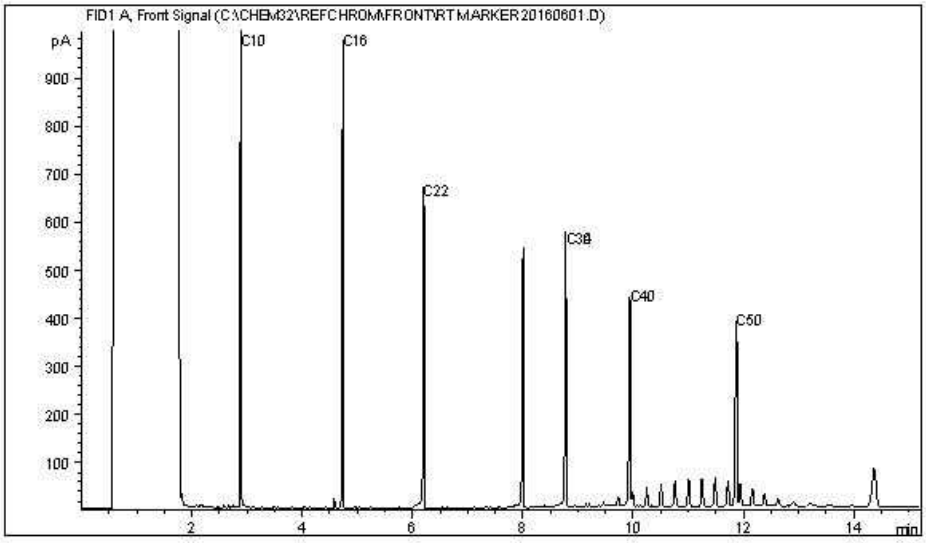
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-22B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



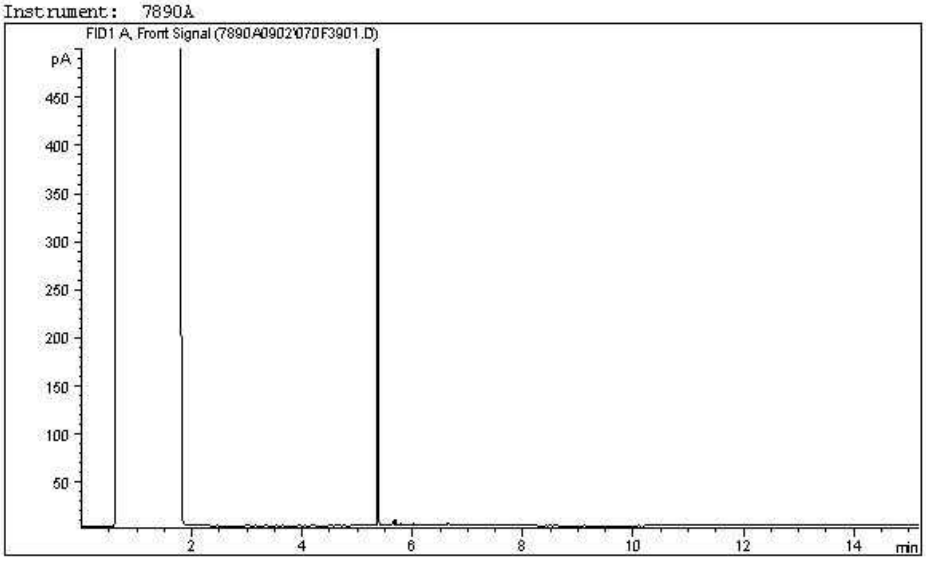
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

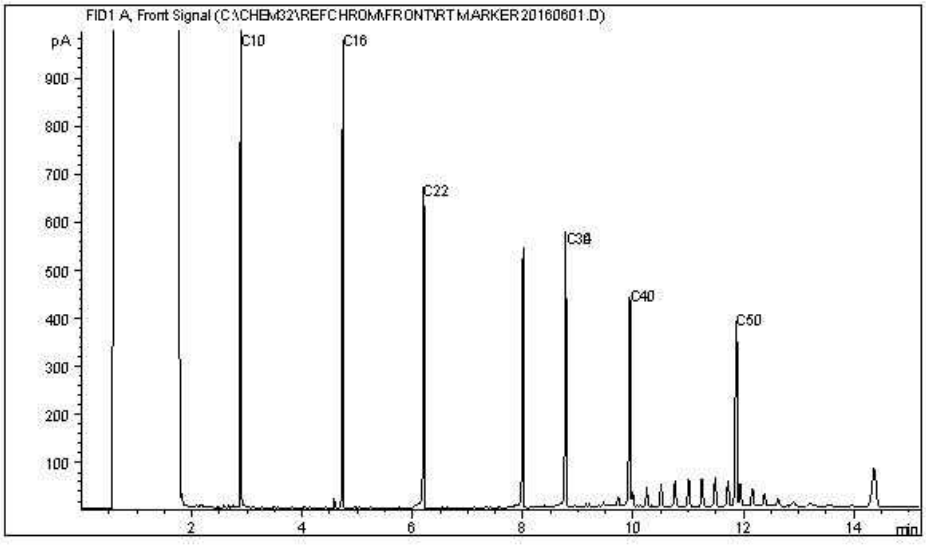
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

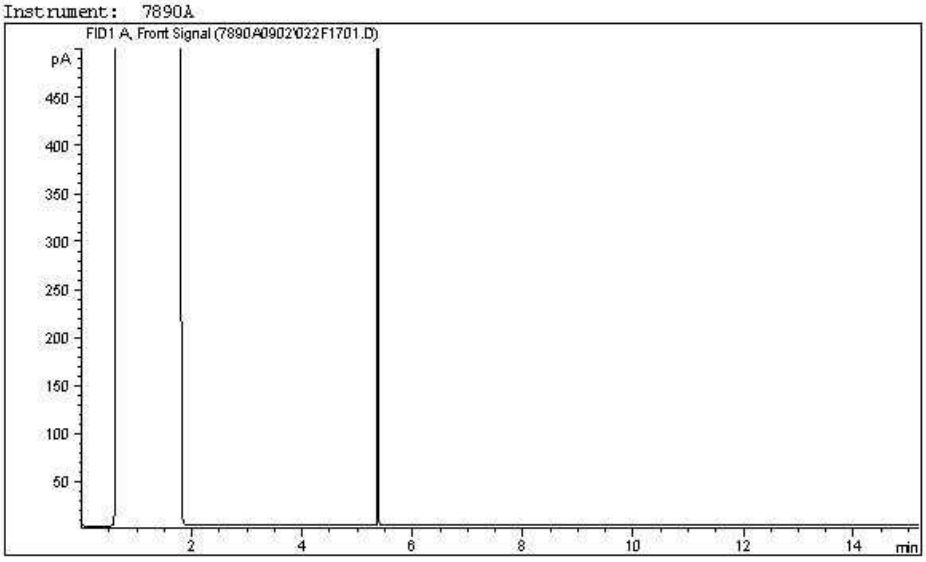
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4048

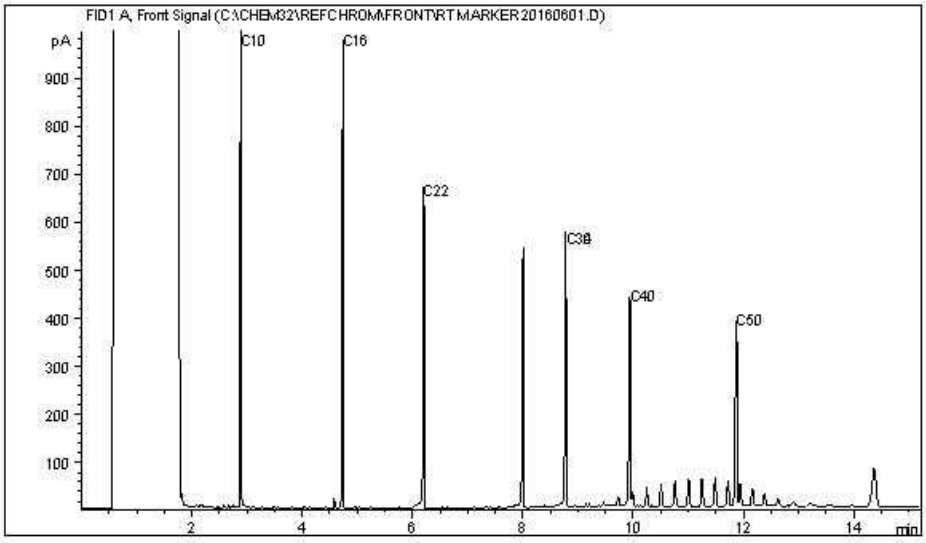
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-23B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

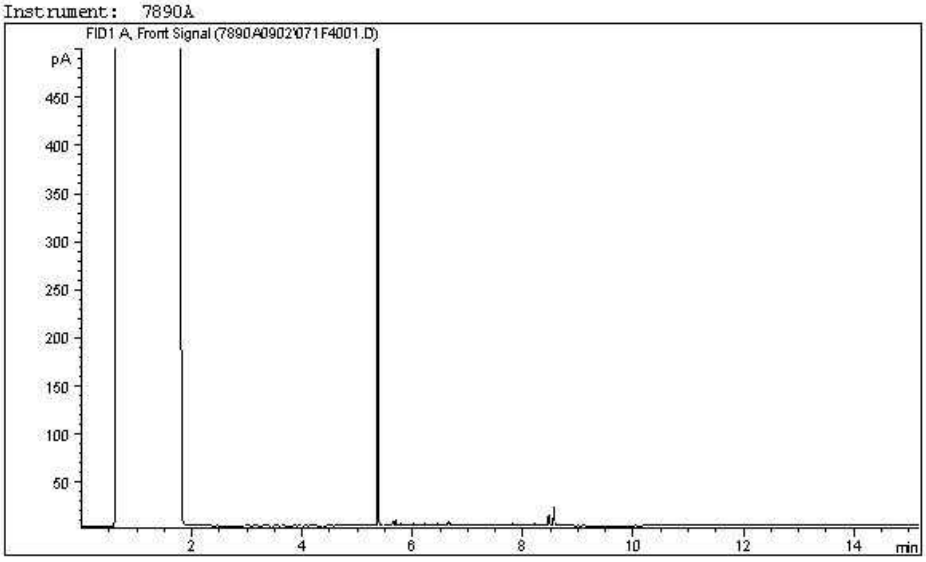
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4049

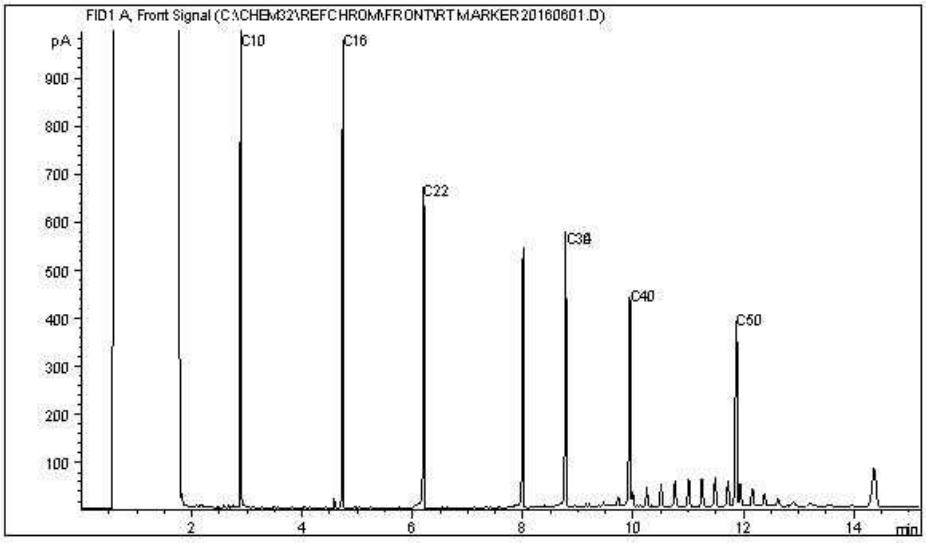
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-17A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

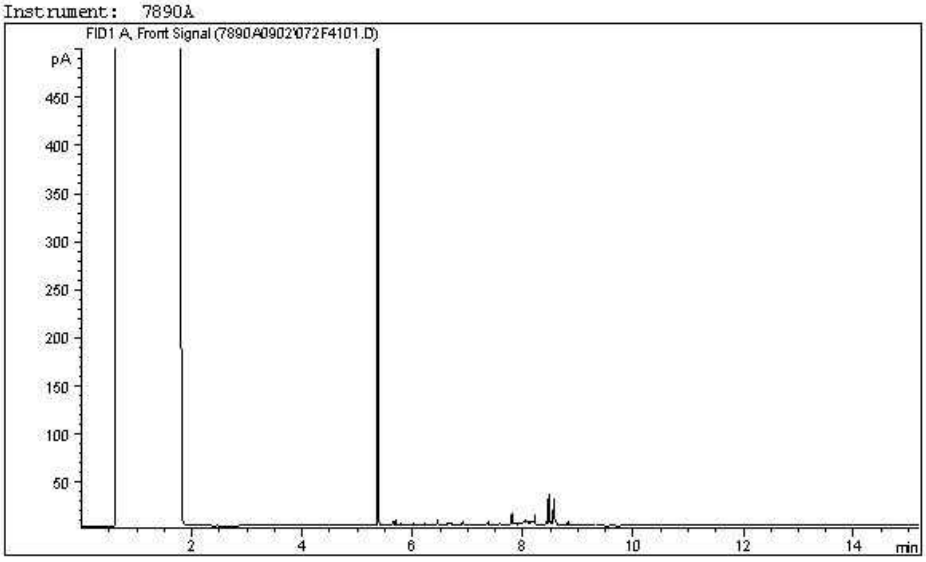
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4050

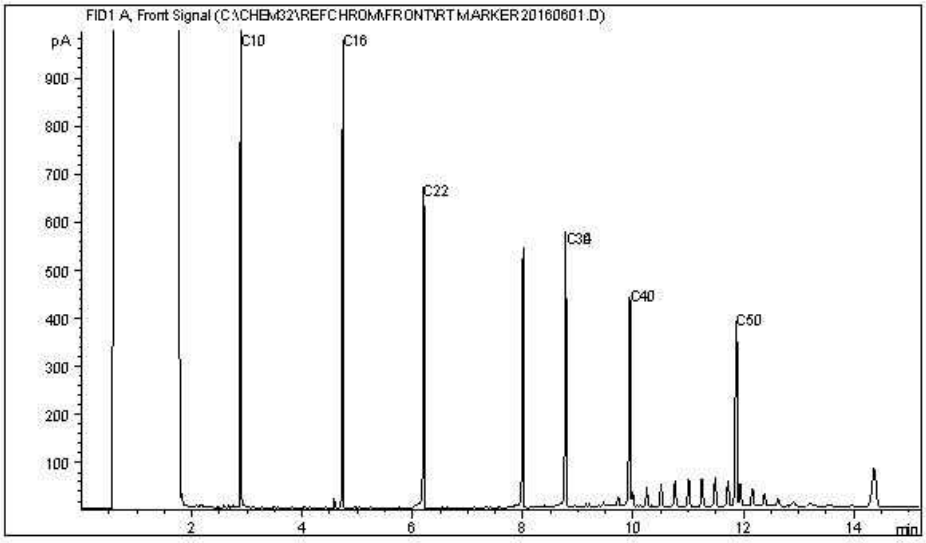
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-17B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

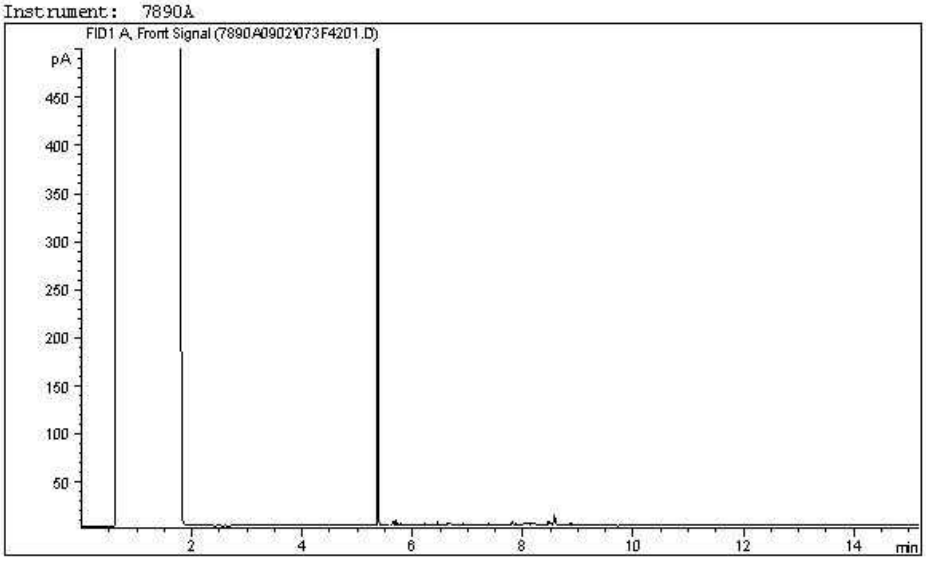
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4051

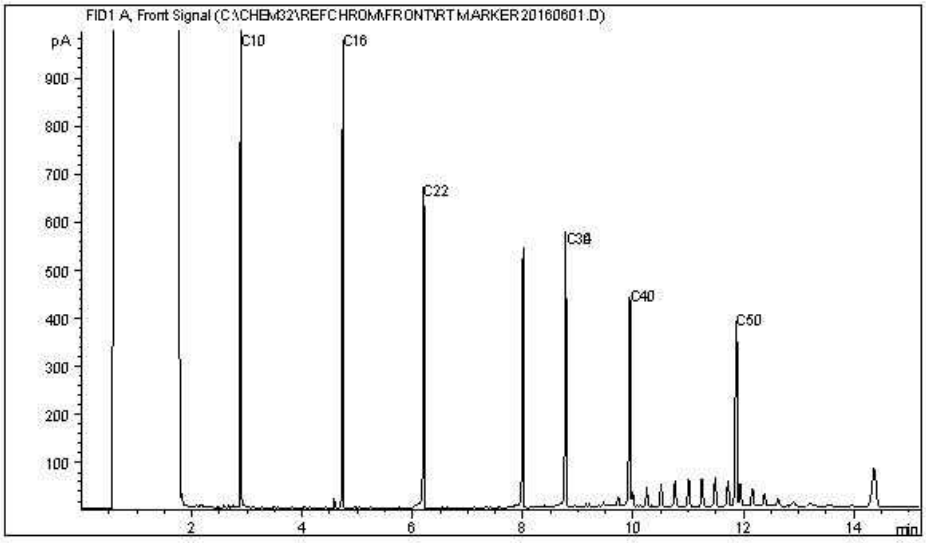
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-18A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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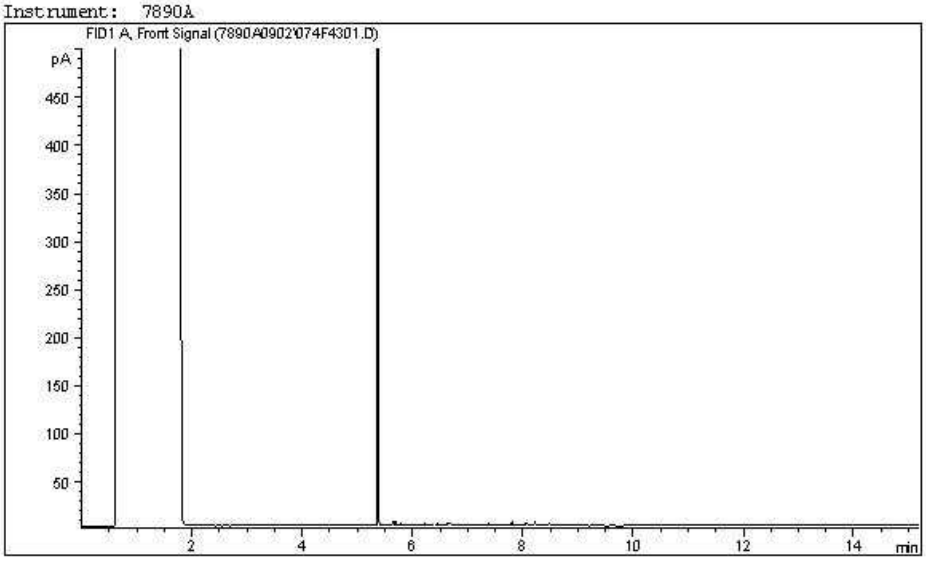
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4052

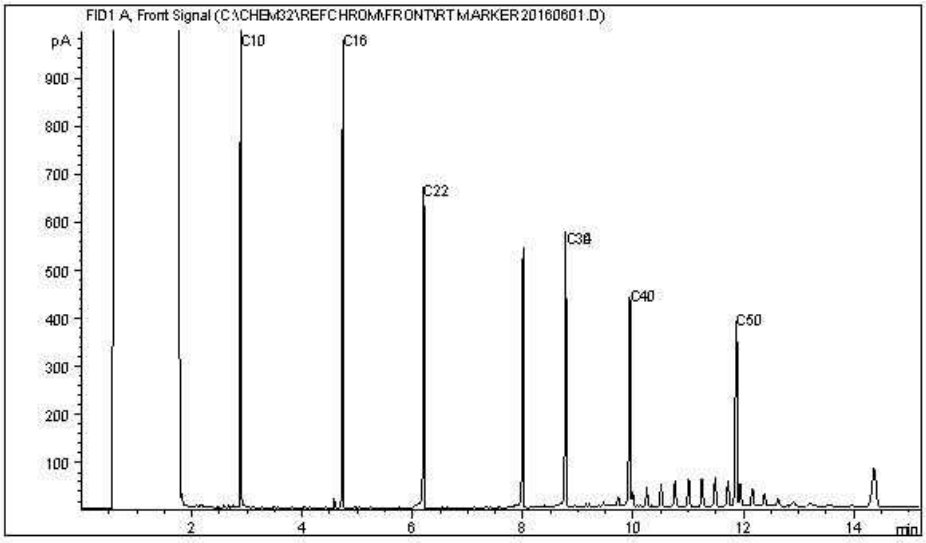
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-18B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

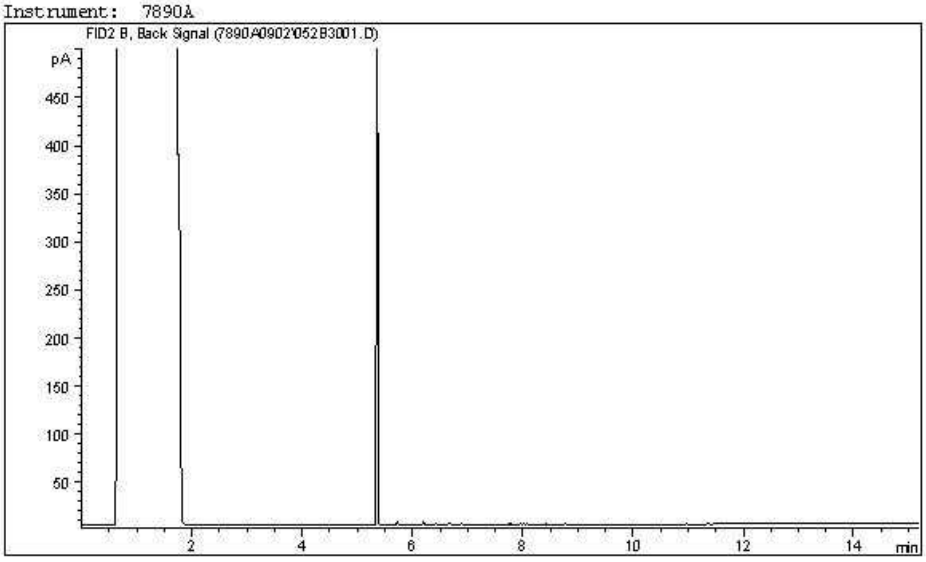
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4053

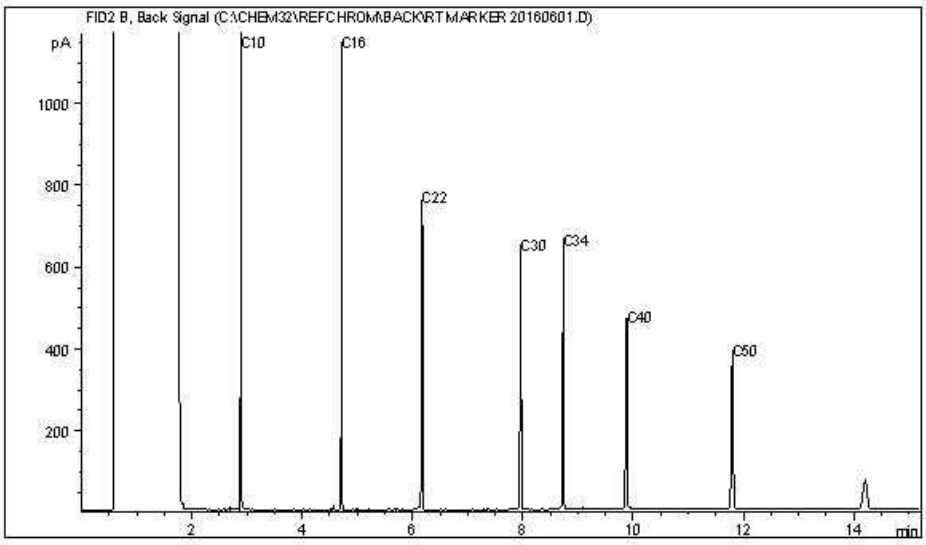
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-19A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

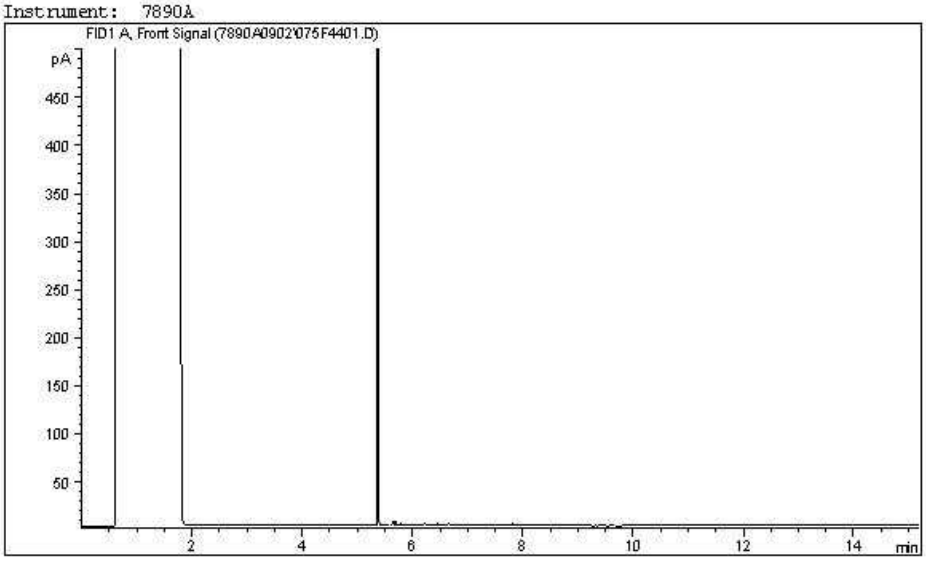
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4054

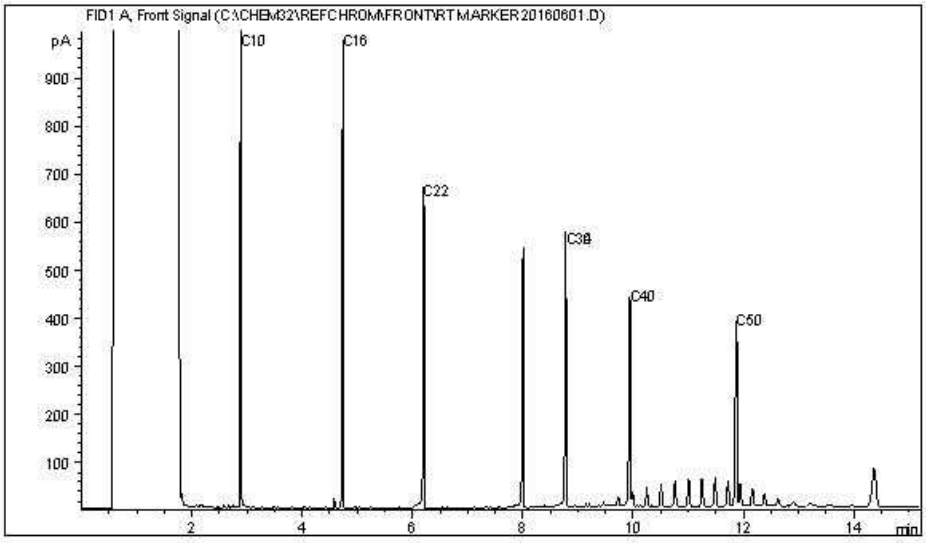
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-19B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

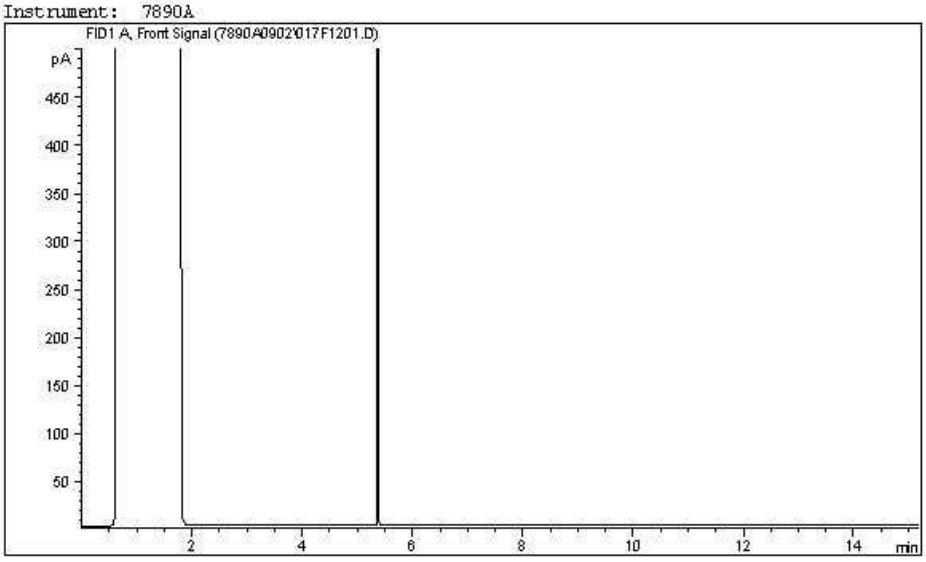
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4055

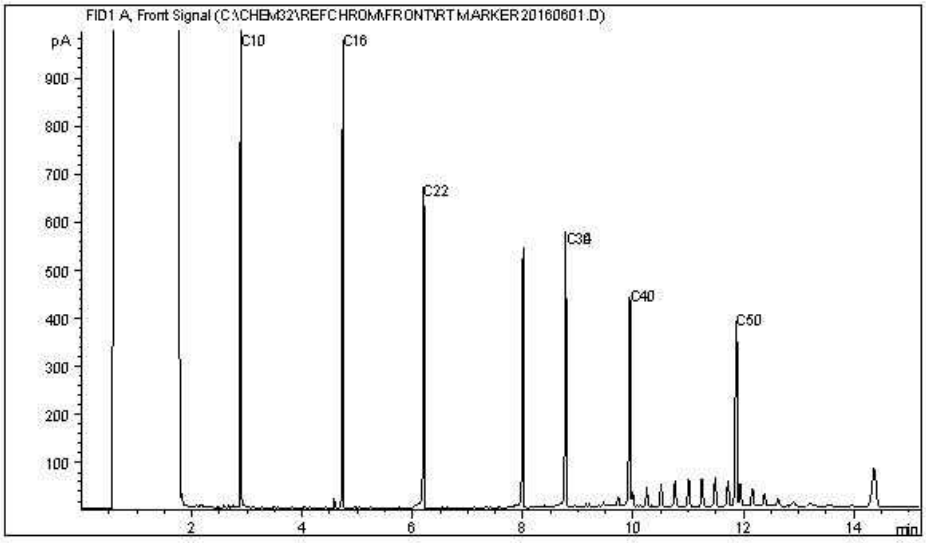
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-20A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

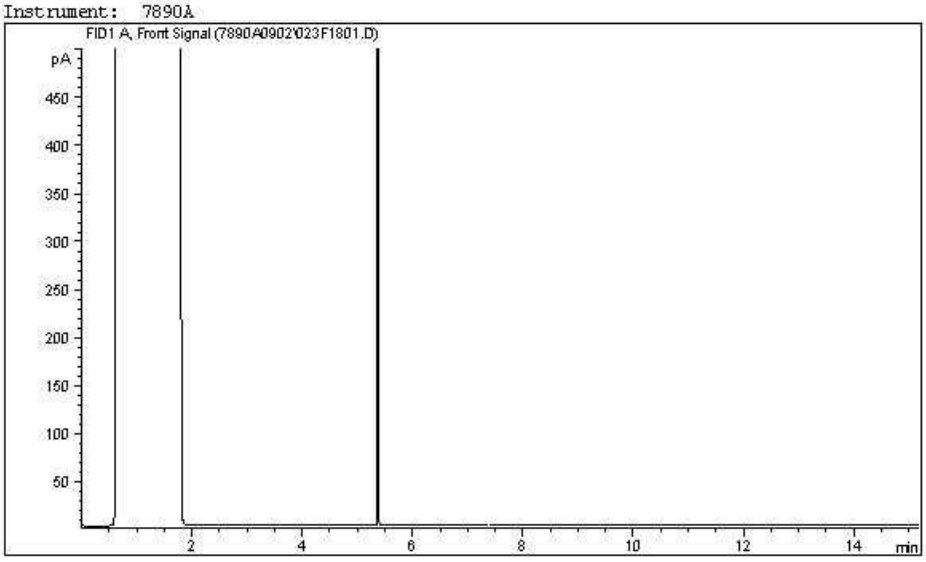
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4056

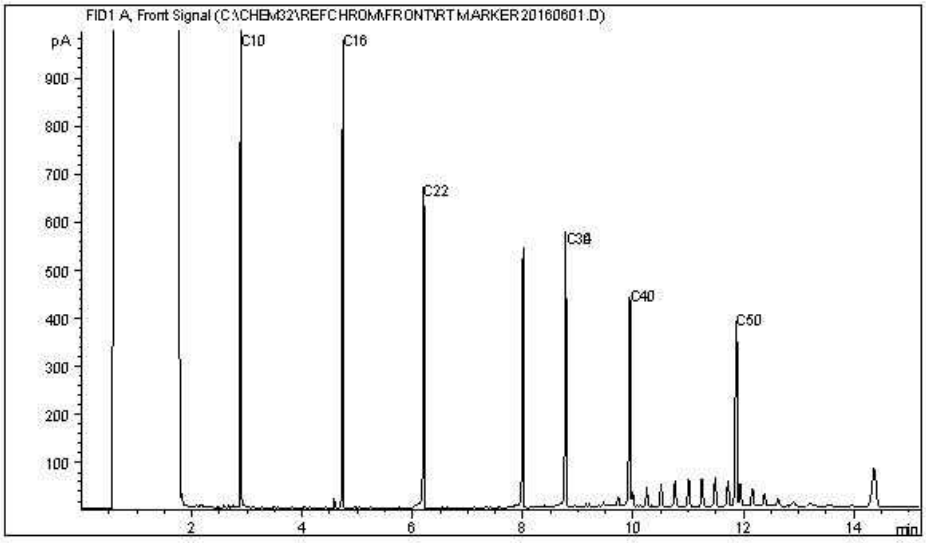
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-MW-20B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



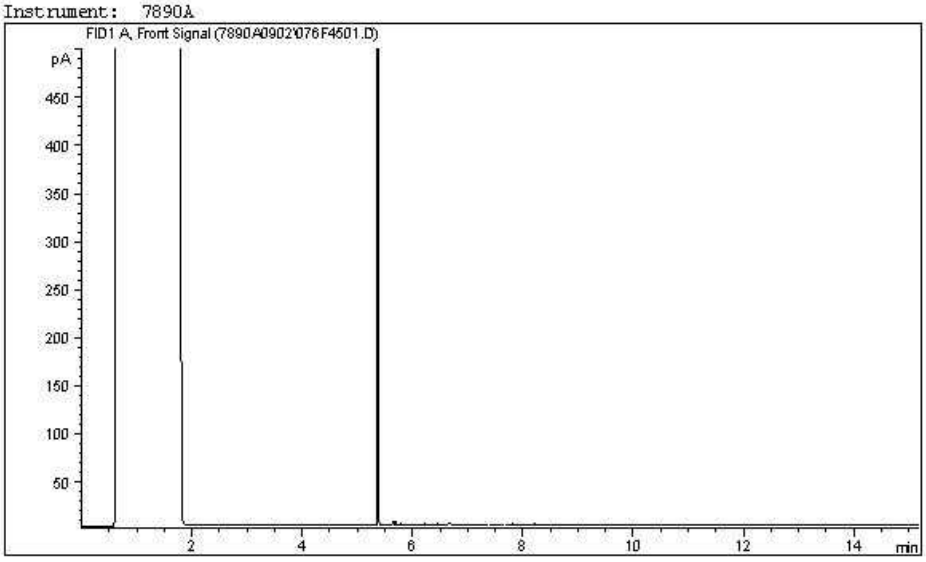
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

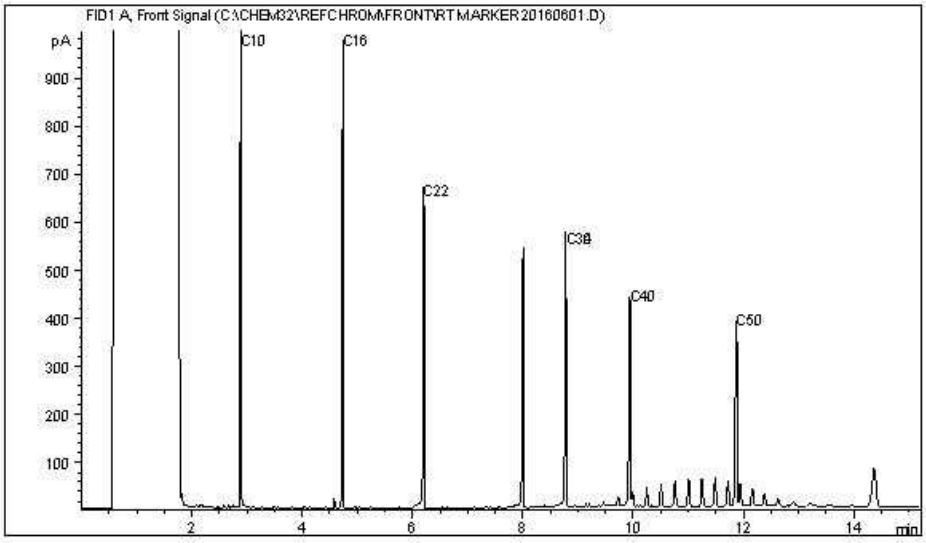
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

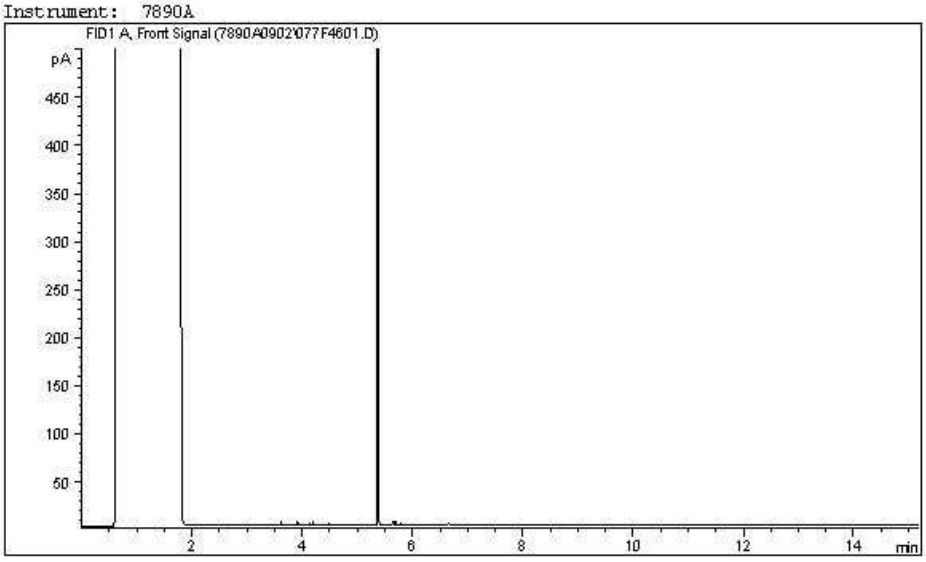
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4058

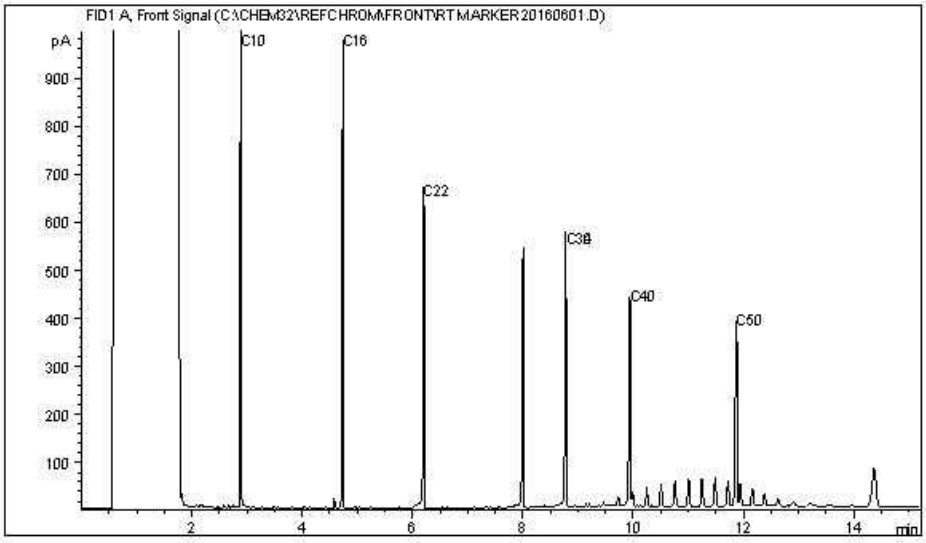
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-1B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

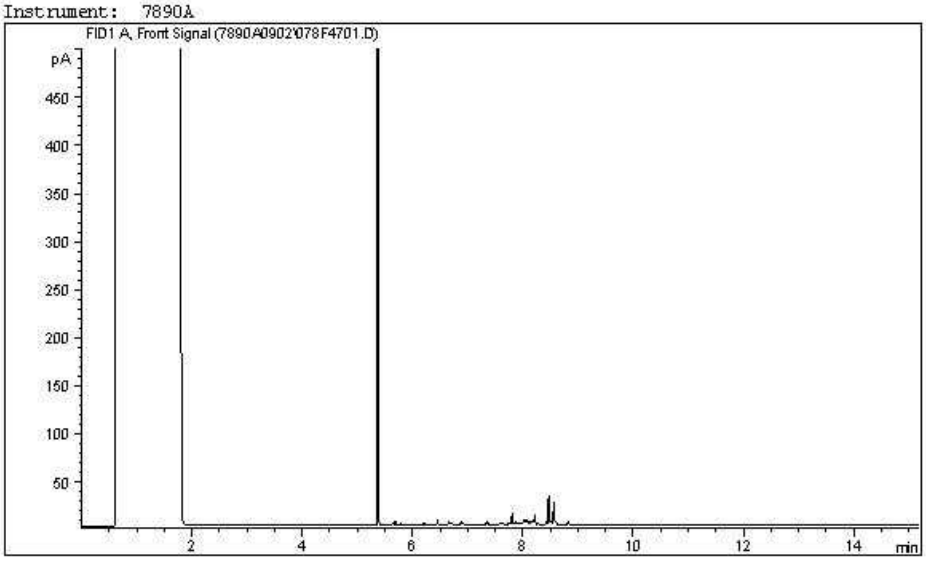
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4059

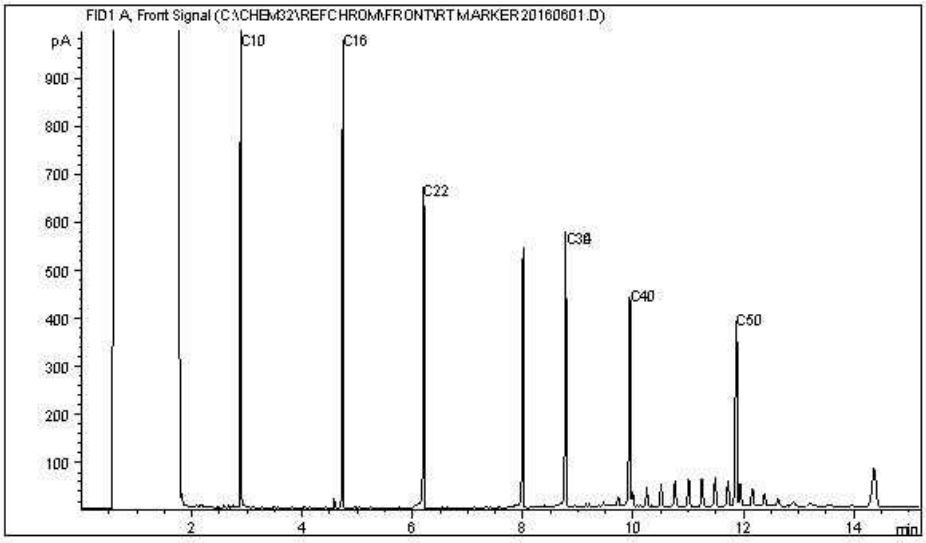
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-2A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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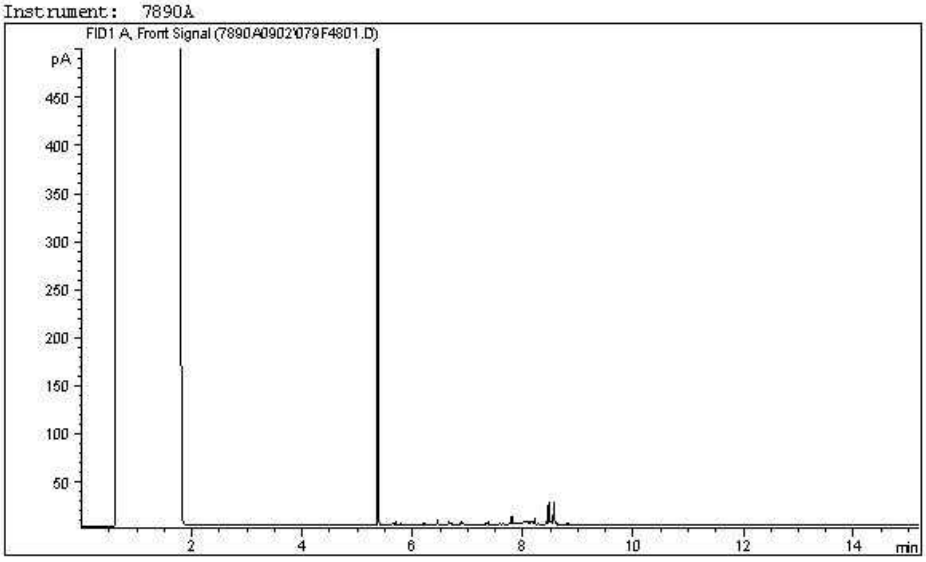
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4060

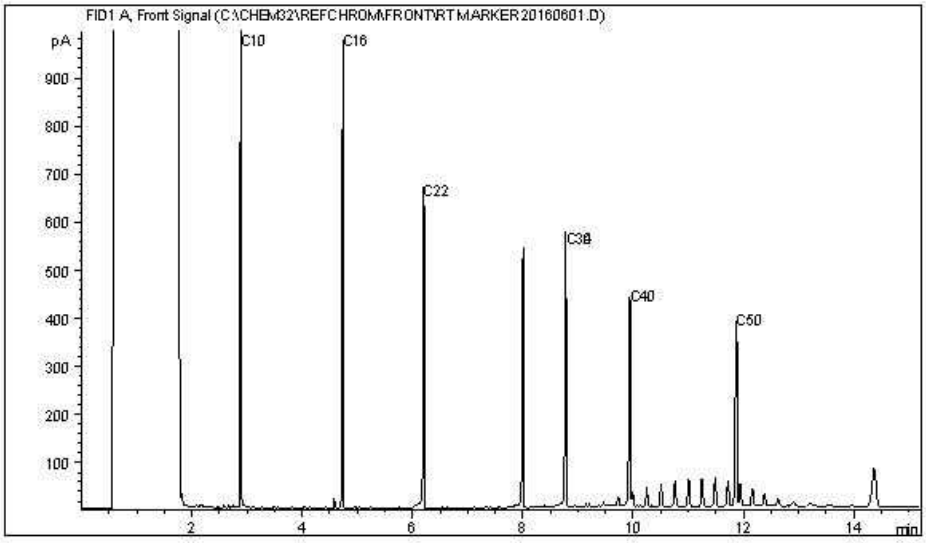
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-2B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

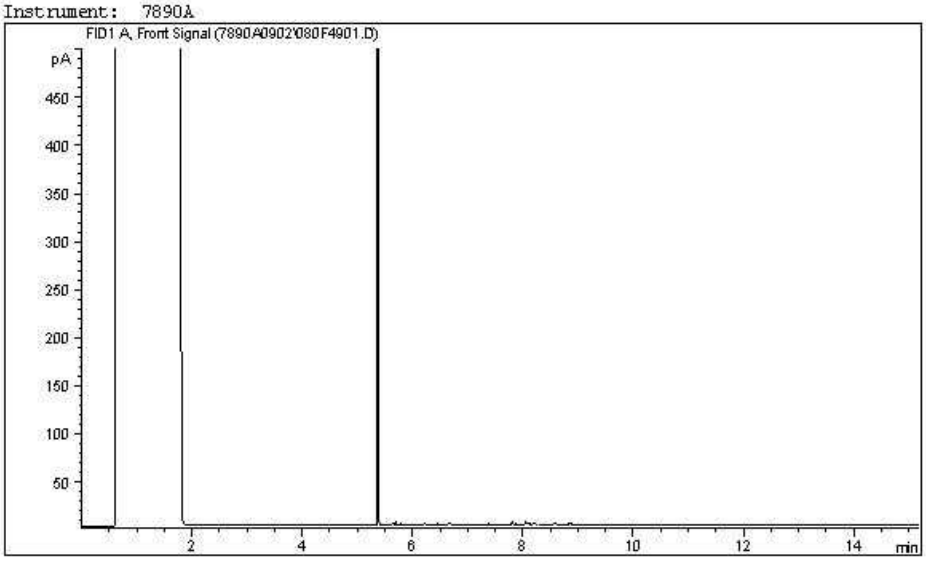
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4061

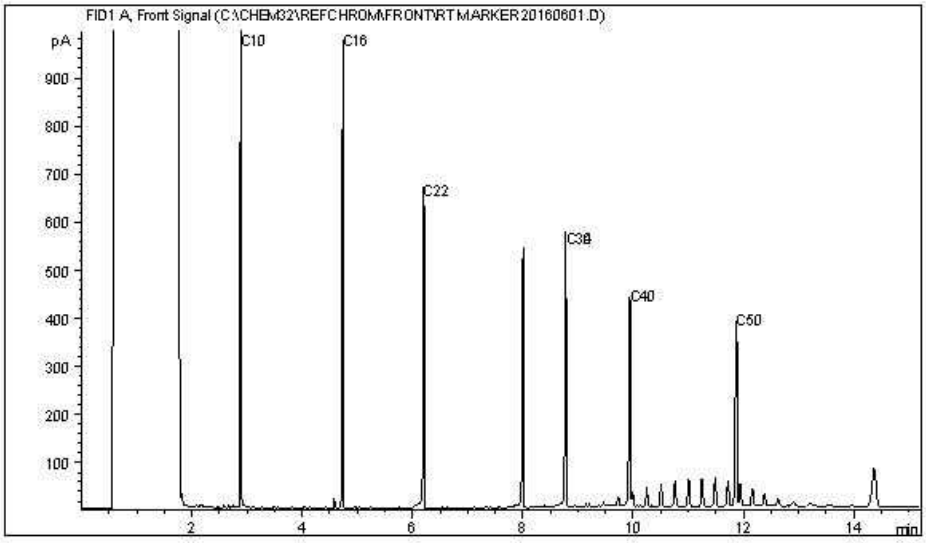
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-3A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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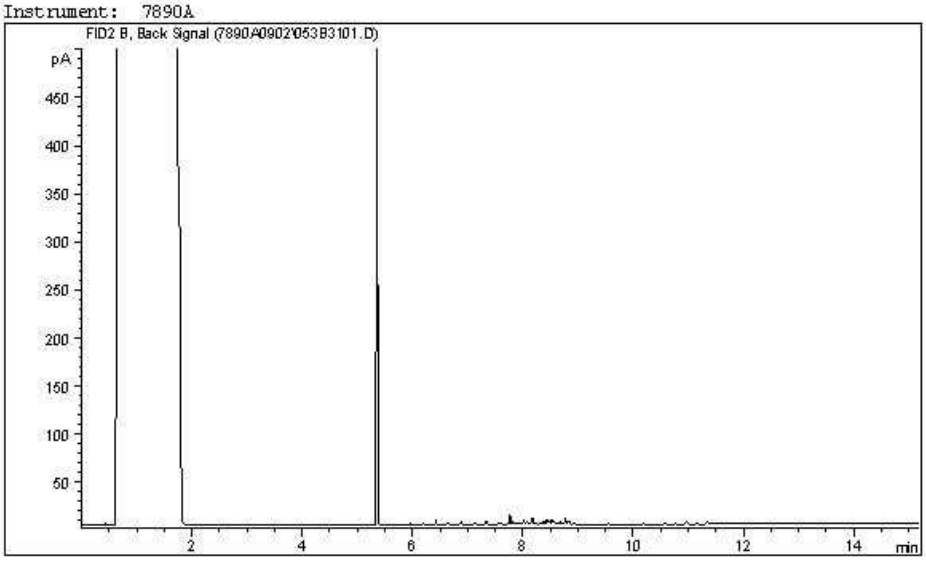
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4062

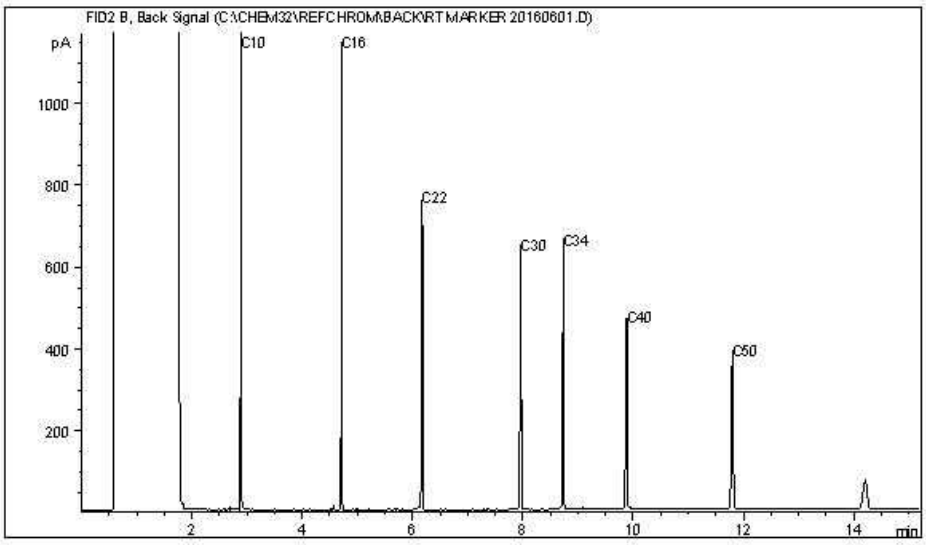
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-3B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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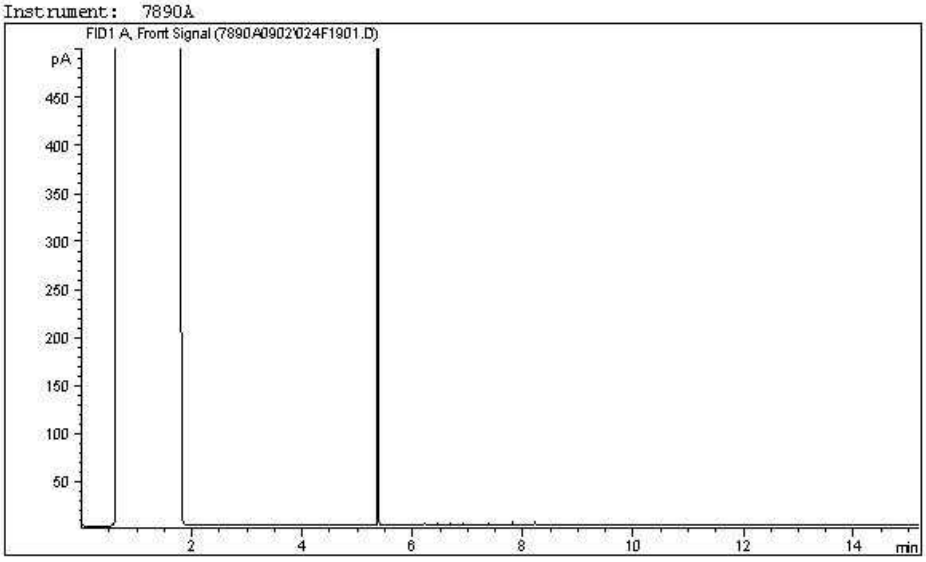
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4063

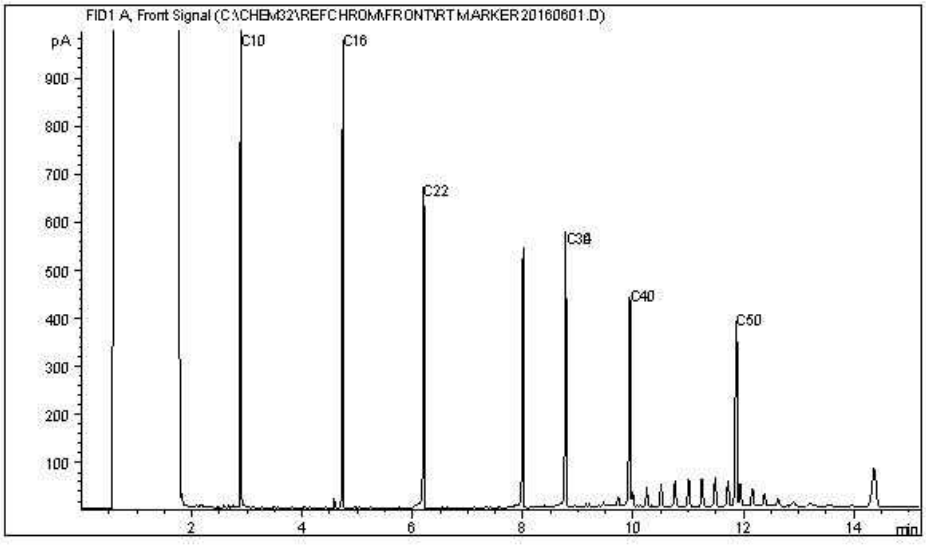
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-3A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

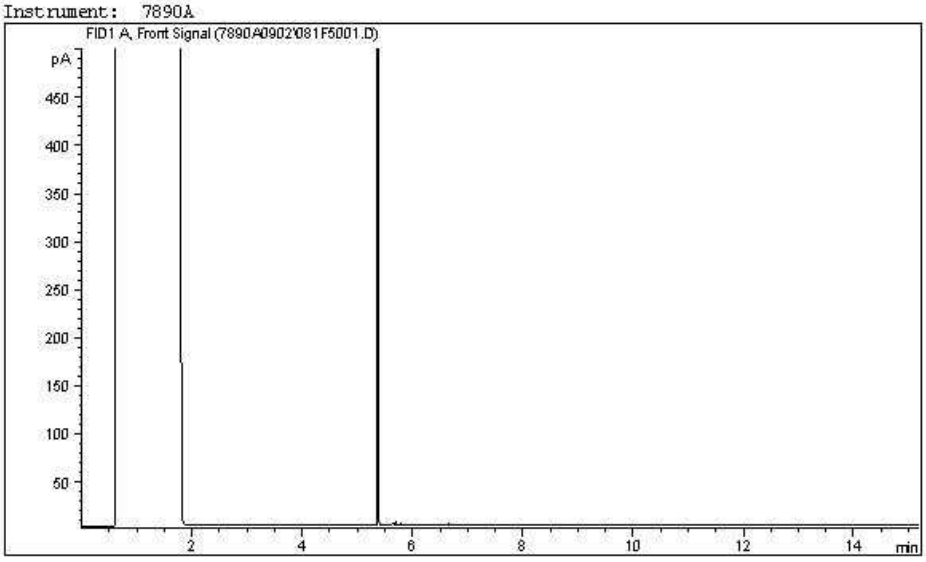
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4064

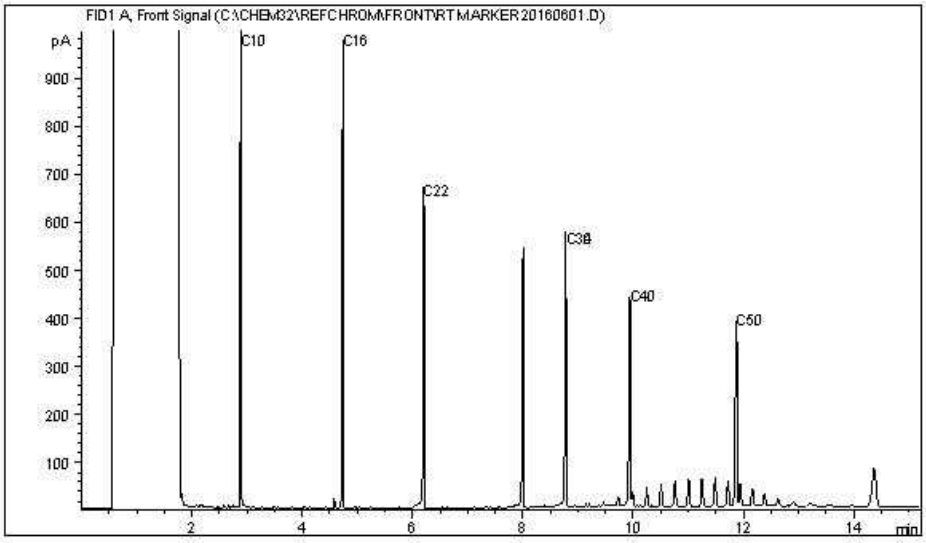
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-3B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

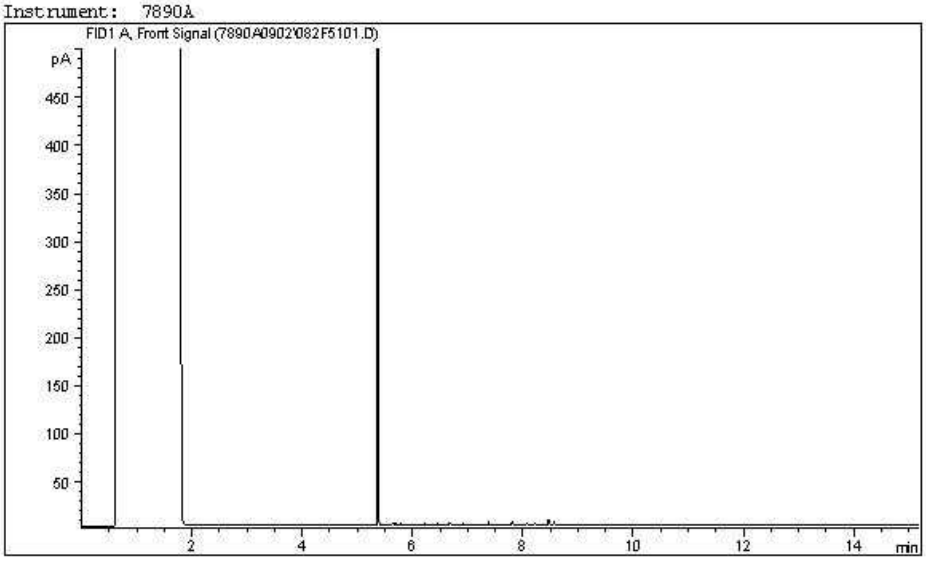
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4065

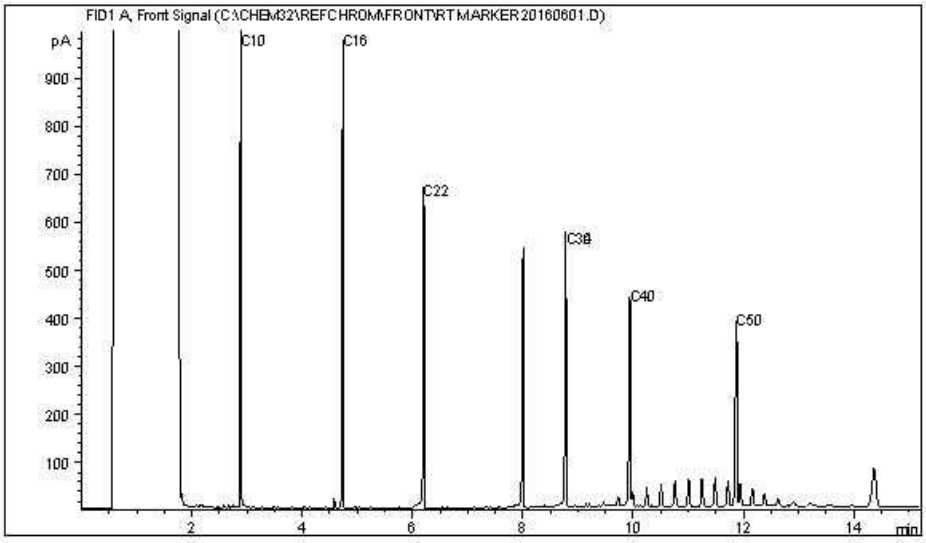
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-4A

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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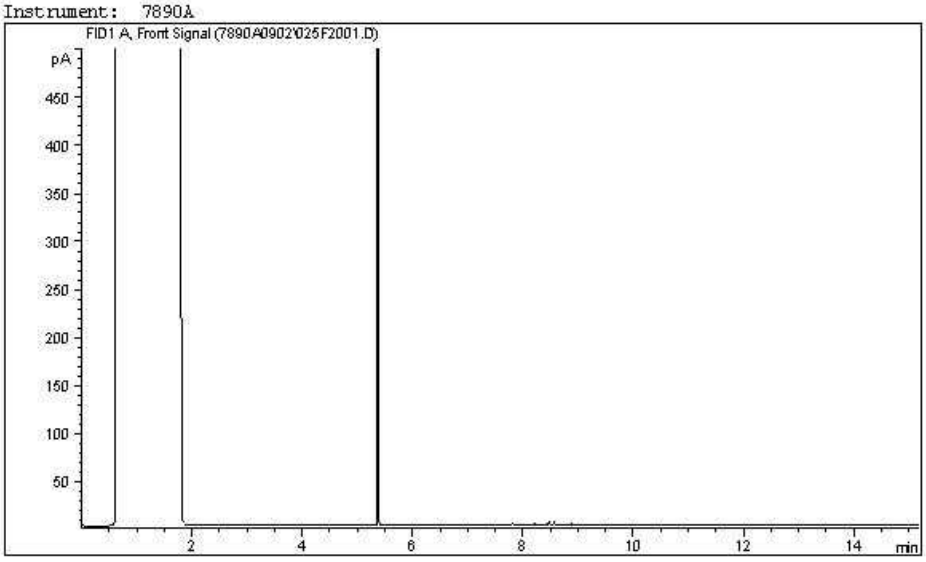
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4066

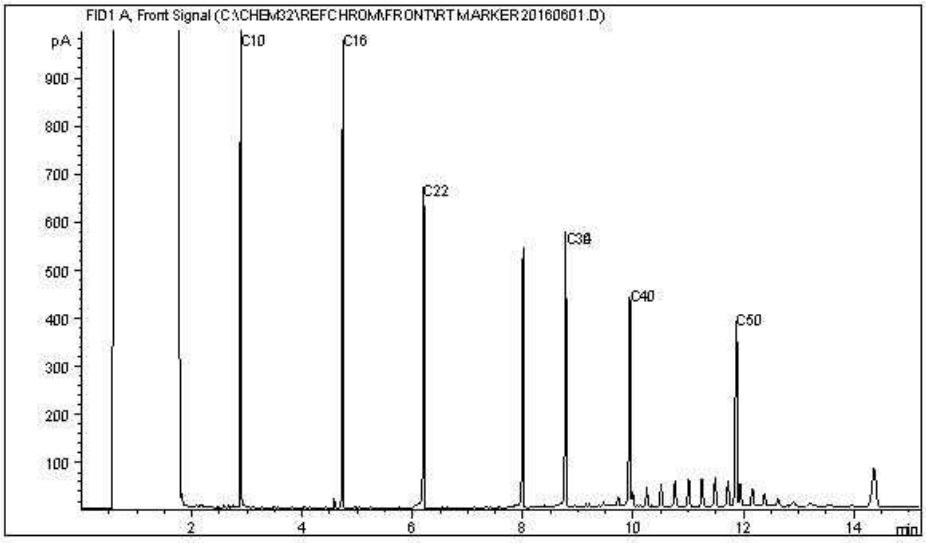
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-BMW-4B

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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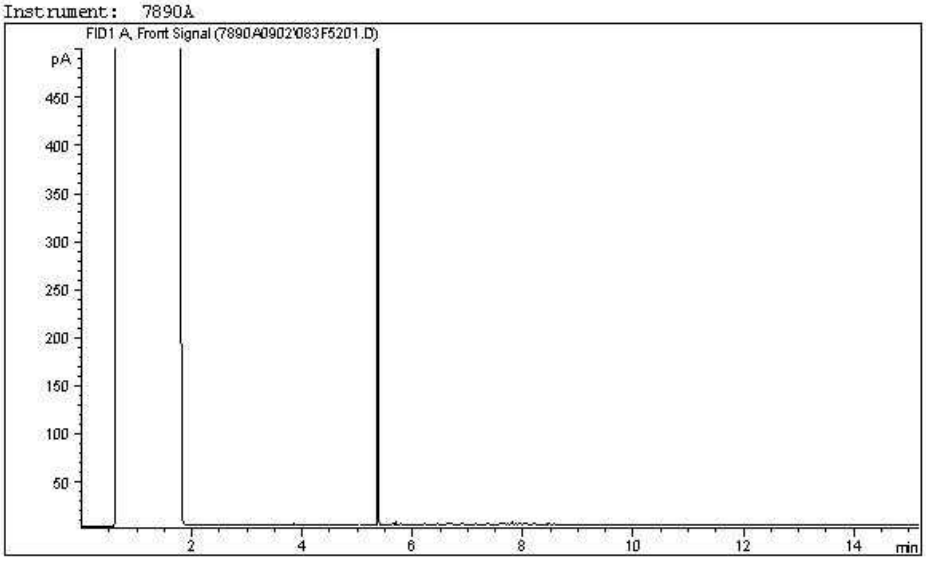
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4067

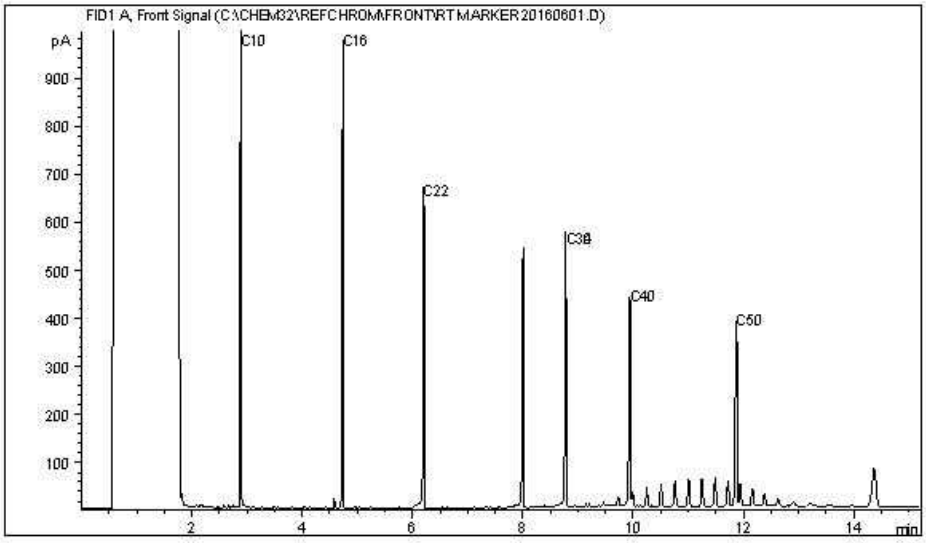
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP1

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

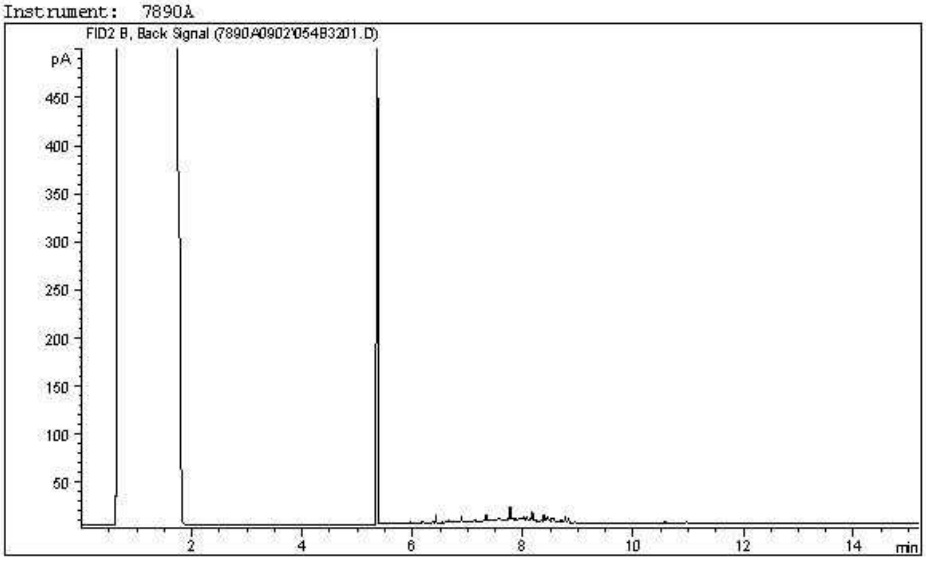
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4068

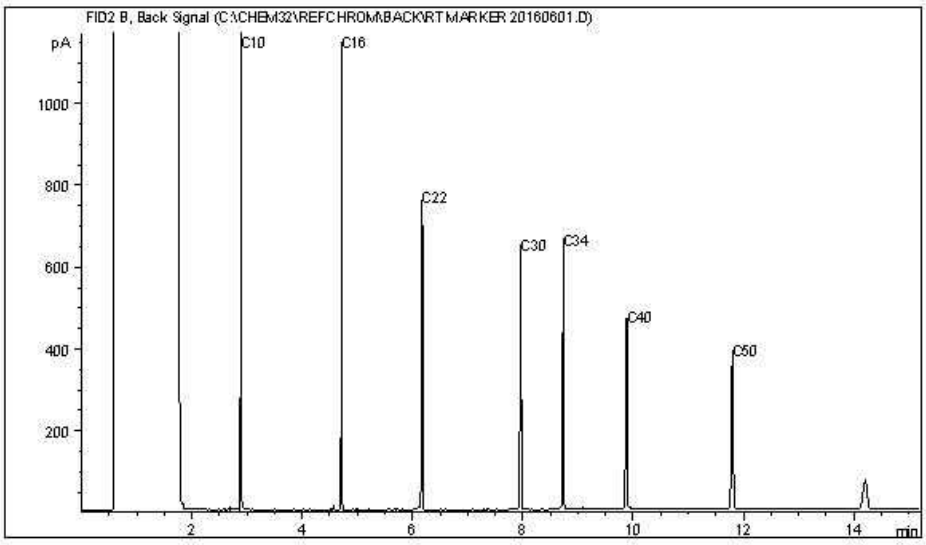
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP2

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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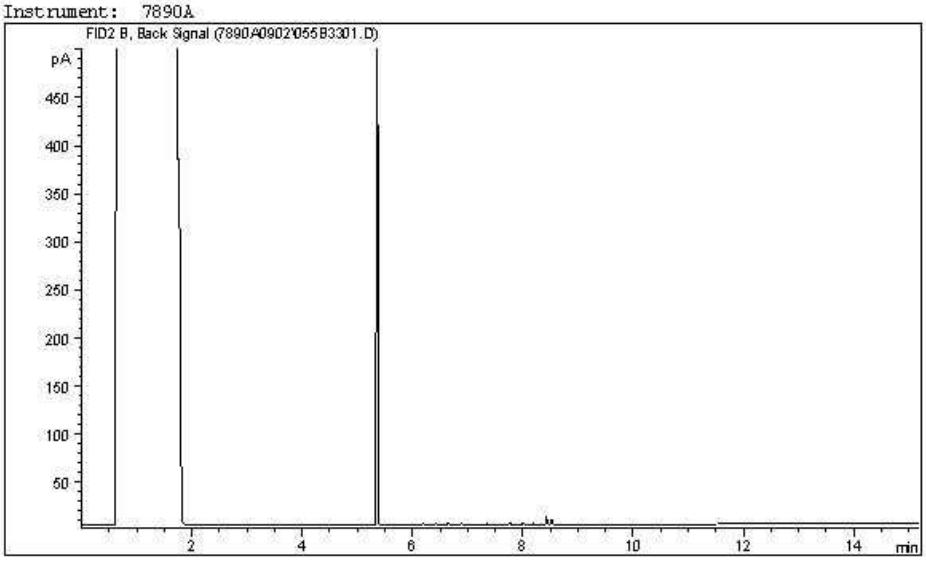
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4069

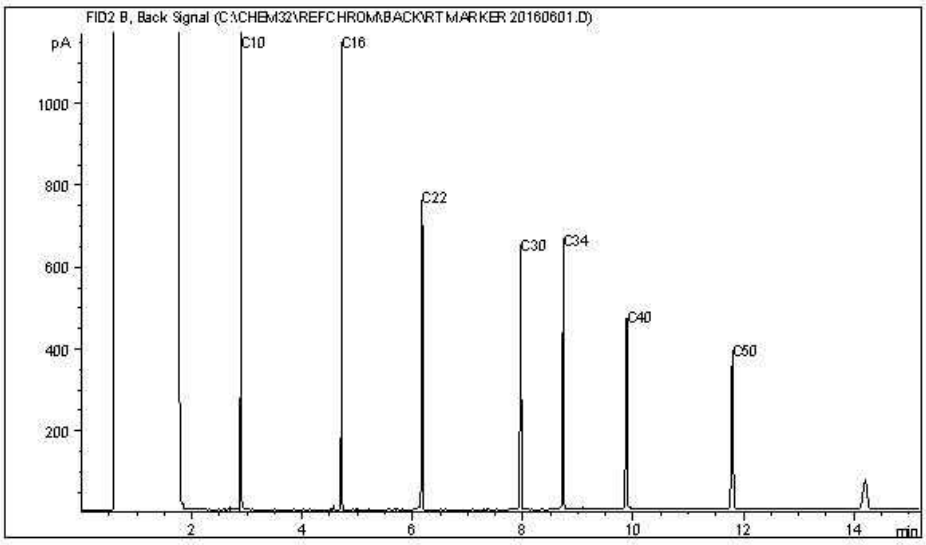
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP3

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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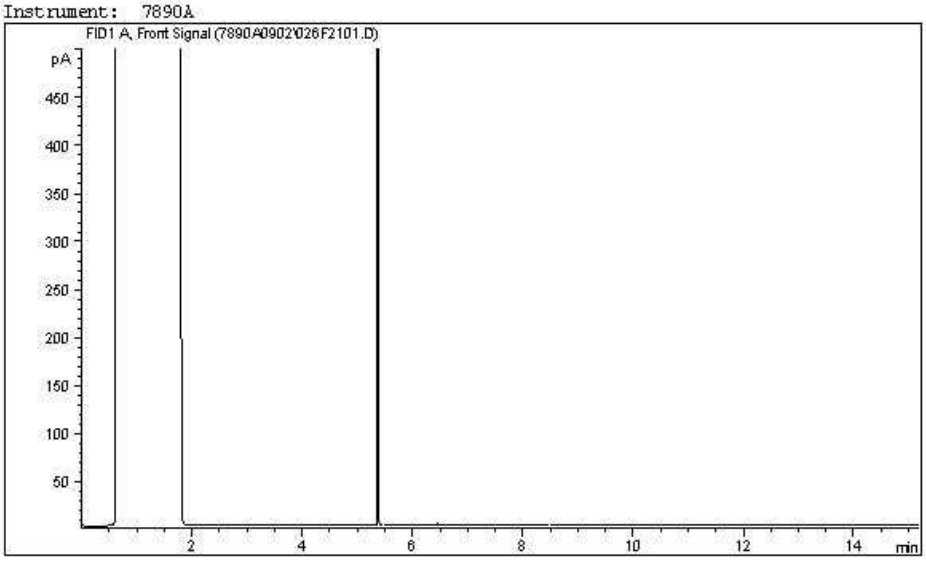
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4070

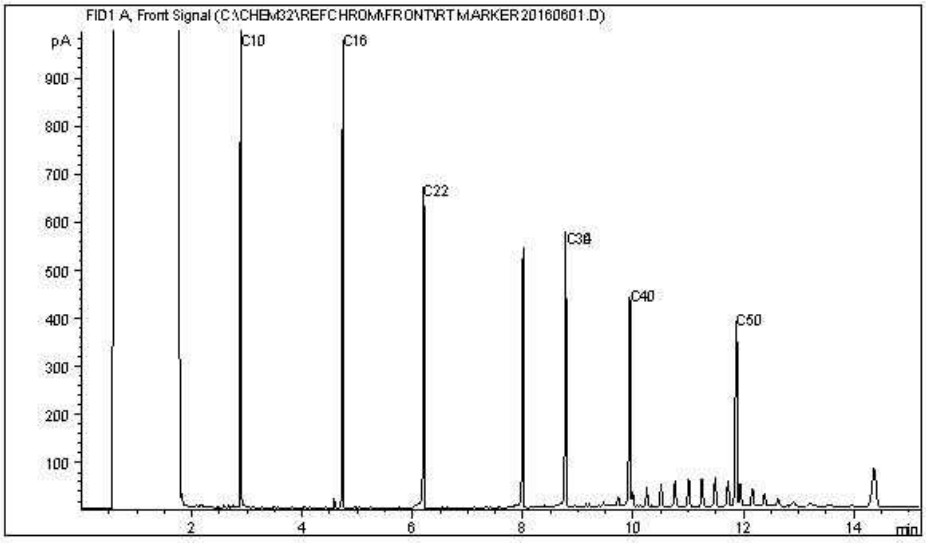
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP4

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

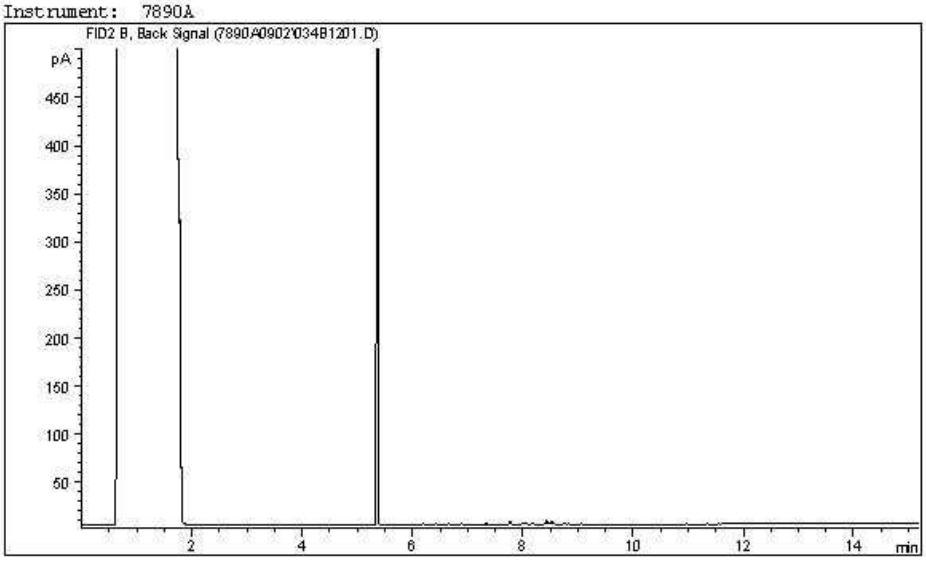
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4071

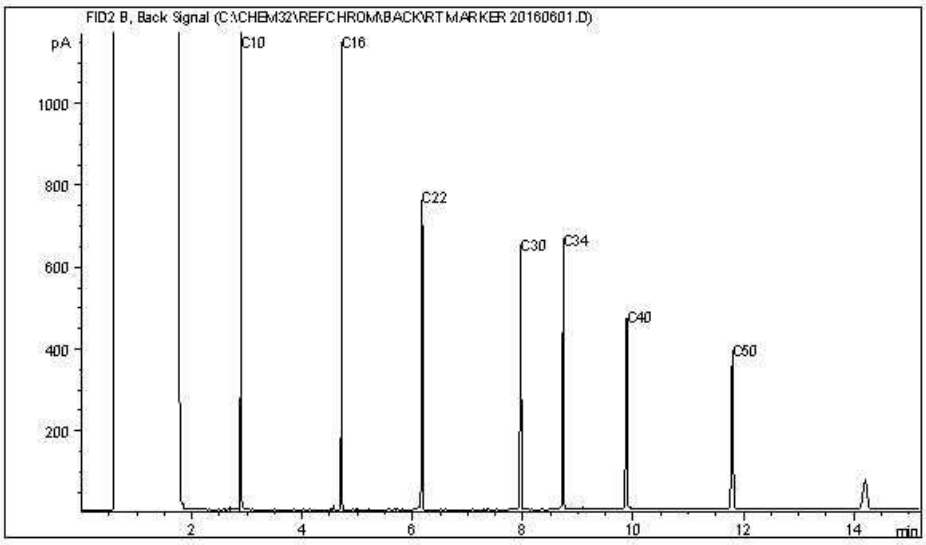
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP5

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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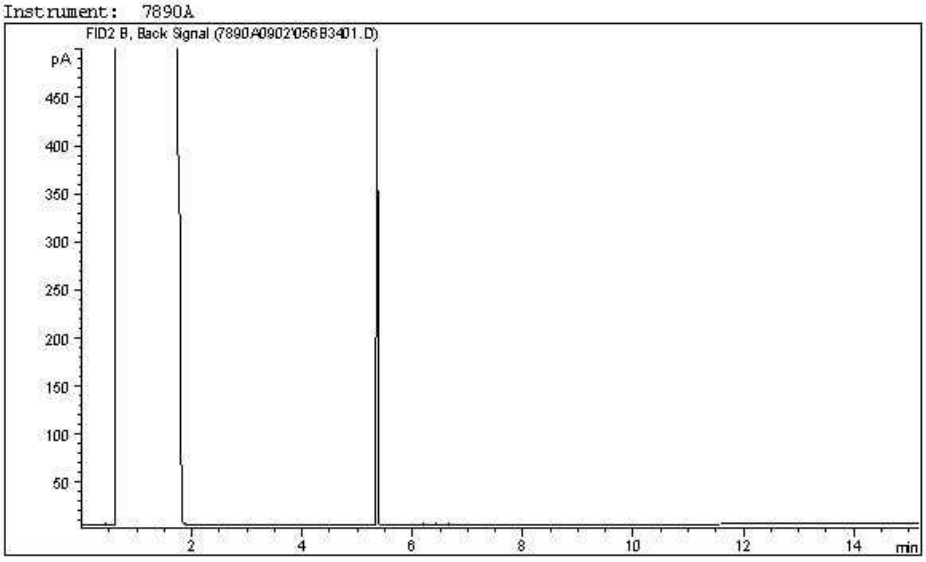
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673300
Report Date: 2016/09/07
Maxxam Sample: PJ4072

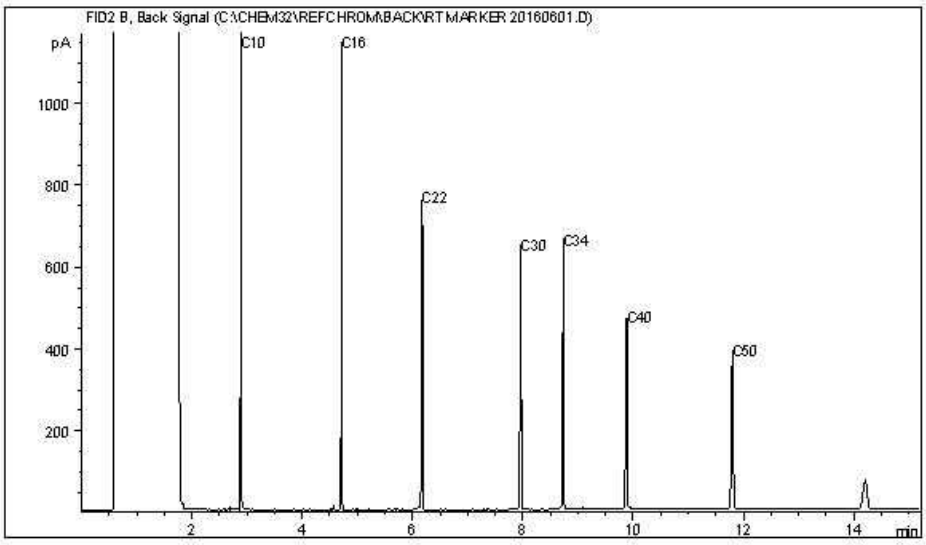
ARCADIS Canada
Client Project #: 102012-000, Kitikmeot DEW Lin
Client ID: 16-C4-DUP6

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: 7890A



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

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

Your P.O. #: N/A
Your Project #: B673300
Your C.O.C. #: na

Attention:Parminder Virk

Maxxam Analytics
Edmonton - Environmental
9331 48th St
Edmonton, AB
T6B 2R4

Report Date: 2016/09/07
Report #: R4156873
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6I4865
Received: 2016/08/30, 10:45

Sample Matrix: Soil
Samples Received: 64

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Moisture	64	N/A	2016/09/02	CAM SOP-00445	Carter 2nd ed 51.2 m
Polychlorinated Biphenyl in Soil	23	2016/09/01	2016/09/02	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Soil	1	2016/09/01	2016/09/03	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Soil	20	2016/09/01	2016/09/04	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Soil	20	2016/09/02	2016/09/03	CAM SOP-00309	EPA 8082A m

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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5806
==========
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 #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB890	CZB891		CZB892		
Sampling Date		2016/08/21 13:35	2016/08/21 13:40		2016/08/21 14:50		
COC Number		na	na		na		
	UNITS	PJ3995-02R/16-C4-BMW-1A	PJ3996-02R/16-C4-BMW-1B	QC Batch	PJ3997-02R/16-C4-MW-1A	RDL	QC Batch
Inorganics							
Moisture	%	38	15	4646426	5.0	1.0	4646903

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB893	CZB894		CZB895		
Sampling Date		2016/08/21 14:55	2016/08/21 15:10		2016/08/21 15:15		
COC Number		na	na		na		
	UNITS	PJ3998-02R/16-C4-MW-1B	PJ3999-02R/16-C4-MW-2A	QC Batch	PJ4000-02R/16-C4-MW-2B	RDL	QC Batch
Inorganics							
Moisture	%	6.1	11	4646426	12	1.0	4646903

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB896		CZB897		
Sampling Date		2016/08/21 14:10		2016/08/21 14:15		
COC Number		na		na		
	UNITS	PJ4001-02R/16-C4-MW-3A	QC Batch	PJ4002-02R/16-C4-MW-3B	RDL	QC Batch
Inorganics						
Moisture	%	15	4646903	10	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB898	CZB899	CZB900		
Sampling Date		2016/08/21 14:40	2016/08/21 14:45	2016/08/21 15:30		
COC Number		na	na	na		
	UNITS	PJ4003-02R/16-C4-MW-4AA	PJ4004-02R/16-C4-MW-4AB	PJ4019-02R/16-C4-MW-6AA	RDL	QC Batch
Inorganics						
Moisture	%	6.9	7.7	9.8	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB901		CZB902	CZB903		
Sampling Date		2016/08/21 15:35		2016/08/22 15:05	2016/08/22 15:10		
COC Number		na		na	na		
	UNITS	PJ4020-02R/16-C4-MW-6AB	QC Batch	PJ4021-02R/16-C4-MW-7AA	PJ4022-02R/16-C4-MW-7AB	RDL	QC Batch
Inorganics							
Moisture	%	11	4646426	18	13	1.0	4646903

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB904		CZB905		
Sampling Date		2016/08/20 16:30		2016/08/20 16:35		
COC Number		na		na		
	UNITS	PJ4023-02R/16-C4-MW-5A	QC Batch	PJ4024-02R/16-C4-MW-5B	RDL	QC Batch
Inorganics						
Moisture	%	8.0	4646426	14	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB906		CZB907		
Sampling Date		2016/08/21 11:30		2016/08/21 11:35		
COC Number		na		na		
	UNITS	PJ4025-02R/16-C4-MW-8A	QC Batch	PJ4026-02R/16-C4-MW-8B	RDL	QC Batch
Inorganics						
Moisture	%	12	4646426	10	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB908	CZB909		CZB910		
Sampling Date		2016/08/21 10:20	2016/08/21 10:25		2016/08/20 14:50		
COC Number		na	na		na		
	UNITS	PJ4027-02R/16-C4-MW-9A	PJ4028-02R/16-C4-MW-9B	QC Batch	PJ4029-02R/16-C4-MW-14AA	RDL	QC Batch
Inorganics							
Moisture	%	11	10	4646426	24	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB911		CZB912		CZB913		
Sampling Date		2016/08/20 14:55		2016/08/21 12:05		2016/08/21 12:10		
COC Number		na		na		na		
	UNITS	PJ4030-02R/16-C4-MW-14AB	QC Batch	PJ4031-02R/16-C4-MW-15A	QC Batch	PJ4032-02R/16-C4-MW-15B	RDL	QC Batch
Inorganics								
Moisture	%	15	4646597	9.0	4646903	12	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB914		CZB915	CZB916		
Sampling Date		2016/08/21		2016/08/21	2016/08/22 15:40		
COC Number		na		na	na		
	UNITS	PJ4033-02R/16-C4-MW-16A	QC Batch	PJ4034-02R/16-C4-MW-16B	PJ4035-02R/16-C4-MW-10A	RDL	QC Batch
Inorganics							
Moisture	%	60	4646597	12	4.0	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB917	CZB918		CZB919		
Sampling Date		2016/08/22 15:45	2016/08/20 16:00		2016/08/20 16:05		
COC Number		na	na		na		
	UNITS	PJ4036-02R/16-C4-MW-10B	PJ4037-02R/16-C4-MW-11A	QC Batch	PJ4038-02R/16-C4-MW-11B	RDL	QC Batch
Inorganics							
Moisture	%	6.5	14	4646903	11	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB920	CZB921	CZB922		
Sampling Date		2016/08/22 15:55	2016/08/22 16:00	2016/08/22 16:20		
COC Number		na	na	na		
	UNITS	PJ4039-02R/16-C4-MW-12A	PJ4040-02R/16-C4-MW-12B	PJ4041-02R/16-C4-MW-13A	RDL	QC Batch
Inorganics						
Moisture	%	9.6	17	11	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB923	CZB924		CZB925		
Sampling Date		2016/08/22 16:25	2016/08/21 17:15		2016/08/21 17:20		
COC Number		na	na		na		
	UNITS	PJ4042-02R/16-C4-MW-13B	PJ4043-02R/16-C4-MW-21A	QC Batch	PJ4044-02R/16-C4-MW-21B	RDL	QC Batch
Inorganics							
Moisture	%	12	6.2	4646426	8.2	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB926		CZB927	CZB928		
Sampling Date		2016/08/22 11:35		2016/08/22 11:40	2016/08/21 16:20		
COC Number		na		na	na		
	UNITS	PJ4045-02R/16-C4-MW-22A	QC Batch	PJ4046-02R/16-C4-MW-22B	PJ4047-02R/16-C4-MW-23A	RDL	QC Batch
Inorganics							
Moisture	%	3.2	4646597	5.1	6.0	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB929	CZB930		CZB931		
Sampling Date		2016/08/21 16:25	2016/08/22 09:55		2016/08/22 10:00		
COC Number		na	na		na		
	UNITS	PJ4048-02R/16-C4-MW-23B	PJ4049-02R/16-C4-MW-17A	QC Batch	PJ4050-02R/16-C4-MW-17B	RDL	QC Batch
Inorganics							
Moisture	%	6.2	11	4646597	13	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB932	CZB933		CZB934		
Sampling Date		2016/08/22 10:10	2016/08/22 10:15		2016/08/22 10:30		
COC Number		na	na		na		
	UNITS	PJ4051-02R/16-C4-MW-18A	PJ4052-02R/16-C4-MW-18B	QC Batch	PJ4053-02R/16-C4-MW-19A	RDL	QC Batch
Inorganics							
Moisture	%	12	12	4646597	11	1.0	4646426

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB935		CZB936		CZB937		
Sampling Date		2016/08/22 10:35		2016/08/21 16:45		2016/08/21 16:50		
COC Number		na		na		na		
	UNITS	PJ4054-02R/16-C4-MW-19B	QC Batch	PJ4055-02R/16-C4-MW-20A	QC Batch	PJ4056-02R/16-C4-MW-20B	RDL	QC Batch
Inorganics								
Moisture	%	9.6	4646597	5.8	4646426	5.7	1.0	4646597

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB938	CZB939	CZB940	CZB941		
Sampling Date		2016/08/22 13:30	2016/08/22 13:35	2016/08/22 10:50	2016/08/22 10:55		
COC Number		na	na	na	na		
	UNITS	PJ4057-02R/16-C4-1A	PJ4058-02R/16-C4-1B	PJ4059-02R/16-C4-2A	PJ4060-02R/16-C4-2B	RDL	QC Batch
Inorganics							
Moisture	%	3.6	2.1	8.3	10	1.0	4646130

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB942	CZB943	CZB944	CZB945		
Sampling Date		2016/08/22 12:20	2016/08/22 12:25	2016/08/20 14:20	2016/08/20 14:25		
COC Number		na	na	na	na		
	UNITS	PJ4061-02R/16-C4-3A	PJ4062-02R/16-C4-3B	PJ4063-02R/16-C4-BMW-3A	PJ4064-02R/16-C4-BMW-3B	RDL	QC Batch
Inorganics							
Moisture	%	12	10	16	8.4	1.0	4646130

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB946	CZB947	CZB948	CZB949		
Sampling Date		2016/08/21 10:55	2016/08/21 11:00	2016/08/21 10:20	2016/08/21 14:10		
COC Number		na	na	na	na		
	UNITS	PJ4065-02R/16-C4-BMW-4A	PJ4066-02R/16-C4-BMW-4B	PJ4067-02R/16-C4-DUP1	PJ4068-02R/16-C4-DUP2	RDL	QC Batch
Inorganics							
Moisture	%	5.0	5.3	17	13	1.0	4646130

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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 #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

RESULTS OF ANALYSES OF SOIL

Maxxam ID		CZB950	CZB951	CZB952		
Sampling Date		2016/08/21 16:45	2016/08/21 14:40	2016/08/22 10:55		
COC Number		na	na	na		
	UNITS	PJ4069-02R/16-C4-DUP3	PJ4070-02R/16-C4-DUP4	PJ4071-02R/16-C4-DUP5	RDL	QC Batch
Inorganics						
Moisture	%	6.3	6.0	5.5	1.0	4646130

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB953		
Sampling Date		2016/08/22 11:35		
COC Number		na		
	UNITS	PJ4072-02R/16-C4-DUP6	RDL	QC Batch
Inorganics				
Moisture	%	2.9	1.0	4646130

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB890		CZB891	CZB892		
Sampling Date		2016/08/21 13:35		2016/08/21 13:40	2016/08/21 14:50		
COC Number		na		na	na		
	UNITS	PJ3995-02R/16-C4-BMW-1A	RDL	PJ3996-02R/16-C4-BMW-1B	PJ3997-02R/16-C4-MW-1A	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1221	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1232	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1242	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1248	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1254	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1260	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1262	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Aroclor 1268	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Total PCB	ug/g	<0.020	0.020	<0.010	<0.010	0.010	4644833
Surrogate Recovery (%)							
Decachlorobiphenyl	%	77		77	82		4644833

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB893	CZB894		CZB895		
Sampling Date		2016/08/21 14:55	2016/08/21 15:10		2016/08/21 15:15		
COC Number		na	na		na		
	UNITS	PJ3998-02R/16-C4-MW-1B	PJ3999-02R/16-C4-MW-2A	QC Batch	PJ4000-02R/16-C4-MW-2B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4644796
Surrogate Recovery (%)							
Decachlorobiphenyl	%	80	74	4644833	98		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB896	CZB897		CZB898		
Sampling Date		2016/08/21 14:10	2016/08/21 14:15		2016/08/21 14:40		
COC Number		na	na		na		
	UNITS	PJ4001-02R/16-C4-MW-3A	PJ4002-02R/16-C4-MW-3B	QC Batch	PJ4003-02R/16-C4-MW-4AA	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1221	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1232	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1242	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1248	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1254	ug/g	0.013	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1260	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1262	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Aroclor 1268	ug/g	<0.010	<0.010	4644796	<0.010	0.010	4644833
Total PCB	ug/g	0.013	<0.010	4644796	<0.010	0.010	4644833
Surrogate Recovery (%)							
Decachlorobiphenyl	%	94	90	4644796	81		4644833

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB899	CZB900		CZB901		
Sampling Date		2016/08/21 14:45	2016/08/21 15:30		2016/08/21 15:35		
COC Number		na	na		na		
	UNITS	PJ4004-02R/16-C4-MW-4AB	PJ4019-02R/16-C4-MW-6AA	QC Batch	PJ4020-02R/16-C4-MW-6AB	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1221	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1232	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1242	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1248	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1254	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1260	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1262	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1268	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Total PCB	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Surrogate Recovery (%)							
Decachlorobiphenyl	%	81	75	4644833	88		4645354

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB902		CZB903	CZB904		
Sampling Date		2016/08/22 15:05		2016/08/22 15:10	2016/08/20 16:30		
COC Number		na		na	na		
	UNITS	PJ4021-02R/16-C4-MW-7AA	QC Batch	PJ4022-02R/16-C4-MW-7AB	PJ4023-02R/16-C4-MW-5A	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Surrogate Recovery (%)							
Decachlorobiphenyl	%	81	4644833	102	95		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB905		CZB906		
Sampling Date		2016/08/20 16:35		2016/08/21 11:30		
COC Number		na		na		
	UNITS	PJ4024-02R/16-C4-MW-5B	QC Batch	PJ4025-02R/16-C4-MW-8A	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	4644796	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	4644796	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	4644796	<0.010	0.010	4646407
Surrogate Recovery (%)						
Decachlorobiphenyl	%	93	4644796	87		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB907	CZB908	CZB909		
Sampling Date		2016/08/21 11:35	2016/08/21 10:20	2016/08/21 10:25		
COC Number		na	na	na		
	UNITS	PJ4026-02R/16-C4-MW-8B	PJ4027-02R/16-C4-MW-9A	PJ4028-02R/16-C4-MW-9B	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Total PCB	ug/g	<0.010	<0.010	<0.010	0.010	4644833
Surrogate Recovery (%)						
Decachlorobiphenyl	%	83	80	79		4644833

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB910	CZB911	CZB912	CZB913		
Sampling Date		2016/08/20 14:50	2016/08/20 14:55	2016/08/21 12:05	2016/08/21 12:10		
COC Number		na	na	na	na		
	UNITS	PJ4029-02R/16-C4-MW-14AA	PJ4030-02R/16-C4-MW-14AB	PJ4031-02R/16-C4-MW-15A	PJ4032-02R/16-C4-MW-15B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4644796
Surrogate Recovery (%)							
Decachlorobiphenyl	%	95	94	88	98		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB914			CZB915	CZB916		
Sampling Date		2016/08/21			2016/08/21	2016/08/22 15:40		
COC Number		na			na	na		
	UNITS	PJ4033-02R/16-C4-MW-16A	RDL	QC Batch	PJ4034-02R/16-C4-MW-16B	PJ4035-02R/16-C4-MW-10A	RDL	QC Batch
PCBs								
Aroclor 1016	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1221	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1232	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1242	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1248	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1254	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1260	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1262	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Aroclor 1268	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Total PCB	ug/g	<0.030	0.030	4645354	<0.010	<0.010	0.010	4644833
Surrogate Recovery (%)								
Decachlorobiphenyl	%	95		4645354	79	79		4644833

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB917		CZB918	CZB919		
Sampling Date		2016/08/22 15:45		2016/08/20 16:00	2016/08/20 16:05		
COC Number		na		na	na		
	UNITS	PJ4036-02R/16-C4-MW-10B	QC Batch	PJ4037-02R/16-C4-MW-11A	PJ4038-02R/16-C4-MW-11B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	4644833	0.015	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	4644833	0.015	<0.010	0.010	4644796
Surrogate Recovery (%)							
Decachlorobiphenyl	%	73	4644833	87	88		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB920		CZB921			CZB922		
Sampling Date		2016/08/22 15:55		2016/08/22 16:00			2016/08/22 16:20		
COC Number		na		na			na		
	UNITS	PJ4039-02R/16-C4-MW-12A	RDL	PJ4040-02R/16-C4-MW-12B	RDL	QC Batch	PJ4041-02R/16-C4-MW-13A	RDL	QC Batch
PCBs									
Aroclor 1016	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	0.010	<0.030	0.030	4644796	<0.010	0.010	4646407
Surrogate Recovery (%)									
Decachlorobiphenyl	%	86		96		4644796	87		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB923	CZB924		CZB925		
Sampling Date		2016/08/22 16:25	2016/08/21 17:15		2016/08/21 17:20		
COC Number		na	na		na		
	UNITS	PJ4042-02R/16-C4-MW-13B	PJ4043-02R/16-C4-MW-21A	QC Batch	PJ4044-02R/16-C4-MW-21B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1221	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1232	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1242	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1248	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1254	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1260	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1262	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Aroclor 1268	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Total PCB	ug/g	<0.010	<0.010	4644833	<0.010	0.010	4645354
Surrogate Recovery (%)							
Decachlorobiphenyl	%	81	72	4644833	79		4645354

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB926		CZB927	CZB928		
Sampling Date		2016/08/22 11:35		2016/08/22 11:40	2016/08/21 16:20		
COC Number		na		na	na		
	UNITS	PJ4045-02R/16-C4-MW-22A	QC Batch	PJ4046-02R/16-C4-MW-22B	PJ4047-02R/16-C4-MW-23A	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	4644833	<0.010	<0.010	0.010	4644796
Surrogate Recovery (%)							
Decachlorobiphenyl	%	77	4644833	91	85		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB929		CZB930	CZB931		
Sampling Date		2016/08/21 16:25		2016/08/22 09:55	2016/08/22 10:00		
COC Number		na		na	na		
	UNITS	PJ4048-02R/16-C4-MW-23B	QC Batch	PJ4049-02R/16-C4-MW-17A	PJ4050-02R/16-C4-MW-17B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	4644796	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)							
Decachlorobiphenyl	%	89	4644796	83	88		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB932		CZB933		CZB934		
Sampling Date		2016/08/22 10:10		2016/08/22 10:15		2016/08/22 10:30		
COC Number		na		na		na		
	UNITS	PJ4051-02R/16-C4-MW-18A	QC Batch	PJ4052-02R/16-C4-MW-18B	QC Batch	PJ4053-02R/16-C4-MW-19A	RDL	QC Batch
PCBs								
Aroclor 1016	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1221	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1232	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1242	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1248	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1254	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1260	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1262	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Aroclor 1268	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Total PCB	ug/g	<0.010	4644833	<0.010	4645354	<0.010	0.010	4644833
Surrogate Recovery (%)								
Decachlorobiphenyl	%	88	4644833	98	4645354	84		4644833

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB935	CZB936	CZB937		
Sampling Date		2016/08/22 10:35	2016/08/21 16:45	2016/08/21 16:50		
COC Number		na	na	na		
	UNITS	PJ4054-02R/16-C4-MW-19B	PJ4055-02R/16-C4-MW-20A	PJ4056-02R/16-C4-MW-20B	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Total PCB	ug/g	<0.010	<0.010	<0.010	0.010	4644796
Surrogate Recovery (%)						
Decachlorobiphenyl	%	92	88	89		4644796

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB938	CZB939	CZB940	CZB941		
Sampling Date		2016/08/22 13:30	2016/08/22 13:35	2016/08/22 10:50	2016/08/22 10:55		
COC Number		na	na	na	na		
	UNITS	PJ4057-02R/16-C4-1A	PJ4058-02R/16-C4-1B	PJ4059-02R/16-C4-2A	PJ4060-02R/16-C4-2B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)							
Decachlorobiphenyl	%	86	82	92	83		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB942	CZB943	CZB944	CZB945		
Sampling Date		2016/08/22 12:20	2016/08/22 12:25	2016/08/20 14:20	2016/08/20 14:25		
COC Number		na	na	na	na		
	UNITS	PJ4061-02R/16-C4-3A	PJ4062-02R/16-C4-3B	PJ4063-02R/16-C4-BMW-3A	PJ4064-02R/16-C4-BMW-3B	RDL	QC Batch
PCBs							
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)							
Decachlorobiphenyl	%	82	89	91	87		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB946	CZB947	CZB948		
Sampling Date		2016/08/21 10:55	2016/08/21 11:00	2016/08/21 10:20		
COC Number		na	na	na		
	UNITS	PJ4065-02R/16-C4-BMW-4A	PJ4066-02R/16-C4-BMW-4B	PJ4067-02R/16-C4-DUP1	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)						
Decachlorobiphenyl	%	86	89	90		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		CZB949	CZB950	CZB951		
Sampling Date		2016/08/21 14:10	2016/08/21 16:45	2016/08/21 14:40		
COC Number		na	na	na		
	UNITS	PJ4068-02R/16-C4-DUP2	PJ4069-02R/16-C4-DUP3	PJ4070-02R/16-C4-DUP4	RDL	QC Batch
PCBs						
Aroclor 1016	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)						
Decachlorobiphenyl	%	86	90	91		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		CZB952	CZB953		
Sampling Date		2016/08/22 10:55	2016/08/22 11:35		
COC Number		na	na		
	UNITS	PJ4071-02R/16-C4-DUP5	PJ4072-02R/16-C4-DUP6	RDL	QC Batch
PCBs					
Aroclor 1016	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1221	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1232	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1242	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1248	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1254	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1260	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1262	ug/g	<0.010	<0.010	0.010	4646407
Aroclor 1268	ug/g	<0.010	<0.010	0.010	4646407
Total PCB	ug/g	<0.010	<0.010	0.010	4646407
Surrogate Recovery (%)					
Decachlorobiphenyl	%	90	85		4646407

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

GENERAL COMMENTS

Sample CZB890-01 : PCB Analysis: Detection limits were adjusted for high moisture content.

Sample CZB914-01 : PCB Analysis: Detection limits were adjusted for high moisture content.

Sample CZB921-01 : PCB Analysis: Detection Limit was raised due to matrix interferences.

Results relate only to the items tested.

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Maxxam Job #: B6I4865
Report Date: 2016/09/07

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
4644796	Decachlorobiphenyl	2016/09/02	88	60 - 130	91	60 - 130	90	%		
4644833	Decachlorobiphenyl	2016/09/04	82	60 - 130	84	60 - 130	79	%		
4645354	Decachlorobiphenyl	2016/09/02	73	60 - 130	77	60 - 130	73	%		
4646407	Decachlorobiphenyl	2016/09/03	88	60 - 130	81	60 - 130	82	%		
4644796	Aroclor 1016	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1221	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1232	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1242	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1248	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1254	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1260	2016/09/02	87	60 - 130	90	60 - 130	<0.010	ug/g	NC	50
4644796	Aroclor 1262	2016/09/02					<0.010	ug/g	NC	50
4644796	Aroclor 1268	2016/09/02					<0.010	ug/g	NC	50
4644796	Total PCB	2016/09/02	87	60 - 130	90	60 - 130	<0.010	ug/g	NC	50
4644833	Aroclor 1016	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1221	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1232	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1242	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1248	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1254	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1260	2016/09/04	83	60 - 130	85	60 - 130	<0.010	ug/g	NC	50
4644833	Aroclor 1262	2016/09/04					<0.010	ug/g	NC	50
4644833	Aroclor 1268	2016/09/04					<0.010	ug/g	NC	50
4644833	Total PCB	2016/09/04	83	60 - 130	85	60 - 130	<0.010	ug/g	NC	50
4645354	Aroclor 1016	2016/09/02					<0.010	ug/g		
4645354	Aroclor 1221	2016/09/02					<0.010	ug/g		
4645354	Aroclor 1232	2016/09/02					<0.010	ug/g		
4645354	Aroclor 1242	2016/09/02					<0.010	ug/g	NC	50
4645354	Aroclor 1248	2016/09/02					<0.010	ug/g	NC	50
4645354	Aroclor 1254	2016/09/02					<0.010	ug/g	NC	50
4645354	Aroclor 1260	2016/09/02	74	60 - 130	78	60 - 130	<0.010	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
4645354	Aroclor 1262	2016/09/02					<0.010	ug/g		
4645354	Aroclor 1268	2016/09/02					<0.010	ug/g		
4645354	Total PCB	2016/09/02	74	60 - 130	78	60 - 130	<0.010	ug/g	NC	50
4646130	Moisture	2016/09/02							NC	20
4646407	Aroclor 1016	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1221	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1232	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1242	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1248	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1254	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1260	2016/09/03	84	60 - 130	82	60 - 130	<0.010	ug/g	NC	50
4646407	Aroclor 1262	2016/09/03					<0.010	ug/g	NC	50
4646407	Aroclor 1268	2016/09/03					<0.010	ug/g	NC	50
4646407	Total PCB	2016/09/03	84	60 - 130	82	60 - 130	<0.010	ug/g	NC	50
4646426	Moisture	2016/09/02							0	20
4646597	Moisture	2016/09/02							2.6	20
4646903	Moisture	2016/09/02							3.0	20

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

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

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

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

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

NC (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 (one or both samples < 5x RDL).

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Maxxam Analytics
Client Project #: B673300
Your P.O. #: N/A

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 Services

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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30-Aug-16 10:45
Andrea Rieth
B6I4865
GK1 ? ENV-667

ARCADIS Canada - OTTAWA
Maxxam PM Parminder Virk

To: Maxxam Ontario (From Edmonton)

Job# B673300

Yes X No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)

Yes X No Special Protocol (if yes, Protocol _____)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
PJ3995-02R\16-C4-BMW-1A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 13:35	2016/09/06
PJ3996-02R\16-C4-BMW-1B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 13:40	2016/09/06
PJ3997-02R\16-C4-MW-1A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 14:50	2016/09/06
PJ3998-02R\16-C4-MW-1B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 14:55	2016/09/06
PJ3999-02R\16-C4-MW-2A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 15:10	2016/09/06
PJ4000-02R\16-C4-MW-2B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 15:15	2016/09/06
PJ4001-02R\16-C4-MW-3A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:10	2016/09/06
PJ4002-02R\16-C4-MW-3B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:15	2016/09/06
PJ4003-02R\16-C4-MW-4AA	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:40	2016/09/06
PJ4004-02R\16-C4-MW-4AB	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:45	2016/09/06
PJ4019-02R\16-C4-MW-6AA	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 15:30	2016/09/06
PJ4020-02R\16-C4-MW-6AB	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 15:35	2016/09/06
PJ4021-02R\16-C4-MW-7AA	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 15:05	2016/09/06
PJ4022-02R\16-C4-MW-7AB	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 15:10	2016/09/06
PJ4023-02R\16-C4-MW-5A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 16:30	2016/09/06
PJ4024-02R\16-C4-MW-5B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 16:35	2016/09/06
PJ4025-02R\16-C4-MW-8A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 11:30	2016/09/06
PJ4026-02R\16-C4-MW-8B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 11:35	2016/09/06
PJ4027-02R\16-C4-MW-9A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 10:20	2016/09/06
PJ4028-02R\16-C4-MW-9B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 10:25	2016/09/06
PJ4029-02R\16-C4-MW-14AA	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 14:50	2016/09/06
PJ4030-02R\16-C4-MW-14AB	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 14:55	2016/09/06
PJ4031-02R\16-C4-MW-15A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 12:05	2016/09/06
PJ4032-02R\16-C4-MW-15B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 12:10	2016/09/06
PJ4033-02R\16-C4-MW-16A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21	2016/09/06
PJ4034-02R\16-C4-MW-16B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21	2016/09/06
PJ4035-02R\16-C4-MW-10A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 15:40	2016/09/06
PJ4036-02R\16-C4-MW-10B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 15:45	2016/09/06
PJ4037-02R\16-C4-MW-11A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 16:00	2016/09/06
PJ4038-02R\16-C4-MW-11B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 16:05	2016/09/06
PJ4039-02R\16-C4-MW-12A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 15:55	2016/09/06
PJ4040-02R\16-C4-MW-12B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 16:00	2016/09/06
PJ4041-02R\16-C4-MW-13A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 16:20	2016/09/06
PJ4042-02R\16-C4-MW-13B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 16:25	2016/09/06
PJ4043-02R\16-C4-MW-21A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 17:15	2016/09/06

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Maxxam PM Parminder Virk

SUBCONTRACTING REQUEST FORM

PJ4044-02R\16-C4-MW-21B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 17:20	2016/09/06
PJ4045-02R\16-C4-MW-22A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 11:35	2016/09/06
PJ4046-02R\16-C4-MW-22B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 11:40	2016/09/06
PJ4047-02R\16-C4-MW-23A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 16:20	2016/09/06
PJ4048-02R\16-C4-MW-23B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 16:25	2016/09/06
PJ4049-02R\16-C4-MW-17A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 09:55	2016/09/06
PJ4050-02R\16-C4-MW-17B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:00	2016/09/06
PJ4051-02R\16-C4-MW-18A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:10	2016/09/06
PJ4052-02R\16-C4-MW-18B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:15	2016/09/06
PJ4053-02R\16-C4-MW-19A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:30	2016/09/06
PJ4054-02R\16-C4-MW-19B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:35	2016/09/06
PJ4055-02R\16-C4-MW-20A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 16:45	2016/09/06
PJ4056-02R\16-C4-MW-20B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 16:50	2016/09/06
PJ4057-02R\16-C4-1A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 13:30	2016/09/06
PJ4058-02R\16-C4-1B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 13:35	2016/09/06
PJ4059-02R\16-C4-2A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:50	2016/09/06
PJ4060-02R\16-C4-2B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:55	2016/09/06
PJ4061-02R\16-C4-3A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 12:20	2016/09/06
PJ4062-02R\16-C4-3B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 12:25	2016/09/06
PJ4063-02R\16-C4-BMW-3A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 14:20	2016/09/06
PJ4064-02R\16-C4-BMW-3B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/20 14:25	2016/09/06
PJ4065-02R\16-C4-BMW-4A	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 10:55	2016/09/06
PJ4066-02R\16-C4-BMW-4B	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 11:00	2016/09/06
PJ4067-02R\16-C4-DUP1	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 10:20	2016/09/06
PJ4068-02R\16-C4-DUP2	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:10	2016/09/06
PJ4069-02R\16-C4-DUP3	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 16:45	2016/09/06
PJ4070-02R\16-C4-DUP4	S	PCB in Soil - Subcontract	1-EOR2	2016/08/21 14:40	2016/09/06
PJ4071-02R\16-C4-DUP5	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 10:55	2016/09/06
PJ4072-02R\16-C4-DUP6	S	PCB in Soil - Subcontract	1-EOR2	2016/08/22 11:35	2016/09/06

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	3	7	7	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #2	8	3	4	Custody Seal Present	YES ✓	NO
				Custody Seal Intact	YES ✓	NO
				Ice Present Upon Receipt	YES ✓	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

64 Jars
DMG

Receiving Maxxam Location: Maxxam Ontario (From Edmonton) JOB # B673300

MAXXAM ANALYTICS
9331 - 48th Street
Edmonton, Alberta, T6B 2R4
(780) 577-7100
(780) 450-4187

Maxxam
A Bureau Veritas Group Company

ARCADIS Canada - OTTAWA
Maxxam PM Parminder Virk

SUBCONTRACTING REQUEST FORM

Relinquished by (Sign) _____ (print) DEJI WU Date and Time 2016/08/27 09:45

Received by (Sign) _____ (print) RAJMEET KAUR Date and Time 2016/08/30 10:45

NOTES:

1) Please call us if due date cannot be met. Please reference Sample ID on your report.
2) Include copy of this completed form, Client COC & signed final report to

Reporting Requirements:

National:

Regional:

Shipping Instructions

- Ship Immediately (highlight Yellow)
- Requires 9am
- Requires Sat. Delivery
- Regular Ship next available day
- Ship Cold
- Ship Room Temp
- Ship Frozen
- COC Must be Attached

Sender (Print) _____ Initial _____

Shipping Department Checklist

- Correct Shipping location
- Correct Sample Ids (Paperwork vs Bottles)
- Yes No Special-Cooler, Ice, Tape-custody seal, Date&Sign

Date Shipped _____ Number of coolers _____
Shipper (Print) _____ Initial _____

[redacted]

ARCADIS Canada Inc. - Ottawa
ATTN: Stephen Borcsok
121 Granton Drive
Richmond ON L4B3N4

Date Received: 29-AUG-16
Report Date: 07-SEP-16 15:10 (MT)
Version: FINAL

Client Phone: 905-882-5984

Certificate of Analysis

Lab Work Order #: L1820488

Project P.O. #: NOT SUBMITTED
Job Reference: 102012-000
C of C Numbers: 10-366453
Legal Site Desc:

[redacted]

Emerson Perez, B.S.E
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

[redacted]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-1 16-C4-MW-9A Sampled By: SB on 21-AUG-16 @ 10:20 Matrix: soil							
Physical Tests							
% Moisture	11.3		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	2.37		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.042		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	14.8		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	6.71		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	8.48		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	7.12		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0401		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	8.74		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	40.9		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	104.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	114.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	110.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	32		20	mg/kg		01-SEP-16	
F4 (C34-C50)	<20		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	32		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	84.2		70-130	%	30-AUG-16	30-AUG-16	R3538173
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	0.012		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	75.8		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-1 16-C4-MW-9A Sampled By: SB on 21-AUG-16 @ 10:20 Matrix: soil							
Polychlorinated Biphenyls							
L1820488-2 16-C4-MW-3A Sampled By: SB on 21-AUG-16 @ 14:10 Matrix: soil							
Physical Tests							
% Moisture	12.9		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	1.73		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.028		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	22.0		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	6.06		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	9.63		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	6.14		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0345		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	12.0		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	37.0		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	89.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	97.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	94.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	36		20	mg/kg		01-SEP-16	
F4 (C34-C50)	27		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	63		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	74.5		70-130	%	30-AUG-16	30-AUG-16	R3538173
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-2 16-C4-MW-3A Sampled By: SB on 21-AUG-16 @ 14:10 Matrix: soil							
Polychlorinated Biphenyls							
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	95.9		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062
L1820488-3 16-C4-MW-4AA Sampled By: SB on 21-AUG-16 @ 14:40 Matrix: soil							
Physical Tests							
% Moisture	6.49		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	0.78		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.024		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	8.57		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	2.69		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	3.42		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	3.32		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0256		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	4.68		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	17.5		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	113.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	125.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	121.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	<20		20	mg/kg		01-SEP-16	
F4 (C34-C50)	<20		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	<20		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	87.6		70-130	%	30-AUG-16	30-AUG-16	R3538173
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-3 16-C4-MW-4AA Sampled By: SB on 21-AUG-16 @ 14:40 Matrix: soil							
Polychlorinated Biphenyls							
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	100.0		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062
L1820488-4 16-C4-MW-20A Sampled By: SB on 21-AUG-16 @ 16:45 Matrix: soil							
Physical Tests							
% Moisture	4.85		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	2.07		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.037		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	14.5		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	5.17		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	7.27		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	6.48		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0233		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	8.76		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	33.7		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	92.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	102.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	95.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	<20		20	mg/kg		01-SEP-16	
F4 (C34-C50)	<20		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	<20		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	87.9		70-130	%	30-AUG-16	30-AUG-16	R3538173

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-4 16-C4-MW-20A Sampled By: SB on 21-AUG-16 @ 16:45 Matrix: soil							
Hydrocarbons							
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	115.0		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062
L1820488-5 16-C4-BMW-4A Sampled By: SB on 22-AUG-16 @ 10:55 Matrix: soil							
Physical Tests							
% Moisture	5.60		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	1.01		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.027		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	15.1		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	4.39		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	4.95		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	3.75		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0208		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	8.77		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	19.8		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	94.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	104.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	95.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	24		20	mg/kg		01-SEP-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-5 16-C4-BMW-4A Sampled By: SB on 22-AUG-16 @ 10:55 Matrix: soil							
Hydrocarbons							
F4 (C34-C50)	<20		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	24		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	79.4		70-130	%	30-AUG-16	30-AUG-16	R3538173
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	99.8		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062
L1820488-6 16-C4-MW-22A Sampled By: SB on 22-AUG-16 @ 11:35 Matrix: soil							
Physical Tests							
% Moisture	1.78		0.50	%		30-AUG-16	R3537775
Metals							
Arsenic (As)	1.62		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cadmium (Cd)	0.030		0.020	mg/kg	01-SEP-16	02-SEP-16	R3539852
Chromium (Cr)	8.85		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Cobalt (Co)	3.28		0.10	mg/kg	01-SEP-16	02-SEP-16	R3539852
Copper (Cu)	6.81		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Lead (Pb)	6.66		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Mercury (Hg)	0.0149		0.0050	mg/kg	01-SEP-16	01-SEP-16	R3539037
Nickel (Ni)	6.66		0.50	mg/kg	01-SEP-16	02-SEP-16	R3539852
Zinc (Zn)	19.8		2.0	mg/kg	01-SEP-16	02-SEP-16	R3539852
Volatile Organic Compounds							
Benzene	<0.0050		0.0050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Ethylbenzene	<0.015		0.015	mg/kg	30-AUG-16	31-AUG-16	R3534386
Toluene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
o-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
m+p-Xylene	<0.050		0.050	mg/kg	30-AUG-16	31-AUG-16	R3534386
Xylenes	<0.10		0.10	mg/kg	30-AUG-16	31-AUG-16	R3534386
Surrogate: 4-Bromofluorobenzene (SS)	108.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 3,4-Dichlorotoluene (SS)	124.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Surrogate: 1,4-Difluorobenzene (SS)	112.0		70-130	%	30-AUG-16	31-AUG-16	R3534386
Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820488-6 16-C4-MW-22A Sampled By: SB on 22-AUG-16 @ 11:35 Matrix: soil							
Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		01-SEP-16	
F1-BTEX	<10		10	mg/kg		01-SEP-16	
F2 (C10-C16)	<20		20	mg/kg		01-SEP-16	
F3 (C16-C34)	<20		20	mg/kg		01-SEP-16	
F4 (C34-C50)	<20		20	mg/kg		01-SEP-16	
Total Hydrocarbons (C6-C50)	<20		20	mg/kg		01-SEP-16	
Chrom. to baseline at nC50	YES				30-AUG-16	30-AUG-16	R3538173
Surrogate: 2-Bromobenzotrifluoride	89.3		70-130	%	30-AUG-16	30-AUG-16	R3538173
Polychlorinated Biphenyls							
Aroclor 1016	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1221	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1232	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1242	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1248	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1254	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1260	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1262	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Aroclor 1268	<0.010		0.010	mg/kg		01-SEP-16	R3540062
Surrogate: Decachlorobiphenyl	89.6		65-130	%		01-SEP-16	R3540062
Total PCBs	<0.050		0.050	mg/kg		01-SEP-16	R3540062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX,F1-ED	Soil	BTEX and F1 (C6-C10)	CCME CWS-PHC, Pub #1310, Dec 2001
ETL-TVH,TEH-CCME-ED	Soil	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F2-4-TMB-ED	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

F2-4-TMB-ED
This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment" For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

HG-200.2-CVAA-ED	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (Mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

MET-200.2-CCMS-ED	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction. depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.

PCB-ED	Soil	PCBs	EPA 3570/8082-GC-ECD
PREP-MOISTURE-ED	Soil	% Moisture	Oven dry 105C-Gravimetric

The weighed portion of soil is placed in a 105°C oven to dry to a constant weight; the drying time will vary based on the moisture content of the soil. The dried soil weight is then used to calculate % moisture.

Reference: ASTM D2974-00.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Reference Information

ED ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

10-366453

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Soil**							
Batch R3534386								
WG2378631-4 DUP		**L1820488-5**						
Benzene		<0.0050	<0.0050	RPD-NA	mg/kg	N/A	40	31-AUG-16
Toluene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	31-AUG-16
Ethylbenzene		<0.015	<0.015	RPD-NA	mg/kg	N/A	40	31-AUG-16
o-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	31-AUG-16
m+p-Xylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	40	31-AUG-16
F1(C6-C10)		<10	<10	RPD-NA	mg/kg	N/A	40	31-AUG-16
WG2378631-2 LCS								
Benzene			90.0		%		70-130	31-AUG-16
Toluene			89.5		%		70-130	31-AUG-16
Ethylbenzene			91.2		%		70-130	31-AUG-16
o-Xylene			88.9		%		70-130	31-AUG-16
m+p-Xylene			92.6		%		70-130	31-AUG-16
WG2378631-3 LCS								
F1(C6-C10)			91.8		%		70-130	31-AUG-16
WG2378631-1 MB								
Benzene			<0.0050		mg/kg		0.005	31-AUG-16
Toluene			<0.050		mg/kg		0.05	31-AUG-16
Ethylbenzene			<0.015		mg/kg		0.015	31-AUG-16
o-Xylene			<0.050		mg/kg		0.05	31-AUG-16
m+p-Xylene			<0.050		mg/kg		0.05	31-AUG-16
F1(C6-C10)			<10		mg/kg		10	31-AUG-16
Surrogate: 1,4-Difluorobenzene (SS)			118.0		%		70-130	31-AUG-16
Surrogate: 4-Bromofluorobenzene (SS)			112.0		%		70-130	31-AUG-16
Surrogate: 3,4-Dichlorotoluene (SS)			120.0		%		70-130	31-AUG-16
F2-4-TMB-ED	**Soil**							
Batch R3538173								
WG2378606-4 DUP		**L1820488-3**						
F2 (C10-C16)		<20	<20	RPD-NA	mg/kg	N/A	40	30-AUG-16
F3 (C16-C34)		<20	<20	RPD-NA	mg/kg	N/A	40	30-AUG-16
F4 (C34-C50)		<20	<20	RPD-NA	mg/kg	N/A	40	30-AUG-16
WG2378606-3 IRM		**ALS PHC2 RM**						
F2 (C10-C16)			94.7		%		70-130	30-AUG-16
F3 (C16-C34)			102.9		%		70-130	30-AUG-16
F4 (C34-C50)			113.2		%		70-130	30-AUG-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-4-TMB-ED	**Soil**							
Batch R3538173								
WG2378606-2 LCS								
F2 (C10-C16)			89.7		%		70-130	30-AUG-16
F3 (C16-C34)			87.1		%		70-130	30-AUG-16
F4 (C34-C50)			91.6		%		70-130	30-AUG-16
WG2378606-1 MB								
F2 (C10-C16)			<20		mg/kg		20	30-AUG-16
F3 (C16-C34)			<20		mg/kg		20	30-AUG-16
F4 (C34-C50)			<20		mg/kg		20	30-AUG-16
Surrogate: 2-Bromobenzotrifluoride			80.0		%		70-130	30-AUG-16
HG-200.2-CVAA-ED	**Soil**							
Batch R3539037								
WG2379995-3 CRM		**TILL-1_SOIL**						
Mercury (Hg)			120.6		%		70-130	01-SEP-16
WG2380003-4 CRM		**TILL-1_SOIL**						
Mercury (Hg)			108.1		%		70-130	01-SEP-16
WG2379995-4 DUP		**L1819351-6**						
Mercury (Hg)		0.687	0.609		mg/kg	12	40	01-SEP-16
WG2379995-2 LCS								
Mercury (Hg)			96.4		%		70-130	01-SEP-16
WG2380003-2 LCS								
Mercury (Hg)			108.0		%		70-130	01-SEP-16
WG2379995-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-SEP-16
WG2380003-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	01-SEP-16
MET-200.2-CCMS-ED	**Soil**							
Batch R3539852								
WG2379995-3 CRM		**TILL-1_SOIL**						
Arsenic (As)			102.8		%		70-130	02-SEP-16
Cadmium (Cd)			86.5		%		70-130	02-SEP-16
Chromium (Cr)			95.8		%		70-130	02-SEP-16
Cobalt (Co)			96.4		%		70-130	02-SEP-16
Copper (Cu)			96.1		%		70-130	02-SEP-16
Lead (Pb)			89.6		%		70-130	02-SEP-16
Nickel (Ni)			98.4		%		70-130	02-SEP-16
Zinc (Zn)			95.5		%		70-130	02-SEP-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-ED	**Soil**							
Batch R3539852								
WG2380003-4 CRM		**TILL-1_SOIL**						
Arsenic (As)			100.0		%		70-130	02-SEP-16
Cadmium (Cd)			87.9		%		70-130	02-SEP-16
Chromium (Cr)			91.4		%		70-130	02-SEP-16
Cobalt (Co)			92.9		%		70-130	02-SEP-16
Copper (Cu)			93.3		%		70-130	02-SEP-16
Lead (Pb)			92.6		%		70-130	02-SEP-16
Nickel (Ni)			95.2		%		70-130	02-SEP-16
Zinc (Zn)			91.6		%		70-130	02-SEP-16
WG2379995-4 DUP		**L1819351-6**						
Arsenic (As)		491	500		mg/kg	1.7	30	02-SEP-16
Cadmium (Cd)		0.353	0.357		mg/kg	1.2	30	02-SEP-16
Chromium (Cr)		6.95	6.97		mg/kg	0.4	30	02-SEP-16
Cobalt (Co)		5.96	6.06		mg/kg	1.6	30	02-SEP-16
Copper (Cu)		27.1	27.2		mg/kg	0.7	30	02-SEP-16
Lead (Pb)		40.0	41.7		mg/kg	4.1	40	02-SEP-16
Nickel (Ni)		9.61	9.81		mg/kg	2.1	30	02-SEP-16
Zinc (Zn)		72.4	72.4		mg/kg	0.1	30	02-SEP-16
WG2380003-5 DUP		**L1818206-3**						
Arsenic (As)		52.0	38.6		mg/kg	30	30	02-SEP-16
Cadmium (Cd)		0.181	0.165		mg/kg	9.1	30	02-SEP-16
Chromium (Cr)		25.8	23.0		mg/kg	11	30	02-SEP-16
Cobalt (Co)		7.55	7.02		mg/kg	7.3	30	02-SEP-16
Copper (Cu)		24.5	23.3		mg/kg	5.0	30	02-SEP-16
Lead (Pb)		50.2	52.8		mg/kg	5.0	40	02-SEP-16
Nickel (Ni)		20.8	20.0		mg/kg	4.2	30	02-SEP-16
Zinc (Zn)		43.8	39.2		mg/kg	11	30	02-SEP-16
WG2379995-2 LCS								
Arsenic (As)			96.1		%		80-120	02-SEP-16
Cadmium (Cd)			97.7		%		80-120	02-SEP-16
Chromium (Cr)			97.4		%		80-120	02-SEP-16
Cobalt (Co)			98.4		%		80-120	02-SEP-16
Copper (Cu)			97.3		%		80-120	02-SEP-16
Lead (Pb)			101.2		%		80-120	02-SEP-16
Nickel (Ni)			99.2		%		80-120	02-SEP-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-ED	**Soil**							
Batch R3539852								
WG2379995-2 LCS								
Zinc (Zn)			96.0		%		80-120	02-SEP-16
WG2380003-2 LCS								
Arsenic (As)			96.6		%		80-120	02-SEP-16
Cadmium (Cd)			94.0		%		80-120	02-SEP-16
Chromium (Cr)			94.5		%		80-120	02-SEP-16
Cobalt (Co)			95.2		%		80-120	02-SEP-16
Copper (Cu)			93.7		%		80-120	02-SEP-16
Lead (Pb)			98.2		%		80-120	02-SEP-16
Nickel (Ni)			96.7		%		80-120	02-SEP-16
Zinc (Zn)			92.8		%		80-120	02-SEP-16
WG2379995-1 MB								
Cadmium (Cd)			<0.020		mg/kg		0.02	02-SEP-16
Chromium (Cr)			<0.50		mg/kg		0.5	02-SEP-16
Cobalt (Co)			<0.10		mg/kg		0.1	02-SEP-16
Copper (Cu)			<0.50		mg/kg		0.5	02-SEP-16
Lead (Pb)			<0.50		mg/kg		0.5	02-SEP-16
Nickel (Ni)			<0.50		mg/kg		0.5	02-SEP-16
Zinc (Zn)			<2.0		mg/kg		2	02-SEP-16
WG2380003-1 MB								
Arsenic (As)			<0.10		mg/kg		0.1	02-SEP-16
Cadmium (Cd)			<0.020		mg/kg		0.02	02-SEP-16
Chromium (Cr)			<0.50		mg/kg		0.5	02-SEP-16
Cobalt (Co)			<0.10		mg/kg		0.1	02-SEP-16
Copper (Cu)			<0.50		mg/kg		0.5	02-SEP-16
Lead (Pb)			<0.50		mg/kg		0.5	02-SEP-16
Nickel (Ni)			<0.50		mg/kg		0.5	02-SEP-16
Zinc (Zn)			<2.0		mg/kg		2	02-SEP-16
Batch R3540585								
WG2379995-1 MB								
Arsenic (As)			<0.10		mg/kg		0.1	03-SEP-16
PCB-ED	**Soil**							

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-ED	**Soil**							
Batch R3540062								
WG2379566-3 CRM		**PCB_SOIL_CRM915-050**						
Aroclor 1260			97.0		%		65-130	01-SEP-16
WG2379566-4 DUP		**L1820488-6**						
Aroclor 1016		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1221		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1232		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1242		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1248		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1254		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1260		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1262		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
Aroclor 1268		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	01-SEP-16
WG2379566-2 LCS								
Aroclor 1268			69.7		%		65-130	01-SEP-16
WG2379566-1 MB								
Aroclor 1016			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1221			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1232			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1242			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1248			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1254			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1260			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1262			<0.010		mg/kg		0.01	01-SEP-16
Aroclor 1268			<0.010		mg/kg		0.01	01-SEP-16
Surrogate: Decachlorobiphenyl			76.6		%		65-130	01-SEP-16
PREP-MOISTURE-ED	**Soil**							
Batch R3537775								
WG2378720-3 DUP		**L1820488-5**						
% Moisture		5.60	6.57		%	16	20	30-AUG-16
WG2378720-2 LCS								
% Moisture			101.9		%		90-110	30-AUG-16
WG2378720-1 MB								
% Moisture			<0.50		%		0.5	30-AUG-16

Quality Control Report

Workorder: L1820488 Report Date: 07-SEP-16

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1820488 Report Date: 07-SEP-16

Client: ARCADIS Canada Inc. - Ottawa
121 Granton Drive
Richmond ON L4B3N4
Contact: Stephen Borcsok

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Volatile Organic Compounds							
BTEX and F1 (C6-C10)							
	1	21-AUG-16 10:20	30-AUG-16 00:00	7	9	days	EHTR
	2	21-AUG-16 14:10	30-AUG-16 00:00	7	8	days	EHTR
	3	21-AUG-16 14:40	30-AUG-16 00:00	7	8	days	EHTR
	4	21-AUG-16 16:45	30-AUG-16 00:00	7	8	days	EHTR
	5	22-AUG-16 10:55	30-AUG-16 00:00	7	8	days	EHTR
	6	22-AUG-16 11:35	30-AUG-16 00:00	7	8	days	EHTL

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1820488 were received on 29-AUG-16 11:30.

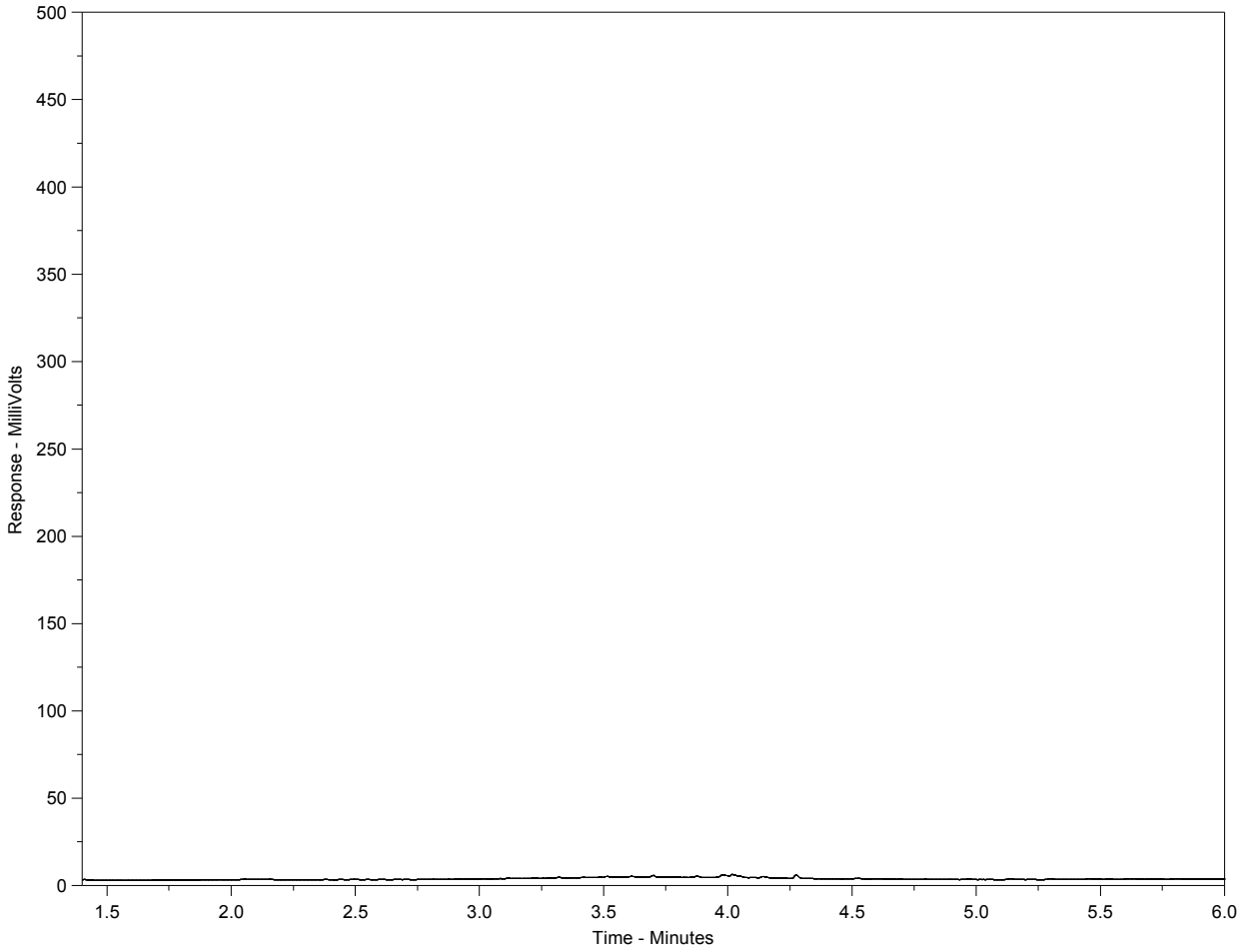
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

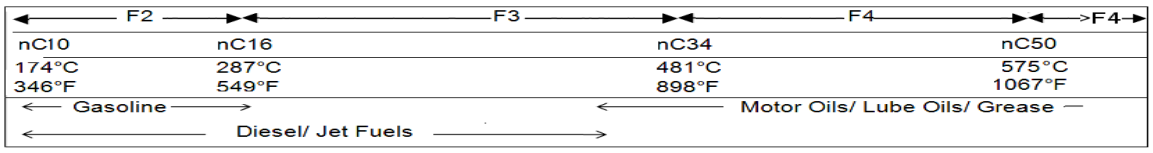
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-1
Client ID: 16-C4-MW-9A





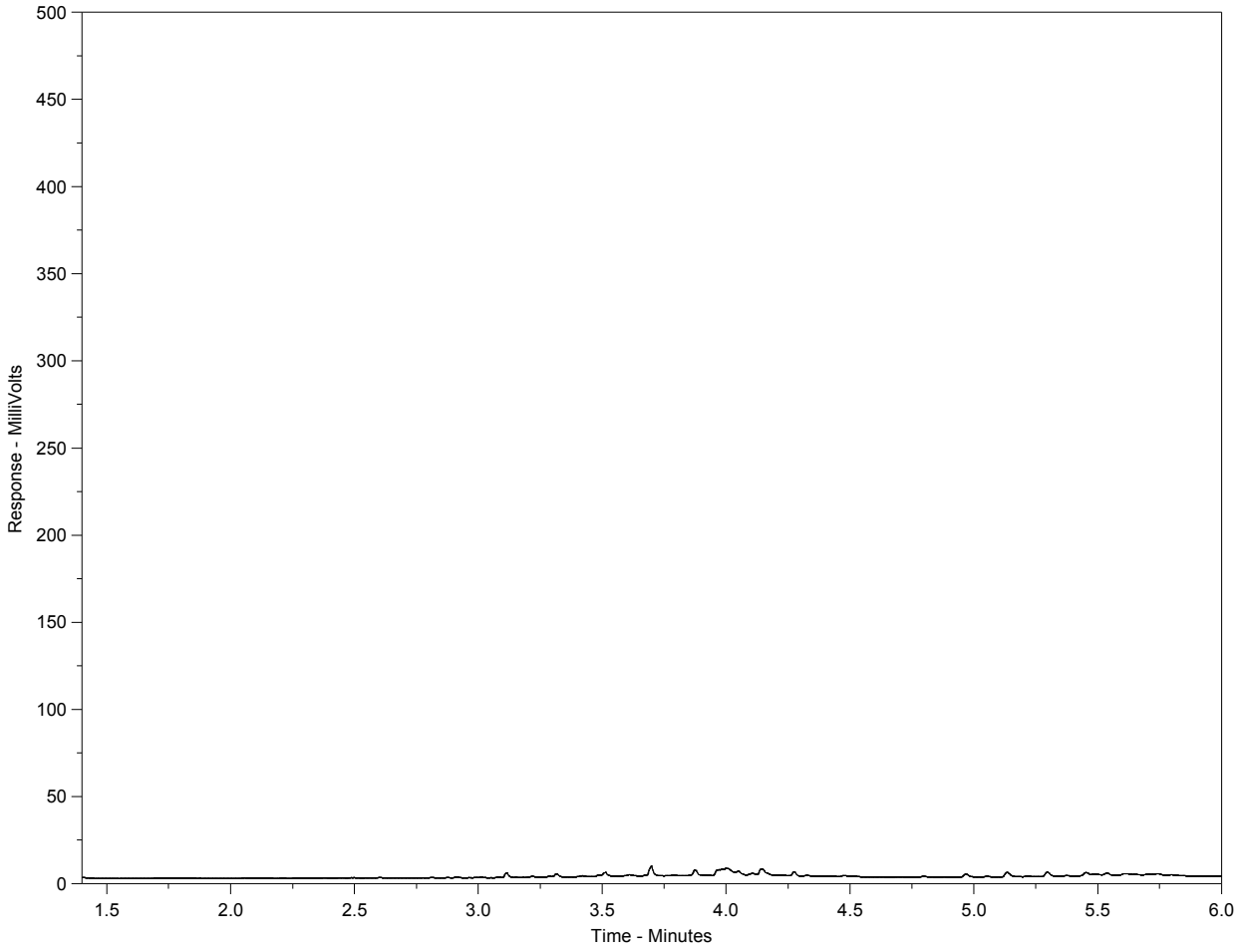
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

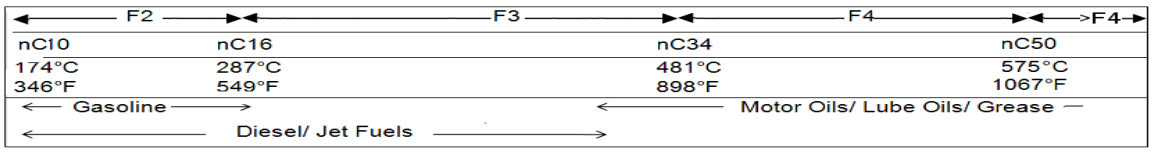
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-2
Client ID: 16-C4-MW-3A





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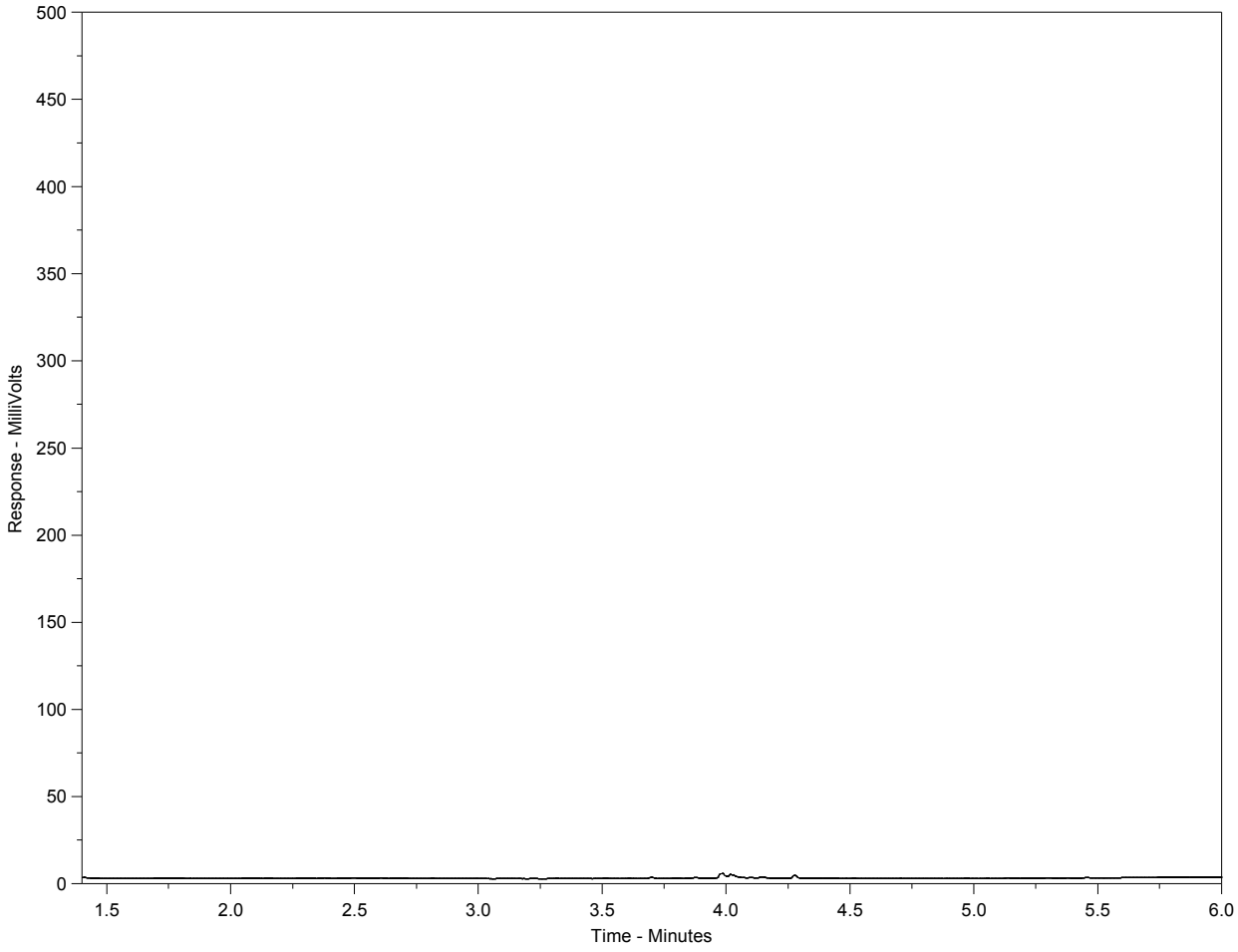
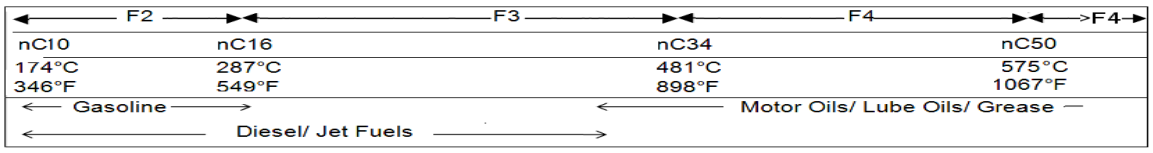
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-3
Client ID: 16-C4-MW-4AA





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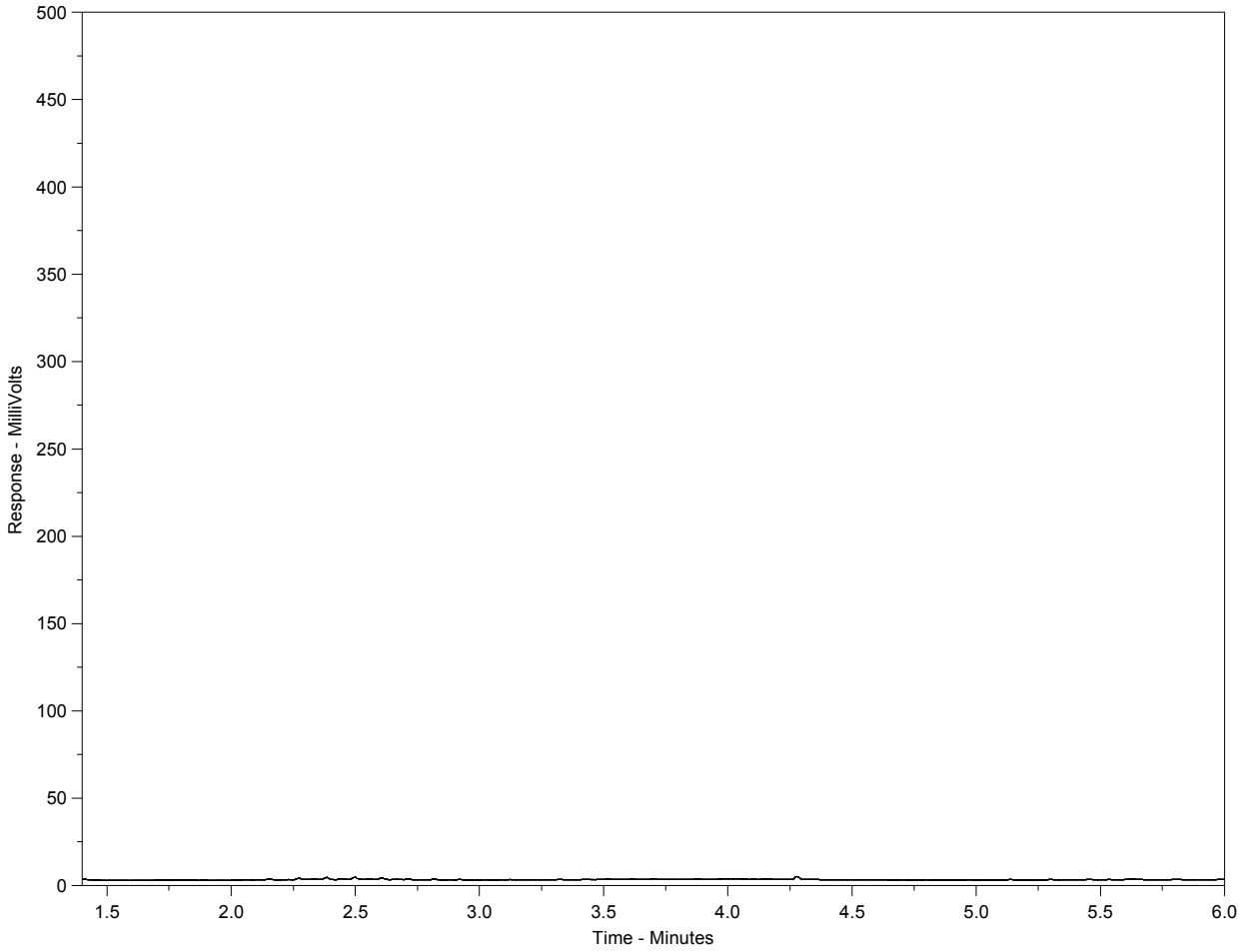
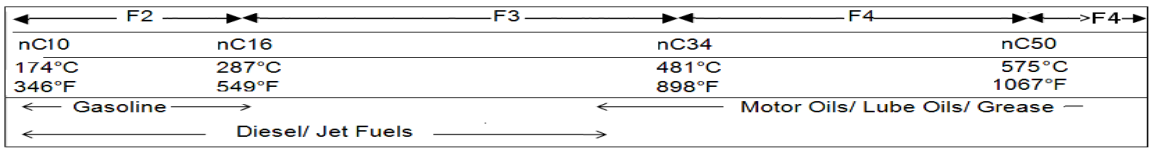
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-4
Client ID: 16-C4-MW-20A





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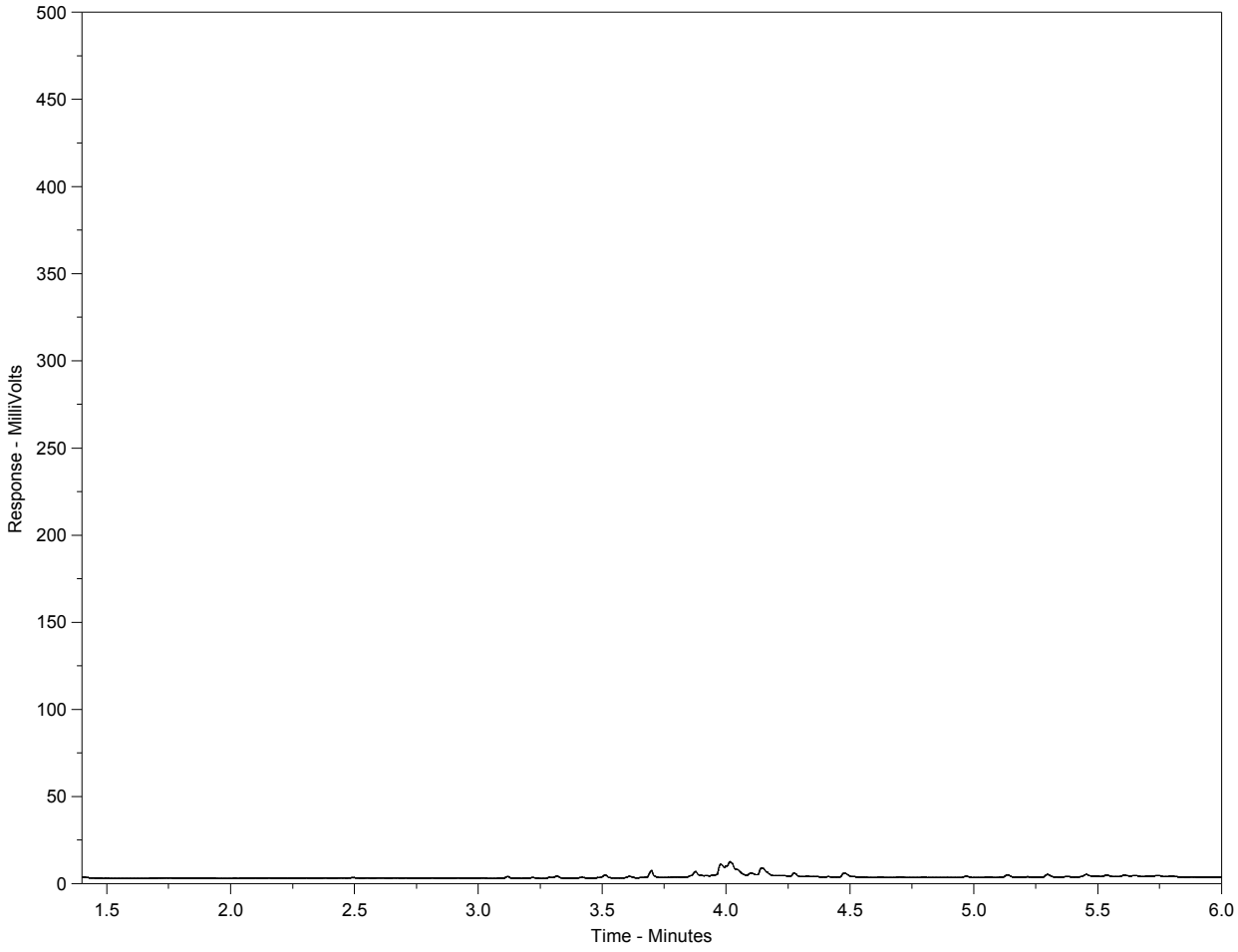
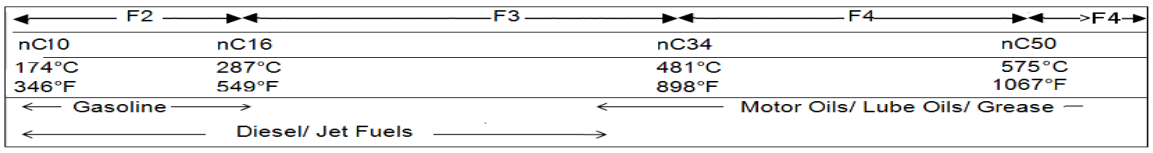
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-5
Client ID: 16-C4-BMW-4A





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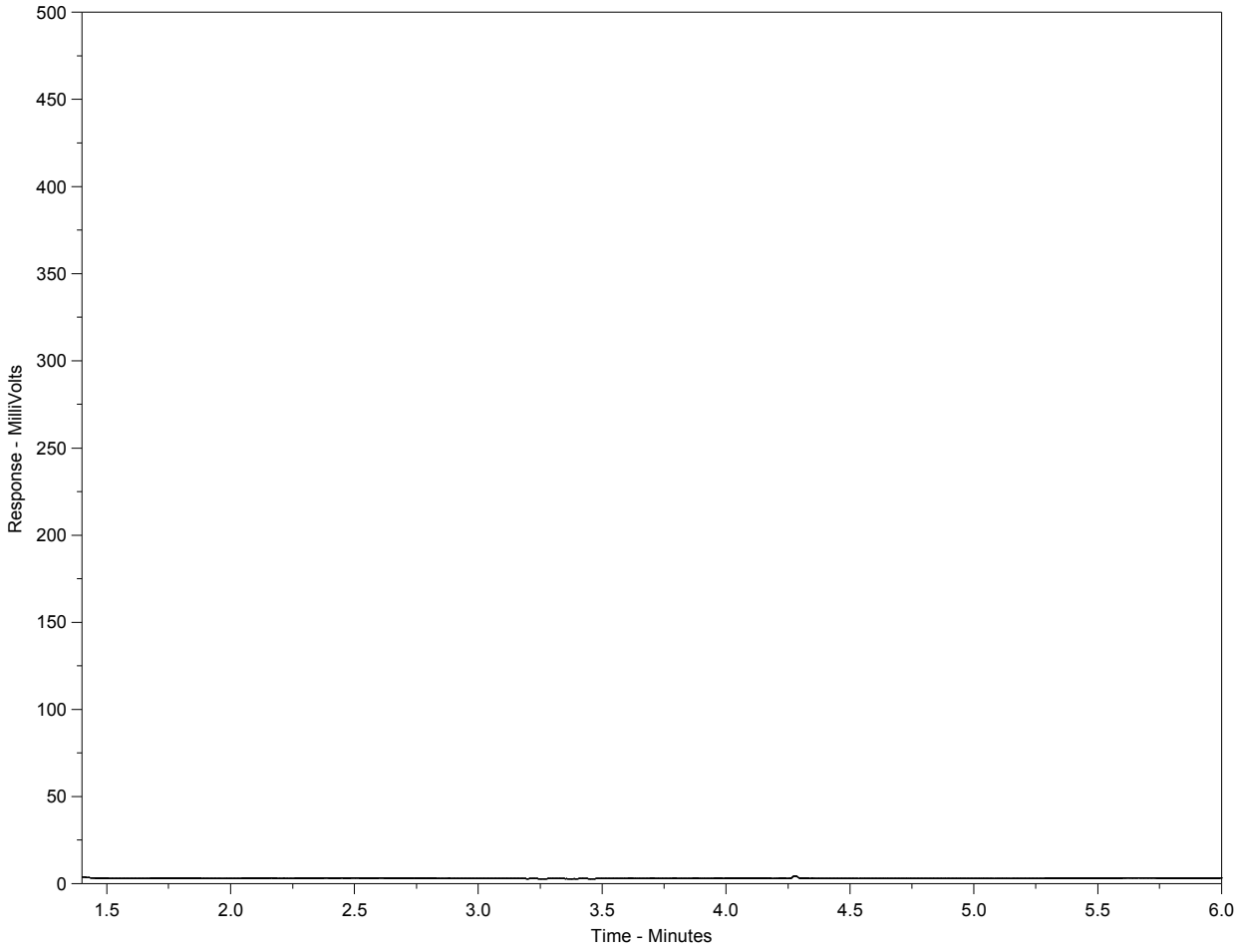
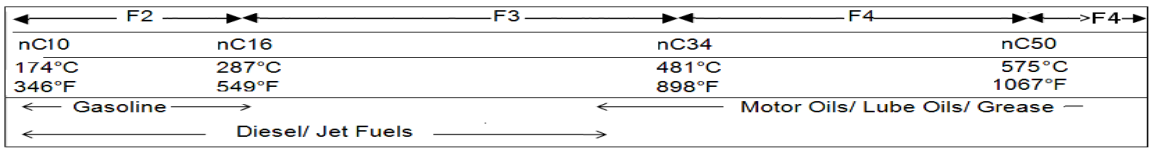
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L1820488-6
Client ID: 16-C4-MW-22A





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Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

10- 366453

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: ARCADIS CANADA	Standard: Other (specify):	X Regular (Standard Turnaround Times - Business Days)
Contact: STEPHEN BORCSOK	Select: PDF X Excel X Digital Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 121 GRANTON DRIVE, SUITE 12	Email 1: stephen.borcsok@arcadis.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
RICHMOND HILL, ONTARIO L4B 3N4	Email 2: ryan.fletcher@arcadis.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 905 882 5984 Fax:		
Invoice To Same as Report ? (circle) (Yes) or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #: 102012-000	(Indicate Filtered or Preserved, F/P)
Company: SAME	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only)	**ALS Contact:** Sampler: S. Borcsok	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	PHCs F1-F4/BTEX	PCBs	Metals ICPMS (see note)									Number of Containers
	16-C4-MW-9A	21-Aug/16	1020am	SOIL	X	X	X									4
	16-C4-MW-3A	21-Aug/16	210pm	SOIL	X	X	X									4
	16-C4-MW-4AA	21-Aug/16	240pm	SOIL	X	X	X									4
	16-C4-MW-20A	21-Aug/16	445pm	SOIL	X	X	X									4
	16-C4-BMW-4A	22-Aug/16	1055am	SOIL	X	X	X									3
	16-C4-MW-22A	22-Aug/16	1135am	SOIL	X	X	X									4

L1820488-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Metals report ONLY arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, mercury.

L1820488

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
S. Borcsok	24 Aug/16	1030am		24 Aug 16	11:30	1.1 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated in and form part of the Agreement between ALS Laboratory Group – Environmental Division ("ALS") and the party named in the Offer (the "Client").

1. Definitions. Capitalized Terms not defined in these Terms and Conditions have the definitions set out in the other Agreement documents.
2. The Services. ALS will provide the Services to the Client as described in the Offer and in any change of custody form provided with any sample.
3. Prices. ALS may review and change all prices, fees, surcharges or other charges set out in the Agreement if there are changes to ALS's cost beyond ALS's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding Condition 3, all quotations are reviewed and updated on a yearly basis.
4. Payment Terms. The Client shall pay ALS within 30 days of the invoice date OAC. ALS may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. Quotation Numbers. The Client shall provide the quotation number to ALS (where applicable) to ensure correct pricing.
6. Taxes. Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. Quality Control. ALS has an extensive QA/QC program and all analytical data reported is analyzed using approved, referenced procedures followed by checks and reviews of senior managers and quality assurance personnel.
8. No Guarantee of Results. Results are obtained from chemical measurements. The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
9. Standard of Care. ALS will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested.
10. Storage. Where possible, ALS will store samples for 30 days from the date a final report is issued to the Client, after which ALS may discard the sample.
11. Holds. If the Client requests a sample be placed on hold, ALS will store the sample for 60 days for the quoted price, after which ALS will invoice the Client and discard the sample.
12. Archives. If the Client requests a sample be archived, ALS will store the sample for 6 months for the quoted price, after which ALS will invoice the Client and discard the sample.
13. Handling Protocol. Legal sample handling protocol must be arranged before samples are collected. ALS may charge a 20% surcharge on the list price plus the hourly technologist or chemist rates for legal sample protocol. Samples processed under legal protocol are stored indefinitely (storage charges may apply).
14. Samples. The quality, condition, content and source of samples stored and tested are not known to ALS except as declared and described on the chain of custody form completed and submitted by the Client and accompanying the sample.
15. Risk of Loss. ALS will use reasonable care to protect samples during storage, however all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the Client releases ALS from any claim the Client may have for any loss or damage to the sample.
16. Environmental. The Client must comply with all applicable environment legislation, including labeling all hazardous samples to comply with WHMIS and TDG regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client will indemnify ALS for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
17. Hazardous Materials Disposal. ALS may return, at the Client's cost, hazardous material to the Client for disposal.
18. Hazardous Materials Surcharge. ALS may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occuring Radioactive Materials (NORM), H2S, CN, etc.
19. Sample Containers. ALS may ship sample containers to the Client's location by the most cost effective means using ALS preferred courier suppliers, within the specified project timeline.
20. Additional Charges. ALS may charge the Client (a) its cost for emergency bottle shipments and shipments to and from a remote site, and (b) where pick up and delivery services are provided, subject in each instance to a minimum charge of $25.00.
21. Large Bottle Orders. The Client shall provide ALS with 24 hours notice for large bottle orders.
22. Re-Tests. ALS reserves the right to re-test any samples that remains in its possession. Re-tests requested by the Client may be charged.
23. Waiver. The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any claims against ALS it may have as a result of the interpretation of the results. The Client shall indemnify ALS for all claims made by any third party against ALS in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
24. Limitation of Liability. In no event shall ALS be liable for any consequential, indirect, incidental, special, exemplary or punitive damages, whether foreseeable of unforeseeable, (including claims for loss of profits or revenue or losses caused by stoppage of other work or impairment of other assets) incurred by the Client arising out of breach or failure of express of implied warranty, breach of contract, breach of warranty, misrepresentation, negligence, strict liability in tort or otherwise. In any event, the liability of ALS to the Client shall be limited to the cost of testing the sample as requested in the chain of custody form under which the sample was originally deposited. For the purposes of this paragraph and paragraphs 8, 15, 16, 23 and 25, as the applicable, "ALS" includes without limitations its directors, officers, employees and affiliates and the "Client" includes without limitation any third party that may have a claim against ALS through the Client.
25. Notice of Liability. Notwithstanding paragraph 24, ALS shall not be liable to the Client unless the Client provides notice in writing to ALS of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk under the Agreement between the Client and ALS, and the fees to be paid by the Client to ALS reflect this allocation of risks and the limitations of liability in this Agreement.
26. Entire Agreement. The Agreement is the entire agreement between the parties and supercedes and takes precedence over any terms and conditions contained in any documentation provided by the Client. ALS's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein. If there is a conflict between these terms and conditions and any other Agreement document, these terms and conditions prevail.

GENF 19.00 Terms

Your P.O. #: 102012
Site Location: CAM 4
Your C.O.C. #: A170929, A170930

Attention:TROY AUSTINS

ARCADIS Canada
329 CHURCHILL AVE NORTH
SUITE 2000
OTTAWA, ON
CANADA K1Z 5B8

Report Date: 2016/09/06
Report #: R2254152
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B673330
Received: 2016/08/25, 10:00

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 in Water by HS GC/MS/FID	16	N/A	2016/08/29	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 in Water by HS GC/MS/FID	3	N/A	2016/08/30	AB SOP-00039	CCME CWS/EPA 8260c m
BTEX/F1 in Water by HS GC/MS/FID	2	N/A	2016/09/02	AB SOP-00039	CCME CWS/EPA 8260c m
PCB in Water - Subcontract (1)	19	N/A	2016/09/06		
CCME Hydrocarbons (F2-F4 in water)	19	2016/08/31	2016/08/31	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
CCME Hydrocarbons (F2-F4 in water)	1	2016/09/01	2016/09/02	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Mercury - Low Level (Total)	19	2016/09/01	2016/09/01	EENVSOP-00031	EPA 1631E/245.1 R3 m
Elements by ICPMS - Total	19	2016/09/03	2016/09/03	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Ontario (From Edmonton)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parminder Virk, Project Manager
Email: PVirk@maxxam.ca
Phone# (780) 577-7100
==========
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 #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PJ4262	PJ4263	PJ4264		PJ4265	PJ4266		
Sampling Date		2016/08/21 11:50	2016/08/20 00:35	2016/08/20 10:50		2016/08/20 14:45	2016/08/20 13:40		
COC Number		A170929	A170929	A170929		A170929	A170929		
	UNITS	CAM4-MW5	CAM4-MW8	CAM4-MW9	QC Batch	CAM4-MW14A	CAM4-MW15	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	5.0	<0.10	8383439	<0.10	4.0	0.10	8383439
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	0.36	0.32	8383439	<0.20	0.37	0.20	8383439
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	8383439	<0.20	<0.20	0.20	8383439
Reached Baseline at C50	mg/L	Yes	Yes	Yes	8383439	Yes	Yes	N/A	8383439
Volatiles									
Benzene	ug/L	<0.40	240	<0.40	8381836	<0.40	3.1	0.40	8380758
Toluene	ug/L	<0.40	190	<0.40	8381836	<0.40	1.0	0.40	8380758
Ethylbenzene	ug/L	<0.40	19	<0.40	8381836	<0.40	4.4	0.40	8380758
m & p-Xylene	ug/L	<0.80	610	<0.80	8381836	<0.80	30	0.80	8380758
o-Xylene	ug/L	<0.40	360	0.58 (1)	8381836	<0.40	25	0.40	8380758
Xylenes (Total)	ug/L	<0.80	970	<0.80	8381836	<0.80	55	0.80	8380758
F1 (C6-C10) - BTEX	ug/L	<100	1100	<100	8381836	<100	320	100	8380758
F1 (C6-C10)	ug/L	<100	2500	<100	8381836	<100	390	100	8380758
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	98	97	95	8381836	95	96	N/A	8380758
4-Bromofluorobenzene (sur.)	%	90	105	92	8381836	93	100	N/A	8380758
D4-1,2-Dichloroethane (sur.)	%	99	110	95	8381836	98	97	N/A	8380758
O-TERPHENYL (sur.)	%	107	103	114	8383439	104	103	N/A	8383439

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Qualifying ion outside of acceptance criteria. Results are tentatively identified and potentially biased high.

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PJ4267	PJ4268	PJ4269	PJ4270	PJ4271	PJ4272		
Sampling Date		2016/08/20 15:40	2016/08/20 17:00	2016/08/21 14:45	2016/08/21 13:45	2016/08/21 10:50			
COC Number		A170929	A170929	A170929	A170929	A170929	A170929		
	UNITS	CAM4-MW11	CAM4-MW12	CAM4-MW7B	CAM4-MW6B	CAM4-BMW3	CAM4-DUP1	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	7.1	<0.10	<0.10	0.10	8383439
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.42	<0.20	0.22	0.20	8383439
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8383439
Reached Baseline at C50	mg/L	Yes	Yes	Yes	Yes	Yes	Yes	N/A	8383439
Volatiles									
Benzene	ug/L	<0.40	<0.40	<0.40	7.3	<0.40	<0.40	0.40	8380758
Toluene	ug/L	<0.40	<0.40	<0.40	36	<0.40	<0.40	0.40	8380758
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	4.1	<0.40	<0.40	0.40	8380758
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	84	<0.80	<0.80	0.80	8380758
o-Xylene	ug/L	<0.40	0.83	<0.40	59	<0.40	0.53	0.40	8380758
Xylenes (Total)	ug/L	<0.80	0.83	<0.80	140	<0.80	<0.80	0.80	8380758
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	500	<100	<100	100	8380758
F1 (C6-C10)	ug/L	<100	<100	<100	690	<100	<100	100	8380758
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	93	95	95	97	93	94	N/A	8380758
4-Bromofluorobenzene (sur.)	%	95	93	93	98	93	94	N/A	8380758
D4-1,2-Dichloroethane (sur.)	%	96	96	97	98	96	97	N/A	8380758
O-TERPHENYL (sur.)	%	104	106	104	118	108	104	N/A	8383439

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PJ4273	PJ4293	PJ4294	PJ4295	PJ4296	PJ4297		
Sampling Date			2016/08/21 16:45	2016/08/21 17:30	2016/08/22 14:30	2016/08/22 10:20	2016/08/22 11:10		
COC Number		A170929	A170930	A170930	A170930	A170930	A170930		
	UNITS	CAM4-DUP2	CAM4-MW17	CAM4-MW19	CAM4-BMW4	CAM4-MW18	CAM4-MW20	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	1.9	0.10	8383439
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8383439
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8383439
Reached Baseline at C50	mg/L	Yes	Yes	Yes	Yes	Yes	Yes	N/A	8383439
Volatiles									
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8380758
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8380758
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.54	0.40	8380758
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	<0.80	5.1	0.80	8380758
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	3.1	0.40	8380758
Xylenes (Total)	ug/L	<0.80	<0.80	<0.80	<0.80	<0.80	8.2	0.80	8380758
F1 (C6-C10) - BTEX	ug/L	<100	<100	140	<100	<100	460	100	8380758
F1 (C6-C10)	ug/L	<100	<100	140	<100	<100	460	100	8380758
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	95	95	95	96	98	96	N/A	8380758
4-Bromofluorobenzene (sur.)	%	94	93	93	92	91	97	N/A	8380758
D4-1,2-Dichloroethane (sur.)	%	100	99	98	98	96	99	N/A	8380758
O-TERPHENYL (sur.)	%	113	108	104	104	105	112	N/A	8383439

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PJ4298	PJ4299			PJ4300		
Sampling Date		2016/08/22 13:20	2016/08/22 12:15			2016/08/22		
COC Number		A170930	A170930					
	UNITS	CAM4-MW22	CAM4-MW23	RDL	QC Batch	CAM4-BMW1	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	0.10	8383439	1800 (1)	1.0	8384698
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	8383439	160 (1)	2.0	8384698
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	0.20	8383439	16 (1)	2.0	8384698
Reached Baseline at C50	mg/L	Yes	Yes	N/A	8383439	Yes	N/A	8384698
Volatiles								
Benzene	ug/L	<0.40	<0.40	0.40	8380758	59	0.40	8374571
Toluene	ug/L	<0.40	<0.40	0.40	8380758	300	0.40	8374571
Ethylbenzene	ug/L	<0.40	<0.40	0.40	8380758	180	0.40	8374571
m & p-Xylene	ug/L	<0.80	<0.80	0.80	8380758	880	0.80	8374571
o-Xylene	ug/L	<0.40	<0.40	0.40	8380758	510	0.40	8374571
Xylenes (Total)	ug/L	<0.80	<0.80	0.80	8380758	1400	0.80	8374571
F1 (C6-C10) - BTEX	ug/L	<100	<100	100	8380758	32000	100	8374571
F1 (C6-C10)	ug/L	<100	<100	100	8380758	34000	100	8374571
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	98	96	N/A	8380758	116	N/A	8374571
4-Bromofluorobenzene (sur.)	%	92	92	N/A	8380758	NC	N/A	8374571
D4-1,2-Dichloroethane (sur.)	%	96	99	N/A	8380758	126	N/A	8374571
O-TERPHENYL (sur.)	%	104	111	N/A	8383439	104	N/A	8384698

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

AT1 BTEX AND F1 WATER (WATER)

Maxxam ID		PJ4302		
Sampling Date				
	UNITS	TRIP BLANK	RDL	QC Batch
Volatiles				
Benzene	ug/L	<0.40	0.40	8374571
Toluene	ug/L	<0.40	0.40	8374571
Ethylbenzene	ug/L	<0.40	0.40	8374571
m & p-Xylene	ug/L	<0.80	0.80	8374571
o-Xylene	ug/L	<0.40	0.40	8374571
Xylenes (Total)	ug/L	<0.80	0.80	8374571
F1 (C6-C10) - BTEX	ug/L	<100	100	8374571
F1 (C6-C10)	ug/L	<100	100	8374571
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	100	N/A	8374571
4-Bromofluorobenzene (sur.)	%	98	N/A	8374571
D4-1,2-Dichloroethane (sur.)	%	104	N/A	8374571

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		PJ4262	PJ4263	PJ4264	PJ4265	PJ4266	PJ4267	
Sampling Date		2016/08/21 11:50	2016/08/20 00:35	2016/08/20 10:50	2016/08/20 14:45	2016/08/20 13:40	2016/08/20 15:40	
COC Number		A170929	A170929	A170929	A170929	A170929	A170929	
	UNITS	CAM4-MW5	CAM4-MW8	CAM4-MW9	CAM4-MW14A	CAM4-MW15	CAM4-MW11	QC Batch
Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8388882

Maxxam ID		PJ4268	PJ4269	PJ4270	PJ4271	PJ4272	PJ4273	
Sampling Date		2016/08/20 17:00	2016/08/21 14:45	2016/08/21 13:45	2016/08/21 10:50			
COC Number		A170929	A170929	A170929	A170929	A170929	A170929	
	UNITS	CAM4-MW12	CAM4-MW7B	CAM4-MW6B	CAM4-BMW3	CAM4-DUP1	CAM4-DUP2	QC Batch
Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8388882

Maxxam ID		PJ4293	PJ4294	PJ4295	PJ4296	PJ4297	PJ4298	
Sampling Date		2016/08/21 16:45	2016/08/21 17:30	2016/08/22 14:30	2016/08/22 10:20	2016/08/22 11:10	2016/08/22 13:20	
COC Number		A170930	A170930	A170930	A170930	A170930	A170930	
	UNITS	CAM4-MW17	CAM4-MW19	CAM4-BMW4	CAM4-MW18	CAM4-MW20	CAM4-MW22	QC Batch
Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8388882

Maxxam ID		PJ4299	
Sampling Date		2016/08/22 12:15	
COC Number		A170930	
	UNITS	CAM4-MW23	QC Batch
Parameter			
Subcontract Parameter	N/A	ATTACHED	8388882

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PJ4262	PJ4263		PJ4264		PJ4265		
Sampling Date		2016/08/21 11:50	2016/08/20 00:35		2016/08/20 10:50		2016/08/20 14:45		
COC Number		A170929	A170929		A170929		A170929		
	UNITS	CAM4-MW5	CAM4-MW8	RDL	CAM4-MW9	RDL	CAM4-MW14A	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/L	0.00026	0.0019	0.00020	0.0019	0.00020	0.00093	0.00020	8387438
Total Cadmium (Cd)	mg/L	0.000031	0.00019	0.000020	0.00073	0.000020	0.000080	0.000020	8387438
Total Chromium (Cr)	mg/L	0.0056	0.0070	0.0010	0.024	0.0010	0.010	0.0010	8387438
Total Cobalt (Co)	mg/L	<0.00030	0.0025	0.00030	0.0011	0.00030	0.00096	0.00030	8387438
Total Copper (Cu)	mg/L	0.0029	0.0040	0.00020	0.0067	0.00020	0.0080	0.00020	8387438
Total Lead (Pb)	mg/L	0.00032	0.0023	0.00020	0.0014	0.00020	0.00057	0.00020	8387438
Total Nickel (Ni)	mg/L	0.0057	0.016	0.00050	0.019	0.00050	0.0091	0.00050	8387438
Total Zinc (Zn)	mg/L	0.023	0.020	0.0030	0.028	0.0030	0.45	0.0030	8387438
Low Level Elements									
Total Mercury (Hg)	ug/L	<0.0020	0.0053	0.0020	0.078 (1)	0.020	<0.0020	0.0020	8384241

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

Maxxam ID		PJ4266	PJ4267	PJ4268		PJ4269		
Sampling Date		2016/08/20 13:40	2016/08/20 15:40	2016/08/20 17:00		2016/08/21 14:45		
COC Number		A170929	A170929	A170929		A170929		
	UNITS	CAM4-MW15	CAM4-MW11	CAM4-MW12	RDL	CAM4-MW7B	RDL	QC Batch
Elements								
Total Arsenic (As)	mg/L	0.0014	0.00053	0.00083	0.00020	0.0017	0.00020	8387438
Total Cadmium (Cd)	mg/L	0.00056	0.000034	0.00012	0.000020	0.000073	0.000020	8387438
Total Chromium (Cr)	mg/L	0.0029	0.0051	0.0089	0.0010	0.017	0.0010	8387438
Total Cobalt (Co)	mg/L	0.0013	0.00058	0.0020	0.00030	0.0054	0.00030	8387438
Total Copper (Cu)	mg/L	0.0019	0.0025	0.0061	0.00020	0.0092	0.00020	8387438
Total Lead (Pb)	mg/L	0.00059	<0.00020	0.0021	0.00020	0.0065	0.00020	8387438
Total Nickel (Ni)	mg/L	0.0044	0.0052	0.0069	0.00050	0.017	0.00050	8387438
Total Zinc (Zn)	mg/L	0.080	0.0041	0.15	0.0030	2.1	0.0030	8387438
Low Level Elements								
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0050	0.0020	<0.020 (1)	0.020	8384241

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PJ4270		PJ4271		PJ4272	PJ4273		
Sampling Date		2016/08/21 13:45		2016/08/21 10:50					
COC Number		A170929		A170929		A170929	A170929		
	UNITS	CAM4-MW6B	RDL	CAM4-BMW3	RDL	CAM4-DUP1	CAM4-DUP2	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/L	0.0022	0.00020	0.0028	0.00020	0.0017	0.00033	0.00020	8387438
Total Cadmium (Cd)	mg/L	0.00012	0.000020	0.000040	0.000020	0.00069	0.000020	0.000020	8387438
Total Chromium (Cr)	mg/L	0.057	0.0010	0.038	0.0010	0.022	0.0053	0.0010	8387438
Total Cobalt (Co)	mg/L	0.0059	0.00030	0.0094	0.00030	0.00098	<0.00030	0.00030	8387438
Total Copper (Cu)	mg/L	0.013	0.00020	0.016	0.00020	0.0060	0.0032	0.00020	8387438
Total Lead (Pb)	mg/L	0.0068	0.00020	0.0096	0.00020	0.0012	0.00032	0.00020	8387438
Total Nickel (Ni)	mg/L	0.046	0.00050	0.022	0.00050	0.017	0.0056	0.00050	8387438
Total Zinc (Zn)	mg/L	0.096	0.0030	0.11	0.0030	0.024	0.025	0.0030	8387438
Low Level Elements									
Total Mercury (Hg)	ug/L	0.0022	0.0020	<0.020 (1)	0.020	0.044	<0.0020	0.0020	8384241

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

Maxxam ID		PJ4293		PJ4294		PJ4295	PJ4296		
Sampling Date		2016/08/21 16:45		2016/08/21 17:30		2016/08/22 14:30	2016/08/22 10:20		
COC Number		A170930		A170930		A170930	A170930		
	UNITS	CAM4-MW17	RDL	CAM4-MW19	RDL	CAM4-BMW4	CAM4-MW18	RDL	QC Batch
Elements									
Total Arsenic (As)	mg/L	0.0034	0.00020	0.0033	0.00020	0.0031	0.00056	0.00020	8387438
Total Cadmium (Cd)	mg/L	0.00017	0.000020	0.00045	0.000020	0.000089	0.000029	0.000020	8387438
Total Chromium (Cr)	mg/L	0.013	0.0010	0.057	0.0010	0.023	0.0049	0.0010	8387438
Total Cobalt (Co)	mg/L	0.0018	0.00030	0.0063	0.00030	0.0024	0.00043	0.00030	8387438
Total Copper (Cu)	mg/L	0.0081	0.00020	0.016	0.00020	0.015	0.0044	0.00020	8387438
Total Lead (Pb)	mg/L	0.0097	0.00020	0.0097	0.00020	0.0091	0.00063	0.00020	8387438
Total Nickel (Ni)	mg/L	0.0076	0.00050	0.028	0.00050	0.015	0.0037	0.00050	8387438
Total Zinc (Zn)	mg/L	0.044	0.0030	0.052	0.0030	0.18	0.018	0.0030	8387438
Low Level Elements									
Total Mercury (Hg)	ug/L	0.010	0.0020	<0.020 (1)	0.020	0.0099	0.0021	0.0020	8384241

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PJ4297	PJ4298	PJ4299		
Sampling Date		2016/08/22 11:10	2016/08/22 13:20	2016/08/22 12:15		
COC Number		A170930	A170930	A170930		
	UNITS	CAM4-MW20	CAM4-MW22	CAM4-MW23	RDL	QC Batch
Elements						
Total Arsenic (As)	mg/L	0.00055	0.00024	0.00048	0.00020	8387438
Total Cadmium (Cd)	mg/L	<0.000020	0.000026	0.000030	0.000020	8387438
Total Chromium (Cr)	mg/L	<0.0010	0.0016	0.0040	0.0010	8387438
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00035	0.00030	8387438
Total Copper (Cu)	mg/L	0.0013	0.0025	0.0090	0.00020	8387438
Total Lead (Pb)	mg/L	<0.00020	0.00056	0.00042	0.00020	8387438
Total Nickel (Ni)	mg/L	0.00052	0.0012	0.0061	0.00050	8387438
Total Zinc (Zn)	mg/L	<0.0030	0.0039	0.034	0.0030	8387438
Low Level Elements						
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	<0.0020	0.0020	8384241
RDL = Reportable Detection Limit						

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

GENERAL COMMENTS

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

Package 1	5.0°C
Package 2	2.7°C
Package 3	3.7°C
Package 4	4.3°C
Package 5	3.3°C
Package 6	2.0°C
Package 7	4.0°C
Package 8	2.3°C
Package 9	3.0°C

As per client request, additional analysis has been completed. 1 X BTEXF1F4 ,Resemble and BTEXF1. The client request was received 2016/08/30.

Maxxam Analytics Disclaimer

HYDROCARBON RESEMBLANCE
The reported hydrocarbon resemblance was obtained by visual comparison of the sample chromatogram with a library of reference product chromatograms. Since variables such as the degree and type of weathering and the presence of non-petrogenic hydrocarbons cannot be duplicated in reference spectra, the resemblance information must be regarded as approximate and qualitative and as such, Maxxam can assume no liability for any conclusions drawn from these data.

CHROMATOGRAM PROVISION
The chromatograms are provided for information purposes only. Any conclusion drawn by the data user from these chromatograms is their sole responsibility. Maxxam can assume no liability for any such 3rd-party interpretations and is responsible only for the quality of the quantitative data provided.

Sample PJ4262-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4263-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4264-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4265-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4266-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4267-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4268-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4269-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4270-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4271-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4272-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4273-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4293-01 : Sample was received unpreserved for Total Metals analysis by ICP.

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Maxxam Job #: B673330
Report Date: 2016/09/06

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

GENERAL COMMENTS

Sample PJ4294-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4295-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4296-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4297-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4298-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4299-01 : Sample was received unpreserved for Total Metals analysis by ICP.

Sample PJ4300-01 : Sample required decanting due to inappropriate sample container for F24 analysis.

Sample container(s) submitted with headspace for BTEX/F1. Analysis performed with client's consent.

Sample(s) were submitted using a container that was not appropriate for BTEX/F1. Analysis performed with client's consent.

The CCME F2-F4 chromatographic peak profile is consistent with a middle distillate petroleum product (e.g. diesel/fuel oil). These are typically characterized by evenly distributed peaks between C8 and C24 , representing the simple straight chain aliphatic compounds (n-alkanes). These peaks will decrease in height, relative to the unresolved complex mixture (UCM or “hump”) with increased weathering of the product material.

Results relate only to the items tested.

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Maxxam Job #: B673330
Report Date: 2016/09/06

QUALITY ASSURANCE REPORT

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8374571	1,4-Difluorobenzene (sur.)	2016/08/24	99	70 - 130	100	70 - 130	102	%				
8374571	4-Bromofluorobenzene (sur.)	2016/08/24	97	70 - 130	98	70 - 130	100	%				
8374571	D4-1,2-Dichloroethane (sur.)	2016/08/24	99	70 - 130	93	70 - 130	93	%				
8380758	1,4-Difluorobenzene (sur.)	2016/08/29	94	70 - 130	97	70 - 130	97	%				
8380758	4-Bromofluorobenzene (sur.)	2016/08/29	96	70 - 130	96	70 - 130	93	%				
8380758	D4-1,2-Dichloroethane (sur.)	2016/08/29	99	70 - 130	98	70 - 130	94	%				
8381836	1,4-Difluorobenzene (sur.)	2016/08/30	98	70 - 130	99	70 - 130	98	%				
8381836	4-Bromofluorobenzene (sur.)	2016/08/30	95	70 - 130	94	70 - 130	92	%				
8381836	D4-1,2-Dichloroethane (sur.)	2016/08/30	99	70 - 130	97	70 - 130	94	%				
8383439	O-TERPHENYL (sur.)	2016/08/31	116	50 - 130	105	50 - 130	117	%				
8384698	O-TERPHENYL (sur.)	2016/09/01	101	50 - 130	98	50 - 130	103	%				
8374571	Benzene	2016/08/24	100	70 - 130	97	70 - 130	<0.40	ug/L	NC	40		
8374571	Ethylbenzene	2016/08/24	108	70 - 130	105	70 - 130	<0.40	ug/L	NC	40		
8374571	F1 (C6-C10) - BTEX	2016/08/24					<100	ug/L	NC	40		
8374571	F1 (C6-C10)	2016/08/24	76	70 - 130	100	70 - 130	<100	ug/L	NC	40		
8374571	m & p-Xylene	2016/08/24	105	70 - 130	105	70 - 130	<0.80	ug/L	NC	40		
8374571	o-Xylene	2016/08/24	104	70 - 130	103	70 - 130	<0.40	ug/L	NC	40		
8374571	Toluene	2016/08/24	100	70 - 130	98	70 - 130	<0.40	ug/L	NC	40		
8374571	Xylenes (Total)	2016/08/24					<0.80	ug/L	NC	40		
8380758	Benzene	2016/08/29	92	70 - 130	90	70 - 130	<0.40	ug/L	NC	40		
8380758	Ethylbenzene	2016/08/29	89	70 - 130	88	70 - 130	<0.40	ug/L	NC	40		
8380758	F1 (C6-C10) - BTEX	2016/08/29					<100	ug/L	NC	40		
8380758	F1 (C6-C10)	2016/08/29	85	70 - 130	98	70 - 130	<100	ug/L	NC	40		
8380758	m & p-Xylene	2016/08/29	89	70 - 130	88	70 - 130	<0.80	ug/L	NC	40		
8380758	o-Xylene	2016/08/29	90	70 - 130	88	70 - 130	<0.40	ug/L	NC	40		
8380758	Toluene	2016/08/29	84	70 - 130	82	70 - 130	<0.40	ug/L	NC	40		
8380758	Xylenes (Total)	2016/08/29					<0.80	ug/L	NC	40		
8381836	Benzene	2016/08/30	107	70 - 130	107	70 - 130	<0.40	ug/L	NC	40		
8381836	Ethylbenzene	2016/08/30	100	70 - 130	101	70 - 130	<0.40	ug/L	NC	40		
8381836	F1 (C6-C10) - BTEX	2016/08/30					<100	ug/L	NC	40		
8381836	F1 (C6-C10)	2016/08/30	80	70 - 130	84	70 - 130	<100	ug/L	NC	40		

Maxxam Job #: B673330
Report Date: 2016/09/06

QUALITY ASSURANCE REPORT(CONT'D)

ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8381836	m & p-Xylene	2016/08/30	100	70 - 130	102	70 - 130	<0.80	ug/L	NC	40		
8381836	o-Xylene	2016/08/30	98	70 - 130	99	70 - 130	<0.40	ug/L	NC	40		
8381836	Toluene	2016/08/30	94	70 - 130	95	70 - 130	<0.40	ug/L	NC	40		
8381836	Xylenes (Total)	2016/08/30					<0.80	ug/L	NC	40		
8383439	F2 (C10-C16 Hydrocarbons)	2016/08/31	118	50 - 130	105	70 - 130	<0.10	mg/L	NC	40		
8383439	F3 (C16-C34 Hydrocarbons)	2016/08/31	121	50 - 130	109	70 - 130	<0.20	mg/L	NC	40		
8383439	F4 (C34-C50 Hydrocarbons)	2016/08/31	109	50 - 130	101	70 - 130	<0.20	mg/L	NC	40		
8384241	Total Mercury (Hg)	2016/09/01	98	85 - 115	98	85 - 115	<0.0020	ug/L	NC	20	110	85 - 115
8384698	F2 (C10-C16 Hydrocarbons)	2016/09/01	101	50 - 130	99	70 - 130	<0.10	mg/L	NC	40		
8384698	F3 (C16-C34 Hydrocarbons)	2016/09/01	100	50 - 130	98	70 - 130	<0.20	mg/L	NC	40		
8384698	F4 (C34-C50 Hydrocarbons)	2016/09/01	90	50 - 130	88	70 - 130	<0.20	mg/L	NC	40		
8387438	Total Arsenic (As)	2016/09/03	106	80 - 120	99	80 - 120	<0.00020	mg/L	NC	20		
8387438	Total Cadmium (Cd)	2016/09/03	110	80 - 120	97	80 - 120	<0.000020	mg/L	NC	20		
8387438	Total Chromium (Cr)	2016/09/03	111	80 - 120	100	80 - 120	<0.0010	mg/L	18	20		
8387438	Total Cobalt (Co)	2016/09/03	104	80 - 120	100	80 - 120	<0.00030	mg/L	NC	20		
8387438	Total Copper (Cu)	2016/09/03	103	80 - 120	101	80 - 120	0.00037, RDL=0.00020	mg/L	2.8	20		
8387438	Total Lead (Pb)	2016/09/03	104	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20		
8387438	Total Nickel (Ni)	2016/09/03	105	80 - 120	100	80 - 120	<0.00050	mg/L	5.2	20		
8387438	Total Zinc (Zn)	2016/09/03	105	80 - 120	96	80 - 120	<0.0030	mg/L	2.6	20		

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

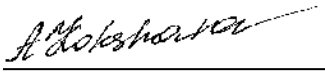
Maxxam Analytics International Corporation o/a Maxxam Analytics Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Job #: B673330
Report Date: 2016/09/06

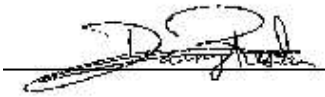
ARCADIS Canada
Site Location: CAM 4
Your P.O. #: 102012
Sampler Initials: KC

VALIDATION SIGNATURE PAGE

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



Anna Koksharova, M.Sc., Organics Senior Analyst



Daniel Reslan, cCT, QP, Organics Supervisor

Justin Geisel, B.Sc., Organics Supervisor

Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

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

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Chain of Custody A170929

Page: 1 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒
Company:	Arcadis Canada Inc.	
Contact:	Troy Austrins	
Address:	3229 Churchill Ave, Ottawa	
	Prov: ON PC:	Prov: PC:
Contact #s:	Ph: 613 721-0555 Cell:	Ph: Cell:

Report Distribution (E-Mail):
Stephen.Dorcsak@arcadis.com
troy.austrins@arcadis.com

REGULATORY GUIDELINES:
☐ AT1
☒ CCME
☐ Regulated Drinking Water
☒ Other: Client provided MDLs - site specific

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: 102012
Project # / Name:
Site Location: CAM4
Quote #:
Sampled By: Keith Caithcart

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve) Date Required: ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐BTEX F1 ☐BTEX F1-F2	WATER: ☒BTEX F1-F4	WATER: ☐ Routine Water ☐ TOC	WATER: ☐ Turb ☐ F ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: ☐ Total ☐ Dissolved Mercury	Other Analysis: Enviro	Other Analysis: F2-F4	Other Analysis: PCB	Other Analysis: Select #Metals (Total)	HOLD - Do not Analyze	# of Containers Submitted
1	CAM4-MW5		GW	08/21 11:50							X	X	X	X	X	X	X	X	X	X	X		9
2	CAM4-MW8	12:35pm		08/20 10:50							X	X	X	X	X	X	X	X	X	X	X		9
3	CAM4-MW9			08/20 10:50							X	X	X	X	X	X	X	X	X	X	X		9
4	CAM4-MW14A			14:45							X	X	X	X	X	X	X	X	X	X	X		9
5	CAM4-MW15			13:40							X	X	X	X	X	X	X	X	X	X	X		9
6	CAM4-MW11			15:40							X	X	X	X	X	X	X	X	X	X	X		9
7	CAM4-MW12			17:00							X	X	X	X	X	X	X	X	X	X	X		9
8	CAM4-MW7B			08/21 14:45							X	X	X	X	X	X	X	X	X	X	X		9
9	CAM4-MW6B			13:45							X	X	X	X	X	X	X	X	X	X	X		8
10	CAM4-BMW3			10:50							X	X	X	X	X	X	X	X	X	X	X		9
11	CAM4-DUP1										X	X	X	X	X	X	X	X	X	X	X		9
12	CAM4-DUP2										X	X	X	X	X	X	X	X	X	X	X		9

RECEIVED IN YELLOWKNIFE
By: Michelle Burke 10:00
2016 -08- 25
Temp: 3-5-4 5-0-3 5-5-1 4-2-5 3-3-0 4-6-2 0-3-4 2-2-5

Note - Metals Not preserved or filtered as per client request

F/P

Please indicate Filtered, Preserved or Both (F, P, F/P)

Relinquished By (Signature/Print): Keith Caithcart Date (YY/MM/DD): 2016 Aug 25 Time (24:00): 10:30 am
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: * Metals: Arsenic, Cadmium, Chromium Cobalt, Copper, Lead, Nickel, Zinc

# of Jars Used & Not Submitted

LAB USE ONLY
Received By: Jennifer Mc Date: 20160826 Time: 1146
Lab Comments:
Maxxam Job #: B673330
Custody Seal | Temperature | Ice
See ATTR

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam

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Chain of Custody A170930

Page: 2 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☐ (A170929)	Report Distribution (E-Mail):	REGULATORY GUIDELINES:
Company:				☐ AT1
Contact:	SEE PAGE 1			☐ CCME
Address:				☐ Regulated Drinking Water
	Prov: PC:	Prov: PC:		☐ Other:
Contact #s:	Ph: Cell:	Ph: Cell:		

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	
Site Location:	
Quote #:	
Sampled By:	

SERVICE REQUESTED: ☐ **RUSH** (Contact lab to reserve) **Date Required:** ☐ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐VOCs	☐BTEX F1	☒BTEX F1-F4	☐BTEX F1-F2	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Regulated Metals (CCME / AT1) Dissolved	☒ Total ☐ Dissolved Mercury	Other Analysis: Sent	PUB	Selected Metals + Total	HOLD - Do not Analyze	# of Containers Submitted
1	CAM4-MW17		GW	21 Aug 16:45									X	X					X	X	X	X		9
2	CAM4-MW19			21 Aug 17:30									X	X					X	X	X	X		9
3	CAM4-BMW4			22 Aug 14:30									X	X					X	X	X	X		9
4	CAM4-MW18			10:20									X	X					X	X	X	X		9
5	CAM4-MW20			11:10									X	X					X	X	X	X		8
6	CAM4-MW22			13:20									X	X					X	X	X	X		9
7	CAM4-MW23			12:15									X	X					X	X	X	X		9
8																								
9																								
10																								
11																								
12																								

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

RECEIVED IN YELLOWKNIFE
By: Michelle Gaule 10:00
2016-08-25

Temp: 5.1 4.1 6.4 / 3.2 5.5 / 3.3 3.0

3-5-7 6-4-2
5-0-3 0-3-4
5-5-1 2-2-5

Relinquished By (Signature/Print): Keith Coulthart Date (YY/MM/DD): 2016 Aug 24 Time (24:00): 10:30 AM

Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):

Special Instructions: Metals: Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Nickel, Zinc

# of Jars Used & Not Submitted

LAB USE ONLY

Received By: Jenna Walter Date: 20160826 Time: 1146

Lab Comments:

Maxxam Job #: B673330 0 T

Custody Seal | Temperature | Ice

See ACTR

AB FCD-00331 Rev3 2010/05

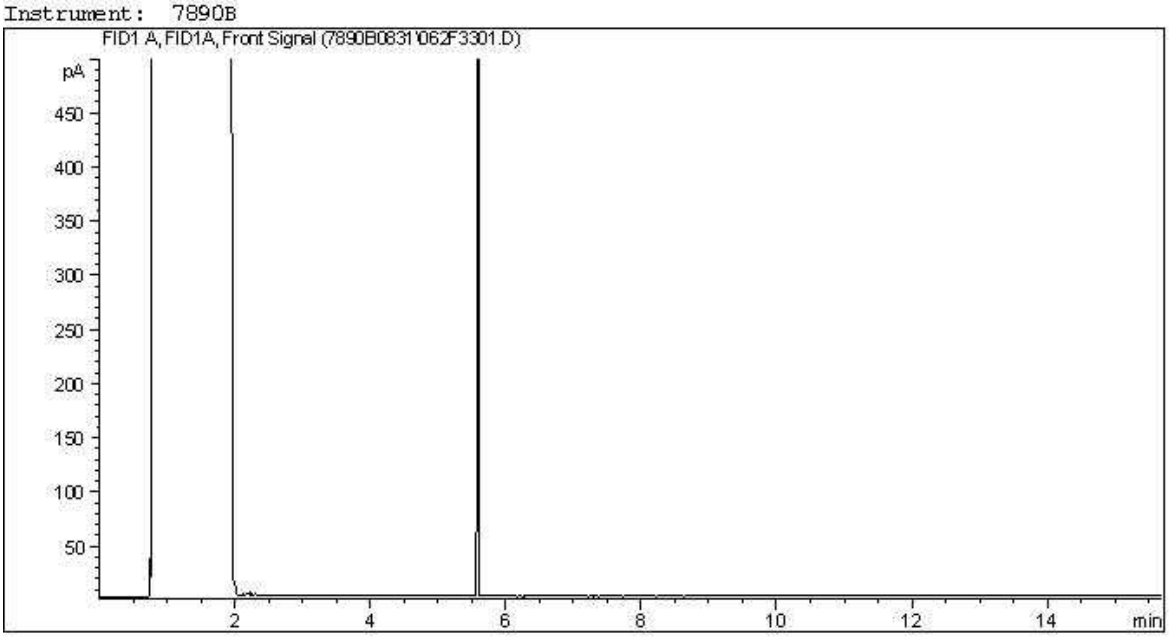
Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4262

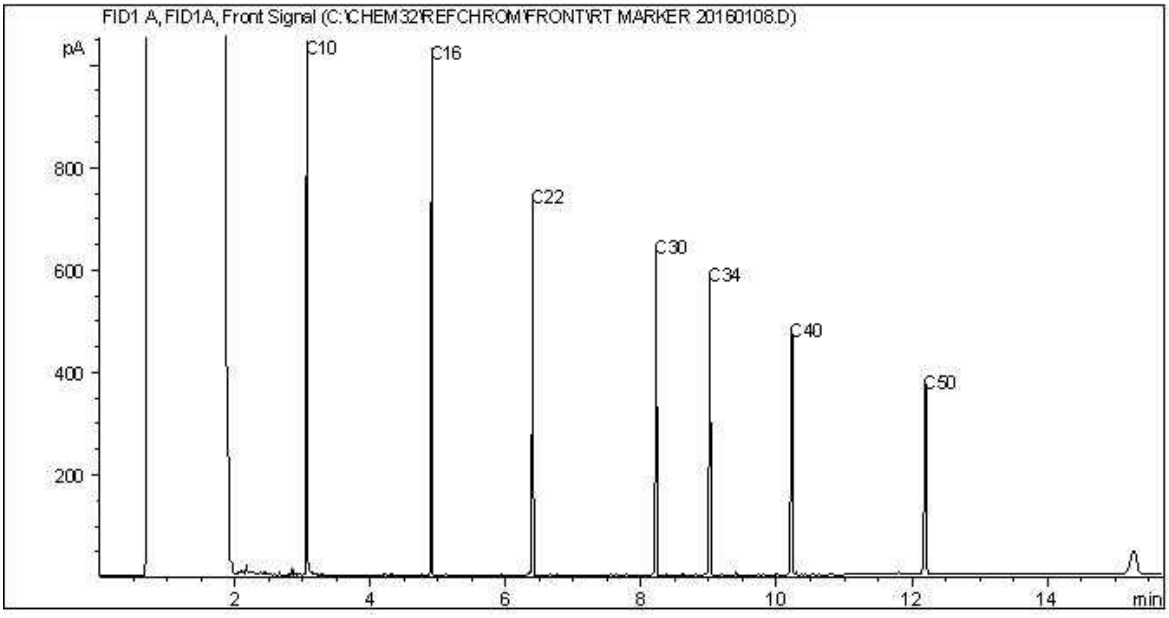
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW5

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

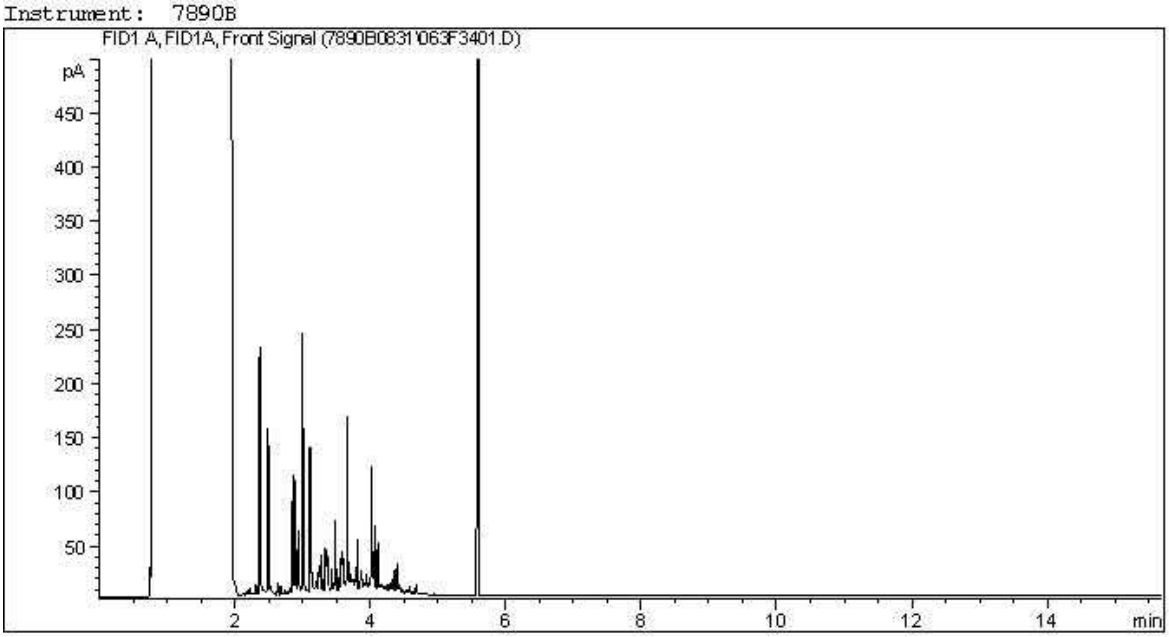
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4263

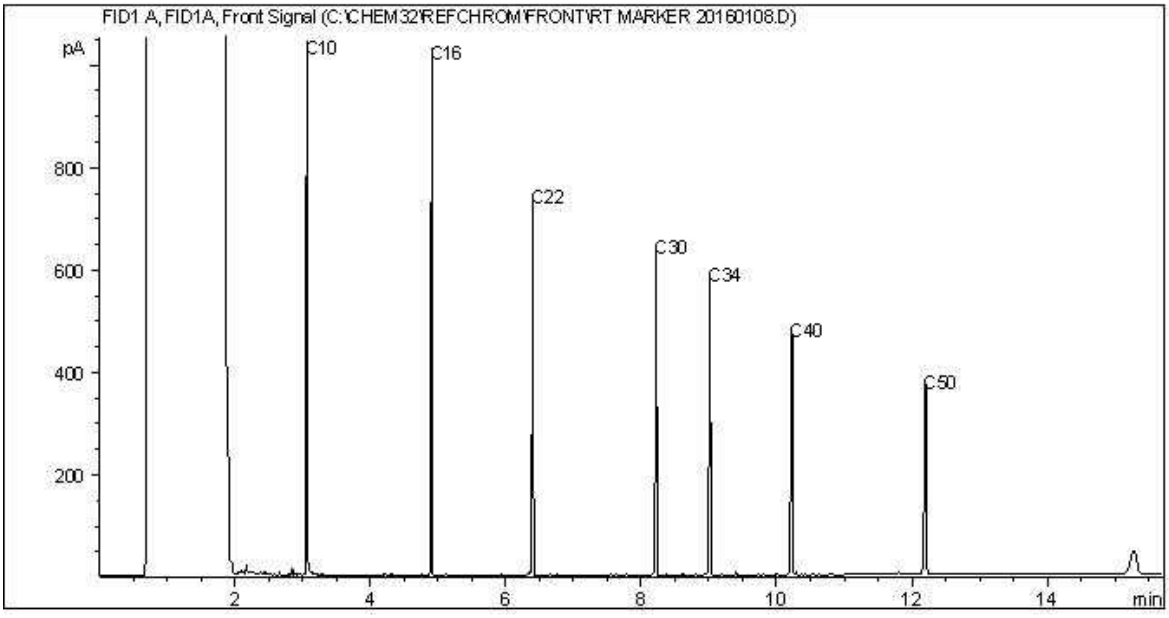
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW8

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

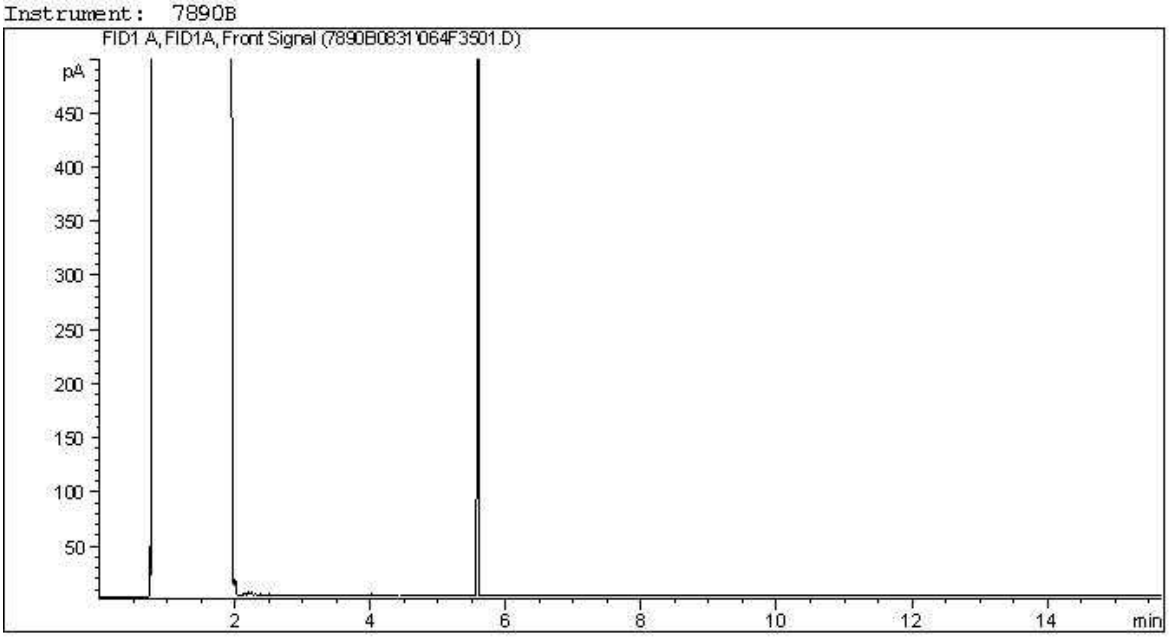
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4264

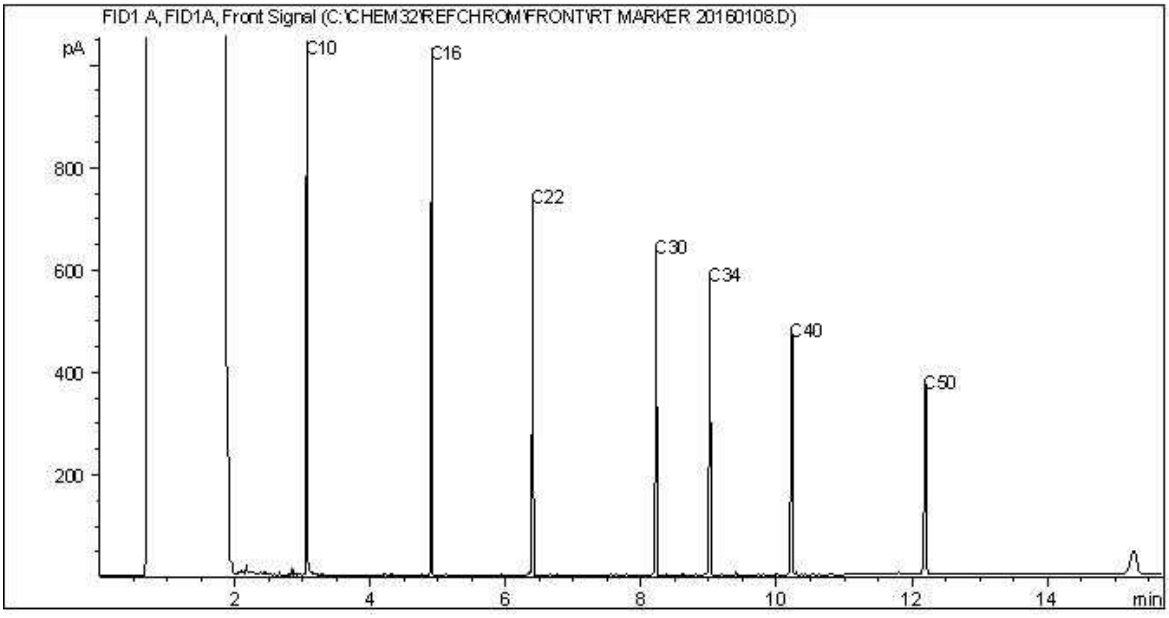
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW9

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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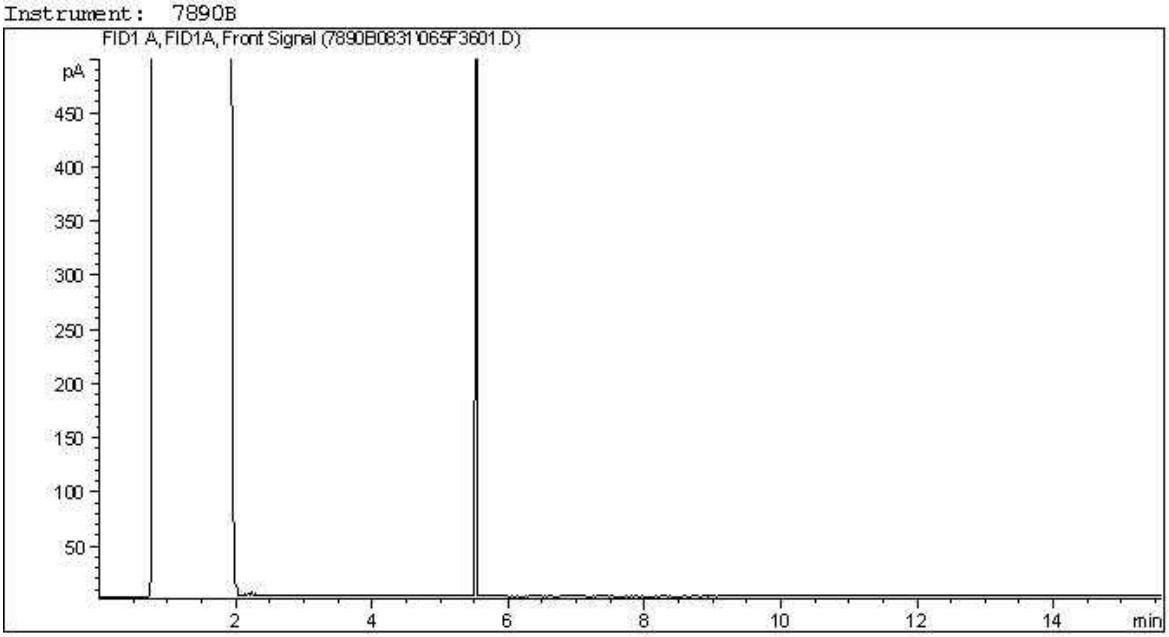
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4265

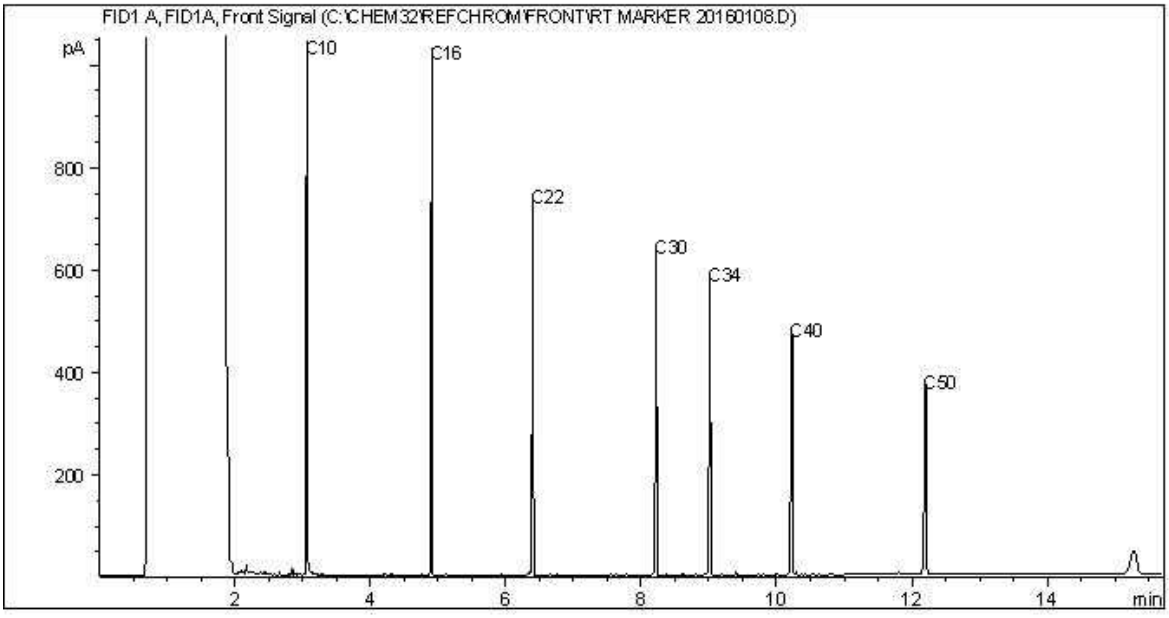
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW14A

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

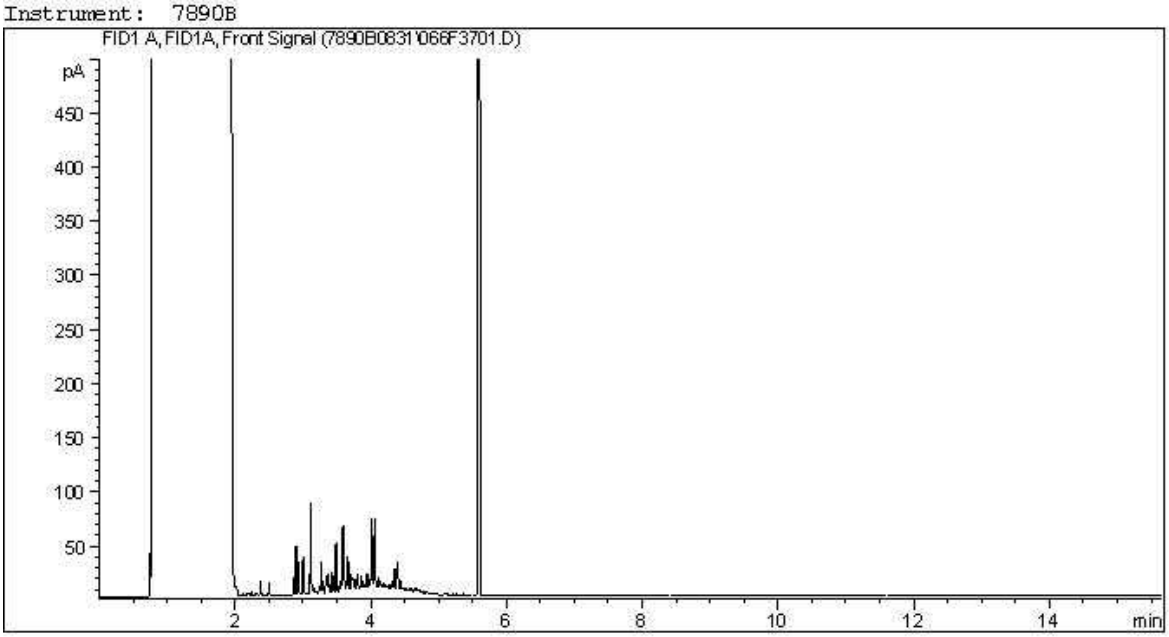
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4266

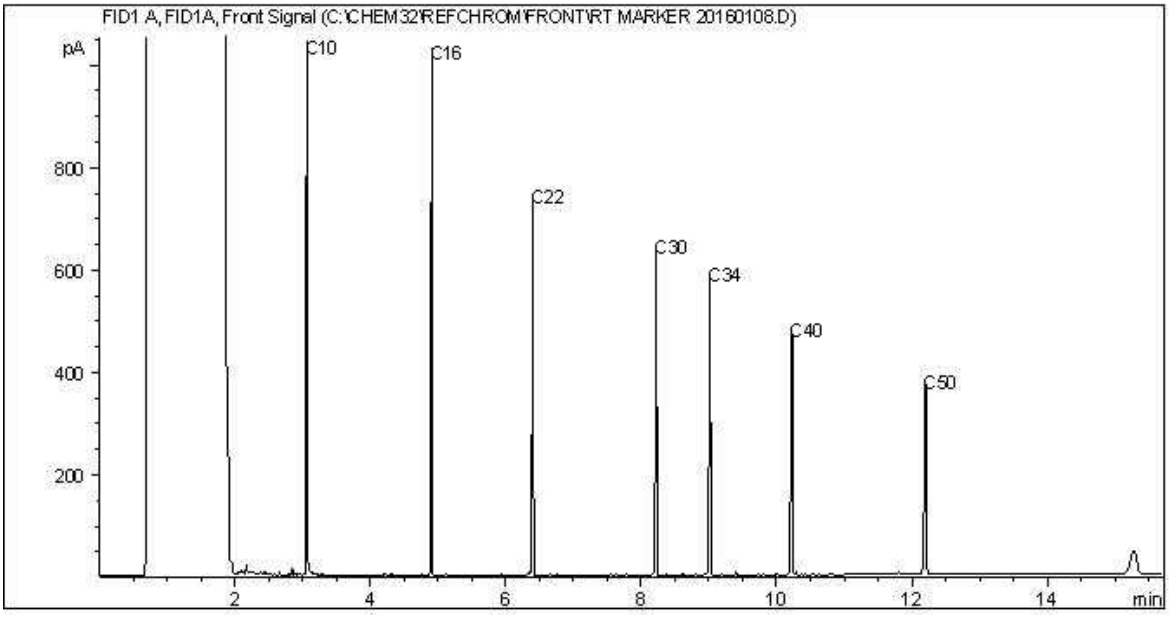
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW15

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

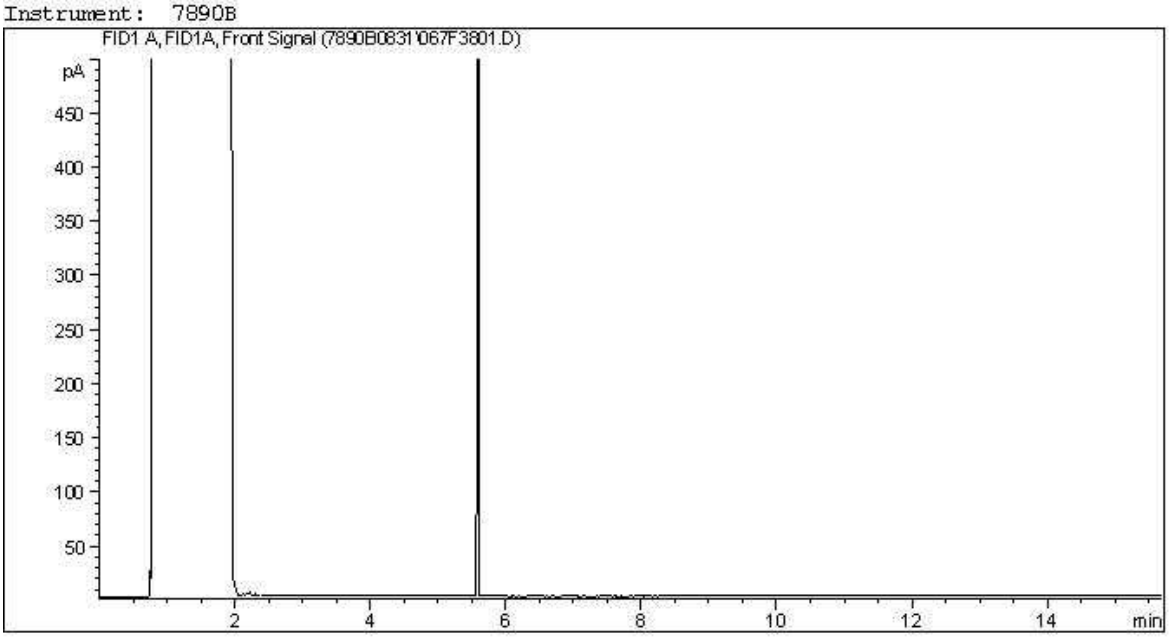
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4267

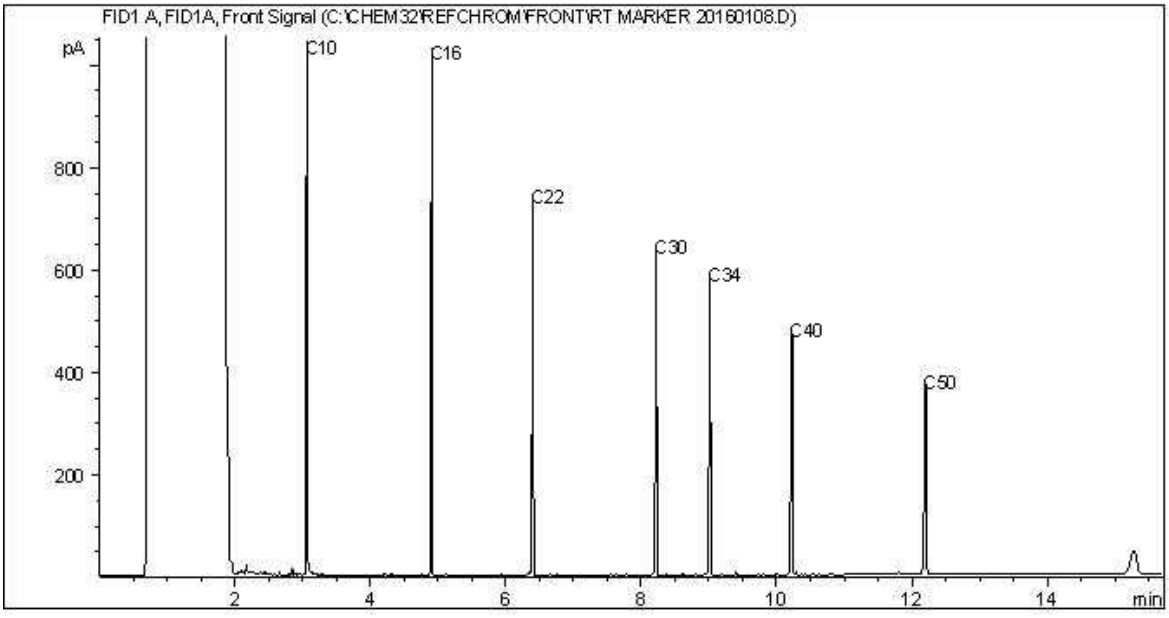
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW11

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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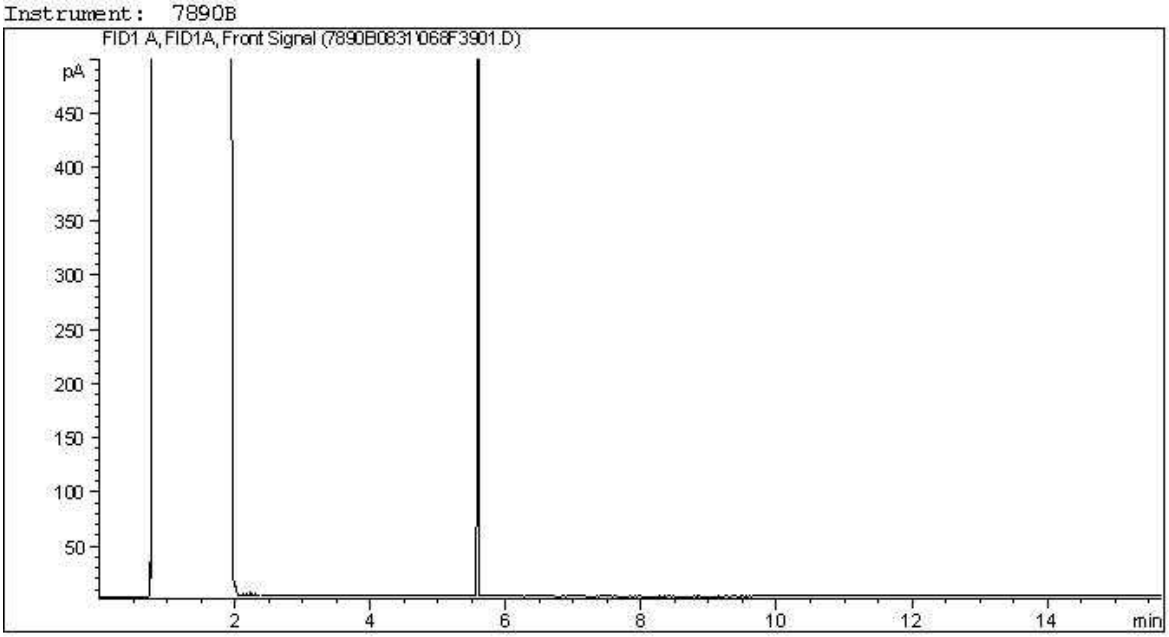
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4268

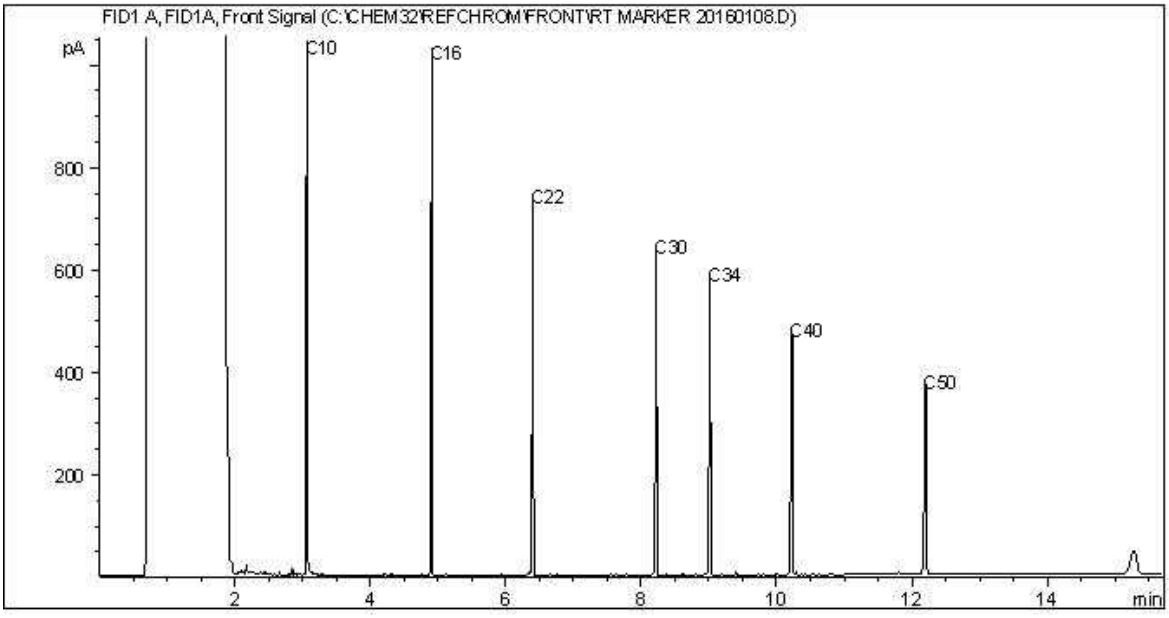
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW12

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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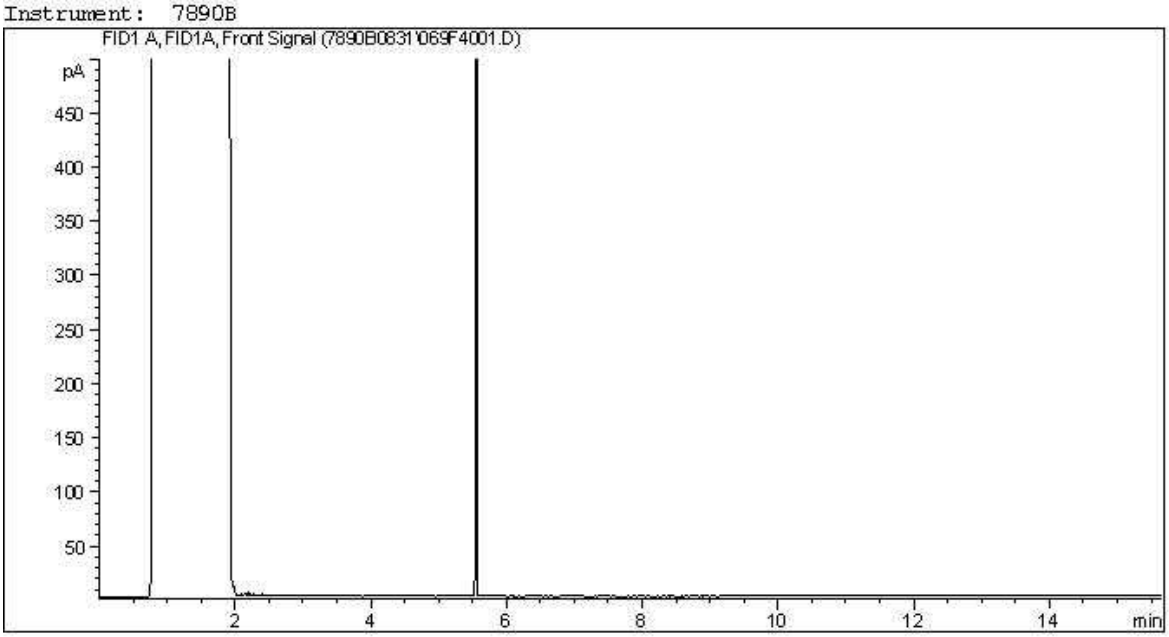
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4269

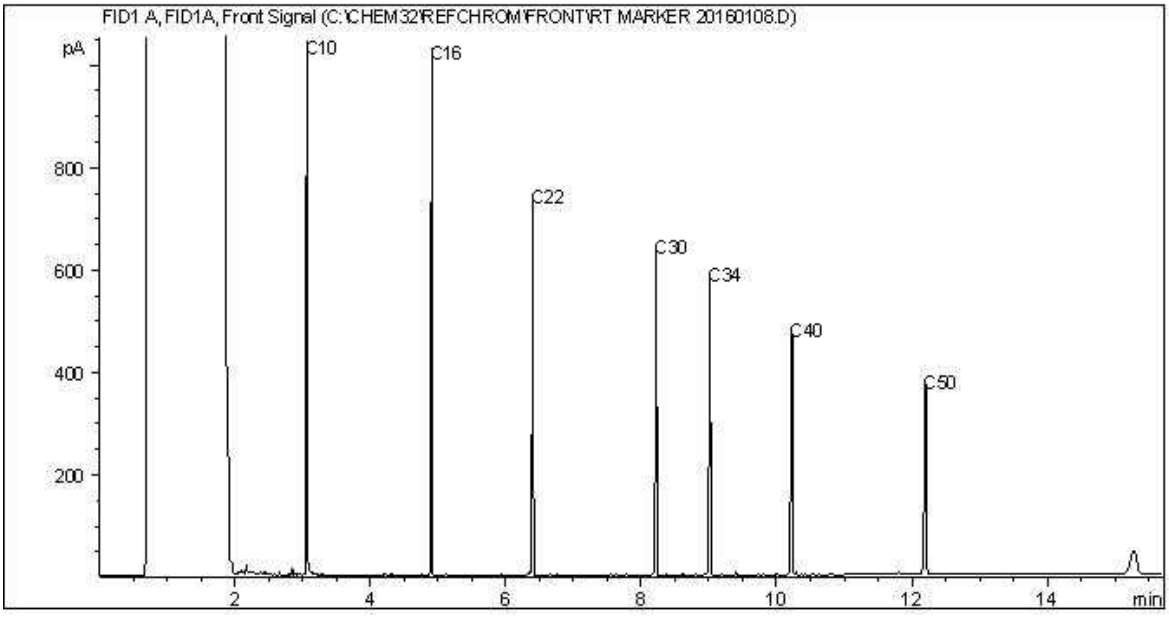
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW7B

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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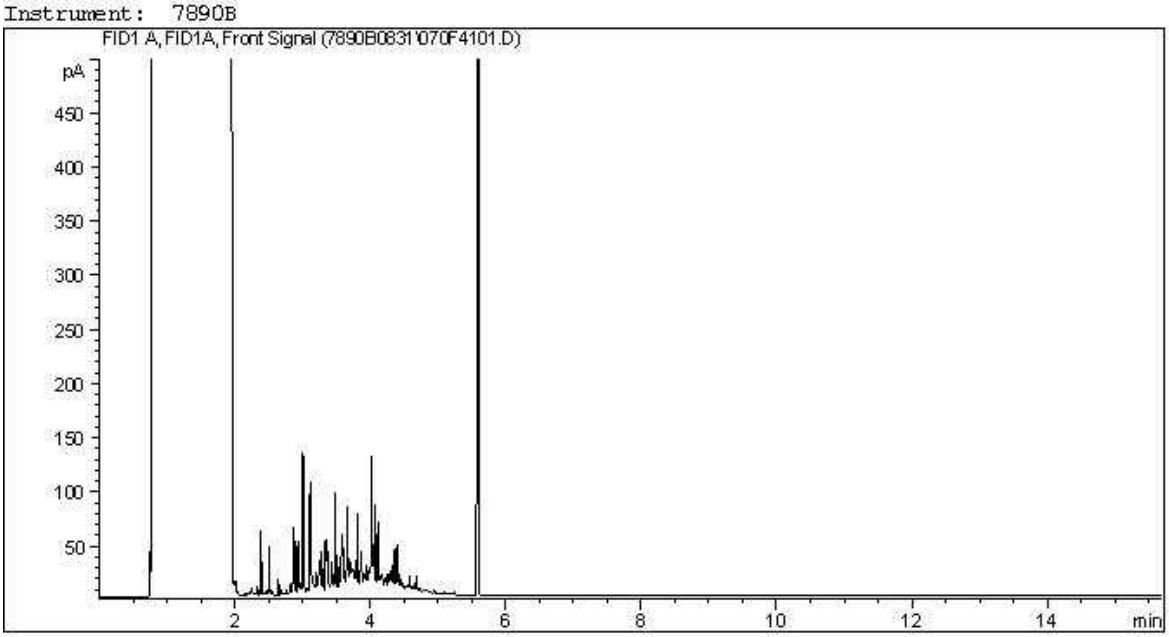
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4270

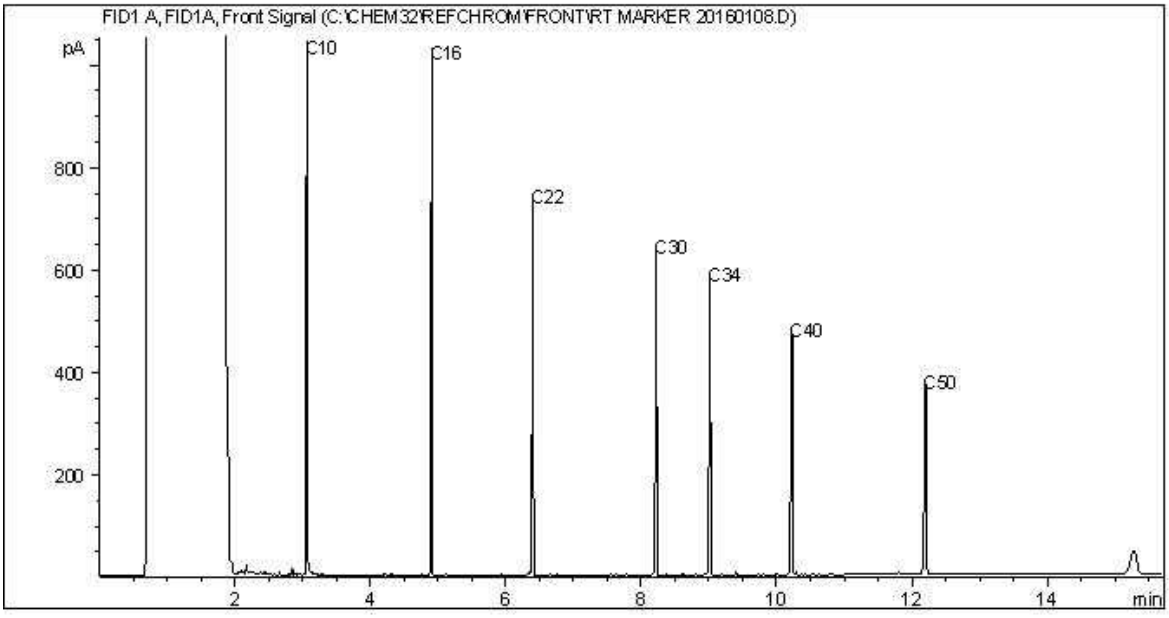
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW6B

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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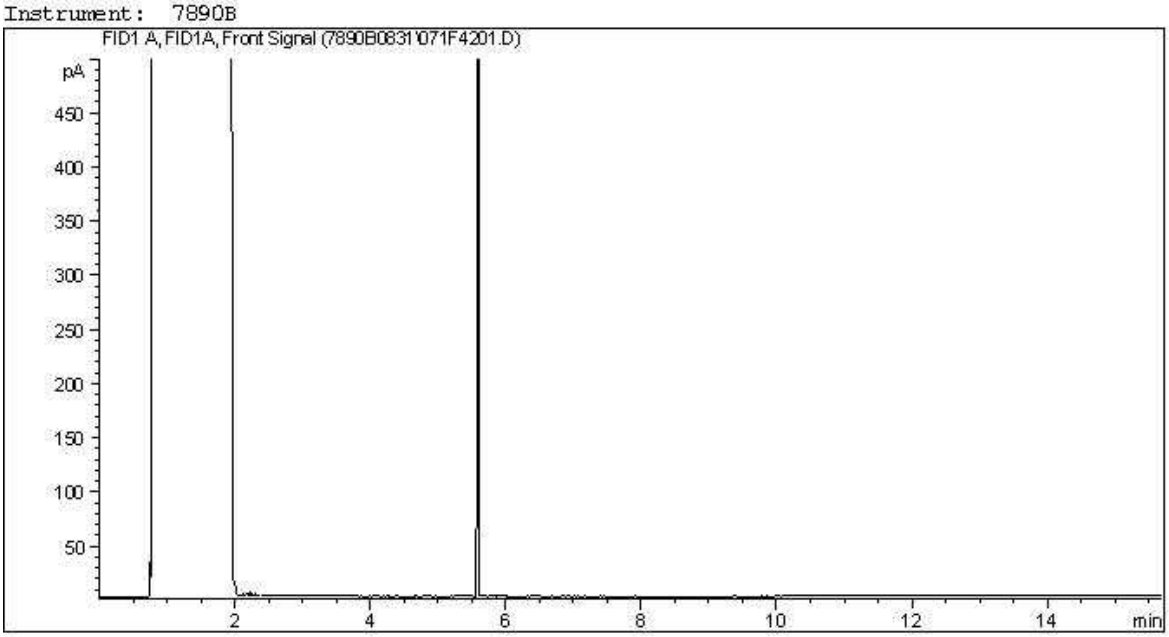
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4271

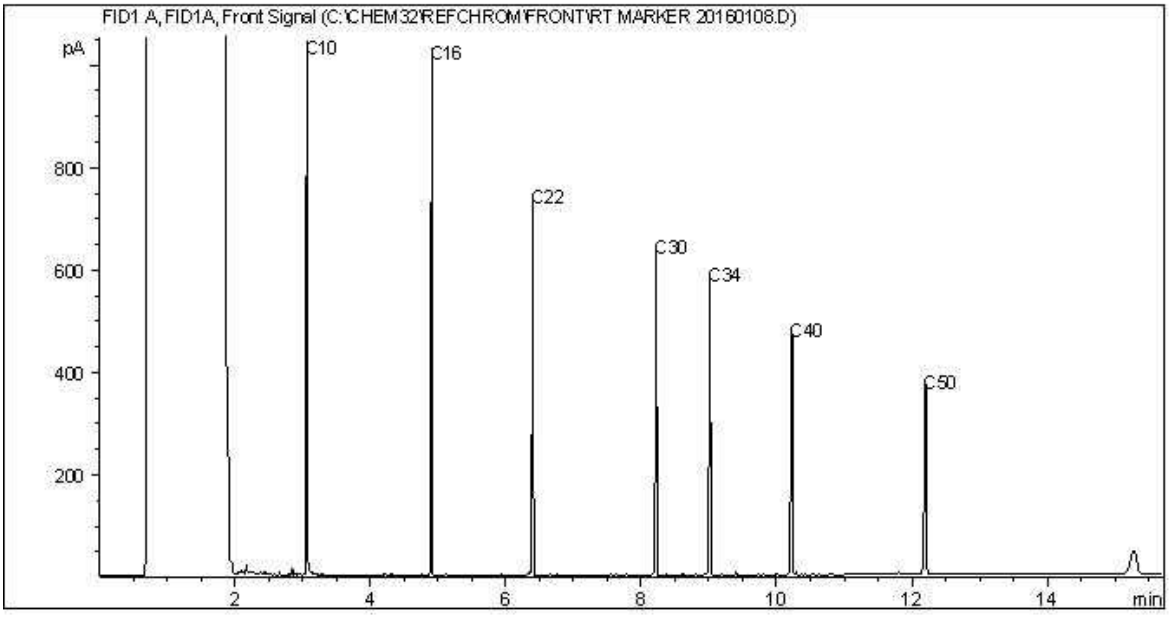
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-BMW3

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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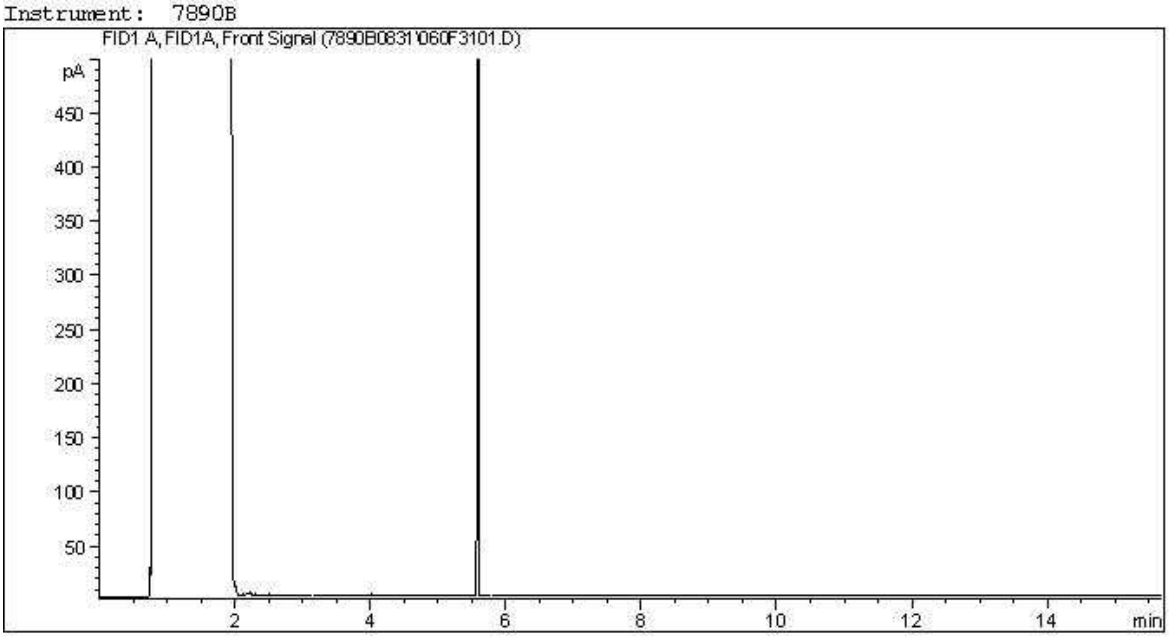
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4272

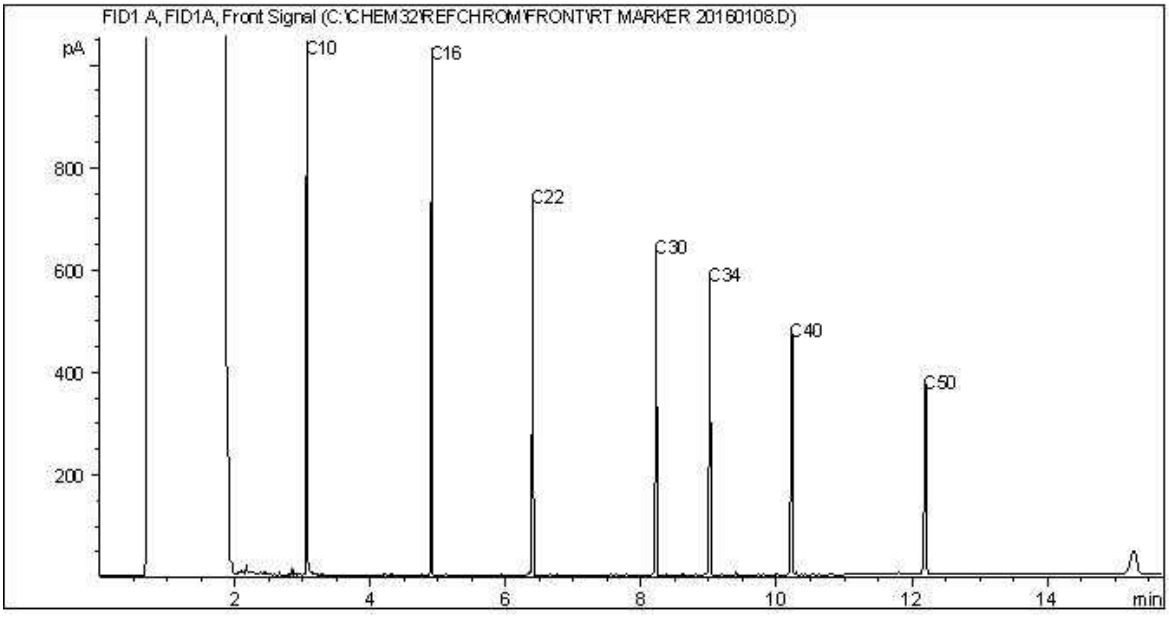
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-DUP1

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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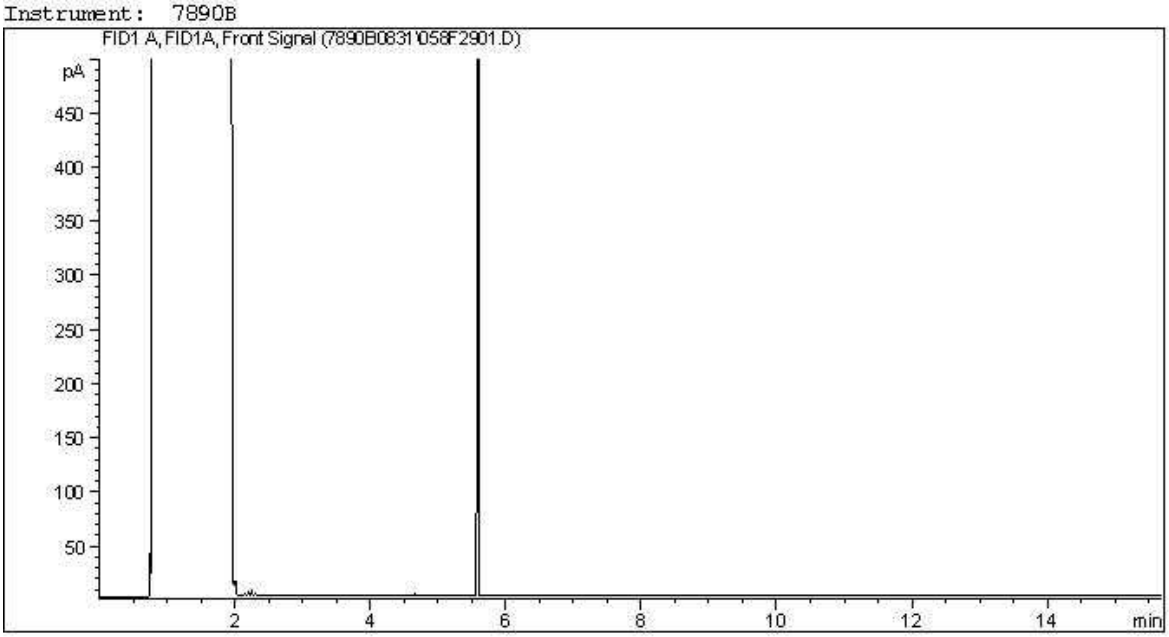
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4273

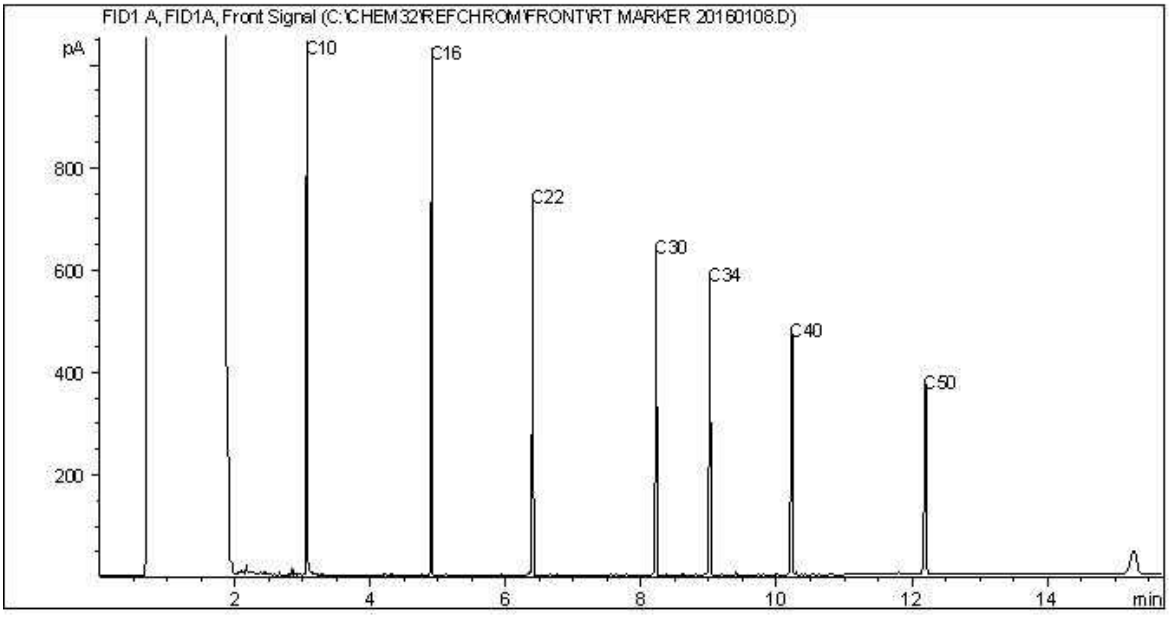
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-DUP2

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

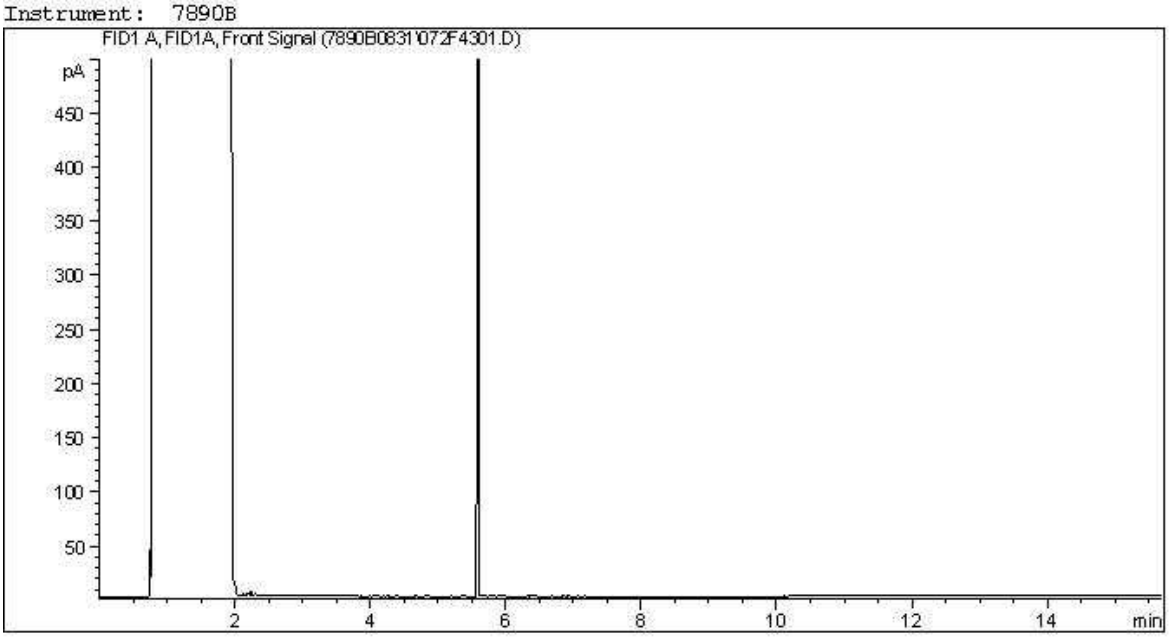
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4293

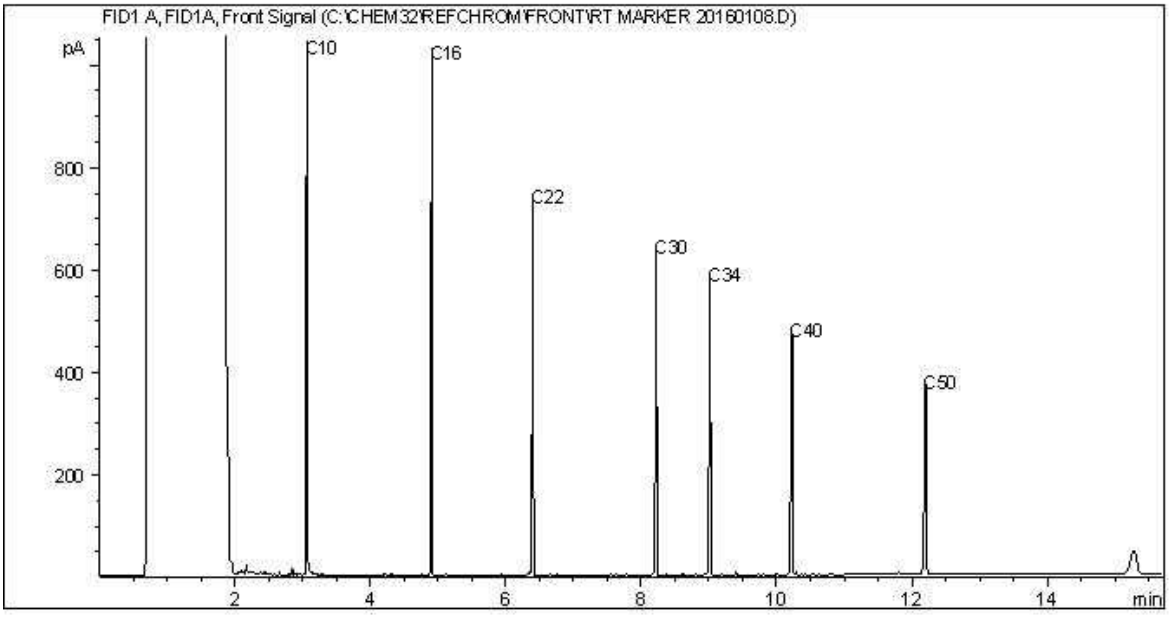
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW17

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

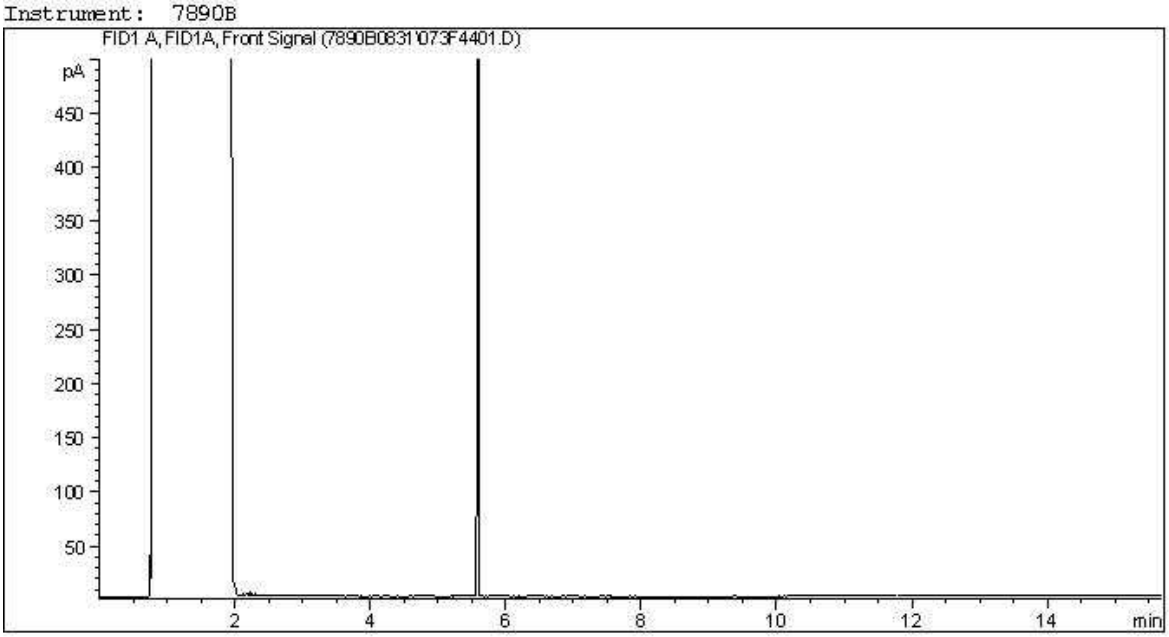
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4294

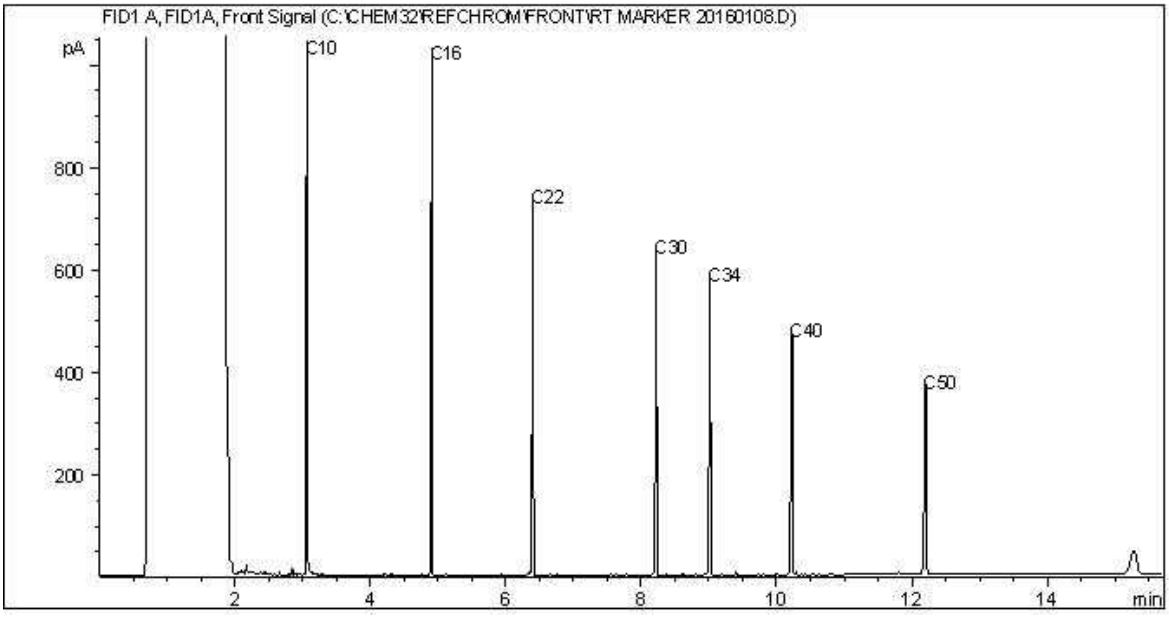
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW19

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

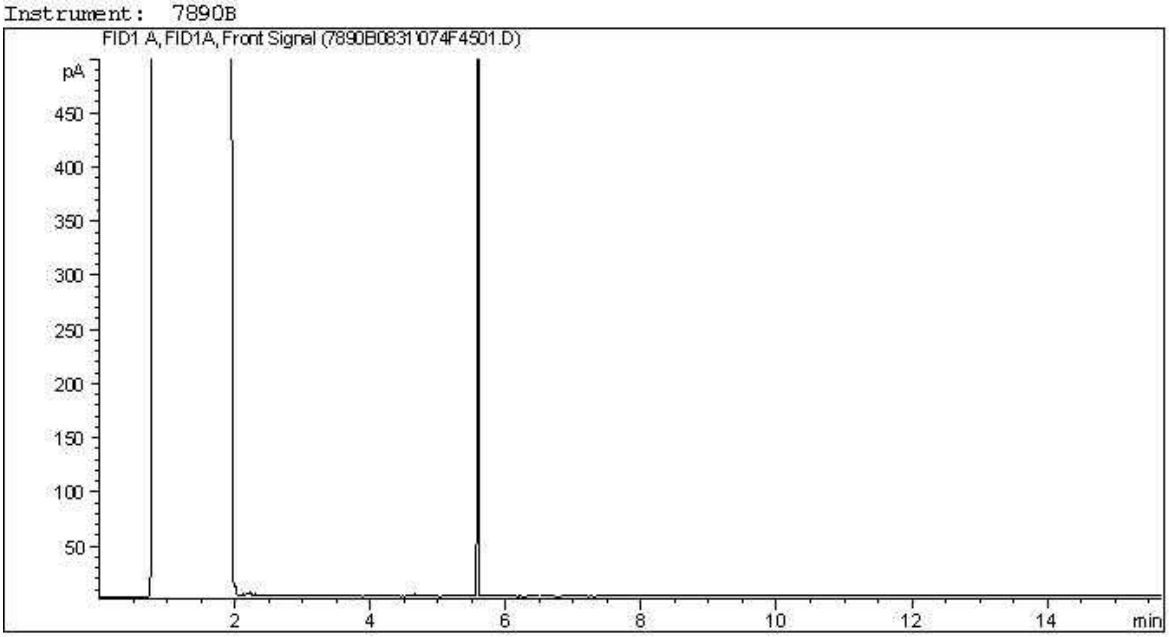
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4295

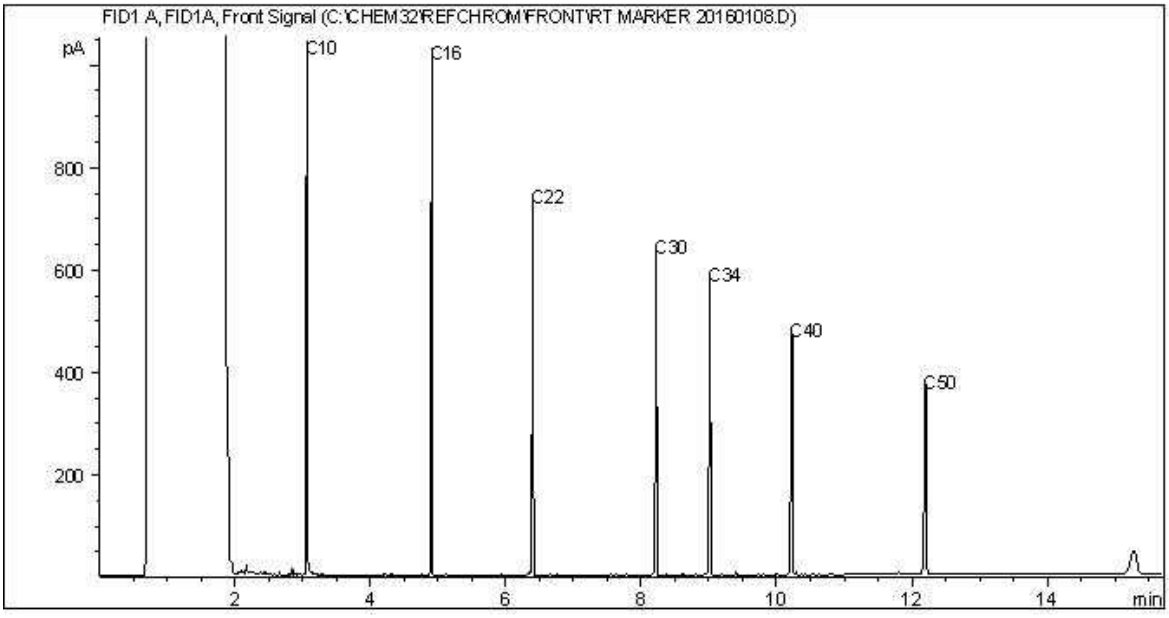
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-BMW4

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

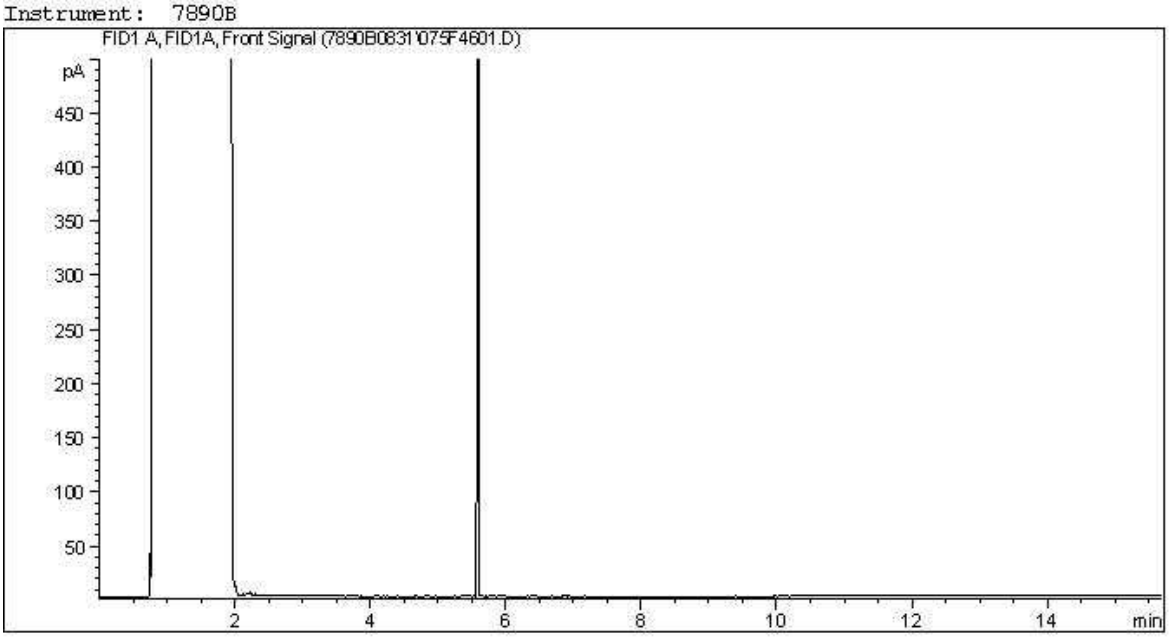
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4296

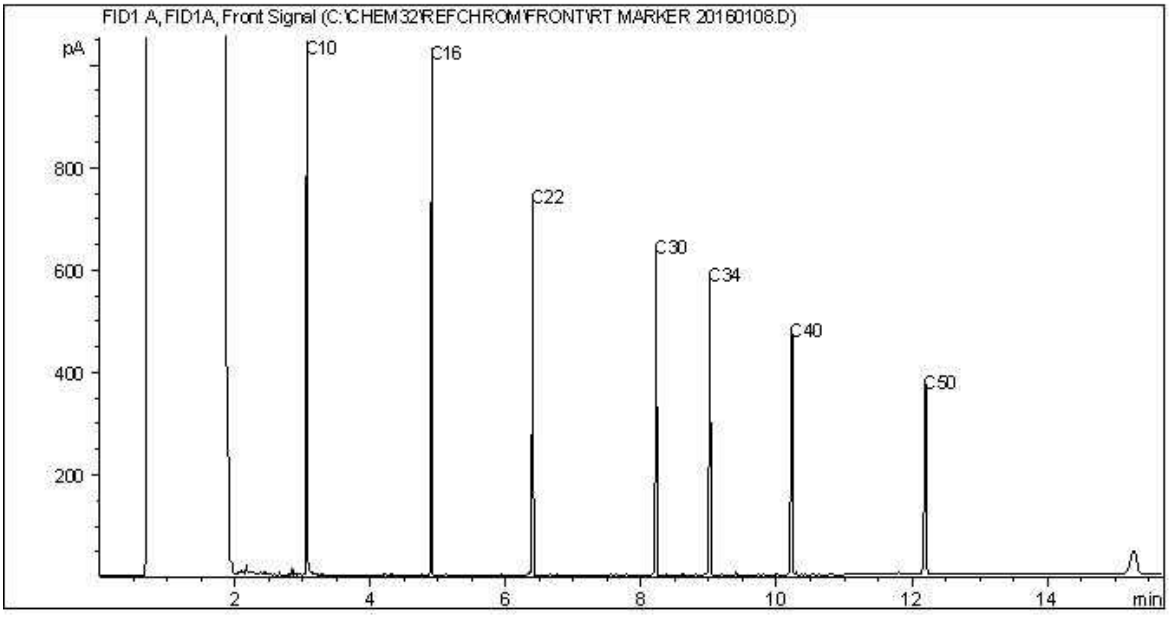
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW18

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

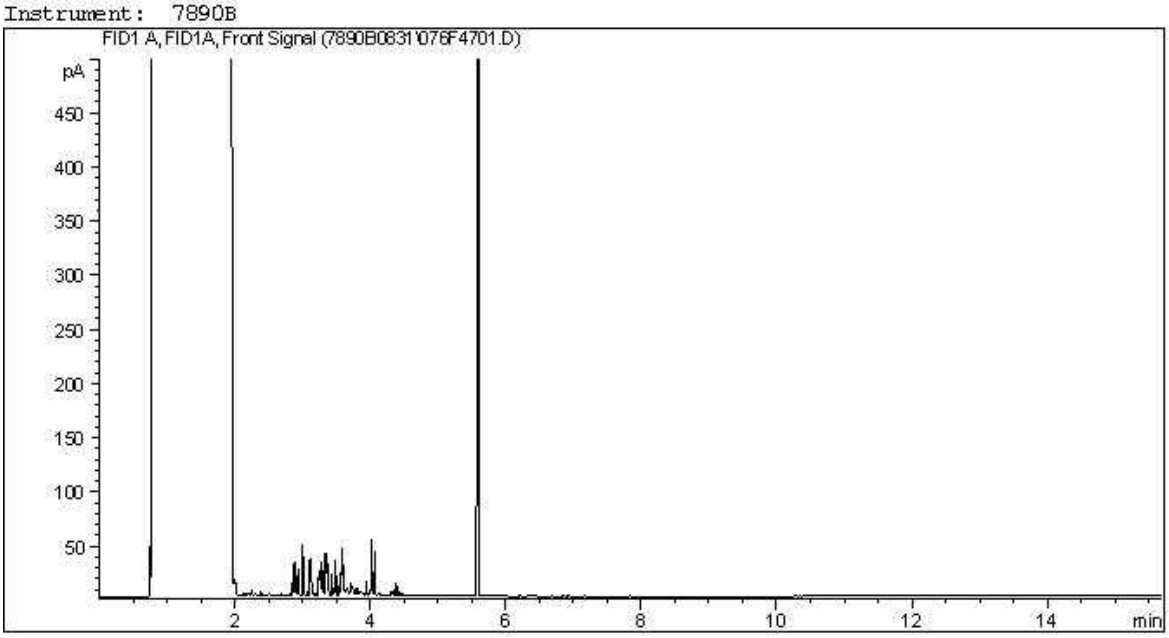
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4297

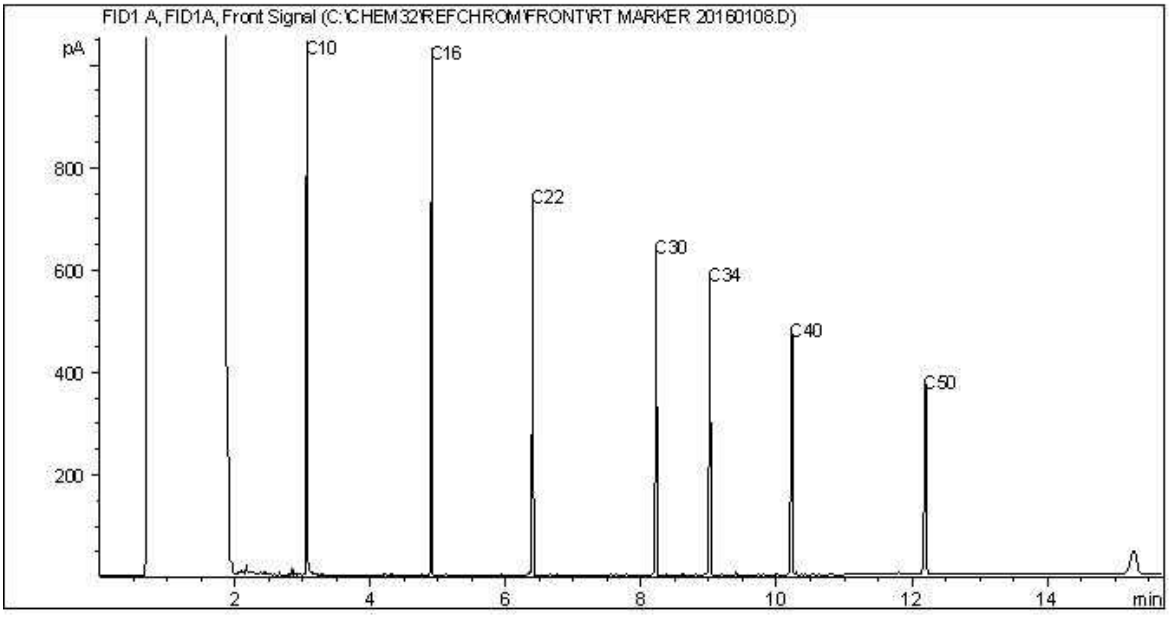
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW20

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

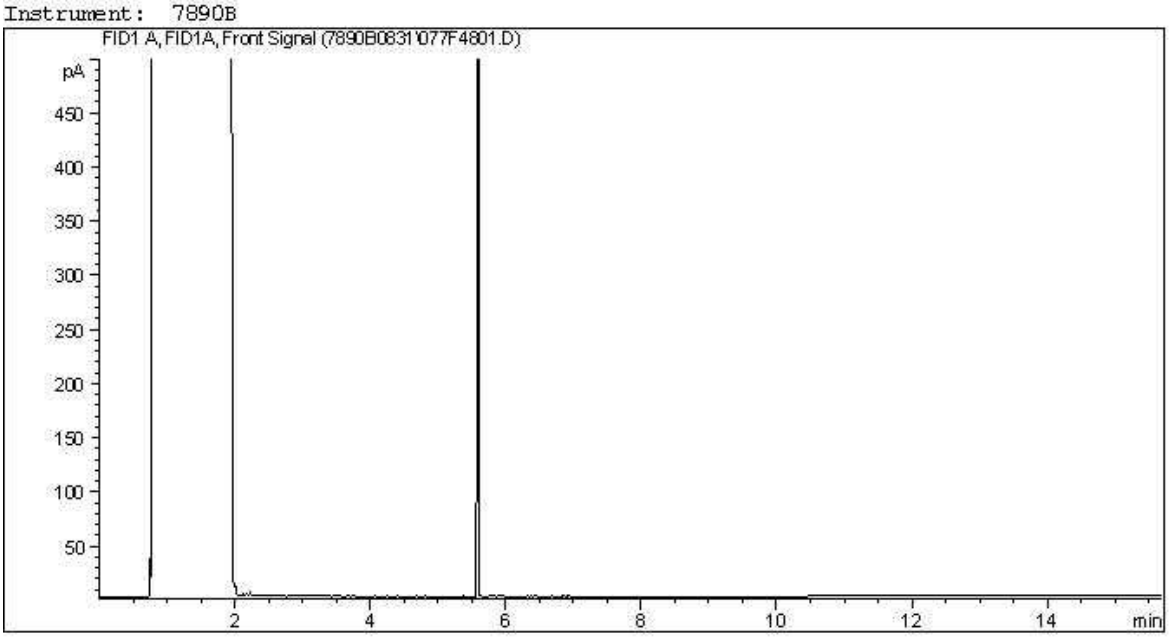
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4298

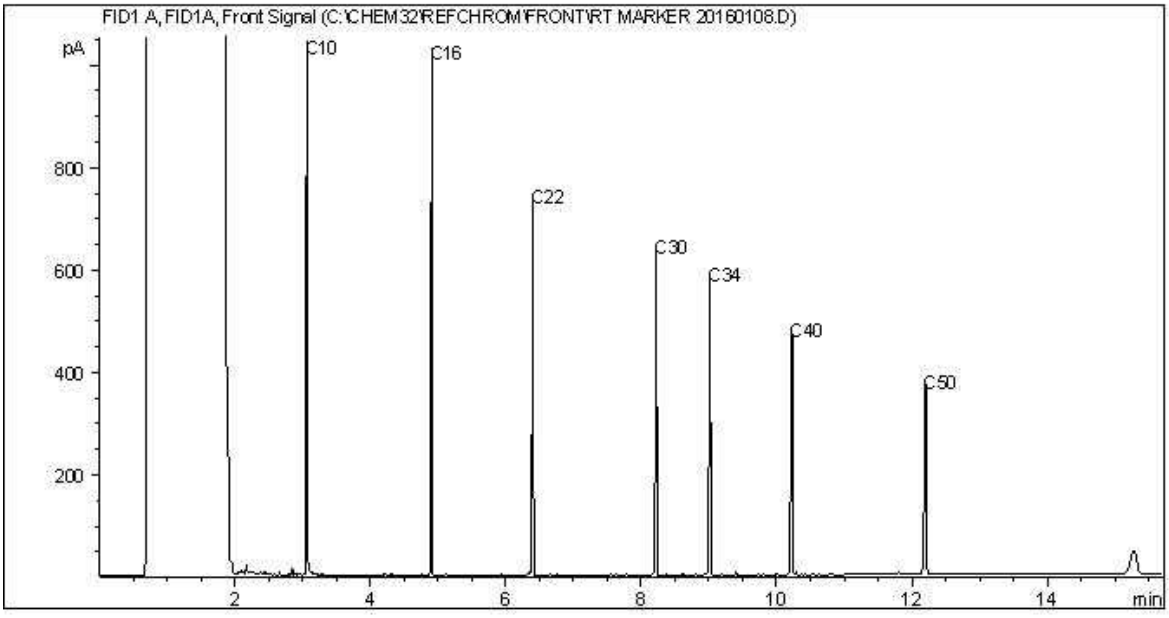
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW22

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

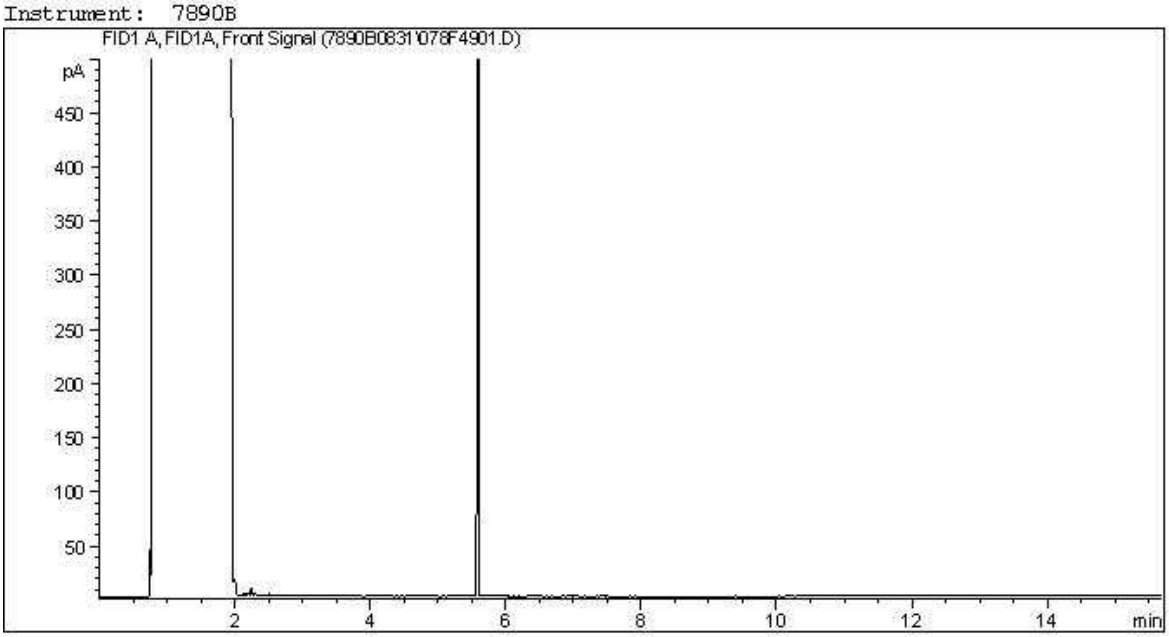
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4299

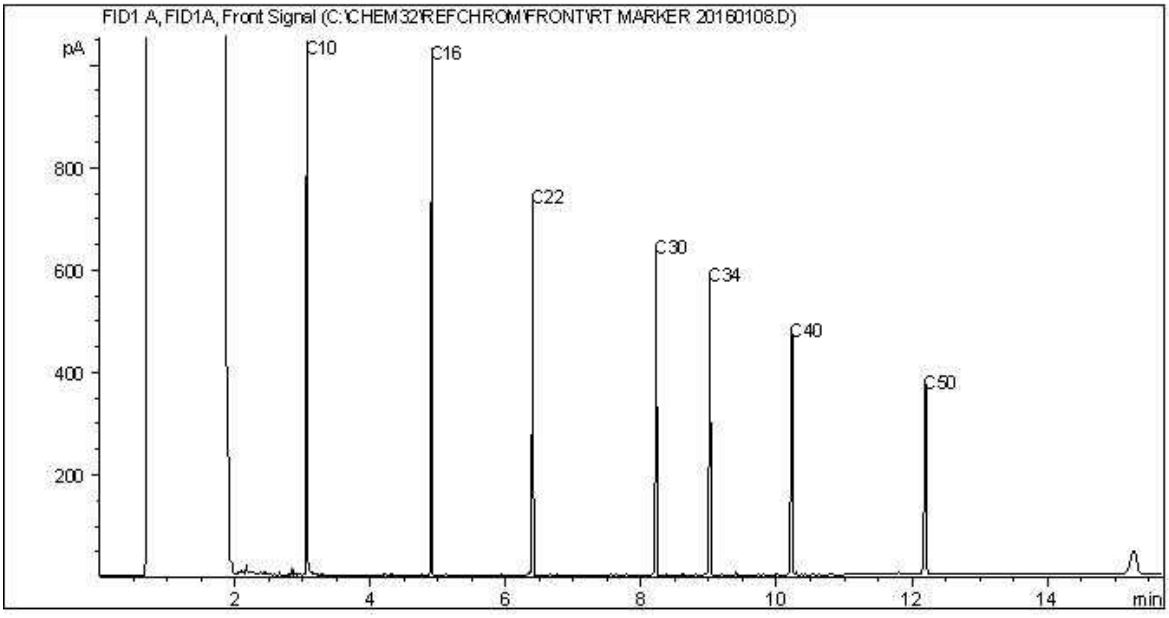
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-MW23

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890B



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

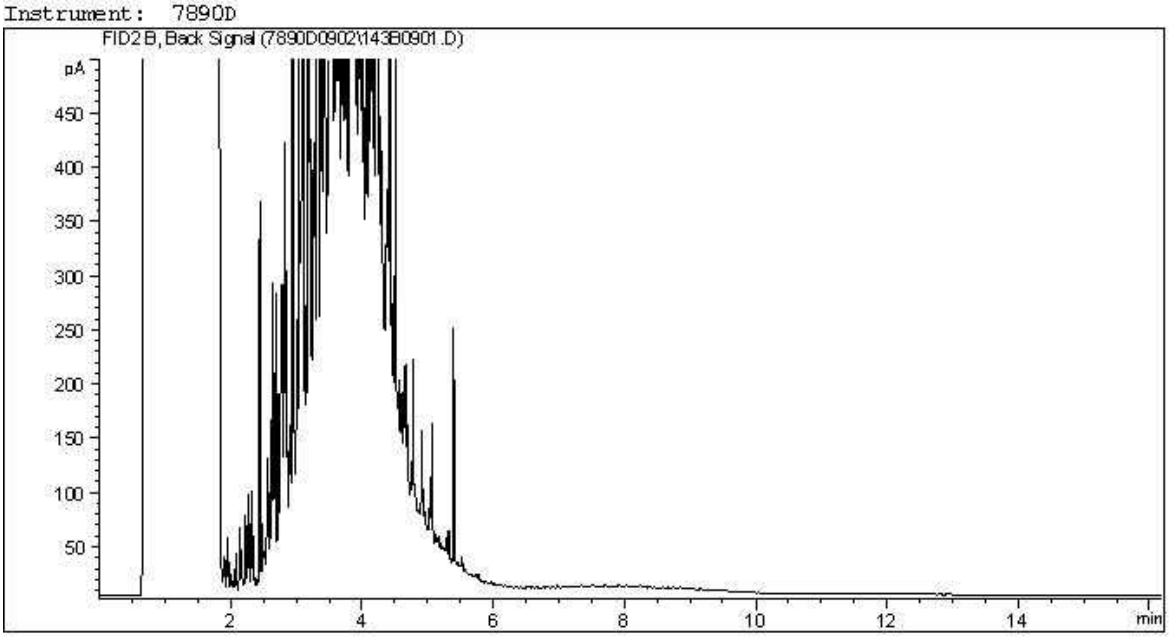
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B673330
Report Date: 2016/09/06
Maxxam Sample: PJ4300

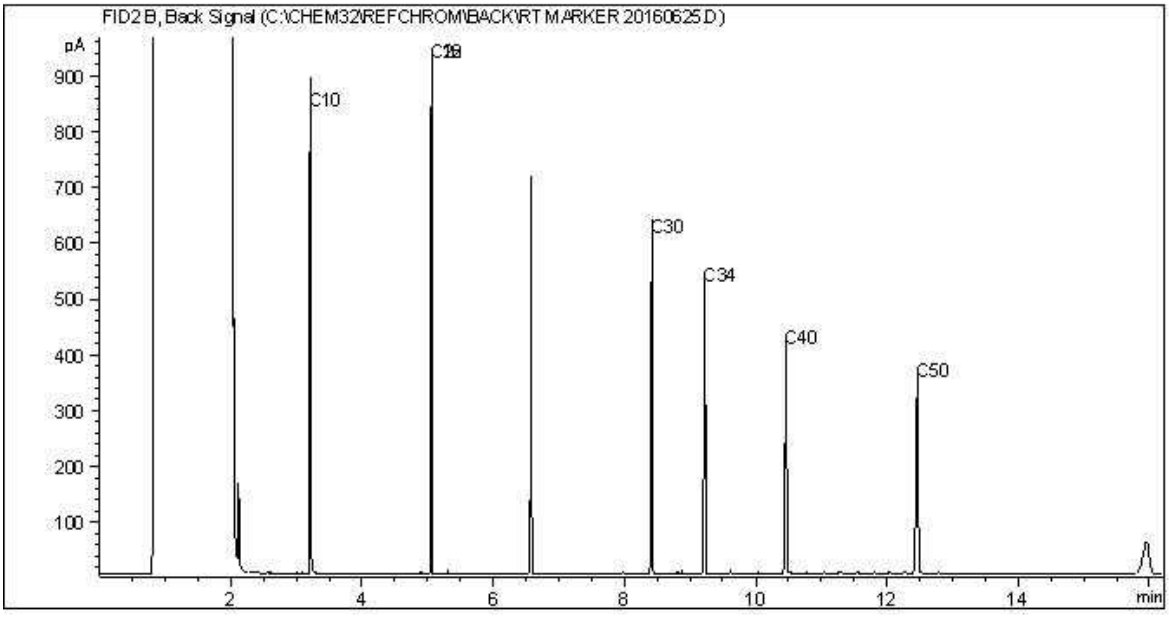
ARCADIS Canada
Site Reference: CAM 4
Client ID: CAM4-BMW1

CCME Hydrocarbons (F2-F4 in water) Chromatogram

Instrument: 7890D



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

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

Your P.O. #: N/A
Your Project #: B673330
Your C.O.C. #: na

Attention:Parminder Virk

Maxxam Analytics
2021 41st Ave NE
Calgary, AB
T2E 6P2

Report Date: 2016/09/06
Report #: R4155854
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6I4629
Received: 2016/08/30, 10:30

Sample Matrix: Water
Samples Received: 19

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Polychlorinated Biphenyl in Water	6	2016/09/01	2016/09/02	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Water	13	2016/09/01	2016/09/03	CAM SOP-00309	EPA 8082A m

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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Andrea Rieth, Project Manager
Email: ARieth@maxxam.ca
Phone# (905)817-5806
==========
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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA890	CZA890	CZA891	CZA892		
Sampling Date		2016/08/21 11:50	2016/08/21 11:50	2016/08/20 00:35	2016/08/20 10:50		
COC Number		na	na	na	na		
	UNITS	PJ4262 \ CAM4-MW5	PJ4262 \ CAM4-MW5 Lab-Dup	PJ4263 \ CAM4-MW8	PJ4264 \ CAM4-MW9	RDL	QC Batch
PCBs							
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Surrogate Recovery (%)							
Decachlorobiphenyl	%	86	95	77	84	N/A	4645112

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

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Maxxam Job #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA893	CZA894	CZA895		
Sampling Date		2016/08/20 14:45	2016/08/20 13:40	2016/08/20 15:40		
COC Number		na	na	na		
	UNITS	PJ4265 \ CAM4-MW14A	PJ4266 \ CAM4-MW15	PJ4267 \ CAM4-MW11	RDL	QC Batch
PCBs						
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	<0.05	<0.05	0.05	4645112
Surrogate Recovery (%)						
Decachlorobiphenyl	%	87	92	96	N/A	4645112

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

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Maxxam Job #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA896	CZA897	CZA898	CZA899		
Sampling Date		2016/08/20 17:00	2016/08/21 14:45	2016/08/21 14:45	2016/08/21 10:50		
COC Number		na	na	na	na		
	UNITS	PJ4268 \ CAM4-MW12	PJ4269 \ CAM4-MW7B	PJ4270 \ CAM4-MW6B	PJ4271 \ CAM4-BMW3	RDL	QC Batch
PCBs							
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Surrogate Recovery (%)							
Decachlorobiphenyl	%	92	88	86	92	N/A	4645112

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

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA900	CZA901	CZA902	CZA903		
Sampling Date				2016/08/21 16:45	2016/08/21 17:30		
COC Number		na	na	na	na		
	UNITS	PJ4272 \ CAM4-DUP1	PJ4273 \ CAM4-DUP2	PJ4293 \ CAM4-MW17	PJ4294 \ CAM4-MW19	RDL	QC Batch
PCBs							
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Surrogate Recovery (%)							
Decachlorobiphenyl	%	92	84	88	101	N/A	4645112

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

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA904	CZA905	CZA906	CZA907		
Sampling Date		2016/08/22 14:30	2016/08/22 10:20	2016/08/22 11:10	2016/08/22 13:20		
COC Number		na	na	na	na		
	UNITS	PJ4295 \ CAM4-BMW4	PJ4296 \ CAM4-MW18	PJ4297 \ CAM4-MW20	PJ4298 \ CAM4-MW22	RDL	QC Batch
PCBs							
Aroclor 1016	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	0.05	4645112
Surrogate Recovery (%)							
Decachlorobiphenyl	%	93	90	101	85	N/A	4645112

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

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		CZA908		
Sampling Date		2016/08/22 12:15		
COC Number		na		
	UNITS	PJ4299 \ CAM4-MW23	RDL	QC Batch
PCBs				
Aroclor 1016	ug/L	<0.05	0.05	4645112
Aroclor 1221	ug/L	<0.05	0.05	4645112
Aroclor 1232	ug/L	<0.05	0.05	4645112
Aroclor 1242	ug/L	<0.05	0.05	4645112
Aroclor 1248	ug/L	<0.05	0.05	4645112
Aroclor 1254	ug/L	<0.05	0.05	4645112
Aroclor 1260	ug/L	<0.05	0.05	4645112
Aroclor 1262	ug/L	<0.05	0.05	4645112
Aroclor 1268	ug/L	<0.05	0.05	4645112
Total PCB	ug/L	<0.05	0.05	4645112
Surrogate Recovery (%)				
Decachlorobiphenyl	%	87	N/A	4645112

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

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: CZA890 **Collected:** 2016/08/21
Sample ID: PJ4262 \ CAM4-MW5 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA890 Dup **Collected:** 2016/08/21
Sample ID: PJ4262 \ CAM4-MW5 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA891 **Collected:** 2016/08/20
Sample ID: PJ4263 \ CAM4-MW8 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA892 **Collected:** 2016/08/20
Sample ID: PJ4264 \ CAM4-MW9 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA893 **Collected:** 2016/08/20
Sample ID: PJ4265 \ CAM4-MW14A **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA894 **Collected:** 2016/08/20
Sample ID: PJ4266 \ CAM4-MW15 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

Maxxam ID: CZA895 **Collected:** 2016/08/20
Sample ID: PJ4267 \ CAM4-MW11 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/02	Li Peng

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: CZA896 **Collected:** 2016/08/20
Sample ID: PJ4268 \ CAM4-MW12 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA897 **Collected:** 2016/08/21
Sample ID: PJ4269 \ CAM4-MW7B **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA898 **Collected:** 2016/08/21
Sample ID: PJ4270 \ CAM4-MW6B **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA899 **Collected:** 2016/08/21
Sample ID: PJ4271 \ CAM4-BMW3 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA900 **Collected:**
Sample ID: PJ4272 \ CAM4-DUP1 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA901 **Collected:**
Sample ID: PJ4273 \ CAM4-DUP2 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA902 **Collected:** 2016/08/21
Sample ID: PJ4293 \ CAM4-MW17 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

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 #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

TEST SUMMARY

Maxxam ID: CZA903 **Collected:** 2016/08/21
Sample ID: PJ4294 \ CAM4-MW19 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA904 **Collected:** 2016/08/22
Sample ID: PJ4295 \ CAM4-BMW4 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA905 **Collected:** 2016/08/22
Sample ID: PJ4296 \ CAM4-MW18 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA906 **Collected:** 2016/08/22
Sample ID: PJ4297 \ CAM4-MW20 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA907 **Collected:** 2016/08/22
Sample ID: PJ4298 \ CAM4-MW22 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

Maxxam ID: CZA908 **Collected:** 2016/08/22
Sample ID: PJ4299 \ CAM4-MW23 **Shipped:**
Matrix: Water **Received:** 2016/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Polychlorinated Biphenyl in Water	GC/ECD	4645112	2016/09/01	2016/09/03	Li Peng

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Maxxam Job #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

GENERAL COMMENTS

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

Package 1	6.0°C
Package 2	7.3°C
Package 3	6.7°C
Package 4	6.7°C
Package 5	5.7°C
Package 6	6.7°C

Results relate only to the items tested.

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Maxxam Job #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4645112	LPG	Matrix Spike	Decachlorobiphenyl	2016/09/02		101	%	60 - 130
			Aroclor 1260	2016/09/02		95	%	60 - 130
			Total PCB	2016/09/02		95	%	60 - 130
4645112	LPG	Spiked Blank	Decachlorobiphenyl	2016/09/02		90	%	60 - 130
			Aroclor 1260	2016/09/02		77	%	60 - 130
			Total PCB	2016/09/02		77	%	60 - 130
4645112	LPG	Method Blank	Decachlorobiphenyl	2016/09/02		95	%	60 - 130
			Aroclor 1016	2016/09/02	<0.05		ug/L	
			Aroclor 1221	2016/09/02	<0.05		ug/L	
			Aroclor 1232	2016/09/02	<0.05		ug/L	
			Aroclor 1242	2016/09/02	<0.05		ug/L	
			Aroclor 1248	2016/09/02	<0.05		ug/L	
			Aroclor 1254	2016/09/02	<0.05		ug/L	
			Aroclor 1260	2016/09/02	<0.05		ug/L	
			Aroclor 1262	2016/09/02	<0.05		ug/L	
			Aroclor 1268	2016/09/02	<0.05		ug/L	
			Total PCB	2016/09/02	<0.05		ug/L	
4645112	LPG	RPD [CZA890-01]	Aroclor 1016	2016/09/02	NC		%	40
			Aroclor 1221	2016/09/02	NC		%	40
			Aroclor 1232	2016/09/02	NC		%	40
			Aroclor 1242	2016/09/02	NC		%	30
			Aroclor 1248	2016/09/02	NC		%	30
			Aroclor 1254	2016/09/02	NC		%	30
			Aroclor 1260	2016/09/02	NC		%	30
			Aroclor 1262	2016/09/02	NC		%	40
			Aroclor 1268	2016/09/02	NC		%	40
			Total PCB	2016/09/02	NC		%	40

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B6I4629
Report Date: 2016/09/06

Maxxam Analytics
Client Project #: B673330
Your P.O. #: N/A

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 Services

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

ARCADIS Canada Inc. - Ottawa
ATTN: Troy Austrins
260 Hearst Way
Suite 512
Ottawa ON K2L 3H1

Date Received: 29-AUG-16
Report Date: 07-SEP-16 15:13 (MT)
Version: FINAL

Client Phone: 613-230-2405

Certificate of Analysis

Lab Work Order #: L1820490

Project P.O. #: NOT SUBMITTED
Job Reference: 102012
C of C Numbers: 10-366452
Legal Site Desc:

Emerson Perez, B.S.E
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820490-1 CAM4-DUP1 Sampled By: CLIENT on 20-AUG-16 Matrix: water							
Total Metals							
Arsenic (As)-Total	0.00367		0.00010	mg/L		03-SEP-16	R3540585
Cadmium (Cd)-Total	0.000259		0.0000050	mg/L		03-SEP-16	R3540585
Chromium (Cr)-Total	0.0321		0.00010	mg/L		03-SEP-16	R3540585
Cobalt (Co)-Total	0.00139		0.00010	mg/L		03-SEP-16	R3540585
Copper (Cu)-Total	0.0107		0.00050	mg/L		03-SEP-16	R3540585
Lead (Pb)-Total	0.00289		0.000050	mg/L		03-SEP-16	R3540585
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		04-SEP-16	R3540895
Nickel (Ni)-Total	0.0307		0.00050	mg/L		03-SEP-16	R3540585
Zinc (Zn)-Total	0.0437		0.0030	mg/L		03-SEP-16	R3540585
Volatile Organic Compounds							
Benzene	<0.00050		0.00050	mg/L		02-SEP-16	R3539571
Ethylbenzene	<0.00050		0.00050	mg/L		02-SEP-16	R3539571
Toluene	0.00062		0.00050	mg/L		02-SEP-16	R3539571
o-Xylene	0.00162		0.00050	mg/L		02-SEP-16	R3539571
m+p-Xylene	0.00214		0.00050	mg/L		02-SEP-16	R3539571
Xylenes	0.00376		0.00071	mg/L		02-SEP-16	R3539571
F1(C6-C10)	<0.10		0.10	mg/L		02-SEP-16	R3539571
F1-BTEX	<0.10		0.10	mg/L		02-SEP-16	R3539571
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%		02-SEP-16	R3539571
Surrogate: 3,4-Dichlorotoluene (SS)	101.0		70-130	%		02-SEP-16	R3539571
Surrogate: 1,4-Difluorobenzene (SS)	98.0		70-130	%		02-SEP-16	R3539571
Hydrocarbons							
F2 (>C10-C16)	0.28		0.10	mg/L	30-AUG-16	30-AUG-16	R3537290
F3 (C16-C34)	0.41		0.25	mg/L	30-AUG-16	30-AUG-16	R3537290
F4 (C34-C50)	<0.25		0.25	mg/L	30-AUG-16	30-AUG-16	R3537290
Surrogate: 2-Bromobenzotrifluoride	98.4		60-140	%	30-AUG-16	30-AUG-16	R3537290
Polychlorinated Biphenyls							
Aroclor 1016	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1221	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1232	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1242	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1248	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1254	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1260	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1262	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1268	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Surrogate: Decachlorobiphenyl	71.7		65-130	%		31-AUG-16	R3538732
Total PCBs	<0.000050		0.000050	mg/L		31-AUG-16	R3538732
L1820490-2 CAM4-DUP2 Sampled By: CLIENT on 21-AUG-16 Matrix: water							
Total Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1820490-2 CAM4-DUP2 Sampled By: CLIENT on 21-AUG-16 Matrix: water							
Total Metals							
Arsenic (As)-Total	0.00025		0.00010	mg/L		03-SEP-16	R3540585
Cadmium (Cd)-Total	0.0000224		0.0000050	mg/L		03-SEP-16	R3540585
Chromium (Cr)-Total	0.00444		0.00010	mg/L		03-SEP-16	R3540585
Cobalt (Co)-Total	0.00019		0.00010	mg/L		03-SEP-16	R3540585
Copper (Cu)-Total	0.00268		0.00050	mg/L		03-SEP-16	R3540585
Lead (Pb)-Total	0.000457		0.000050	mg/L		03-SEP-16	R3540585
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		04-SEP-16	R3540895
Nickel (Ni)-Total	0.00541		0.00050	mg/L		03-SEP-16	R3540585
Zinc (Zn)-Total	0.0230		0.0030	mg/L		03-SEP-16	R3540585
Volatile Organic Compounds							
Benzene	<0.00050		0.00050	mg/L		30-AUG-16	R3530990
Ethylbenzene	<0.00050		0.00050	mg/L		30-AUG-16	R3530990
Toluene	<0.00050		0.00050	mg/L		30-AUG-16	R3530990
o-Xylene	<0.00050		0.00050	mg/L		30-AUG-16	R3530990
m+p-Xylene	<0.00050		0.00050	mg/L		30-AUG-16	R3530990
Xylenes	<0.00071		0.00071	mg/L		30-AUG-16	R3530990
F1(C6-C10)	<0.10		0.10	mg/L		30-AUG-16	R3530990
F1-BTEX	<0.10		0.10	mg/L		30-AUG-16	R3530990
Surrogate: 4-Bromofluorobenzene (SS)	97.0		70-130	%		30-AUG-16	R3530990
Surrogate: 3,4-Dichlorotoluene (SS)	98.0		70-130	%		30-AUG-16	R3530990
Surrogate: 1,4-Difluorobenzene (SS)	101.0		70-130	%		30-AUG-16	R3530990
Hydrocarbons							
F2 (>C10-C16)	<0.10		0.10	mg/L	30-AUG-16	30-AUG-16	R3537290
F3 (C16-C34)	<0.25		0.25	mg/L	30-AUG-16	30-AUG-16	R3537290
F4 (C34-C50)	<0.25		0.25	mg/L	30-AUG-16	30-AUG-16	R3537290
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	30-AUG-16	30-AUG-16	R3537290
Polychlorinated Biphenyls							
Aroclor 1016	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1221	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1232	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1242	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1248	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1254	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1260	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1262	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Aroclor 1268	<0.000010		0.000010	mg/L		31-AUG-16	R3538732
Surrogate: Decachlorobiphenyl	73.3		65-130	%		31-AUG-16	R3538732
Total PCBs	<0.000050		0.000050	mg/L		31-AUG-16	R3538732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SPL	HG-T - Sample was Preserved at the laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTX,F1-ED	Water	BTEX and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
F2,F3,F4-ED	Water	F2, F3, F4	EPA 3510/CCME PHC CWS-GC-FID
		Water samples are spiked with 2-BBTF surrogate, and extracted by reciprocal action shaker for 30 minutes using a single micro-extraction with 2 mL hexane. After extraction, hexane extracts are dispensed into GC vials for GC-FID analysis.	
HG-T-CVAA-ED	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
		Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.	
MET-T-CCMS-ED	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
		Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.	
		Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.	
PCB-ED	Water	PCBs	EPA 3510/8082-GC-ECD

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

10-366452

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1820490 Report Date: 07-SEP-16

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R3530990								
WG2378531-4 DUP		**L1816360-1**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	31-AUG-16
WG2378531-8 DUP		**L1817434-13**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	31-AUG-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	31-AUG-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	31-AUG-16
WG2378531-9 DUP		**L1817437-15**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	30-AUG-16
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	30-AUG-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	30-AUG-16
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	30-AUG-16
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	24	30-AUG-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	30-AUG-16
WG2378531-2 LCS								
Benzene			84.4		%		70-130	30-AUG-16
Toluene			77.5		%		70-130	30-AUG-16
Ethylbenzene			76.8		%		70-130	30-AUG-16
o-Xylene			77.9		%		70-130	30-AUG-16
m+p-Xylene			77.4		%		70-130	30-AUG-16
WG2378531-3 LCS								
Benzene			N/A		ug/L			30-AUG-16
Benzene			N/A		mg/L			30-AUG-16
Toluene			N/A		ug/L			30-AUG-16
Toluene			N/A		mg/L			30-AUG-16
Ethylbenzene			N/A		ug/L			30-AUG-16
Ethylbenzene			N/A		mg/L			30-AUG-16
o-Xylene			N/A		ug/L			30-AUG-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R3530990								
WG2378531-3 LCS								
o-Xylene			N/A		mg/L			30-AUG-16
m+p-Xylene			N/A		ug/L			30-AUG-16
m+p-Xylene			N/A		mg/L			30-AUG-16
F1(C6-C10)			117.2		%		70-130	30-AUG-16
WG2378531-6 LCS								
Benzene			83.9		%		70-130	31-AUG-16
Toluene			84.2		%		70-130	31-AUG-16
Ethylbenzene			85.9		%		70-130	31-AUG-16
o-Xylene			87.0		%		70-130	31-AUG-16
m+p-Xylene			85.1		%		70-130	31-AUG-16
F1(C6-C10)			N/A		ug/L			31-AUG-16
F1(C6-C10)			N/A		mg/L			31-AUG-16
WG2378531-7 LCS								
Benzene			N/A		ug/L			31-AUG-16
Benzene			N/A		mg/L			31-AUG-16
Toluene			N/A		ug/L			31-AUG-16
Toluene			N/A		mg/L			31-AUG-16
Ethylbenzene			N/A		ug/L			31-AUG-16
Ethylbenzene			N/A		mg/L			31-AUG-16
o-Xylene			N/A		ug/L			31-AUG-16
o-Xylene			N/A		mg/L			31-AUG-16
m+p-Xylene			N/A		ug/L			31-AUG-16
m+p-Xylene			N/A		mg/L			31-AUG-16
F1(C6-C10)			113.3		%		70-130	31-AUG-16
WG2378531-1 MB								
Benzene			<0.00050		mg/L		0.0005	30-AUG-16
Toluene			<0.00050		mg/L		0.0005	30-AUG-16
Ethylbenzene			<0.00050		mg/L		0.0005	30-AUG-16
o-Xylene			<0.00050		mg/L		0.0005	30-AUG-16
m+p-Xylene			<0.00050		mg/L		0.0005	30-AUG-16
F1(C6-C10)			<0.10		mg/L		0.1	30-AUG-16
Surrogate: 1,4-Difluorobenzene (SS)			101.0		%		70-130	30-AUG-16
Surrogate: 4-Bromofluorobenzene (SS)			98.0		%		70-130	30-AUG-16
Surrogate: 3,4-Dichlorotoluene (SS)			99.0		%		70-130	30-AUG-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R3530990								
WG2378531-5 MB								
Benzene			<0.00050		mg/L		0.0005	31-AUG-16
Toluene			<0.00050		mg/L		0.0005	31-AUG-16
Ethylbenzene			<0.00050		mg/L		0.0005	31-AUG-16
o-Xylene			<0.00050		mg/L		0.0005	31-AUG-16
m+p-Xylene			<0.00050		mg/L		0.0005	31-AUG-16
F1(C6-C10)			<0.10		mg/L		0.1	31-AUG-16
Surrogate: 1,4-Difluorobenzene (SS)			102.0		%		70-130	31-AUG-16
Surrogate: 4-Bromofluorobenzene (SS)			91.0		%		70-130	31-AUG-16
Surrogate: 3,4-Dichlorotoluene (SS)			91.0		%		70-130	31-AUG-16
Batch R3539571								
WG2380773-4 DUP		**L1820490-1**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-SEP-16
Toluene		0.00062	0.00059		mg/L	3.9	30	02-SEP-16
Ethylbenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	02-SEP-16
o-Xylene		0.00162	0.00169		mg/L	4.4	24	02-SEP-16
m+p-Xylene		0.00214	0.00225		mg/L	5.2	24	02-SEP-16
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	02-SEP-16
WG2380773-2 LCS								
Benzene			81.9		%		70-130	02-SEP-16
Toluene			77.7		%		70-130	02-SEP-16
Ethylbenzene			79.1		%		70-130	02-SEP-16
o-Xylene			79.5		%		70-130	02-SEP-16
m+p-Xylene			83.2		%		70-130	02-SEP-16
WG2380773-3 LCS								
F1(C6-C10)			123.1		%		70-130	02-SEP-16
WG2380773-1 MB								
Benzene			<0.00050		mg/L		0.0005	02-SEP-16
Toluene			<0.00050		mg/L		0.0005	02-SEP-16
Ethylbenzene			<0.00050		mg/L		0.0005	02-SEP-16
o-Xylene			<0.00050		mg/L		0.0005	02-SEP-16
m+p-Xylene			<0.00050		mg/L		0.0005	02-SEP-16
F1(C6-C10)			<0.10		mg/L		0.1	02-SEP-16
Surrogate: 1,4-Difluorobenzene (SS)			118.0		%		70-130	02-SEP-16
Surrogate: 4-Bromofluorobenzene (SS)			108.0		%		70-130	02-SEP-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX,F1-ED	**Water**							
Batch R3539571								
WG2380773-1 MB								
Surrogate: 3,4-Dichlorotoluene (SS)			114.0		%		70-130	02-SEP-16
F2,F3,F4-ED	**Water**							
Batch R3537290								
WG2378461-2 LCS								
F2 (>C10-C16)			94.2		%		70-130	30-AUG-16
F3 (C16-C34)			95.6		%		70-130	30-AUG-16
F4 (C34-C50)			95.6		%		70-130	30-AUG-16
WG2378461-1 MB								
F2 (>C10-C16)			<0.10		mg/L		0.1	30-AUG-16
F3 (C16-C34)			<0.25		mg/L		0.25	30-AUG-16
F4 (C34-C50)			<0.25		mg/L		0.25	30-AUG-16
Surrogate: 2-Bromobenzotrifluoride			98.5		%		60-140	30-AUG-16
HG-T-CVAA-ED	**Water**							
Batch R3540895								
WG2381993-3 DUP		**L1820960-1**						
Mercury (Hg)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-SEP-16
WG2381993-2 LCS								
Mercury (Hg)-Total			103.0		%		80-120	04-SEP-16
WG2381993-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	04-SEP-16
WG2381993-4 MS		**L1820960-2**						
Mercury (Hg)-Total			89.8		%		70-130	04-SEP-16
MET-T-CCMS-ED	**Water**							
Batch R3540585								
WG2380011-3 DUP		**L1801034-5**						
Arsenic (As)-Total		0.00454	0.00455		mg/L	0.3	20	03-SEP-16
Chromium (Cr)-Total		0.00643	0.00646		mg/L	0.4	20	03-SEP-16
Cobalt (Co)-Total		0.00021	0.00022		mg/L	1.7	20	03-SEP-16
Copper (Cu)-Total		0.246	0.250		mg/L	1.7	20	03-SEP-16
Lead (Pb)-Total		0.00484	0.00482		mg/L	0.5	20	03-SEP-16
Nickel (Ni)-Total		0.00293	0.00301		mg/L	2.8	20	03-SEP-16
Zinc (Zn)-Total		0.0349	0.0350		mg/L	0.3	20	03-SEP-16
WG2381858-3 DUP		**L1823633-1**						
Arsenic (As)-Total		0.00178	0.00181		mg/L	1.8	20	03-SEP-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED	**Water**							
Batch R3540585								
WG2381858-3 DUP		**L1823633-1**						
Cadmium (Cd)-Total		0.0000393	0.0000408		mg/L	3.8	20	03-SEP-16
Chromium (Cr)-Total		0.00039	0.00041		mg/L	4.5	20	03-SEP-16
Cobalt (Co)-Total		0.00035	0.00034		mg/L	2.4	20	03-SEP-16
Copper (Cu)-Total		0.00470	0.00483		mg/L	2.6	20	03-SEP-16
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-SEP-16
Nickel (Ni)-Total		0.00390	0.00393		mg/L	0.8	20	03-SEP-16
Zinc (Zn)-Total		0.0040	0.0039		mg/L	4.6	20	03-SEP-16
WG2380011-2 LCS								
Arsenic (As)-Total			101.3		%		80-120	03-SEP-16
Cadmium (Cd)-Total			102.4		%		80-120	03-SEP-16
Chromium (Cr)-Total			102.0		%		80-120	03-SEP-16
Cobalt (Co)-Total			99.6		%		80-120	03-SEP-16
Copper (Cu)-Total			98.5		%		80-120	03-SEP-16
Lead (Pb)-Total			106.1		%		80-120	03-SEP-16
Nickel (Ni)-Total			99.7		%		80-120	03-SEP-16
Zinc (Zn)-Total			101.1		%		80-120	03-SEP-16
WG2381858-2 LCS								
Arsenic (As)-Total			102.2		%		80-120	03-SEP-16
Cadmium (Cd)-Total			98.6		%		80-120	03-SEP-16
Chromium (Cr)-Total			97.1		%		80-120	03-SEP-16
Cobalt (Co)-Total			99.6		%		80-120	03-SEP-16
Copper (Cu)-Total			96.0		%		80-120	03-SEP-16
Lead (Pb)-Total			101.3		%		80-120	03-SEP-16
Nickel (Ni)-Total			99.2		%		80-120	03-SEP-16
Zinc (Zn)-Total			97.9		%		80-120	03-SEP-16
WG2380011-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	03-SEP-16
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Copper (Cu)-Total			<0.00050		mg/L		0.0005	03-SEP-16
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	03-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-SEP-16

Quality Control Report

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-ED	**Water**							
Batch R3540585								
WG2381858-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	03-SEP-16
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-SEP-16
Copper (Cu)-Total			<0.00050		mg/L		0.0005	03-SEP-16
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	03-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-SEP-16
PCB-ED	**Water**							
Batch R3538732								
WG2379103-2 LCS								
Aroclor 1242			66.2		%		65-130	31-AUG-16
WG2379103-1 MB								
Aroclor 1016			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1221			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1232			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1242			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1248			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1254			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1260			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1262			<0.000010		mg/L		0.00001	31-AUG-16
Aroclor 1268			<0.000010		mg/L		0.00001	31-AUG-16
Surrogate: Decachlorobiphenyl			82.5		%		65-130	31-AUG-16

Quality Control Report

Workorder: L1820490 Report Date: 07-SEP-16

Client: ARCADIS Canada Inc. - Ottawa
260 Hearst Way Suite 512
Ottawa ON K2L 3H1
Contact: Troy Austrins

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

10- 366452

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To		**Report Format / Distribution**		**Service Request:** (Rush subject to availability - Contact ALS to confirm TAT)
Company:	Arcadis Canada Inc.	Standard:	Other (specify):	Regular (Standard Turnaround Times - Business Days)
Contact:	Troy Austrins	Select: PDF X	Excel X Digital X Fax	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	333 Churchill Ave Ottawa ON	Email 1:	troy.austrins@arcadis.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:	~~stephen.borcsok@arcadis.com~~	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	613 721-0555 Fax:		stephen.borcsok@arcadis.com	**Analysis Request**
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**		(Indicate Filtered or Preserved, F/P)
	Copy of Invoice with Report? (circle) Yes or No	Job #:	102012	
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	L1820490	**ALS Contact:**	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	PHC F1 (Hex-FH)	Mercury-total	Select Metals (Total)	PCBs	Number of Containers
	CAM4-DUP1	20 Aug '16	—	GW	X	X	X	X	9
	CAM4-DUP2	21 Aug '16	—	GW	X	X	X	X	9

* Metals not preserved or filtered as per client request

L1820490-COFC

Special Instructi ... **water Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details**

Metals Selected: Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Nickel, Zinc

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Keith Courtnall	24 Aug	10:30am		24/Aug/2016	11:30	1.1 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 Front

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated in and form part of the Agreement between ALS Laboratory Group – Environmental Division ("ALS") and the party named in the Offer (the "Client").

1. Definitions. Capitalized Terms not defined in these Terms and Conditions have the definitions set out in the other Agreement documents.
2. The Services. ALS will provide the Services to the Client as described in the Offer and in any change of custody form provided with any sample.
3. Prices. ALS may review and change all prices, fees, surcharges or other charges set out in the Agreement if there are changes to ALS's cost beyond ALS's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding Condition 3, all quotations are reviewed and updated on a yearly basis.
4. Payment Terms. The Client shall pay ALS within 30 days of the invoice date OAC. ALS may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. Quotation Numbers. The Client shall provide the quotation number to ALS (where applicable) to ensure correct pricing.
6. Taxes. Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. Quality Control. ALS has an extensive QA/QC program and all analytical data reported is analyzed using approved, referenced procedures followed by checks and reviews of senior managers and quality assurance personnel.
8. No Guarantee of Results. Results are obtained from chemical measurements. The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
9. Standard of Care. ALS will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested.
10. Storage. Where possible, ALS will store samples for 30 days from the date a final report is issued to the Client, after which ALS may discard the sample.
11. Holds. If the Client requests a sample be placed on hold, ALS will store the sample for 60 days for the quoted price, after which ALS will invoice the Client and discard the sample.
12. Archives. If the Client requests a sample be archived, ALS will store the sample for 6 months for the quoted price, after which ALS will invoice the Client and discard the sample.
13. Handling Protocol. Legal sample handling protocol must be arranged before samples are collected. ALS may charge a 20% surcharge on the list price plus the hourly technologist or chemist rates for legal sample protocol. Samples processed under legal protocol are stored indefinitely (storage charges may apply).
14. Samples. The quality, condition, content and source of samples stored and tested are not known to ALS except as declared and described on the chain of custody form completed and submitted by the Client and accompanying the sample.
15. Risk of Loss. ALS will use reasonable care to protect samples during storage, however all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the Client releases ALS from any claim the Client may have for any loss or damage to the sample.
16. Environmental. The Client must comply with all applicable environment legislation, including labeling all hazardous samples to comply with WHMIS and TDG regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client will indemnify ALS for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
17. Hazardous Materials Disposal. ALS may return, at the Client's cost, hazardous material to the Client for disposal.
18. Hazardous Materials Surcharge. ALS may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occuring Radioactive Materials (NORM), H2S, CN, etc.
19. Sample Containers. ALS may ship sample containers to the Client's location by the most cost effective means using ALS preferred courier suppliers, within the specified project timeline.
20. Additional Charges. ALS may charge the Client (a) its cost for emergency bottle shipments and shipments to and from a remote site, and (b) where pick up and delivery services are provided, subject in each instance to a minimum charge of $25.00.
21. Large Bottle Orders. The Client shall provide ALS with 24 hours notice for large bottle orders.
22. Re-Tests. ALS reserves the right to re-test any samples that remains in its possession. Re-tests requested by the Client may be charged.
23. Waiver. The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any claims against ALS it may have as a result of the interpretation of the results. The Client shall indemnify ALS for all claims made by any third party against ALS in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
24. Limitation of Liability. In no event shall ALS be liable for any consequential, indirect, incidental, special, exemplary or punitive damages, whether foreseeable of unforeseeable, (including claims for loss of profits or revenue or losses caused by stoppage of other work or impairment of other assets) incurred by the Client arising out of breach or failure of express of implied warranty, breach of contract, breach of warranty, misrepresentation, negligence, strict liability in tort or otherwise. In any event, the liability of ALS to the Client shall be limited to the cost of testing the sample as requested in the chain of custody form under which the sample was originally deposited. For the purposes of this paragraph and paragraphs 8, 15, 16, 23 and 25, as the applicable, "ALS" includes without limitations its directors, officers, employees and affiliates and the "Client" includes without limitation any third party that may have a claim against ALS through the Client.
25. Notice of Liability. Notwithstanding paragraph 24, ALS shall not be liable to the Client unless the Client provides notice in writing to ALS of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk under the Agreement between the Client and ALS, and the fees to be paid by the Client to ALS reflect this allocation of risks and the limitations of liability in this Agreement.
26. Entire Agreement. The Agreement is the entire agreement between the parties and supercedes and takes precedence over any terms and conditions contained in any documentation provided by the Client. ALS's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein. If there is a conflict between these terms and conditions and any other Agreement document, these terms and conditions prevail.

GENF 19.00 Terms

APPENDIX C

Field Notes

CAM-4 Upper Site Landfill 19 August 2016

ANNEX P: Preliminary Stability Assessment

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not observed	None
Lateral Movement	Not observed	None
Frost Action	Not observed	None
Sloughing	Not observed	None
Cracking	Acceptable	Isolated
Animal Burrows	Not observed	None
Vegetation establishment	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris and/or liner exposure	Not observed	None
Other	Not observed	None
Overall Landfill Performance	Acceptable	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

CAM-4 Station Area Non-Hazardous Waste Landfill

ANNEX P: Preliminary Stability Assessment

20 August 2016

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not observed	None
Frost Action	Not Observed	None
Sloughing	Not observed	None
Cracking	Acceptable	Isolated
Animal Burrows	Not observed	None
Vegetation establishment	Not observed	None
Staining	Acceptable	Occasional
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris and/or liner exposure	Not observed	None
Other	ACCEPTABLE	ISOLATED *
Overall Landfill Performance	ACCEPTABLE	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

* Erosion channel/ drainage course along southeast toe of landfill (not in contact with landfill)

CAM-4 TIER II DISPOSAL FACILITY 20 August 2016

ANNEX P: Preliminary Stability Assessment

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Acceptable	Occasional
Animal Burrows	Not Observed	None
Vegetation establishment	Not Observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not Observed	None
Seepage/Ponded Water	Acceptable	Isolated
Debris and/or liner exposure	Not Observed	None
Other	Not Observed	None
Overall Landfill Performance	Acceptable	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

CAM-4 Lower Site Landfill 18/19 August 2016

ANNEX P: Preliminary Stability Assessment

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Acceptable	Occasional
Lateral Movement	Not observed	None
Frost Action	Not observed	None
Sloughing	Not observed	None
Cracking	Acceptable	Occasional
Animal Burrows	Not Observed	None
Vegetation establishment	Acceptable	Occasional
Staining	Not Observed	None
Vegetation Stress	Not Observed	None
Seepage/Ponded Water	Acceptable	Occasional
Debris and/or liner exposure	Acceptable	Isolated
Other	Not Observed	None
Overall Landfill Performance	Acceptable	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

CAM-4 Lower Site Non-Hazardous Waste Landfill 18 August 2016

ANNEX P: Preliminary Stability Assessment

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Not Observed	None
Lateral Movement	Not Observed	None
Frost Action	Not Observed	None
Sloughing	Not Observed	None
Cracking	Not Observed	None
Animal Burrows	Not Observed	None
Vegetation establishment	Acceptable	Occasional
Staining	Not Observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not Observed	None
Debris and/or liner exposure	Not Observed	None
Other	Not Observed	None
Overall Landfill Performance	ACCEPTABLE	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

ANNEX M: Thermistor Inspection Template 18

Inspector Name: S. Borcsok	Inspection Date: August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	UPPER SITE LANDFILL
Thermistor Number:	VT-1	Inclination:	Vertical
Datalogger model no:	N/A	Datalogger cable download model:	N/A
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m)	3.92m (from floor)	Cable Lead Above Ground (m)	1.05m (casing height)
Datalogger Serial #	N/A	Nodal Points	

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☐	☑	NO DATALOGGER FOUND
Cable	☑	☐	
Beads	☐	☐	UNKNOWN
Lock condition	☑ NEW	☐	
Battery Installation Date	N/A		
Battery Levels	Main N/A	Aux N/A	

Manual Ground Temperature Readings

Bead	ohms ✓	Degrees C
1		
2		
3		
4		
5		
6		
7		
8		

Bead	ohms ✓	Degrees C
9		
10		
11		
12		
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☐ No ☒ Monitoring Year: 10

Battery model number installed or model of battery in place: N/A

Expected remaining battery life (years): N/A

Datalogger Programming (Describe programming completed; beads and frequency)

Observations and Proposed Maintenance

Datalogger was not present.
Datalogger should be brought to site and re-installed

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	UPPER SITE LANDFILL
Thermistor Number:	VT-2	Inclination:	VERTICAL
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m)	0.85	Cable Lead Above Ground (m)	0.93 (casing, Lev, LD
Datalogger Serial #	02020175	Nodal Points	11

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	Beads 2/3 malfunctioning
Lock condition	☐	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34 V	Aux 13.38V	
NEW	11.34V	13.02V	

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	1.2883	11.3788
2	0.0005	-101.4553
3	0.0005	-101.4553
4	1.0706	4.2083
5	0.9562	0.4492
6	0.9025	-1.3408
7	0.8651	-2.6017
8	0.8266	-3.9179

Bead	ohms	Degrees C
9	0.7952	-5.0065
10	0.7557	-6.3956
11	0.7186	-7.7268
12	0.0000	381.0742
13	↓	↓
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBI5, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

Two beads malfunctioning

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	UPPER SITE LANDFILL
Thermistor Number:	VT-3	Inclination:	VERTICAL
Datalogger model no:	Rx-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation		N	E / Elev
Length of Cable (m)	0.65m	Cable Lead Above Ground (m)	1.075m
Datalogger Serial #	111126	Nodal Points	12

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☑	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux	13.99V then wait down to 13.75V
NEW	11.34V		13.50V

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2883	11.3783
2	1.1354	6.3295
3	1.0924	4.9220
4	1.0103	2.2332
5	0.9278	-0.4939
6	0.8878	-1.8357
7	0.8516	-3.0609
8	0.8143	-4.3415

Bead	ohms V	Degrees C
9	0.7803	-5.5271
10	0.7425	-6.8659
11	0.7156	-7.8377
12	0.8341	-3.6584
13	0.0000	381.0742
14	↓	↓
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance No maintenance required.

On download, Pakbus showed ERROR: The logger's next recording time stamp was invalid. The time displayed may be inaccurate.

Then, Error: The sample rate of the data logger was invalid.

Then Error 1 again. Started downloading then said 'Bad Recording Rate' twice, then again 4 times, then "There was an error calculating the time in the raw file. This is usually caused by a hardware problem or power interruption to the datalogger. The following time was stored in the raw file: Year=2016, Month=0, Day=0, Hour=0, Min=0, Sec=0 (EncodeTime Call #0)

After resetting clock, got Error 1 but saying 'last recording' instead of 'Reset'

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	UPPER SITE LANDFILL
Thermistor Number:	VT-4	Inclination:	VERTICAL
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation		N	E / Elev
Length of Cable (m)	0.52m	Cable Lead Above Ground (m)	1m
Datalogger Serial #	207046	Nodal Points	10

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux 14.11V	
	NEW 11.34V	13.87V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2694	10.7486
2	1.1256	6.0074
3	1.1373	6.3920
4	1.0636	3.9787
5	0.9530	0.3430
6	0.9065	-1.2078
7	0.8683	-2.4931
8	0.8249	-3.9756

Bead	ohms V	Degrees C
9	0.7932	-5.0757
10	0.7883	-5.2463
11	0.0000	381.0742
12		
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

None required

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill: TIER II DISPOSAL FACILITY	
Thermistor Number:	VT-5	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m) 6.40m		Cable Lead Above Ground (m) 1.31m	
Datalogger Serial # 111072		Nodal Points 14	

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☑	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux 13.99V then 13.63V	
	NEW 11.34V	13.26V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.1354	6.3295
2	1.2037	8.5688
3	1.0392	3.1819
4	0.9700	0.9061
5	0.9162	-0.8835
6	0.8657	-2.5836
7	0.8351	-3.6243
8	0.8071	-4.5926

Bead	ohms V	Degrees C
9	-5.6611	0.7765
10	-6.5389	0.7517
11	-7.3540	0.7289
12	-8.1381	0.7073
13	-8.3253	0.7022
14	381.0742	0.0000
15	↓	↓
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

Very short cable inside casing, very difficult to get on/off

No maintenance required

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	TIER II DISPOSAL FACILITY
Thermistor Number:	VT-6	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m) 3.86	Cable Lead Above Ground (m) 1.25m		
Datalogger Serial # 111102	Nodal Points 10		

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☐	☐	
Beads	☐	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux 13.87V	
	NEW 11.34V	13.52V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2445	9.8957
2	1.1349	6.2721
3	1.0762	4.3706
4	0.9987	1.8519
5	0.9217	-0.7178
6	0.8780	-2.1652
7	0.8322	-3.7264
8	0.7973	-4.9320

Bead	ohms V	Degrees C
9	0.7655	-6.0487
10	0.7594	-6.2649
11	0.0000	381.0742
12		
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBI5, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

Datalogger was inside casing but not connected to cable w beads.

No maintenance required.

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 August 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CBM-4	Landfill: TIER II DISPOSAL FACILITY	
Thermistor Number:	VT-7	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m) 8.54m	Cable Lead Above Ground (m) 1.03m (casing height)		
Datalogger Serial # 108067	Nodal Points 16		

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☑	☐	
Lock condition	☐ NEW	☐	
Battery Installation Date		19 Aug 2016	
Battery Levels	Main	11.34V	Aux 13.63V
	NEW	11.34 V	13.14 V

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.1044	5.3136
2	1.0166	2.4387
3	0.9230	-0.6567
4	0.8786	-2.1446
5	0.8412	-3.4153
6	0.8065	-4.6111
7	0.7783	-5.5780
8	0.7492	-6.6286

Bead	ohms V	Degrees C
9	0.7224	-7.5884
10	0.7014	-8.3561
11	0.6839	-9.0009
12	0.6674	-9.6161
13	0.6546	-10.0996
14	0.6435	-10.5236
15	0.6509	-10.2415
16	0.6629	-9.7854

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS ULB1

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

No maintenance required

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Barcsok	Inspection Date: 19 AUGUST 2016
Inspector Signature / Prepared By: S. Barcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	TIER II DISPOSAL FACILITY
Thermistor Number:	VT-8	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m)	0.25m	Cable Lead Above Ground (m)	1.16 (Casing Length)
Datalogger Serial #	108038	Nodal Points	10

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	Bead 9 not reading
Lock condition	☑ NEW	☐	
Battery Installation Date		19 Aug 2016	
Battery Levels	Main 11.34V NEW 11.34V	Aux 13.87V then 13.63V 13.26V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2700	18.7665
2	1.1024	5.2483
3	1.1076	5.4184
4	1.0275	2.7967
5	0.9321	-0.3515
6	0.8729	-2.3380
7	0.8194	-4.1650
8	0.7852	-5.3558

Bead	ohms V	Degrees C
9	0.0000	381.0742
10	0.7253	-7.4835
11	0.0000	381.0742
12	↓	↓
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBI5, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

Datalogger was not recording over last period.
Cable is very short and is difficult to attach to logger
No dessicant was present in datalogger

No maintenance required.

One bead malfunctioning.

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 AUGUST 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	LOWER SITE LANDFILL
Thermistor Number:	VT-9	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m)	0.63m	Cable Lead Above Ground (m)	1.16m (casing height)
Datalogger Serial #	02020165	Nodal Points	10

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☐	☑	No ground screw
Cable	☑	☐	
Beads	☐	☑	Most beads not responding
Lock condition	☑ NEW	☐	
Battery Installation Date			19 Aug 2016
Battery Levels	Main 11.34V	Aux	13.63V then 13.75V
	NEW 11.34V		13.38V

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	0.0000	381.0742
2	↓	381.0742
3		381.0742
4		381.0742
5	0.9757	1.0725
6	0.0000	381.0742
7	0.8753	-2.2554
8	0.0000	381.0742

Bead	ohms V	Degrees C
9	0.8341	4.6758
10	0.7788	-5.5780
11	0.0000	381.0742
12	↓	↓
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

No grounding cable screw present.
Most beads are malfunctioning, may require repair or replacement if temperature data is required for this location moving forward.

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 AUGUST 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-9	Landfill: LOWER SITE LANDFILL	
Thermistor Number:	VT-10	Inclination:	
Datalogger model no:	RX-16	Datalogger cable download model:	CCOSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m)	6.96m	Cable Lead Above Ground (m)	1.15m (CASING LOSS (L)
Datalogger Serial #	108060	Nodal Points	10

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☑	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V		Aux 13.63V
	NEW 11.39		12.90V

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.1999	8.4456
2	1.0774	4.9304
3	1.0959	5.0367
4	1.0340	3.0093
5	0.9451	0.0797
6	0.9114	-1.0442
7	0.8798	-2.1059
8	0.8474	-3.1884

Bead	ohms V	Degrees C
9	0.8386	-4.8878
10	0.7823	-5.4579
11	0.0000	3810742
12		
13		
14		
15		
16		

Battery Information

Batteries changed ? Yes ☒ No ☐ Monitoring Year: 10

Battery model number installed or model of battery in place: ULBI5, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

None required.

ANNEX M: Thermistor Inspection Template

Inspector Name: S Barcsok	Inspection Date: 19 AUGUST 2016
Inspector Signature / Prepared By: S. Barcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	LOWER SITE LANDFILL
Thermistor Number:	VT-11	Inclination:	VERTICAL
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation		N	E / Elev
Length of Cable (m)	0.39m	Cable Lead Above Ground (m)	1.11m (height of casing)
Datalogger Serial #	111070	Nodal Points	10

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☐	☐	
Cover	☑	☐	
Data Logger	☐	☐	No cover on COM port
Cable	☑	☐	
Beads	☑	☐	
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux 13.87V	
	NEW 11.34V	13.50V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2296	9.2614
2	1.0774	4.4304
3	1.1411	6.5344
4	1.0384	4.7897
5	0.9828	1.3292
6	0.9236	-0.6363
7	0.8786	-2.1446
8	0.8436	-3.3344

Bead	ohms V	Degrees C
9	0.8186	-4.1939
10	0.8557	-2.9206
11	0.0005	-101.9553
12	0.0000	381.0742
13	↓	↓
14		
15		
16		

Battery Information

Batteries changed ? Yes [X] No [ ] Monitoring Year: 10

Battery model number installed or model of battery in place: ULBIS, ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency

Observations and Proposed Maintenance

None required.

Install cover on COM Port during next monitoring event.

ANNEX M: Thermistor Inspection Template

Inspector Name: S. Borcsok	Inspection Date: 19 AUGUST 2016
Inspector Signature / Prepared By: S. Borcsok	

Thermistor Information (*Some Information can be pre-populated from thermistor logs)

Site Name:	CAM-4	Landfill:	LOWER SITE LANDFILL
Thermistor Number:	VT-12	Inclination:	Vertical
Datalogger model no:	RX-16	Datalogger cable download model:	CCUSB
*Install Date:		First Date Event	Last Date Event
*Coordinates and Elevation	N	E	Elev
Length of Cable (m) 0.00 (reader spot		Cable Lead Above Ground (m) 1.23m (height of casing)	
Datalogger Serial # 02020150 (RX16)		Nodal Points 11	

0.16m above top of pipe inside

Thermistor Inspection

	Good	Needs Maintenance	Description
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	Beads 6, 7 not working
Lock condition	☑ NEW	☐	
Battery Installation Date	19 Aug 2016		
Battery Levels	Main 11.34V	Aux 13.75V	
NEW	11.34V	13.38V	

Manual Ground Temperature Readings

Bead	ohms V	Degrees C
1	1.2275	9.3548
2	1.1154	5.6730
3	1.1354	6.3295
4	1.1135	5.6131
5	0.0005	-101.4553
6	0.0000	381.0742
7	0.0000	381.0742
8	0.8609	-2.7468

Bead	ohms V	Degrees C
9	0.8194	-4.1650
10	0.7835	-5.4146
11	0.7835	381.0742
12	0.0000	
13		
14		
15		
16		

-5.4146

Battery Information

Batteries changed ? Yes [X] No [ ] Monitoring Year: 10

Battery model number installed or model of battery in place: ULBI5 ULBI

Expected remaining battery life (years): 7 years - July 2023

Datalogger Programming (Describe programming completed; beads and frequency)

Reprogrammed to 48hr frequency.

Observations and Proposed Maintenance

Two beads malfunctioning

No maintenance required.

@ 16-C4-BMW-1B, Dup 1, ALS, ES6 → 3 jars (Maximum Jars)

C4-Dup1 → 16-C4-BMW-1B (2 vials, 3 jars)
-Dup2
etc.

ARCADIS

Soil Sampling Log

Site Name: CAM-4 Pelly Bay

Date & Time of Sampling Event: 20-22 August /2016

Weather: 15°C sunny

Name of Sampling Staff: ~~R. Fletcher~~ S Boresok

Sampling equipment and decontamination methods: Stainless Steel Shovel - Alcanox and water rinse

Soil Sampling Location ID	UTM Coordinates North (m)	UTM Coordinates East (m)	Sample Depth	Notes: *Including (but not limited to) visual/olfactory observations (colour, odour, evidence of contamiantion...), depth and reason for refusal if required depth not achieved...*
Station Area Non-Hazardous Waste Landfill				
135 A 140 BMW-1 Date Aug 21/16 B			0-0.15 ✓	SILTY TOPSOIL - dark brown, damp, trace rootlets, sand, gravel
			~~0.4-0.5~~ 0.3-0.4	SILTY SAND - dark brown, damp, trace rootlets, gravel
250 255 MW-1 Aug 22/16			0-0.15	SAND, brown, damp, medium
			0.4-0.5	SAND - brown, moist, some gravel, medium
310 315 MW-2 Aug 21/16			0-0.15	SAND - dark brown, damp, trace gravel
			0.4-0.5	SAND - dark brown, damp, trace gravel
210 215 MW-3 Aug 20/16			0-0.15	SAND - brown, damp, trace gravel, trace topsoil, rootlets
			0.4-0.5	SAND - brown, damp, trace gravel, medium
240 245 MW-4A Aug 21/16			0-0.15	SAND - brown & grey, damp, trace medium
			0.4-0.5	SAND - brown, damp, medium, trace gravel
330 335 MW-6A Aug 21/16			0-0.15	SAND - brown, damp, medium
			0.4-0.5	SAND - brown, damp, medium
305 310 MW-7A Aug 22/16			0-0.15	SAND - dark brown, moist, trace gravel, silt, rootlets
			0.4-0.5	SAND & GRAVEL - dark brown, wet, trace silt

Time

Box 1

Box 2

4

4 (@ 4)

* DUP 2

* DUP 3

Note: 3 jars, 1 bag @ each soil sample location

Need 6 duplicates for soil @ CAM-4

ARCADIS

Soil Sampling Log

Site Name: CAM-4 Pelly Bay

Date & Time of Sampling Event: 20-22 August /2016

Weather: 15°C sunny

Name of Sampling Staff: ~~R. Fletcher~~ S. Borcsok

Sampling equipment and decontamination methods: Stainless Steel Shovel - Alcanox and water rinse

Soil Sampling Location ID	UTM Coordinates North (m)	UTM Coordinates East (m)	Sample Depth	Notes: *Including (but not limited to) visual/olfactory observations (colour, odour, evidence of contamiantion...), depth and reason for refusal if required depth not achieved...*
Tier II Soil Disposal Facility				
Box 2 4:30pm 4:35pm MW-5 Aug 20/16			0-0.15	SAND & GRAVEL, red & brown, wet, coarse
			0.4-0.5	GRAVEL, brown tred, wet, some sand, coarse
Box 3 11:30 11:35 MW-8 Aug 21/16			0-0.15	SAND, dark brown, wet, some gravel, medium, trace PHC odour
			0.4-0.5	SAND & GRAVEL, dark brown, wet, trace silt, trace PHC odour, sheen in filtrate, sw
10:20am 10:25am MW-9 Aug 21/16			0-0.15	SANDY SILT - dark brown, moist, some gravel, trace clay * DUP1
			0.4-0.5	SAND & GRAVEL - dark brown wet, some silt, trace clay, rootlets
250 255 MW-14A Aug 20/16			0-0.15	SILTY SAND - brown, moist, trace gravel, rootlets
			0.4-0.5	SAND, dark brown wet, some silt, trace gravel, rootlets
1205 1210 MW-15 Aug 21/16			0-0.15	GRAVEL - red and brown, moist, some sand
			0.4-0.5	SAND & GRAVEL red/brown slach, wet,
Box 4 MW-16 Aug 21/16			0-0.15	SAND - grey, moist, trace gravel, rootlets, peat mod. PHC odour
			0.4-0.5	SAND - grey, wet, some gravel, med/coarse, mod PHC odour
Upper Site Landfill				
340 345 MW-10 Aug 22/16			0-0.15	SAND - damp, brown, medium, trace gravel
			0.4-0.5	SAND - brown, damp, medium, trace gravel
4:00pm 4:05pm MW-11 Aug 20/16			0-0.15	SAND - brown, dry to moist, trace silt, rootlets, gravel, fine
			0.4-0.5	AS ABOVE, moist
355 400 MW-12 Aug 22/16			0-0.15	SAND - dry to damp, grey and brown, trace gravel, med-fine
			0.4-0.5	SANDY SILT - damp, dark brown, some gravel, organics
Box 5 420 425 MW-13 Aug 22/16			0-0.15	SAND, brown, moist, some gravel
			0.4-0.5	SILTY SAND - brown, moist, trace gravel

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Soil Sampling Log

Site Name: CAM-4 Pelly Bay

Date & Time of Sampling Event: 20-22 August /2016

Weather: 15°C sunny

Name of Sampling Staff: ~~R.Fletcher~~ S Borcsok

Sampling equipment and decontamination methods: Stainless Steel Shovel - Alcanox and water rinse

Soil Sampling Location ID	UTM Coordinates North (m)	UTM Coordinates East (m)	Sample Depth	Notes: *Including (but not limited to) visual/olfactory observations (colour, odour, evidence of contamiantion...), depth and reason for refusal if required depth not achieved...*
Lower Site Non-Hazardous Waste Landfill				
515 520 MW-21 Aug 21/16			0-0.15	SAND - brown, damp, trace gravel, rootlets
			0.4-0.5	SAND - reddish brown, damp some gravel
Box 5 1135 1140 MW-22 Aug 22/16			0-0.15	SAND - brown, damp, trace rootlets, gravel *DUP6
			0.4-0.5	SAND - brown, damp, trace to some gravel
420 425 MW-23 Aug 21/16			0-0.15	SAND - brown, damp, trace gravel, rootlets, medium
			0.4-0.5	SAND - brown, damp, trace gravel
Lower Site Landfill				
Box 6 955 1000 MW-17 Aug 22/16			0-0.15	SAND - brown, damp, some gravel, trace rootlets coarse to medium
			0.4-0.5	SAND - brown + black, moist, trace gravel, rootlets organics coarse to med
1010 1015 MW-18 Aug 22/16			0-0.15	SAND - brown, moist, trace gravel
			0.4-0.5	SAND - brown, wet, trace gravel
1030 1035 MW-19 22 Aug /16			0-0.15	SAND - brown, wet, trace gravel, rootlets
			0.4-0.5	SAND - brown, wet, trace gravel, rootlets
445 450 MW-20 Aug 20/16			0-0.15	SAND - brown, damp, trace gravel *DUP4
			0.4-0.5	SAND - brown, damp, some gravel
Box 7 130 135 C4-1 Aug 22/16			0-0.15	SAND - grey+brown, dry to damp, some gravel, medium
			0.4-0.5	SAND - brown, damp, some gravel medium
105 110 C4-2 Aug 22/16			0-0.15	SAND + GRAVEL - dark brown to black, damp, trace rootlets
			0.4-0.5	SAND + GRAVEL - dark brown to black, damp trace rootlets
1220 1225 C4-3 Aug 22/16			0-0.15	SANDY GRAVEL - dark brown, damp, some silt trace rootlets
			0.4-0.5 ~~0.3-0.4~~	SANDY GRAVEL - dark brown, damp, trace silt

*REFUSAL ON ROCKS

ARCADIS

Soil Sampling Log

Site Name: CAM-4 Pelly Bay

Date & Time of Sampling Event: 20-22 August /2016

Weather: 15°C sunny

Name of Sampling Staff: ~~R.Fletcher~~ S. Borcsok

Sampling equipment and decontamination methods: Stainless Steel Shovel - Alcanox and water rinse

Soil Sampling Location ID	UTM Coordinates		Sample Depth	Notes: *Including (but not limited to) visual/olfactory observations (colour, odour, evidence of contamiantion...), depth and reason for refusal if required depth not achieved...*
	North (m)	East (m)		
Site Background				
2:20pm A 2:25pm BMW-3 Aug 20/16 B			0-0.15	SAND, brown, fine, some silt, moist, trace gravel
			0.4-0.5	SAND brown wet, some silt, trace gravel, fine
10:51 11:05 BMW-4 Aug 22/16			0-0.15	GRAVELLY SAND - brown, damp, trace rootlets
			0.4-0.5	GRAVELLY SAND - brown, damp, trace rootlets

BOX 7

BOX 8

*DUP 5

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM-4 Landfill Name: Upper Site - background

Monitoring Well ID: BMW1 UTM Coordinates: North East

Sample Number(s) include dups.: — Not sampled PHC

Bottles filled (by parameter type): —

Date of Sampling Event: 22 Aug 2016 Time:

Weather: 14°C cloudy

Names of Samplers: Keith and Rich

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good

Lock (condition, presence, model, manufacturer): lock cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.46m Diameter of well (cm)= 0.051m

*Depth to top of screen (cm)= 1.97m Length screened section (cm)= 2.48m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc): —

Well pipe height above ground (cm) (to top of pipe)= 0.63

Static water level (cm) from top of pipe = 2.122m = PHC Product

Static water level (cm) (below ground surface) calculated = 1.392m

Measured well refusal depth (cm) (measure after sampling)= 2.600m

Thickness of water column (cm)= 0.478 Static volume of water in well (mL)= —

Free product thickness (mm)= ~0.05m Evidence of sludge or siltation:

2.122 − 0.630 = 1.392

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Teflon Bailer

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): ~2L

Parameter	Initial	Intermediate	Final	Notes (if not stabilized)
pH		X		
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Strong PHC odour Observed Free Product

Decontamination of sampling equipment

Type of decontamination fluid (s): * See Hydraulic Conductivity Field Notes

Number washes: — Number rinses: —

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Station Area - Background

Monitoring Well ID: BMW 3 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4 - BMW3

Bottles filled (by parameter type): 9 total - (3) Metals, (2) PAH, (4) PHC

Date of Sampling Event: 21 August Time: 10:50 am

Weather: Clear 15°C

Names of Samplers: Keith and Rich

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer): Cut lock Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= N/A Diameter of well (cm)= 2" IN

*Depth to top of screen (cm)= 1.2m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.73m

Static water level (cm) from top of pipe = ~~1.212m~~ 1.076m

Static water level (cm) (below ground surface) calculated = 0.348

Measured well refusal depth (cm) (measure after sampling)= 2.339

Thickness of water column (cm)= 1.039m Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): ~~20~~ 6m - 6L → Intermittent

Parameter	Initial	Intermediate	Final	Notes (if not stabilized)
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Pump Malfunctioning

Purged 6L and sampled

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): cloudy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

@ 20 min 1x Reading: pH = 7.54 / 7.52 / 7.14 / 3.14 Cond = 325 DO = 14.00 ORP = 79.5

4.2m

3.0m

2.334 - 1.076 = 1.261 / 1.261

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAMP BMW | Landfill Name: Lower Site, Back. 500. ND

Monitoring Well ID: | UTM Coordinates: North East

Sample Number(s) include dups.: CAM4 - BMW4

Bottles filled (by parameter type): 6 (9 total)

Date of Sampling Event: 22 August 2016 | Time: 2:30

Weather: 11°C, Windy

Names of Samplers: Kath + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer):

Pre-Measured Data (From Water Well Record Log) 3.80m

*Depth of well installation (cm)= 2.950 m | Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 6.01 m | Length screened section (cm)= 2.16

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.71 m

Static water level (cm) from top of pipe = 1.642 m

Static water level (cm) (below ground surface) calculated = 0.932 m

Measured well refusal depth (cm) (measure after sampling)= 2.950m

Thickness of water column (cm)= 1.308 | Static volume of water in well (mL)=

Free product thickness (mm)= — | Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:

Well purged (Y/N): Y | Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4.0L over 20-25m

Parameter	Initial (10m / 13m)	Intermediate (20m)	Final	Notes (if not stabilized)
pH	8.27 / 8.21	8.2		
Conductivity (uS/cm)	143 / 144	147		
Turbidity (NTU)	56.8 / 60.7	61.0		
Temperature (degC)	4.33 / 3.91	3.86		
DO	14.73 / 13.6	13.4		

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Slightly cloudy - trace sand; becoming clear

Decontamination of sampling equipment

Type of decontamination fluid (s): As Others

Number washes: | Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Upper Site No 1 Hwy 2

Monitoring Well ID: MW 1 UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): 15°C Clear

Date of Sampling Event: 21 Aug 2016 Time:

Weather:

Names of Samplers: Keith and Rick J.

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.30m Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 1.3m Length screened section (cm)= 3.03m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.54

Static water level (cm) from top of pipe = DRY

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= @ 2.151 m

Thickness of water column (cm)= Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Dry

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Non Hazardous - Open

Monitoring Well ID: MW-2 UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 21 Aug Time: —

Weather:

Names of Samplers: KCAT - Consultant + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good

Lock (condition, presence, model, manufacturer): Cut Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.50m Diameter of well (cm)= 0.05.m

*Depth to top of screen (cm)= 1.50 m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.5Φ

Static water level (cm) from top of pipe = Dry

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 2.130

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)	DRY			
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...):

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Non Haz - upper landfill

Monitoring Well ID: MW-2 UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 21 Aug Time: —

Weather:

Names of Samplers: Keith and Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer): locked - and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.50 Diameter of well (cm)= 0.05

*Depth to top of screen (cm)= 1.50 Length screened section (cm)= 2.0

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.63

Static water level (cm) from top of pipe = Dry

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 1.96

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): DRY

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: ADN Haz Upper

Monitoring Well ID: MW4A UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 21 Aug Time: —

Weather:

Names of Samplers: Keith and Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water):

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.00 Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 1.37 Length screened section (cm)= 1.37

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.51

Static water level (cm) from top of pipe = DRY

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 4.06

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate: —

Volume Purged (L) (note multiple purging events if applicable): —

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): DRY

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CM-4 Landfill Name:

Monitoring Well ID: MW-4B UTM Coordinates: North East

Sample Number(s) include dups.:

Bottles filled (by parameter type):

Date of Sampling Event: 21 August 20[illegible] Time:

Weather:

Names of Samplers:

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer):

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 2490 M Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 0.486 M Length screened section (cm)= 2.28 M

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.56

Static water level (cm) from top of pipe = 1.492

Static water level (cm) (below ground surface) calculated = NA 1.432 mbgs

Measured well refusal depth (cm) (measure after sampling)= 2.148

Thickness of water column (cm)= 0.156 M Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic Pump

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 0.25-0.5L to Dr.

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Dry Sandy to

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Tier 11 Disposal

Monitoring Well ID: MW5 UTM Coordinates: North East

Sample Number(s) include dups.: (4) PHC, (3) MW 2 (PCB) & (a total) + (1) Dup - As Others

Bottles filled (by parameter type): CAM 4 - MW5 and Dup 2

Date of Sampling Event: 21 August Time: 11:50

Weather: 16°C, clear

Names of Samplers: Keith + Rio P.

Description of Well Condition and Surrounding ground conditions (note ponding of water): good condition

Lock (condition, presence, model, manufacturer): Cut lock + Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= ~~3.246~~ 3.034 m Diameter of well (cm)= 2" - 0.051 m

*Depth to top of screen (cm)= 0.60 Length screened section (cm)= 2.0 m

3.6m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.60 m

Static water level (cm) from top of pipe = 1.212

Static water level (cm) (below ground surface) calculated = 0.612

Measured well refusal depth (cm) (measure after sampling)= 3.246 m

Thickness of water column (cm)= 2.034 Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4.5L over 2.5 m

Parameter	5m Initial	10m	15m Intermediate	20m	Final	Notes (if not stabilized)
pH	7.55	7.54	7.55		7.54	
Conductivity (uS/cm)	544	562	561		561	
~~ORP~~ Turbidity (NTU)	66.0	58.2	52.6		50.5	
Temperature (degC)	4.09	5.34	4.60		4.90	
DO	14.57	9.41	7.99		7.87	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Clear

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Upper Monitor

Monitoring Well ID: MW6A UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 21 Dec. Time: —

Weather:

Names of Samplers: K. HL + Rich

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer): cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 9.29 Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 0.50 Length screened section (cm)= 2.26

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.52

Static water level (cm) from top of pipe = DRY

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 1.947

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: N —

Well purged (Y/N): Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): —

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): DRY

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Upper 5:te Station

Monitoring Well ID: MW6B UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-MW6B

Bottles filled (by parameter type): ~~6 (4 total = 24)~~

Date of Sampling Event: 21 Aug (4) PHC, (3) Met, (2) PCB Time: 1:45

Weather: 10°C Clear

Names of Samplers: Keith + Ricki

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good - No ponding

Lock (condition, presence, model, manufacturer): ~~No lock~~ Cut lock - replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.3m Diameter of well (cm)= 2:1

*Depth to top of screen (cm)= 0.50 Length screened section (cm)= 2.3

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.70

Static water level (cm) from top of pipe = 1.416

Static water level (cm) (below ground surface) calculated = 0.716

Measured well refusal depth (cm) (measure after sampling)= 2.260

Thickness of water column (cm)= 0.876 Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

1.416 - 0.700 = 0.716

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic - low flow

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4.5 L over 30 MIN

Parameter	5 min Initial	10 min Intermediate	15 min	20 min Final	25 min	30 min	Notes (if not stabilized)
pH	7.42	7.30	7.25	7.21	7.19	7.16	
Conductivity (uS/cm)	288	296	301	298	317	313	
~~Turbidity (NTU)~~ ORP	85.7	77.1	69.5	64.3	63.6	63.0	
Temperature (degC)	3.05	3.00	2.65	2.24	2.11	2.32	
DO	15:00	15:00	11:60	9.42	8.16	7.95	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): ~~Clear~~ Cloudy - Sandy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Water

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

2.280 - 1.416 = 0.476

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Upper-North Cell

Monitoring Well ID: MW7A UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 21 Aug Time:

Weather:

Names of Samplers: Keith and Ricky

Description of Well Condition and Surrounding ground conditions (note ponding of water):

Lock (condition, presence, model, manufacturer): Good Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.57 Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 3.45 Length screened section (cm)= 1.00

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.49

Static water level (cm) from top of pipe = DRY

Static water level (cm) (below ground surface) calculated = —

Measured well refusal depth (cm) (measure after sampling)= 3.965

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): —

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)		DRY		
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...):

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAMG Landfill Name: Upper Station

Monitoring Well ID: MW7B UTM Coordinates: North East

Sample Number(s) include dups.: ~~6 (4 tot. 1 bottles (4) PHC (3) Met. (2) PCB~~

Bottles filled (by parameter type): CAMG - MW7B

Date of Sampling Event: 21 August 2015 Time: 2:45 pm

Weather: 17°C Clear

Names of Samplers: Keith and R.T.

Description of Well Condition and Surrounding ground conditions (note ponding of water): good

Lock (condition, presence, model, manufacturer): No Lock

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 2.7 m Diameter of well (cm)= 2" (2 IN)

*Depth to top of screen (cm)= 0.71 m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

1.966
-0.622
1.346

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.60 m

Static water level (cm) from top of pipe = 0.622 m

Static water level (cm) (below ground surface) calculated = 0.022 m

Measured well refusal depth (cm) (measure after sampling)= 1.968

Thickness of water column (cm)= 1.346 Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 5L over 25 m

Parameter	5m Initial	10 m	15m	20m	25 m Final	Notes (if not stabilized)
pH	7.61	7.67	7.73	7.74	7.79	
Conductivity (uS/cm)	483	457	446	433	434	
~~Turbidity (NTU)~~ ORP	46.1	43.6	42.1	41.9	41.5	
Temperature (degC)	3.97	4.55	5.00	5.16	5.20	
DO	14.00	7.45	5.38	4.74	4.65	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation…): Cloudy - some sand

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distil

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM-4 Landfill Name: Cell II Disposal

Monitoring Well ID: MW8 UTM Coordinates: North East

Sample Number(s) include dups.: CAM-4-MW8

Bottles filled (by parameter type): Metals (3), PHC (4), PCB (2)

Date of Sampling Event: 20 Aug 2016 Time: 12:35pm

Weather: 15°C - Clear

Names of Samplers: Keith Coulthard

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good condition - Water surrounding Area

Lock (condition, presence, model, manufacturer): lock cut - Replaced as per TOR

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.3m Diameter of well (cm)= 0.051 m

*Depth to top of screen (cm)= 0.92 m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc): Interface

Well pipe height above ground (cm) (to top of pipe)= 0.91 m

Static water level (cm) from top of pipe = 0.78 m

Static water level (cm) (below ground surface) calculated = -0.12

Measured well refusal depth (cm) (measure after sampling)= 2.051 m

Thickness of water column (cm)= 1.723 Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic-low flow

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4.5L over 35 min

Parameter	10 min Initial	15 min	25 min Intermediate		Final	*Notes (if not stabilized)*
pH	7.94	7.85	7.73	7.76		
Conductivity (uS/cm)	688	731	893	900		
~~Turbidity (NTU)~~ ORP	-31.5	-48.5	-39.6	-39.0		
Temperature (degC)	3.93	3.80	3.05	2.99		
DO =	8.39	5.11	5.82	5.79		

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Slightly cloudy

No odour

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

* - PCB not DUP: MW

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Tiger II Disposal

Monitoring Well ID: MW9 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-MW9 + CAM4-DUP1

Bottles filled (by parameter type): Met(3), PHC(4), PCB(2) x 3 2x Mercuric 1x Al=*

Date of Sampling Event: 20 Aug 2015 Time: ~~10:30~~ 10:50 AM

Weather: 60 Clear

Names of Samplers: Keith - Consultant + Rich.

Description of Well Condition and Surrounding ground conditions (note ponding of water):

good condition - some water/ponding surrounding

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.3 M Diameter of well (cm)= 0.051 M

*Depth to top of screen (cm)= 0.92 M Length screened section (cm)= 2.0 M

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.280

Static water level (cm) from top of pipe = 0.290

Static water level (cm) (below ground surface) calculated = 0.010

Measured well refusal depth (cm) (measure after sampling)= 2.126 M

Thickness of water column (cm)= 1.836 M Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4L over 30 min Dry x 1

Parameter	5m Initial	10m	Intermediate		25m Final	30m	Notes (if not stabilized)
pH	7.36	7.54	7.60	7.61	7.61	7.62	
Conductivity (uS/cm)	740	746	762	758	748	795	
~~Turbidity (NTU)~~ ORP	96.3	67.3	29.2	10.3	-3.4	-20.2	
Temperature (degC)	4.07	4.75	5.37	4.89	4.64	4.67	
DO=	9.59	7.05	5.22	5.16	4.79	4.66	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Slightly cloudy

No odour

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

2.126
- 0.290
1.836

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAMG Landfill Name:

Monitoring Well ID: MW 10 UTM Coordinates: North East

Sample Number(s) include dups.:

Bottles filled (by parameter type):

Date of Sampling Event: 26 August Time:

Weather:

Names of Samplers: Keith Coulthard

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good condition

Lock (condition, presence, model, manufacturer): Lock Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.57m Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 0.39m Length screened section (cm)= 2.03

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.67m

Static water level (cm) from top of pipe = Dry

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 2.365m

Thickness of water column (cm)= Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)	Dry			
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...):

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Upper Site

Monitoring Well ID: MW11 UTM Coordinates: North East

Sample Number(s) include dups.: (4 Total) 6 Asthers

Bottles filled (by parameter type): 2 CAM4-MW11

Date of Sampling Event: 20 August Time: 3:40 pm

Weather: 15 & clear

Names of Samplers: Keith + Ricki

Description of Well Condition and Surrounding ground conditions (note ponding of water): good Condition - No ponding

Lock (condition, presence, model, manufacturer): ~~No lock~~ Cut lock and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= ~~3.239 m~~ 3.238 m Diameter of well (cm)= ~~1" or 0.6~~ 0.051 m

*Depth to top of screen (cm)= 0.86 Length screened section (cm)= 2.0

*note: *depths are from ground surface*

3.238 - 1.705 = 1.533

Field Measurements

Measurement method (interface probe, tape, etc): _____

Well pipe height above ground (cm) (to top of pipe)= 0.55 m

Static water level (cm) from top of pipe = 1.705 m

Static water level (cm) (below ground surface) calculated = 1.155 m

Measured well refusal depth (cm) (measure after sampling)= 3.238 m

Thickness of water column (cm)= 1.533 Static volume of water in well (mL)= _____

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate: _____

Volume Purged (L) (note multiple purging events if applicable): 4L over 25m

Parameter	5m Initial	10m	15m Intermediate	20m	25m Final		Notes (if not stabilized)
pH	7.50	7.45	7.46	7.46	7.46		
Conductivity (uS/cm)	457	456	456	455	454		
~~Turbidity (NTU)~~ ORP	47.4	47.0	39.5	38.4	38.2		
Temperature (degC)	3.60	3.53	3.59	3.7	3.68		
DO -	24.3	11.95	7.6	6.8	6.4		

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Clear No Sand/Silt

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments: _____

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

1.705 - 0.550 = 1.155

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Upper Site

Monitoring Well ID: MW12 UTM Coordinates: North East

Sample Number(s) include dups.: (9 total) - 6 CAM4-MW12

Bottles filled (by parameter type): As others

Date of Sampling Event: 30 Aug 2016 Time: 5:00pm

Weather: 12°C ~ clear

Names of Samplers: Keith and Ricki

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good condition

Lock (condition, presence, model, manufacturer): ~~No Lock~~ Cut lock and Replaced

2.304 - 1.540 = 0.764

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= ~~3.304 m~~ 3.7m Diameter of well (cm)= ~~1m~~ 2" 0.051 m

*Depth to top of screen (cm)= 0.68 m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.05 m

Static water level (cm) from top of pipe = 1.540 m

Static water level (cm) (below ground surface) calculated = 0.860 m

Measured well refusal depth (cm) (measure after sampling)= 2.304

Thickness of water column (cm)= 0.764 m Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 20 m ~6L

Parameter	5m Initial	10m	15m Intermediate	20m	Final	Notes (if not stabilized)
pH	7.33	7.24	7.29	*		* Intermittent pumping
Conductivity (uS/cm)	223	221	219	*		* Dry to Nearly Dry
~~ORP~~ Turbidity (NTU)	~~52.6~~	52.6	52.4	*		
DO Temperature (degC)	3.41	3.25	3.21	*		Begin Sampling
	5:37	14:09	13:00			

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Cloudy - Sandy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled Water

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

1.540 - 0.860 = 0.800

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM-4 Landfill Name: Upper Landfill

Monitoring Well ID: MW13 UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 22 Aug Time:

Weather:

Names of Samplers: Keith and Derek

Description of Well Condition and Surrounding ground conditions (note ponding of water): Screen - No Cover

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 9.17m Diameter of well (cm)= 0.051m

*Depth to top of screen (cm)= 0.2m Length screened section (cm)= 1.9m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.62

Static water level (cm) from top of pipe = 2.005m

Static water level (cm) (below ground surface) calculated = 1.385

Measured well refusal depth (cm) (measure after sampling)= 2.448m

Thickness of water column (cm)= 0.44m Static volume of water in well (mL)= —

Free product thickness (mm)= Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Y Pump

Well purged (Y/N): Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): Dry after 0.5L

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Sandy - Wont Dry

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Tiger Dispersal

Monitoring Well ID: MW14A UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-14A

Bottles filled (by parameter type): Aq ATLICS

Date of Sampling Event: 20 Aug Time: 2:45 pm

Weather: 8°C Clear

Names of Samplers: Kelly + Dick

Description of Well Condition and Surrounding ground conditions (note ponding of water): good - No ponding

Lock (condition, presence, model, manufacturer): cut + Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 4.7 M Diameter of well (cm)= 2" 0.05 M

*Depth to top of screen (cm)= 1.7 M Length screened section (cm)=

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.51 M

Static water level (cm) from top of pipe = 0.985 M

Static water level (cm) (below ground surface) calculated = 0.475 M

Measured well refusal depth (cm) (measure after sampling)= 2.635 M

Thickness of water column (cm)= 1.650 m Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

2.635 - 0.985 = 1.650

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Y Peristaltic

Well purged (Y/N): Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 3.5 L over 30 min

Parameter	5m Initial	10	15 Intermediate	20	25m Final	Notes (if not stabilized)
pH	7.27	7.30	7.32	7.31	7.31	
Conductivity (uS/cm)	436	434	439	441	442	
~~Turbidity~~ ORP (NTU)	108	56	34	31.8	2.9	
Temperature (degC)	3.22	3.65	3.99	4.0	4.1	
DO =	12.03	11.31	7.55	6.89	6.76	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Cloudy - Sandy - becomes more clear

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

MW 14-B

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM-1 Landfill Name: —

Monitoring Well ID: MW14-B UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 20 Aug Time:

Weather:

Names of Samplers: Keith and Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water):

Good - No well cap

Lock (condition, presence, model, manufacturer):

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.62 m Diameter of well (cm)= 0.65 l m

*Depth to top of screen (cm)= 0.5 m Length screened section (cm)=

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.54 m

Static water level (cm) from top of pipe = Dry

Static water level (cm) (below ground surface) calculated =

Measured well refusal depth (cm) (measure after sampling)= 2.096

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Dry

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Tier II Disposal

Monitoring Well ID: MW15 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-MW15 + DUP1 (PCB only)

Bottles filled (by parameter type): (4 total) as others + PCB DUP x2 (3 bottles)

Date of Sampling Event: 20 Aug Time: 1:45 pm

Weather: Clear 16°C

Names of Samplers: Keith + Rich

Description of Well Condition and Surrounding ground conditions (note ponding of water): good - No ponding

Lock (condition, presence, model, manufacturer): cut and replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.3m Diameter of well (cm)= 0.051m

*Depth to top of screen (cm)= 0.33m Length screened section (cm)=

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= ~~0.716~~ 0.716

Static water level (cm) from top of pipe = 0.376

Static water level (cm) (below ground surface) calculated = -0.402

Measured well refusal depth (cm) (measure after sampling)= 2.099

Thickness of water column (cm)= 1.721m Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 5L over 25 min

Parameter	5m Initial	10m	15m Intermediate		25m Final	Notes (if not stabilized)
pH	7.17	7.15	7.15	7.13	7.13 ✓	
Conductivity (uS/cm)	549	533	521	509	502 ✓	
~~Turbidity (NTU)~~ ORP	-24.1	-31	-33.9	-35.9	-36.2 ✓	
Temperature (degC)	4.6	4.9	4.92	4.91	4.94 ✓	
DO =	10.97	8.44	7.07	6.55	6.24 ✓	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Clear - No odour - No sediment

Decontamination of sampling equipment

Type of decontamination fluid (s): Alcot Water

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: _____

Monitoring Well ID: MW-15 UTM Coordinates: North _____ East _____

Sample Number(s) include dups.: —

Bottles filled (by parameter type): —

Date of Sampling Event: 20 August 2016 Time: _____

Weather: _____

Names of Samplers: Keith + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): _____

Lock (condition, presence, model, manufacturer): _____

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.01 m Diameter of well (cm)= _____

*Depth to top of screen (cm)= 0.54m Length screened section (cm)= _____

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc): _____

Well pipe height above ground (cm) (to top of pipe)= 0.49

Static water level (cm) from top of pipe = Dry

Static water level (cm) (below ground surface) calculated = —

Measured well refusal depth (cm) (measure after sampling)= 1.142m

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: —

Well purged (Y/N): N Recharge Rate: _____

Volume Purged (L) (note multiple purging events if applicable): DRY

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Dry

Decontamination of sampling equipment

Type of decontamination fluid (s): _____

Number washes: _____ Number rinses: _____

Other Relevant Comments: _____

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM 4 Landfill Name: Lower Site

Monitoring Well ID: MW 17 UTM Coordinates: North East

Sample Number(s) include dups.: CAM 4 - MW 17

Bottles filled (by parameter type): 6 (9 total) + ASCH wes

Date of Sampling Event: 21 Aug 2016 Time: 9:45

Weather:

Names of Samplers: Keith + Ricki

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good

Lock (condition, presence, model, manufacturer):

2.508
-1.490
1.018

Pre-Measured Data (From Water Well Record Log) 3.8m

*Depth of well installation (cm)= ~~2.506m~~ Diameter of well (cm)= 0.051m

*Depth to top of screen (cm)= 0.82 Length screened section (cm)= 2.0

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.71m

Static water level (cm) from top of pipe = 1.490m

Static water level (cm) (below ground surface) calculated = 0.780m

Measured well refusal depth (cm) (measure after sampling)= 2.508m

Thickness of water column (cm)= 1.018m Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information:

Well purged (Y/N): Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 3.5 L on 20m

Parameter	Initial	Intermediate (10m / 15m)		Final (20m / 25m)	Notes (if not stabilized)
pH	7.57	7.36	7.30	7.29	
Conductivity (uS/cm)	273	269	269	268	
~~Turbidity (NTU)~~ (SRP)	51 ~~360.8~~	51.6	53.6	53.9	
Temperature (degC)	4.85	4.95	5.05	5.10	
DO	10.82	11.09	10.89	9.00	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Cloudy

Decontamination of sampling equipment

Type of decontamination fluid (s): Same as others

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Lower Site Landfill

Monitoring Well ID: MW18 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-MW18

Bottles filled (by parameter type): #6 (9 bottles)

Date of Sampling Event: 22 August Time: 10:20am

Weather: 12° Cloudy

Names of Samplers: K. Cuttle + R. Kay

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good - Mineral water surrounding

Lock (condition, presence, model, manufacturer): cut off - Replaced as other

2.184 - 0.844 = 1.340

Pre-Measured Data (From Water Well Record Log) 3.2m in

*Depth of well installation (cm)= ~~2.184~~ Diameter of well (cm)= 2"

*Depth to top of screen (cm)= 0.81 m Length screened section (cm)= 2.0m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.71 m

Static water level (cm) from top of pipe = 0.844 m

Static water level (cm) (below ground surface) calculated = 0.073

Measured well refusal depth (cm) (measure after sampling)= 2.184 m

Thickness of water column (cm)= 1.340 Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4.5 L over 30 m

Parameter	5m Initial	10m	15m Intermediate	20m	25m Final	30m	Notes (if not stabilized)
pH	7.53	7.04	6.94	6.98	6.96	6.96	
Conductivity (uS/cm)	325	32	322	327	330	334	
~~ORP~~ Turbidity (NTU)	1.6	2.0	28.1	30.0	33.0	34.0	
Temperature (degC)	2.44	2.8	2.8	3.47	3.52	3.6	
DO = 24.50	13.9	10.23	7.04	7.00	7.00	6.91	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Clear - slightly sandy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Water Distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (EPA/540/S-95/504 or most recent)* .

Sheets = 12 NOTES = 12 Bag = 1

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CFNA Landfill Name: Lower Site Landfill

Monitoring Well ID: MW 19 UTM Coordinates: North East

Sample Number(s) include dups.:

Bottles filled (by parameter type): 6 (a total)

Date of Sampling Event: 21 July 2016 Time: 5:35

Weather: clear

Names of Samplers: KC + MH, RJ

2.152 -0.645 1.507

Description of Well Condition and Surrounding ground conditions (note ponding of water): good - yes marshy/ponding water

Lock (condition, presence, model, manufacturer):

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= ~~2.152 m~~ 3.4 m in Diameter of well (cm)= 2" 0.05 m

*Depth to top of screen (cm)= 0.84 m Length screened section (cm)= 2.0 m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.670

Static water level (cm) from top of pipe = 0.645 m

Static water level (cm) (below ground surface) calculated = -0.025

Measured well refusal depth (cm) (measure after sampling)= 2.152 m

Thickness of water column (cm)= 1.567 m Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic - low flow

Well purged (Y/N): Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 20 min 4 L * pump intermittent sampled at 20 min

Parameter	5 m Initial	10 m Intermediate	15 m 2.9 m Final	Notes (if not stabilized)
pH	6.86	6.83	6.92	-
Conductivity (uS/cm)	440	440	434	-
~~ORP~~ Turbidity (NTU)	75.9	75.9	75.3	-
Temperature (degC)	4.84	4.75	4.93	-
DO	15:48	13:00	19:8	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): cloudy - yellow - sandy*

Decontamination of sampling equipment

Type of decontamination fluid (s): N/A Others

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

CAM4 Lower Site Landfill NON Haz

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: ~~CAM4~~ Landfill Name: ~~Tier II Disposal~~

Monitoring Well ID: CAM4 - MW20 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4-MW20

Bottles filled (by parameter type): As 0.45 - 1 PCB bottle = 8 total

Date of Sampling Event: 22 Aug 14 Time: 10:10 am

Weather: 4°C Clear

Names of Samplers: Keith and Ric

Description of Well Condition and Surrounding ground conditions (note ponding of water): good - No Water/Ponding

Lock (condition, presence, model, manufacturer):

2.759 - 2.446 = 0.313

Pre-Measured Data (From Water Well Record Log) 3.4m

*Depth of well installation (cm)= ~~2.759~~ Diameter of well (cm)= 0.051

*Depth to top of screen (cm)= 6.30 Length screened section (cm)= 2.1

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.92

Static water level (cm) from top of pipe = 2.446

Static water level (cm) (below ground surface) calculated = 1.626

Measured well refusal depth (cm) (measure after sampling)= 2.759

Thickness of water column (cm)= 1.626 Static volume of water in well (mL)=

Free product thickness (mm)= Evidence of sludge or siltation:

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 3L ~~2.5L~~ over ~~15m~~ 20m

Parameter	5m Initial	10m	15m	20m Intermediate			Final	Notes (if not stabilized)
pH	7.65	7.68	7.74	7.79				minimal water sampled 25m
Conductivity (uS/cm)	269	271	273	275				
~~Turbidity (NTU)~~ ORP	29.5	21.8	8.9	7.0				
Temperature (degC)	5.68	6.55	6.38	6.30				
DO =	13.52	7.3	4.2	4.0				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Clear Not sandy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Distill

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

-1 x less PCB bottle filled - minimal water

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Lower Site - Landfill

Monitoring Well ID: MW21 UTM Coordinates: North East

Sample Number(s) include dups.: —

Bottles filled (by parameter type):

Date of Sampling Event: 22 Aug 2016 Time:

Weather:

Names of Samplers: Keith + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good Condition

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (~~cm~~)= 3.42m Diameter of well (cm)= 0.051m

*Depth to top of screen (cm)= 0.83m Length screened section (cm)= 2.03m

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.62

Static water level (cm) from top of pipe = —

Static water level (cm) (below ground surface) calculated = —

Measured well refusal depth (cm) (measure after sampling)= 2.20

Thickness of water column (cm)= — Static volume of water in well (mL)= —

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: N

Well purged (Y/N): N Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable):

Parameter	Initial	Intermediate	Final	*Notes (if not stabilized)*
pH				
Conductivity (uS/cm)	Dry			
Turbidity (NTU)				
Temperature (degC)				

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Dry

Decontamination of sampling equipment

Type of decontamination fluid (s):

Number washes: Number rinses:

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Lowersite Non Haz Landfill

Monitoring Well ID: MW22 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4 MW-22

Bottles filled (by parameter type): As Others

Date of Sampling Event: 22 August '16 Time: 13:20pm

Weather: 12°C Winds - Clear

Names of Samplers: Keith + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good

Lock (condition, presence, model, manufacturer): cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= 3.60m Diameter of well (cm)= 2" 0.051m

*Depth to top of screen (cm)= 0.50 Length screened section (cm)= 2.0

*note: *depths are from ground surface*

2602 - 1.250 1.352

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.61m

Static water level (cm) from top of pipe = 1.250m

Static water level (cm) (below ground surface) calculated = 0.640

Measured well refusal depth (cm) (measure after sampling)= 2.602

Thickness of water column (cm)= 1.352 Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 3.5L over 20m

Parameter	5m Initial	10min	15	20	25 Final	30	Notes (if not stabilized)
pH	6.36	8.20	8.15	8.14			
Conductivity (uS/cm)	101	109	101	100			
~~Turbidity (NTU)~~ ORP	162	56.3	61	62			
Temperature (degC)	4.57	4.85	4.95	4.94			
DO	13.5	13.4	13.7	13.8	✓		

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): Sandy - Cloudy

Decontamination of sampling equipment

Type of decontamination fluid (s): Alconox + Water distilled

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

Non Hazardous

ANNEX J3: Monitoring Well Sampling Log (Complete All Fields)

Site Name: CAM4 Landfill Name: Lower Site Landfill

Monitoring Well ID: MW23 UTM Coordinates: North East

Sample Number(s) include dups.: CAM4 - MW23

Bottles filled (by parameter type): As others

Date of Sampling Event: 22-Aug Time: 12:15

Weather: 15C Clear

Names of Samplers: Keith + Rick

Description of Well Condition and Surrounding ground conditions (note ponding of water): Good - No ponding

Lock (condition, presence, model, manufacturer): Cut and Replaced

Pre-Measured Data (From Water Well Record Log)

*Depth of well installation (cm)= ~~2.502~~ IN Diameter of well (cm)= 211 -0.051M

*Depth to top of screen (cm)= 0.76m Length screened section (cm)= 2.10M

*note: *depths are from ground surface*

Field Measurements

Measurement method (interface probe, tape, etc):

Well pipe height above ground (cm) (to top of pipe)= 0.5M

Static water level (cm) from top of pipe = 1.250M

Static water level (cm) (below ground surface) calculated = 1.100M

Measured well refusal depth (cm) (measure after sampling)= 2.602M

Thickness of water column (cm)= 1.352M Static volume of water in well (mL)=

Free product thickness (mm)= — Evidence of sludge or siltation: —

Purging Information Summary*

Purging/sampling equipment, sampling technique and equipment calibration information: Peristaltic

Well purged (Y/N): Y Recharge Rate:

Volume Purged (L) (note multiple purging events if applicable): 4L over 30M

Parameter	10M Initial	15M	20M Intermediate	25M	Final 30M	Notes (if not stabilized)
pH	7.37	7.25	7.25	7.25	7.25	
Conductivity (uS/cm)	512	517	522	525	523	
~~Turbidity (NTU)~~ ORP	51.7	49.0	47.7	46.9	46.1	
Temperature (degC)	3.27	3.2	3.44	3.59	3.63	
DO	13.08	10.81	7.47	7.00	6.92	

Visual/olfactory observations (incl. colour, odour, presence of free product/sheen/globules, siltation...): slightly cloudy becoming clear

Decontamination of sampling equipment

Type of decontamination fluid (s): As others

Number washes: 1 Number rinses: 1

Other Relevant Comments:

* Complete field notes including a full suite of water quality indicator parameters VS time should be appended to this summary as per US *EPA Low-Flow (Minimal Drawdown) Ground-Water Sampliong Procedures (EPA/540/S-95/504 or most recent)* .

APPENDIX D

QA/QC Discussion of Results

QUALITY ASSURANCE/QUALITY CONTROL

A Quality Assurance/Quality Control (QA/QC) program was implemented to monitor the quality of the analytical results. The main objective of this QA/QC program is to ensure that sampling data and analytical results are complete, precise, representative and comparable.

All samples were given sequential alphanumerical coding before submitting to the analytical laboratories; this coding method masked any information concerning site location, sample type or possible concentrations in the samples.

All samples were collected in laboratory prepared and provided sample containers. All samples were submitted with zero headspace unless otherwise noted. Headspace present in a sample submitted for volatile organic analyses may be biased low due to sample off-gassing.

All soil and groundwater samples were sent for analysis to Maxxam Analytics Ltd, Edmonton, Alberta with PCB analysis being conducted in Mississauga, Ontario. To ensure the quality of analytical results, 10% of duplicate samples were sent to a second laboratory (ALS – Edmonton, Alberta) and analyzed for inter-laboratory comparison purposes. All results are presented in the table to this Appendix (Appendix D, Table 1 for soil and Table 2 for groundwater).

Sampling procedures and laboratory analytical precision are evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair according the following equation:

$$RPD = | X_1 - X_2 | / X_{avg} \times 100$$

where: x_1 and x_1 are the duplicate concentrations and x_{avg} is the mean of these two values.

The duplicate results were evaluated using criteria developed by Zeiner (1994), which draws from several data validation guidelines developed by the United States Environmental Protection Agency (USEPA). According to these criteria, the RPD for duplicate samples should be less than 40% for aqueous samples, and less than 60% for solid samples. In addition, the newly developed CCME Guidance manual – PN1551; 2016 indicates the use of RPD values of less than 40% for aqueous samples, and less than 60% for soils. RPDs can only be calculated when the compound is detected in both the original and the duplicate sample at concentrations of five times above the reportable detection limit (or method detection limit - MDL), or greater. Alternative criteria are used to evaluate duplicate pairs where one or both of the results are less than five times the MDL, or where one or both of the results is less than the MDL (i.e. nd or 'not-detected'). The alternative

criteria used for the evaluation of the data, adapted from Zeiner (1994), are presented in the table below. When both concentrations are less than the MDL, no calculation/evaluation criterion is required. For this review, based on DEW Line criteria, the RPD for duplicate samples comparison criteria of less than 30% for aqueous samples, and less than 30% for solid samples was implemented.

Criteria for the Evaluation of Blind and Duplicate Sample Results

Scenario	Result A	Result B	Criteria for Acceptance	
			Aqueous (water)	Soil (Soil)
A	nd	nd	Acceptable precision; no evaluation required	
B	nd	positive	result B – 0.5 x MDL < MDL	result B – 0.5 x MDL < 2 x MDL
C	positive and > 5 x MDL	positive and > 5 x MDL	RPD < 40% (Zeiner) RPD <30% DEW Line	RPD <60% (Zeiner) RPD <30% DEW Line
D	positive and < or = 5 x MDL	positive	|result B – result A| < MDL[1]	|result B – result A| < 2 x MDL[1]

Source(s):
Zeiner, S.T., Realistic Criteria for the Evaluation of Field Duplicate Sample Results, Proceedings of Superfund XV, November 29-December 1, 1994, Sheraton Washington Hotel, Washington, D.C. – modified to use Method Detection Limit (MDL) or Reportable Detection Limit (RDL) in lieu of the Quantitation Limit (QL), the Instrument Detection Limit (IDL) and/or Laboratory Reporting Limit (LRL).

DCC Dew Line Monitoring Kitik16 RFP – Annex K, Section 1.2.2

Notes:
nd – not detected
RPD – relative percent difference, |result A - result B| / |(result A + result B)/2|
1. When result reported was less than half the quantitation limit, half the limit was used in the equation.

The precision is considered acceptable when the evaluation criteria are met or when both results are below the MDL. When the evaluation criteria are not satisfied, the following apply:

- nd vs. positive – unacceptable precision: the positive result is considered an estimate and the nd result is considered inconclusive.
- Positive vs. positive – unacceptable precision: the res

SHIPPING AND TRANSPORTATION

Samples were kept in coolers and shipped to the contract laboratory as soon as Arcadis field staff arrived back in Cambridge Bay and all attempts were made to expedite this procedure as quickly

as possible. Samples were shipped priority air to Yellowknife laboratory depots. The laboratories were notified and waybill numbers were provided to aid in sample transfer of custody and tracking.

Sample Temperatures

Cooler temperatures were within acceptable ranges when received at the Maxxam Yellowknife depot and ALS Edmonton Laboratory based on the COCs attached in the laboratory results section of this report. Coolers were then sent from Maxxam Yellowknife (in Maxxam's custody) to Maxxam Mississauga or Maxxam Edmonton (depending on the required analysis). Cooler temperatures were within acceptable ranges when received at Maxxam Mississauga and Maxxam Edmonton based on the COCs.

Sample Holding Times

Hold times for the Maxxam soil samples for F1/BTEX were exceeded, as outlined on the Maxxam laboratory certificates of analysis. Although all efforts were made to get the samples to the laboratory on time, given the volume of samples, Maxxam was unable to extract the above-mentioned samples within the 7-day recommended window. In most cases, samples were received at Maxxam one day late. Given that most soil samples stations at CAM-4 have historically had no samples with detectable concentrations of F1 or BTEX, it is not believed that this holding time exceedance has affected the integrity of most sample results. In the cases where concentrations of F1 or BTEX have historically been detected, 2016 reported concentrations may be lower than the actual in-field concentrations; however, as samples were containerized with limited headspace and kept at cool temperatures, losses due to volatilization are likely limited.

Hold times for the ALS duplicate soil samples for F1/BTEX were also exceeded, as outlined on the ALS laboratory certificates of analysis. Given the history of non-detect F1 or BTEX concentrations in soil samples collected from these specific soil sample stations at the CAM-4 site, it is not believed that these holding time exceedances affected the integrity of the sample results and that the sample results should be relied upon.

METHOD DETECTION LIMITS (MDLS)

Method detection limits were raised for soil sample 16-C4-MW-9A (Maxxam ID PJ4027), 16-C4-MW-9B (Maxxam ID PJ4028), and 16-C4-MW-19A (Maxxam ID PJ4053) and groundwater sample CAM4-BMW3 (Maxxam ID PJ4271) and CAM4-MW19 (Maxxam ID PJ4294). The MDLs were raised in this sample due to matrix interference with analytes benzene (for soil samples only) and Hg (for groundwater samples only) being affected. After review of the sample results, it is

not believed that this raise in detection limits caused any bias or any major exceedances were missed and the results should be relied upon.

QA/QC SAMPLE RESULTS

Soil samples were compared against intra-laboratory duplicates (i.e., Maxxam to Maxxam via a parent sample and blind duplicate sample) and inter-laboratory duplicates (i.e., Maxxam parent sample and an identical ALS sample).

Soil

A total of six duplicate and inter-laboratory samples were collected and analyzed at the CAM-4 site. In the case of soil samples, some minor differences were noted within the sample results when field duplicates were compared with the originals, although all differences are considered to be within acceptable limits with four exception noted in the following section.

Metals Analyses

In some instances, minor variance of analytical results occurred between the project laboratory (Maxxam) and the inter-lab analysis (ALS); however, these discrepancies are very small and are considered by Arcadis to be well within an acceptable level.

Sample parent (16-C4-MW-9A Maxxam) and its duplicate (16-C4-DUP1 Maxxam) reported unacceptable RPD results for Ni and Cr. When comparing the Maxxam sample with the inter-laboratory ALS sample (16-C4-MW-9A ALS), all analytes reported concentrations within acceptable ranges. Therefore, it is concluded that the sample parent (16-C4-MW-9A Maxxam) may have reported abnormally high concentrations, which could be attributed to small metal fragments present in the sample or the heterogeneous nature of the soil samples.

Sample parent (16-C4-MW-3A Maxxam) and its duplicate (16-C4-DUP2 Maxxam) reported acceptable RPD results for all analytes. When comparing the parent sample with the inter-laboratory ALS sample (16-C4-MW-3A ALS), the reported Cu concentration was not within acceptable RPD range established under the DEW Line criteria. Therefore, it is concluded that the duplicate sample (16-C4-MW-3A ALS) may have reported an abnormally low concentration, which could be attributed the heterogeneous nature of the soil samples.

Sample parent (16-C4-BMW-4A Maxxam) and its duplicate (16-C4-DUP5) reported unacceptable results for Co. When comparing the Maxxam sample with the inter-laboratory ALS sample (16-C4-BMW-4A), all analytes reported concentrations within acceptable ranges. Therefore, it is

concluded that the sample parent (16-C4-BMW-4A Maxxam) may have reported an abnormally low concentration, which could be attributed to the heterogeneous nature of the soil samples.

Sample parent (16-C4-MW-22A Maxxam) and its duplicate (16-C4-DUP6) reported unacceptable results for Arsenic (As). When comparing the Maxxam sample with the inter-laboratory ALS sample (16-C4-MW-22A ALS), all analytes reported concentrations within acceptable ranges. Therefore, it is concluded that the sample parent (16-C4-MW-22A Maxxam) may have reported an abnormally high concentration, which could be attributed to small metal fragments present in the sample or the heterogeneous nature of the soil samples.

Overall, the data set is considered within acceptable ranges and the results are considered reliable.

Hydrocarbon Analyses

Most soil samples reported non-detect concentrations for hydrocarbons and are considered to meet the QA/QC criteria.

Sample parent (16-C4-MW-3A Maxxam) and its duplicate (16-C4-DUP2 Maxxam) reported unacceptable results for PHC F3. When comparing the Maxxam sample with the inter-laboratory ALS sample (16-C4-MW-3A ALS), the reported PHC F3 concentration was within acceptable RPD range. Therefore, it is concluded that the duplicate sample (16-C4-DUP2) may have reported an abnormally high concentration, which could be attributed to the heterogeneous nature of the soil samples.

It should be noted that the recommended holding time of 7 days was exceeded for F1/BTEX for both the Maxxam and ALS samples. Arcadis took all necessary steps to ensure that this was circumvented including priority shipping as soon as Arcadis returned to Cambridge Bay at the end of the sampling program; however, given the remote nature of the site and long transit times for shipping, these holding time exceedances could not be avoided.

In the cases where concentrations of F1 or BTEX have historically been detected, 2016 reported concentrations may be lower than the actual in-field concentrations; however, as samples were containerized with limited headspace and kept at cool temperatures, losses due to volatilization are likely limited. Therefore, the data set is considered within acceptable ranges and the results are considered reliable.

PCB Analyses

All soil samples reported non-detect concentrations for PCBs and are considered to meet the QA/QC criteria with the exception of soil sample 16-C4-MW-3A. Soil sample parent 16-C4-MW-3A (Maxxam) had a PCB concentration of 0.013 mg/kg. In contrast, its soil sample duplicates (16-C4-DUP2 Maxxam and 16-C4-MW-3A ALS) were both below their method detection limits of 0.010 mg/kg and 0.050 mg/kg for Maxxam and ALS, respectively. Historically, surface samples collected at soil sample station MW-3 have never had detectable concentrations of PCB. The slightly elevated concentration of PCBs in soil sample 16-C4-MW-3A is anomalous; however, the RPDs associated with this sample are within acceptable ranges and the results are considered reliable.

Groundwater

Two groundwater duplicate samples and inter-laboratory samples were collected and analyzed at the CAM-4 site. All concentration variances were within the acceptable range for the one duplicate sets associated with groundwater sample (CAM4-MW5). Sample parent (CAM4-MW9 Maxxam) and its duplicate (CAM4-DUP1 ALS) reported unacceptable results for Cu, Ni, Cd, Pb, Zn and As. When comparing the Maxxam sample with its Maxxam duplicate sample (CAM4-DUP1), all analytes reported concentrations within acceptable ranges. The difference in concentrations noted between sample Maxxam parent and its ALS duplicate may be the result of the poor recharge observed at monitoring well MW5 and the presence of trace sediment in the sample.

Groundwater samples submitted to Maxxam contained two qualifiers. The first was for sample CAM4-BMW1 (Maxxam ID PJ4300-01). This sample required decanting due to inappropriate sample container for F24 analysis. Arcadis staff encountered free product within the BWMW-1 monitoring well, a sample of the product was taken for PHC analysis; the high concentration of free product in the sample would have accounted for the need to decant the sample, any discrepancies in reported F2-4 groundwater concentrations resulting from this process are not considered relevant to current monitoring report. The second qualifier was for some sample container(s) submitted with headspace for BTEX/F1.

Overall, the soil and groundwater sample results are broadly coherent and within the same range of results for both laboratories. In general, the reliability and accuracy of the analytical results is considered as good and should be relied upon.

Summary of 2016 Soil Duplicate Analytical Data																
Sample ID	Location	Year	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	Total PCB [mg/kg]	F1 C_6-C_{10} [mg/kg]	F2 C_{10}-C_{16} [mg/kg]	F3 C_{16}-C_{34} [mg/kg]
RDL				1	1	0.5	0.050	0.5	10	1	1	0.050	0.010	12	10	50
RDL x 5				5	5	2.5	0.25	2.5	50	5	5	0.25	0.05	60	50	250
	MW-9 Surface															
16-C4-MW-9A	MW-9	2016	0-15	11	27	7.7	<0.050	6.8	45	56	2.2	<0.050	<0.010	<12	<10	<50
16-C4-DUP1				12	10	7.3	<0.050	7.8	45	19	2.1	<0.050	<0.010	<12	<10	<50
RPD (Parent and Dup)				8.7%	91.9%	5.3%	--	13.7%	0.0	98.7%	0.1	--	--	--	--	--
Acceptable (Y/N)				Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
16-C4-MW-9A ALS				8.48	8.73	6.71	0.042	7.12	40.9	14.8	2.37	0.0401	<0.050	<10	<20	32
RPD (interlab)				25.9%	13.6%	8.4%	--	9.1%	4.1	24.9%	0.3	--	--	--	--	7
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MW-3 Surface															
16-C4-MW-3A	MW-3	2016	0-15	14	20	7.7	<0.050	7.9	48	38	2.1	<0.050	0.013	<12	<10	<50
16-C4-DUP2				14	15	7.7	0.072	10	49	29	2.2	<0.050	<0.010	<12	<10	100
RPD (Parent and Dup)				0.0%	28.6%	0.0%	0.047	23.5%	1	26.9%	0.1	--	0.008	--	--	75
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
16-C4-MW-3A ALS				9.63	12.0	6.06	0.028	6.14	37.0	22.0	1.73	0.0345	<0.050	<10	<20	36
RPD (interlab)				37.0%	22.2%	23.8%	--	25.1%	25.9%	27.5%	0.5	--	0.012	--	--	11
Acceptable (Y/N)				N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MW-4 Surface															
16-C4-MW-4AA	MW-4	2016	0-15	2.7	5.3	2.8	<0.050	2.6	13	10	<1.0	<0.050	<0.010	<12	<10	<50
16-C4-DUP3				3.9	6.4	3.6	<0.050	3.2	17	12	<1.0	<0.050	<0.010	<12	<10	<50
RPD (Parent and Dup)				1.2	18.8%	25.0%	--	20.7%	26.7%	18.2%	--	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
16-C4-MW-4AA ALS				3.42	4.68	2.69	0.024	3.32	17.5	8.57	0.78	0.0256	<0.050	<10	<20	<20
RPD (interlab)				0.5	12.4%	28.9%	--	3.7%	0.5	15.4%	--	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MW-20 Surface															
16-C1-MW-20A	MW-20	2016	0-15	9.7	9.0	5.6	<0.050	5.3	37	16	1.5	<0.050	<0.010	<12	<10	<50
16-C4-DUP4				8.6	9.5	5.2	0.12	5.0	50	15	1.8	<0.050	<0.010	<12	<10	<50
RPD (Parent and Dup)				12.0%	5.4%	7.4%	0.095	5.8%	13	6.5%	0.3	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
16-C1-MW-20A ALS				7.27	8.76	5.17	0.037	6.48	33.7	14.5	2.07	0.0233	<0.050	<10	<20	<20
RPD (interlab)				16.8%	8.1%	0.6%	0.012	25.8%	3.3	3.4%	0.3	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	BMW-4 Surface															
16-C1-BMW-4A	BMW-4	2016	0-15	5.1	6.8	<0.50	<0.050	4.0	19	10	<1.0	<0.050	<0.010	<12	<10	<50
16-C4-DUP5				6.4	7.5	3.8	<0.050	4.1	20	12	1.0	<0.050	<0.010	<12	<10	<50
RPD (Parent and Dup)				22.6%	9.8%	3.55	--	2.5%	1.0	18.2%	0.5	--	--	--	--	--
Acceptable (Y/N)				Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
16-C1-BMW-4A ALS				4.95	8.77	4.39	0.027	3.75	19.8	15.1	1.01	<0.0050	<0.050	<10	<20	24
RPD (interlab)				25.6%	15.6%	14.4%	--	8.9%	0.2	22.9%	0.0	--	--	--	--	-1
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Summary of 2016 Soil Duplicate Analytical Data																
Sample ID	Location	Year	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	Total PCB [mg/kg]	F1 C_6-C_{10} [mg/kg]	F2 C_{10}-C_{16} [mg/kg]	F3 C_{16}-C_{34} [mg/kg]
RDL				1	1	0.5	0.050	0.5	10	1	1	0.050	0.010	12	10	50
	MW-22 Surface															
16-C1-MW-22A	MW-2	2016	0-15	7.0	6.4	3.0	<0.050	7.9	17	8.2	12	<0.050	<0.01	<12	<10	<50
16-C4-DUP6				7.4	6.3	2.9	<0.050	9.1	18	9.2	1.30	<0.050	<0.010	<12	<10	<50
RPD (Parent and Dup)				5.6%	1.6%	3.4%	--	14.1%	5.7%	11.5%	160.9%	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
16-C1-MW-22A ALS				6.81	6.66	3.28	0.030	6.66	19.8	8.85	1.62	0.0149	<0.050	<10	<20	<20
RPD (interlab)				8.3%	5.6%	12.3%	--	17.0%	2.8	3.9%	0.3	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes:

-- Not calculated - meets criteira

Y Meets Criteria

N Does not meet criteria

Summary of 2016 Groundwater Duplicate Analytical Data

Sample ID	Location	Year	Depth (cm)	Cu [mg/L]	Ni [mg/L]	Co [mg/L]	Cd [mg/L]	Pb [mg/L]	Zn [mg/L]	Cr [mg/L]	As [mg/L]	Hg [mg/L]	Total PCB [mg/L]	F1 C_6-C_{10} [mg/L]	F2 C_{10}-C_{16} [mg/L]	F3 C_{16}-C_{34} [mg/L]
RDL				0.00020	0.00050	0.00030	0.000020	0.00020	0.0030	0.0010	0.00020	0.0000020	0.05	0.1	0.1	0.2
RDL x 5				0.00100	0.00250	0.00150	0.00010	0.00100	0.01500	0.00500	0.00100	0.00001	0.25000	0.500	0.500	1.000
Monitoring Data																
	MW-5															
CAM4-MW5	MW-5	2016	0-15	0.0029	0.0057	<0.00030	0.000031	0.00032	0.023	0.0056	0.00026	<0.0000020	<0.000050	<0.1	<0.10	<0.20
CAM4-DUP2				0.0032	0.0056	<0.00030	0.000020	0.00032	0.025	0.0053	0.00033	<0.0000020	<0.000050	<0.1	<0.10	<0.20
RPD (Parent and Dup)				9.8%	1.8%	--	0.000011	0	8.3%	5.5%	0.00007	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CAM4-DUP2 ALS				0.00268	0.00541	0.00019	0.0000224	0.000457	0.0230	0.00444	0.00025	<0.0000050	<0.000050	<0.10	<0.10	<0.25
RPD (interlab)				7.9%	5.2%	--	0.000009	0.00014	0.0%	23.1%	3.9%	--	--	--	--	--
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MW-9															
CAM4-MW9	MW-9	2016	0-15	0.0067	0.019	0.0011	0.00073	0.0014	0.028	0.024	0.0019	0.000078 (1)	<0.000050	<0.1	<0.10	0.32
CAM4-DUP1				0.0060	0.017	0.00098	0.00069	0.0012	0.024	0.022	0.0017	0.0000440	<0.000050	<0.1	<0.10	0.22
RPD (Parent and Dup)				11.0%	11.1%	11.5%	5.6%	15.4%	15.4%	8.7%	11.1%	--	--	--	--	0.1
Acceptable (Y/N)				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CAM4-DUP1 ALS				0.0107	0.0307	0.00139	0.000259	0.00289	0.0437	0.0321	0.00367	<0.0000050	<0.000050 (2)	<0.10	0.28	0.41
RPD (interlab)				46.0%	47.1%	0.0	95.2%	69.5%	43.8%	28.9%	63.6%	--	--	--	--	0.1
Acceptable (Y/N)				N	N	Y	N	N	N	Y	N	Y	Y	Y	Y	Y

Notes:

-- Not calculated - meets criteira

Y Meets Criteria

(1) Detection limit raised due to sample matrix

(2) PCB duplicate was taken from MW15. The concentration of PCB in groundwater sample MW15 was also below the reportable detection limit.

Volatiles (ug/L)	**TRIP BLANK**
Benzene	<0.40
Toluene	<0.40
Ethylbenzene	<0.40
m & p-Xylene	<0.80
o-Xylene	<0.40
Xylenes (Total)	<0.80
F1 - BTEX	<100
F1 (C6-C10)	<100

APPENDIX E

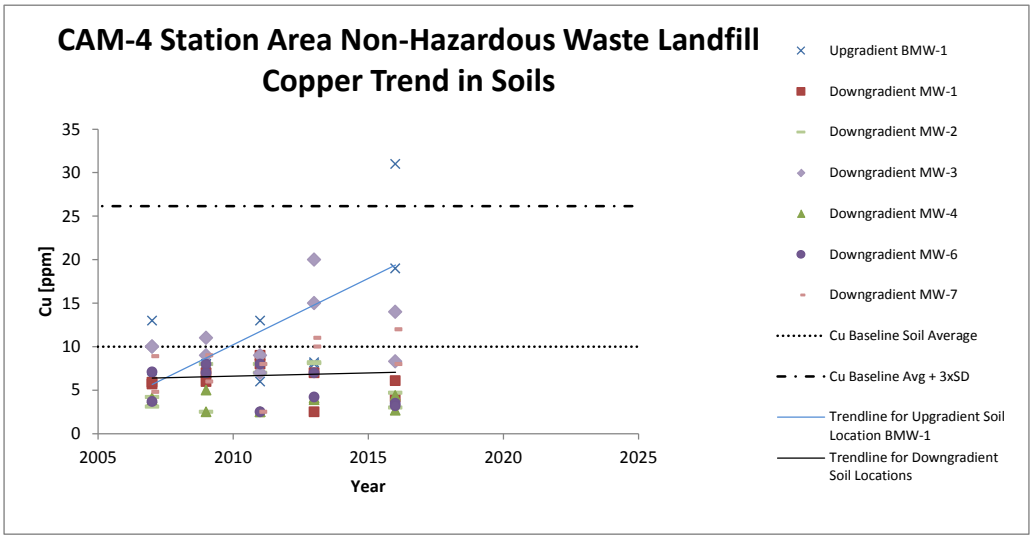
Soil Trend Analysis Graphs

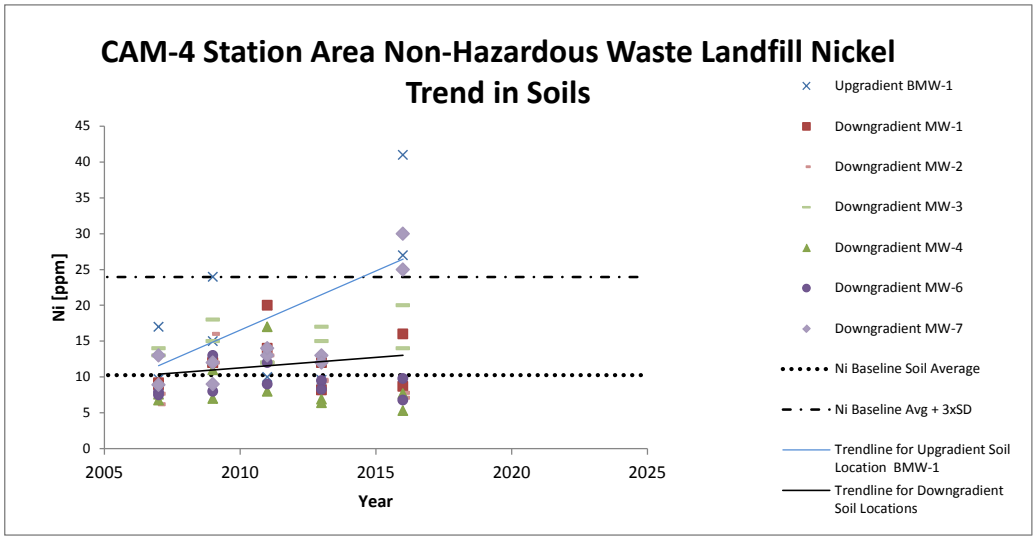
APPENDIX E1

Station Area Non-Hazardous Landfill

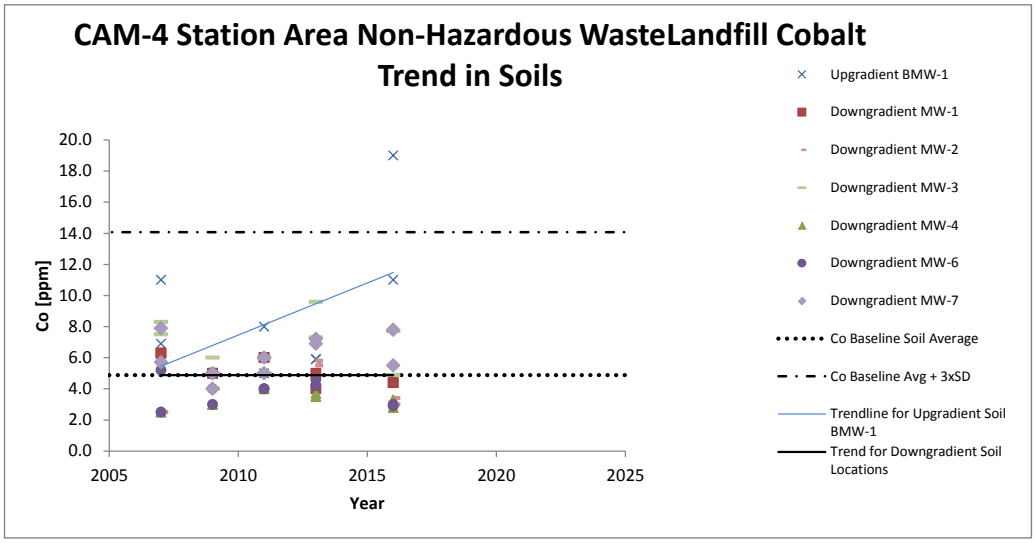
CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

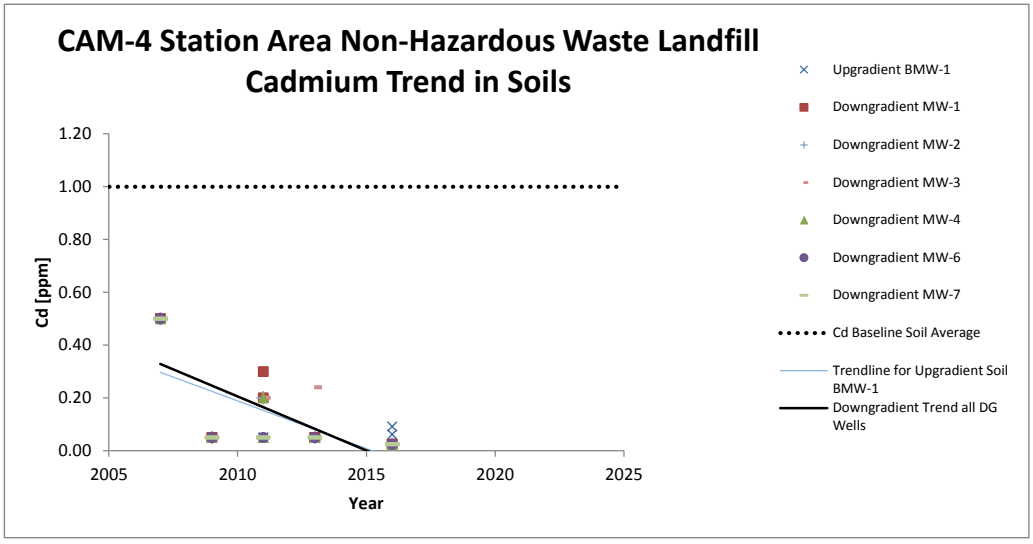
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.





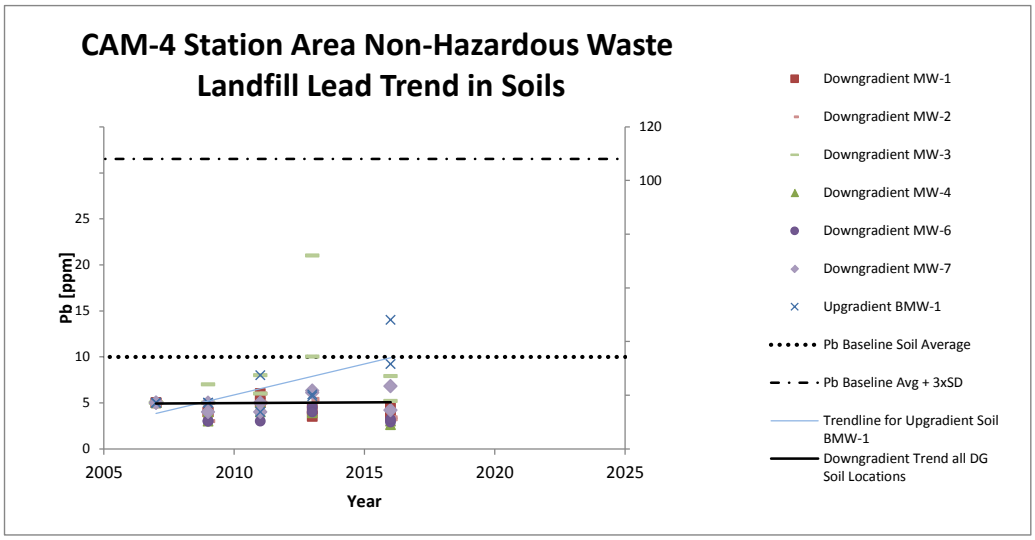
CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

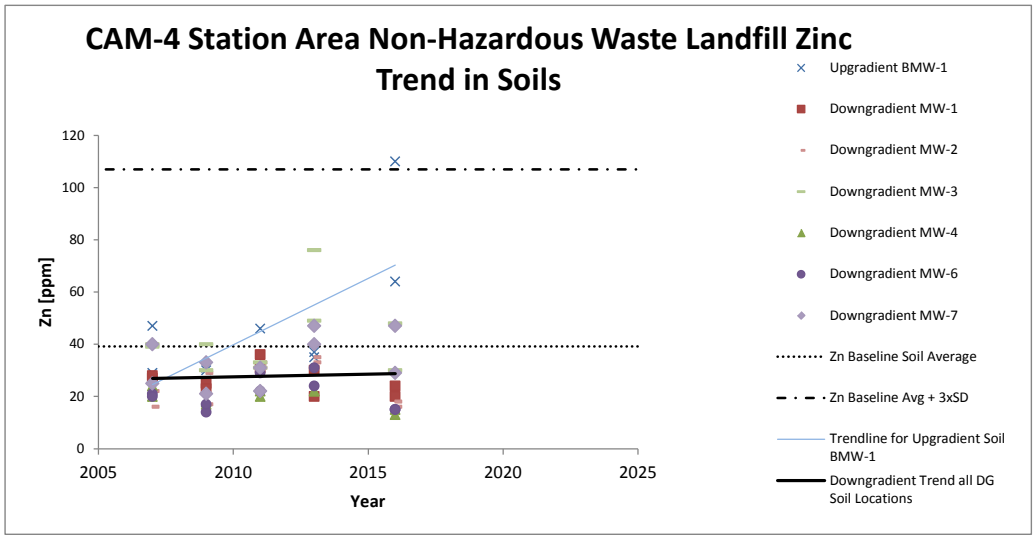




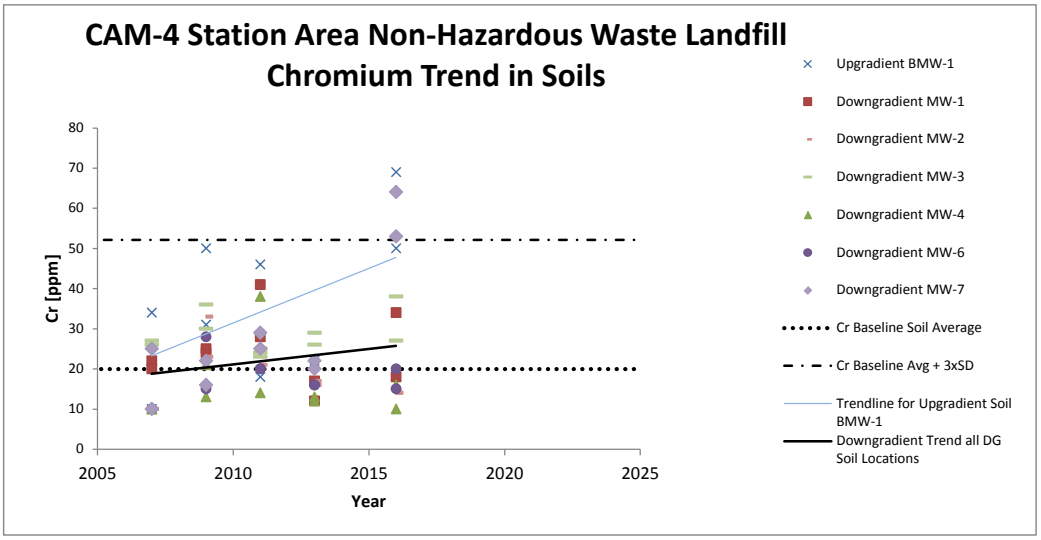
*Cd Baseline Avg SD = 0

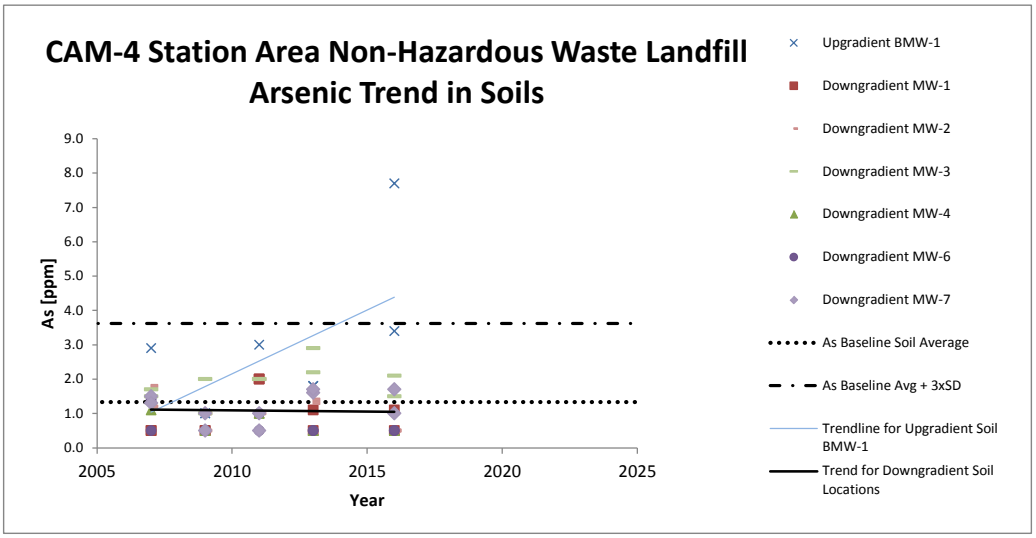
CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



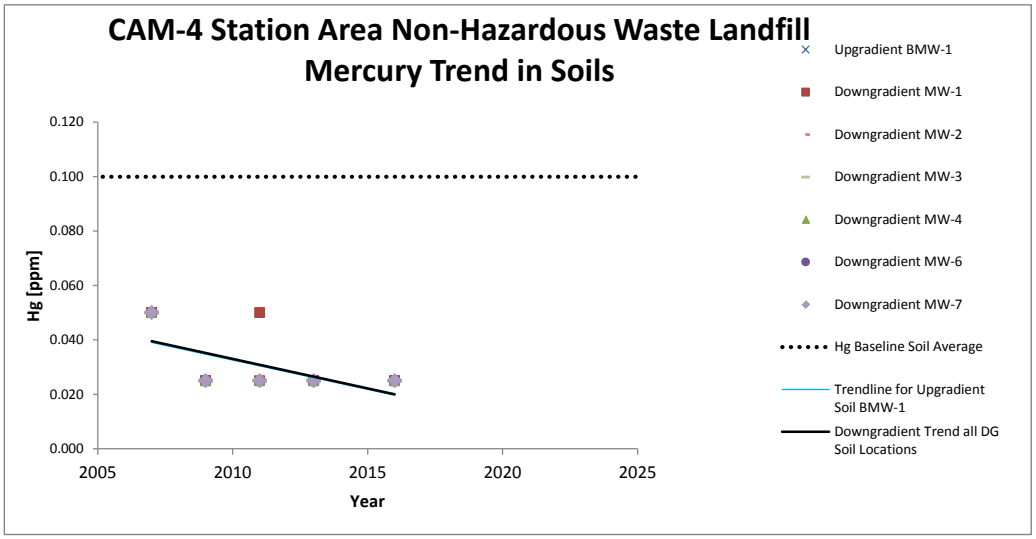


CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)





CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



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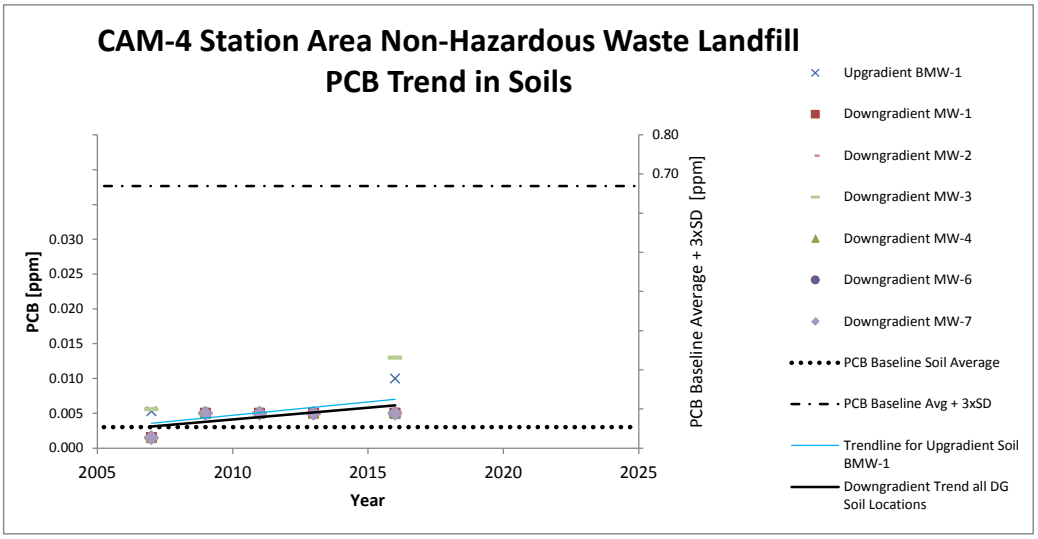
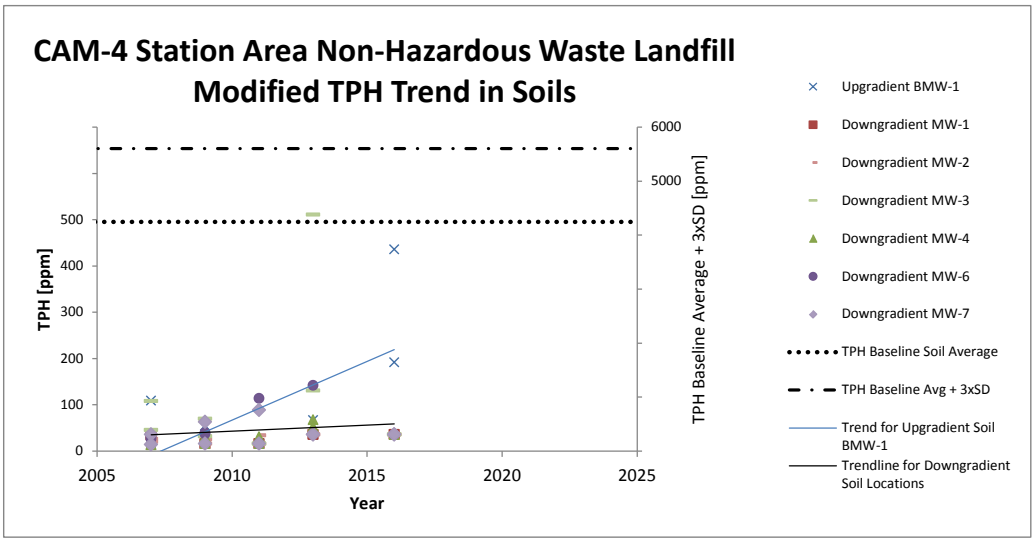


CAM-4 Station Area Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

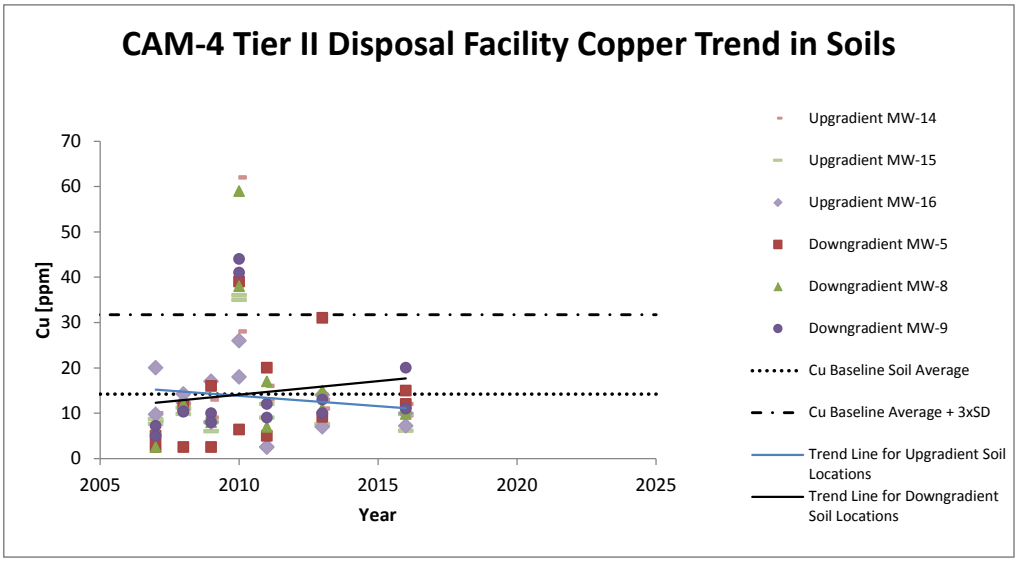


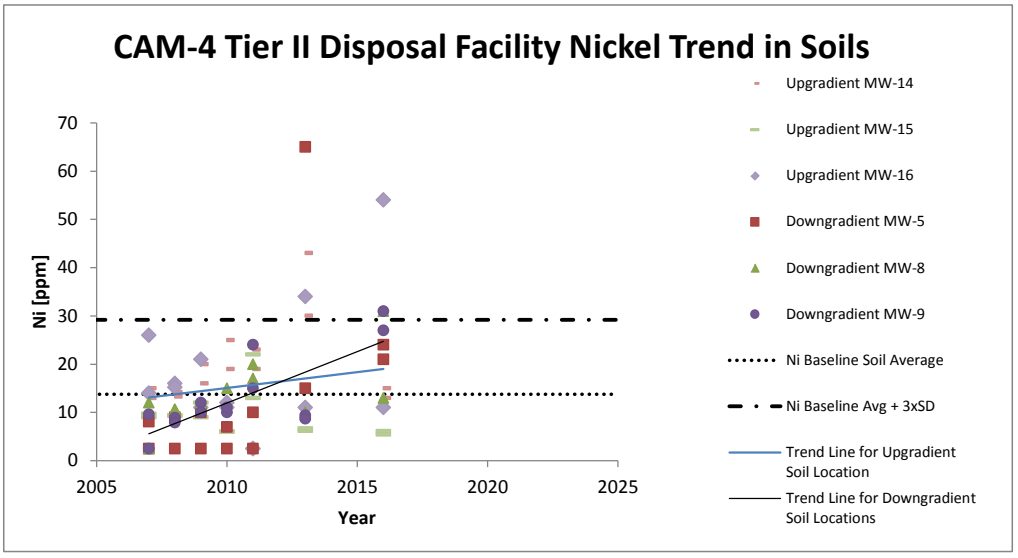
APPENDIX E2

Tier II Disposal Facility

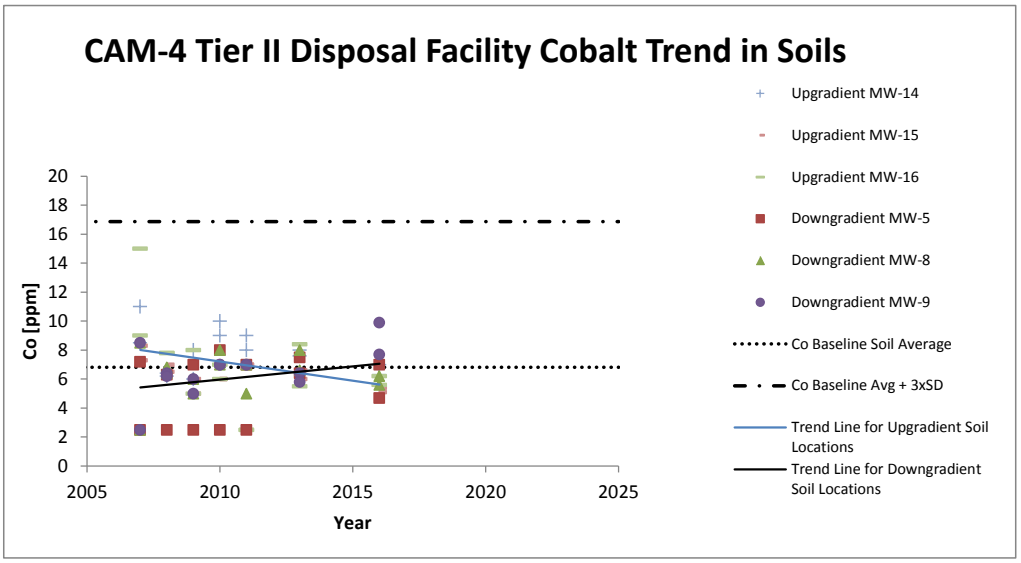
CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

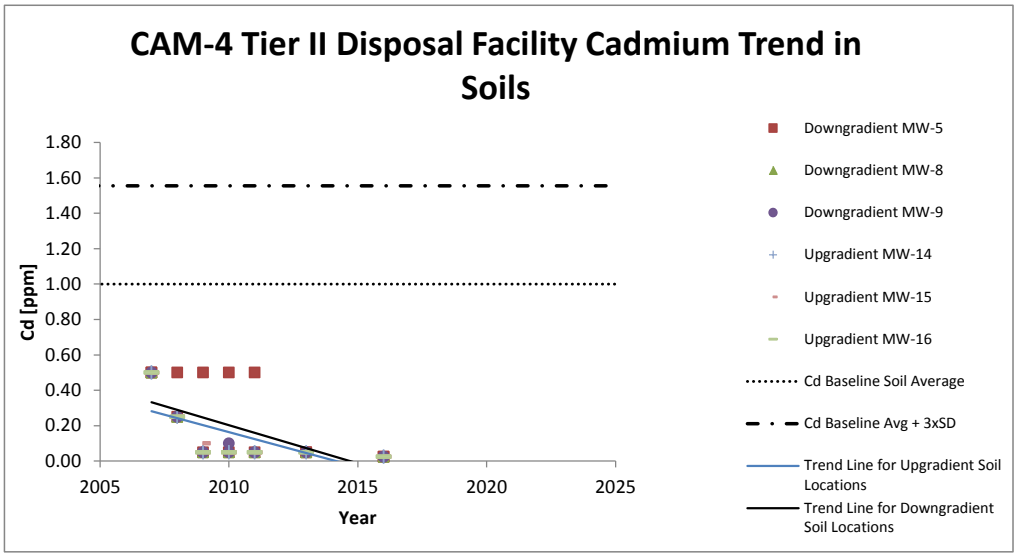
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.



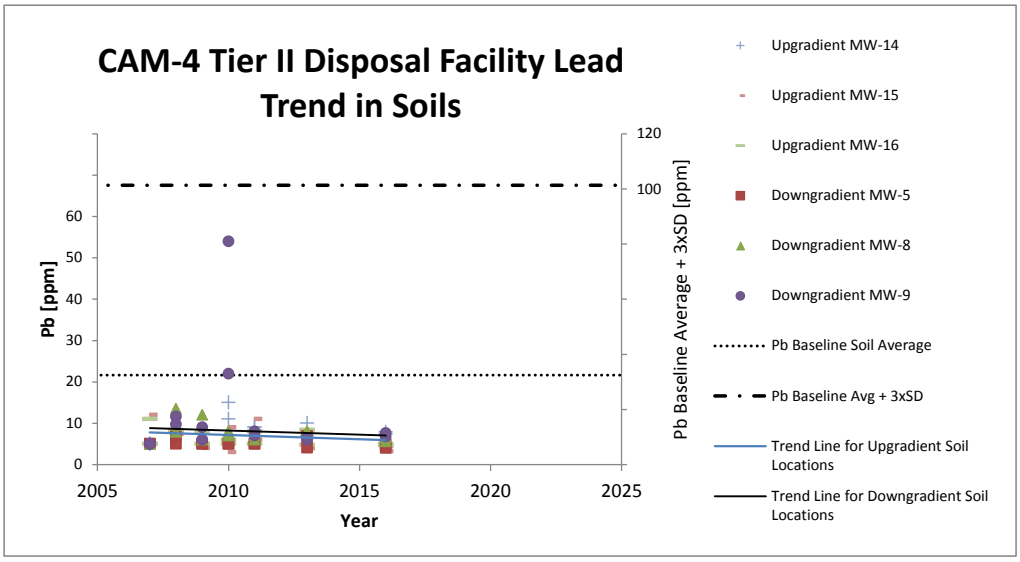


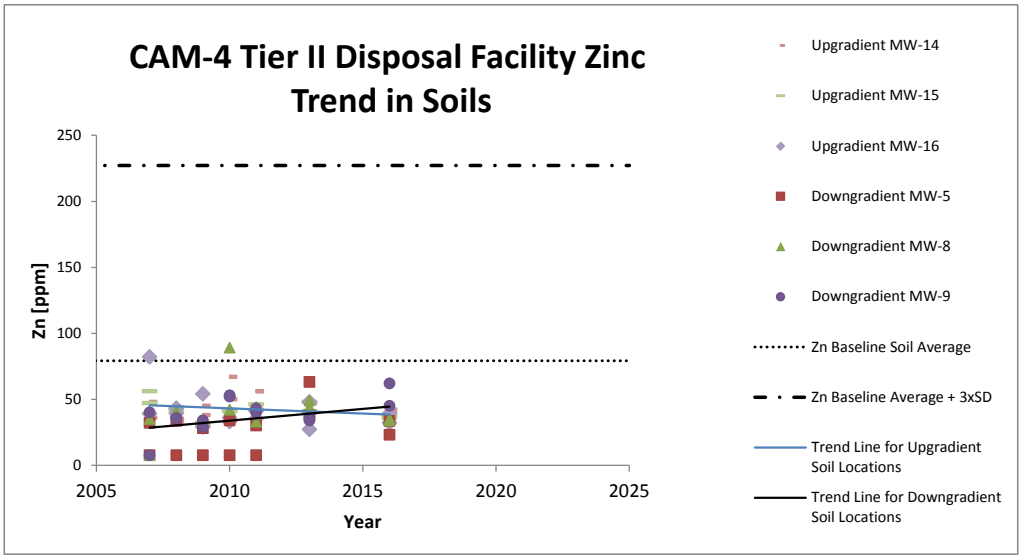
CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



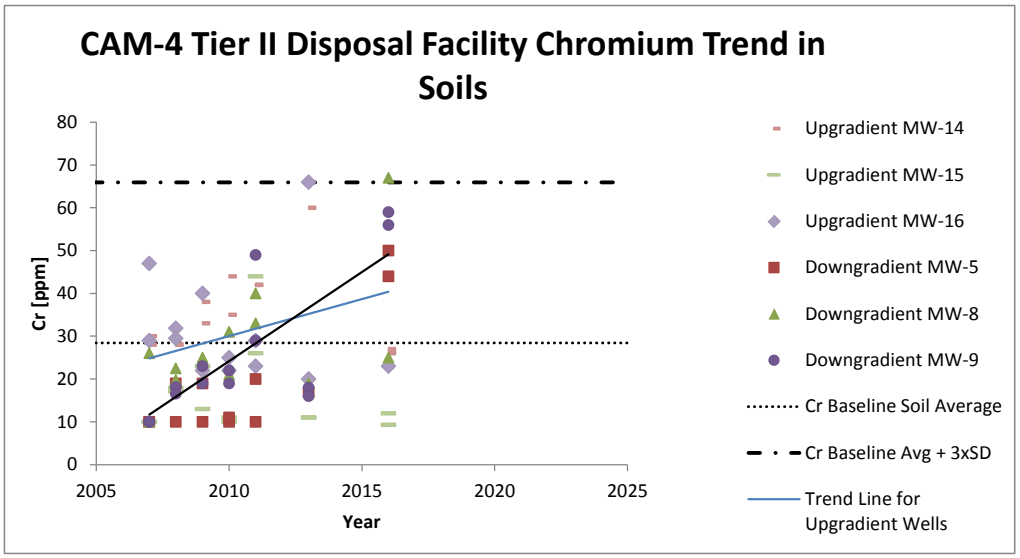


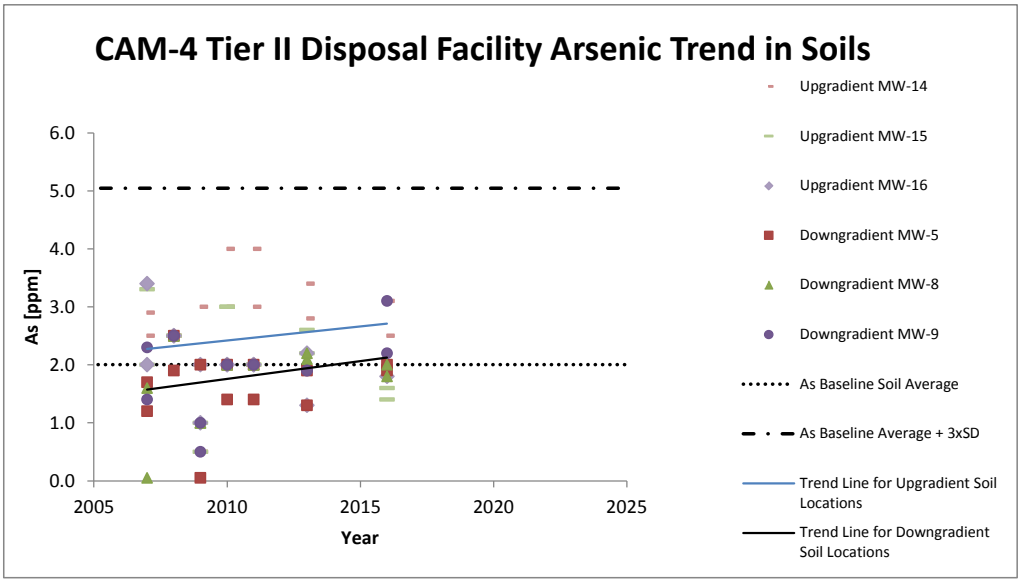
CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



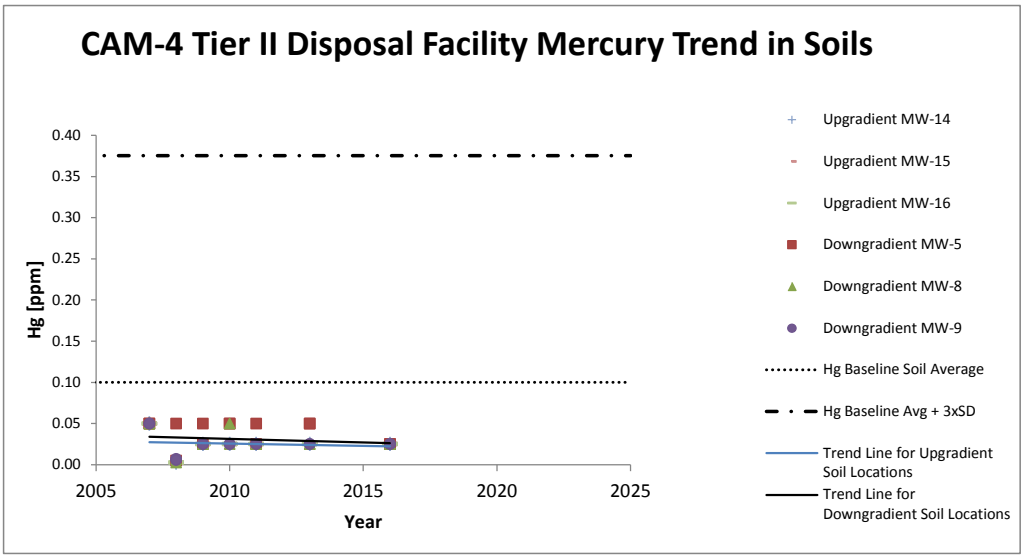


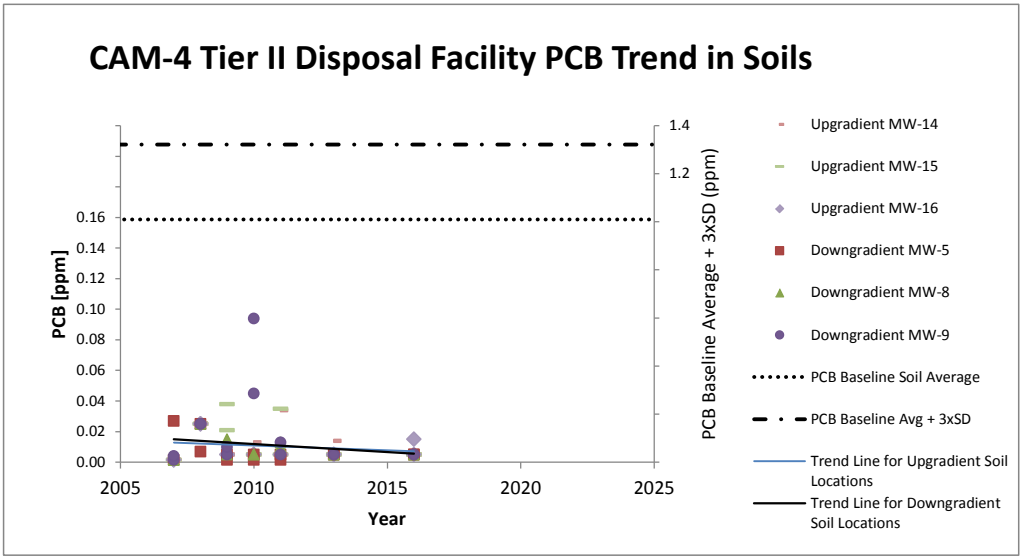
CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



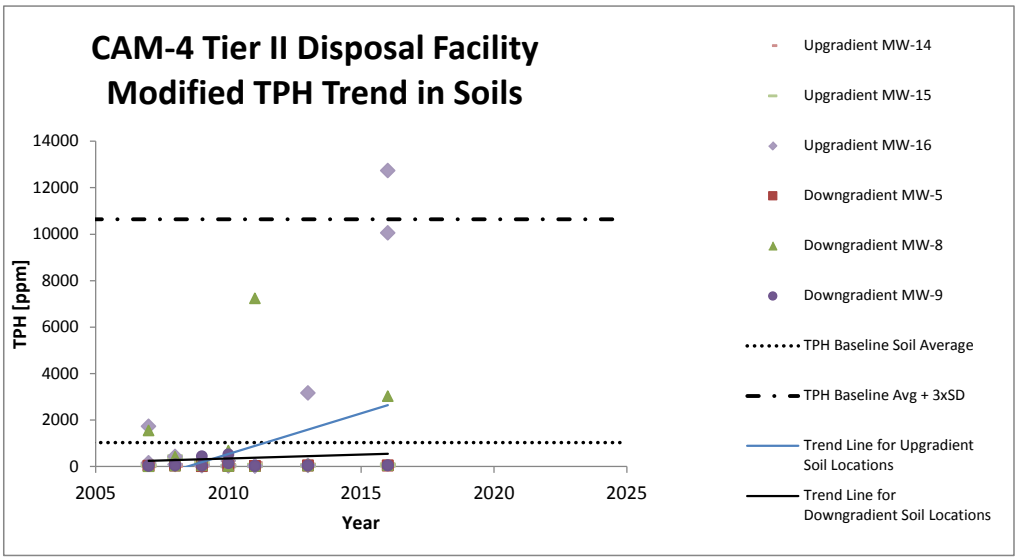


CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)





CAM-4 Tier II Disposal Facility Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

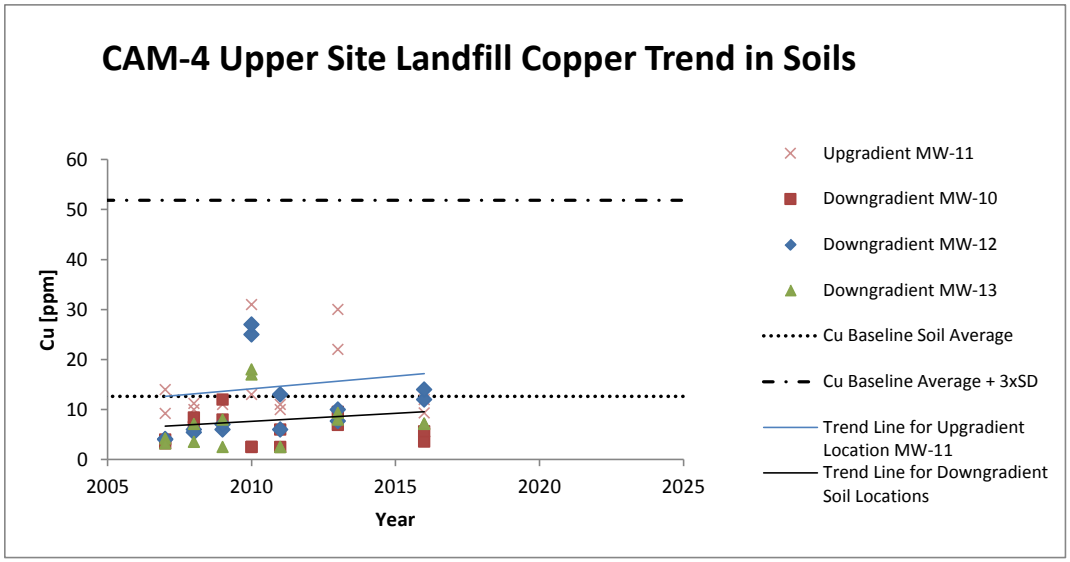


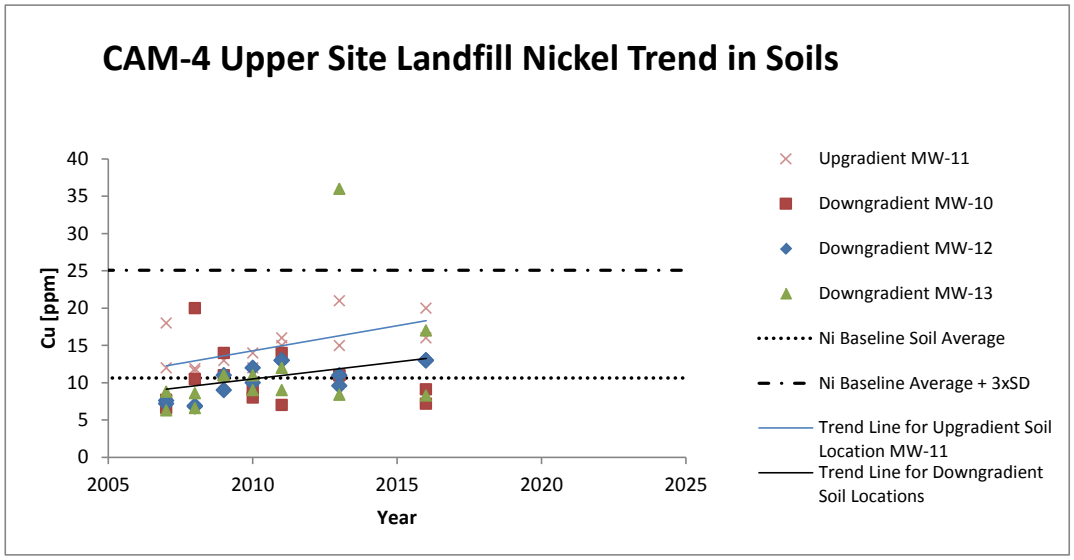
APPENDIX E3

Upper Site Landfill

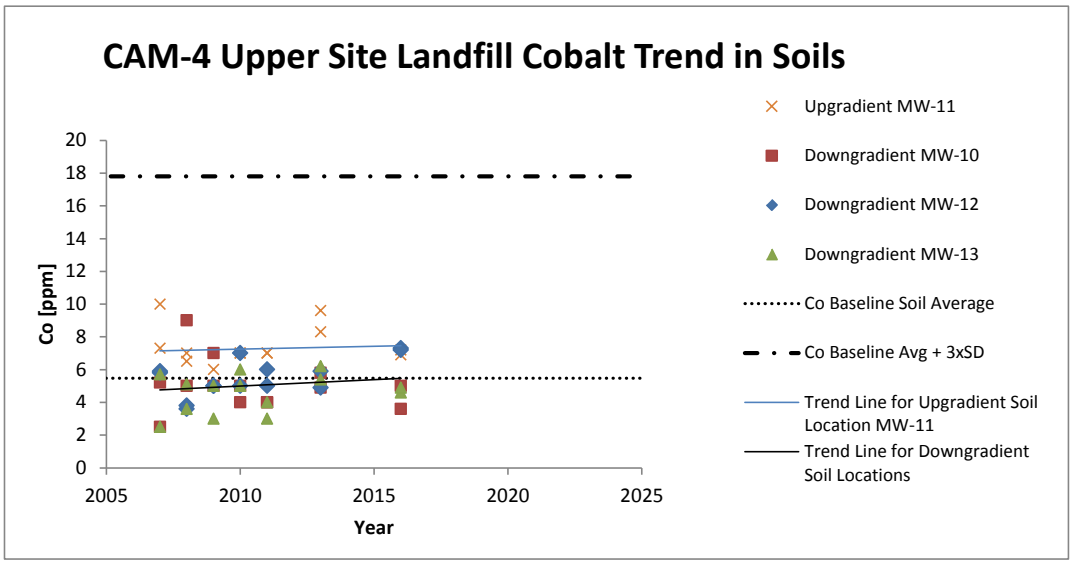
CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

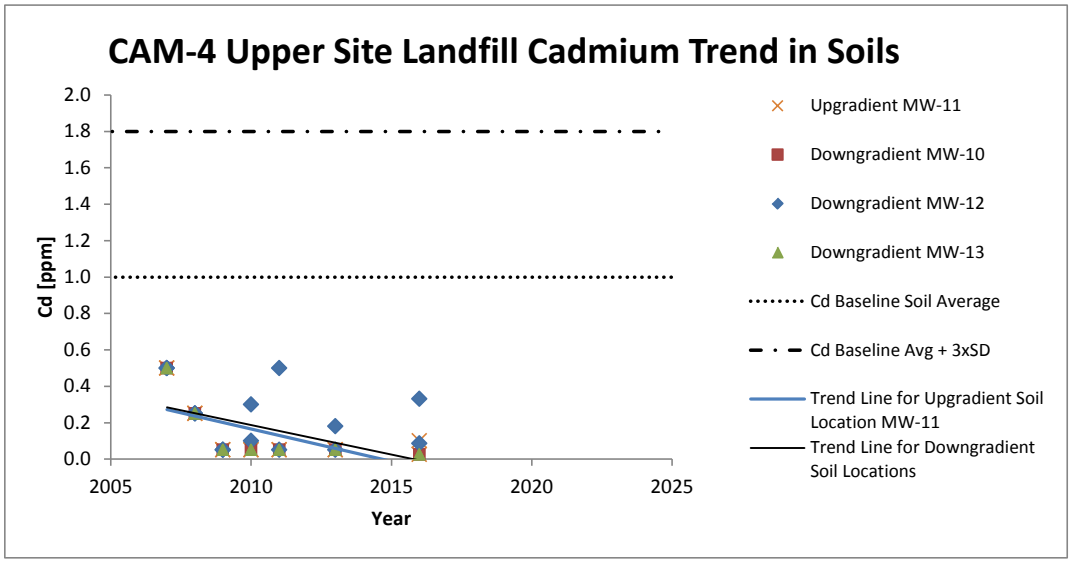
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.



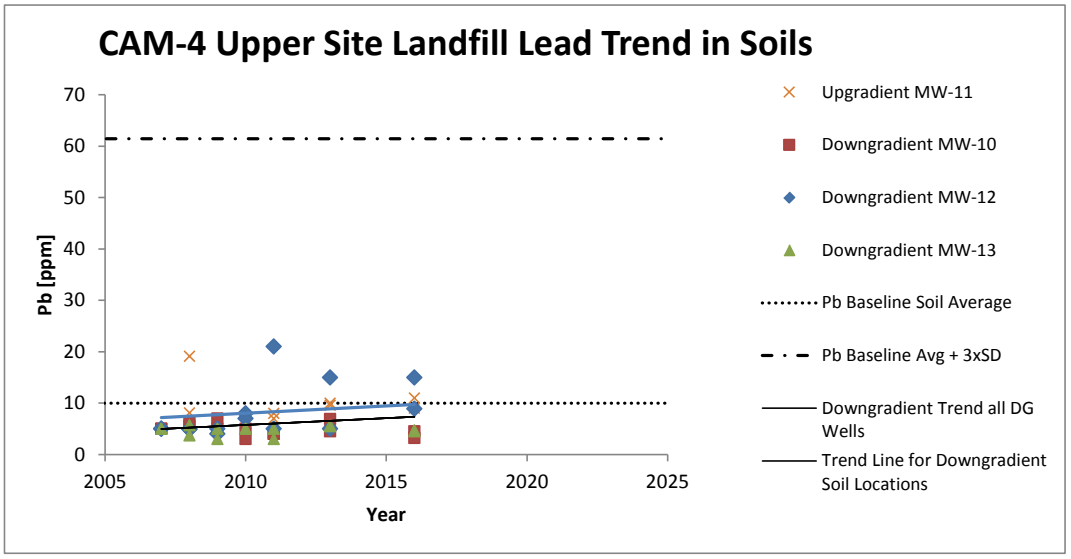


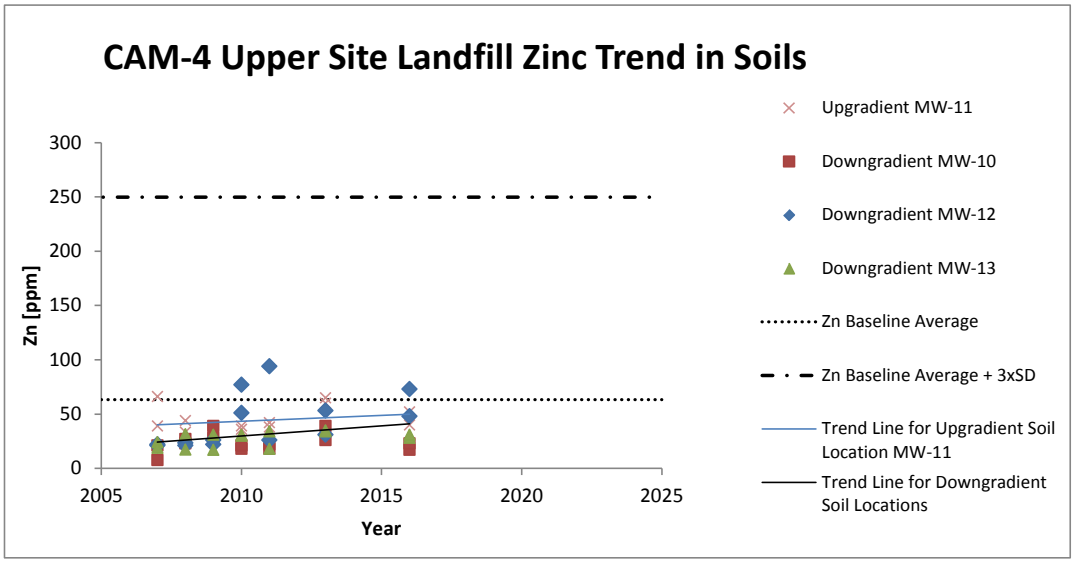
CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



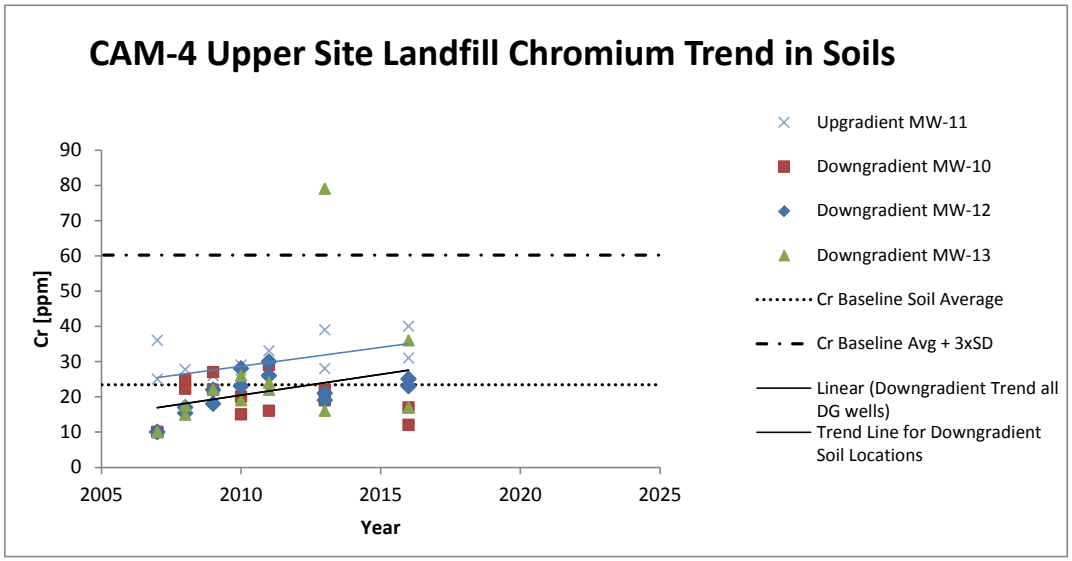


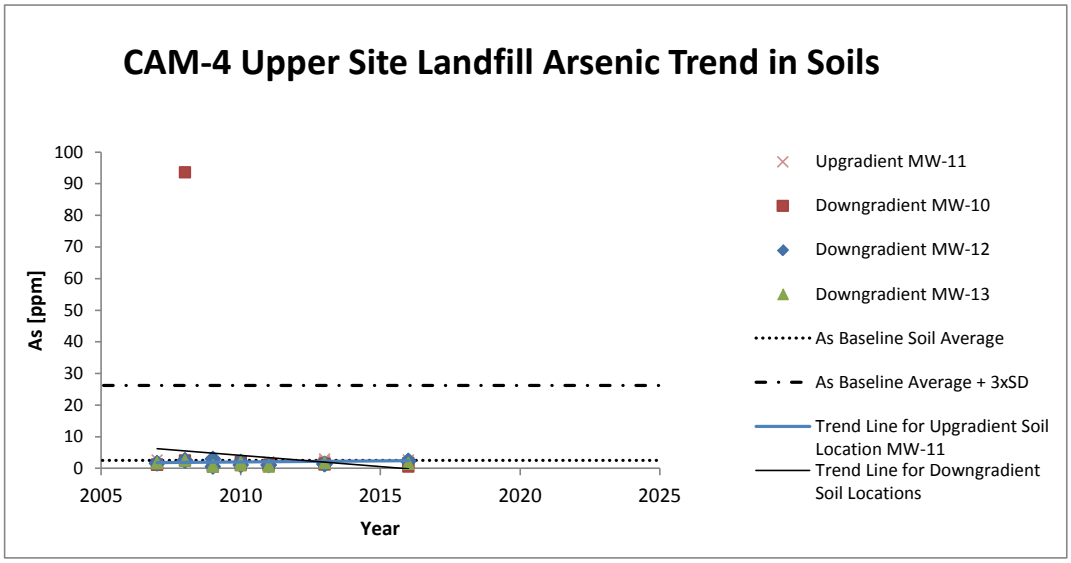
CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



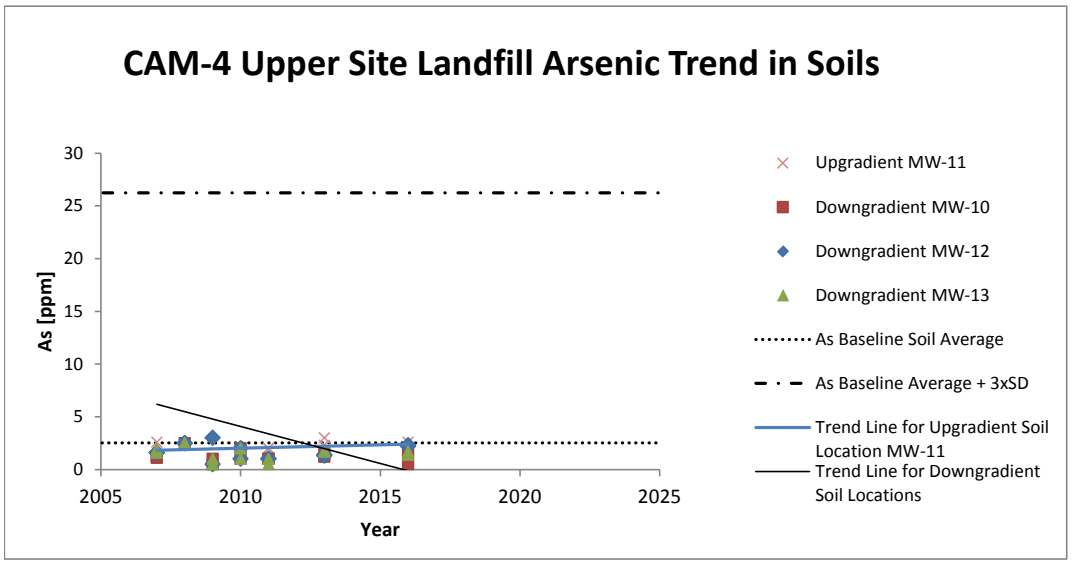


CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

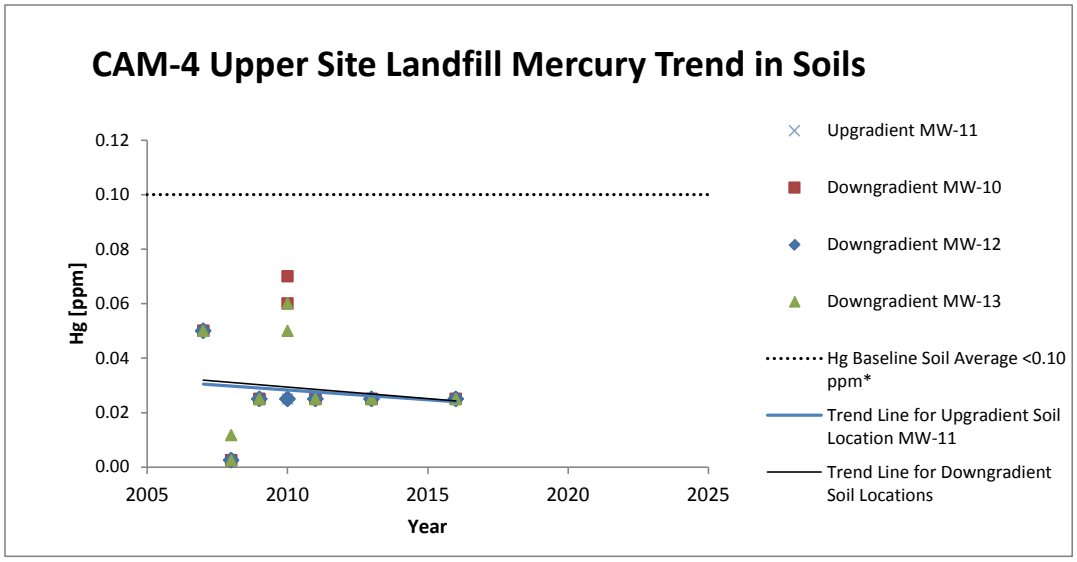




CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

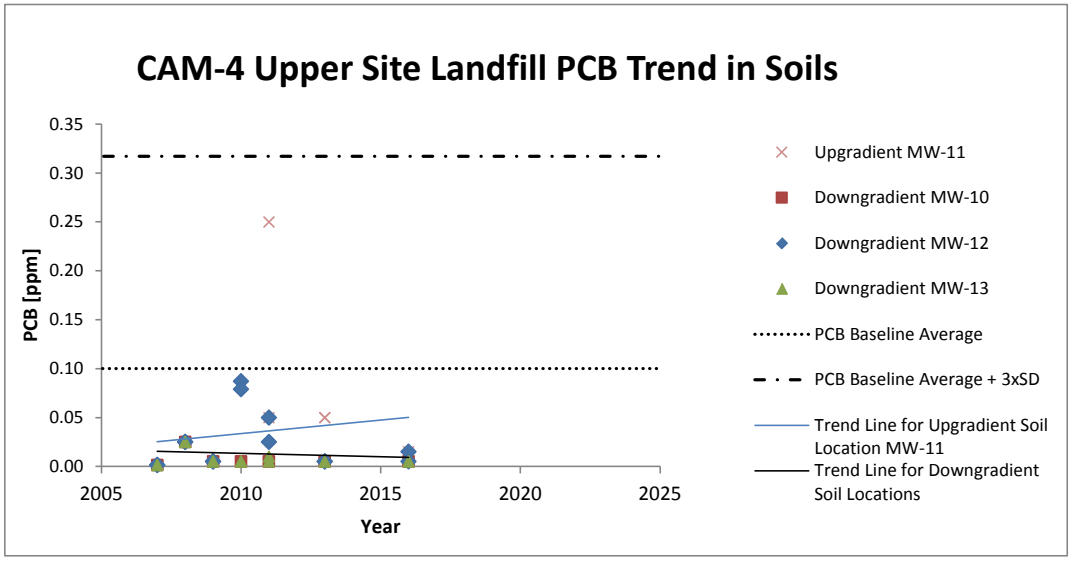


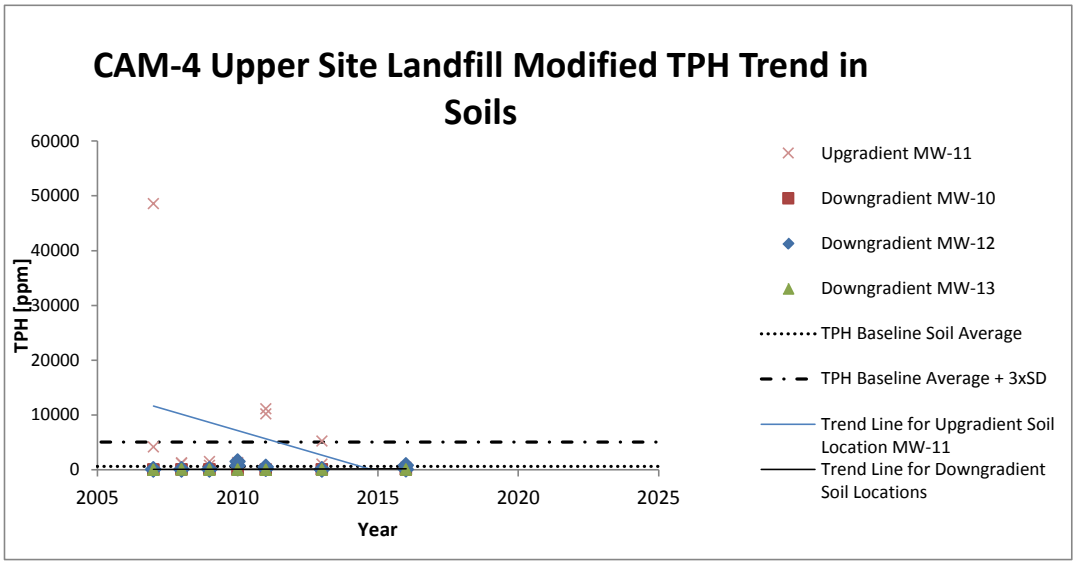
Downgradient MW-10 depth result was 94ppm for As in 2008. This value is not shown in this chart but the value is used in the calculation of the trendline.



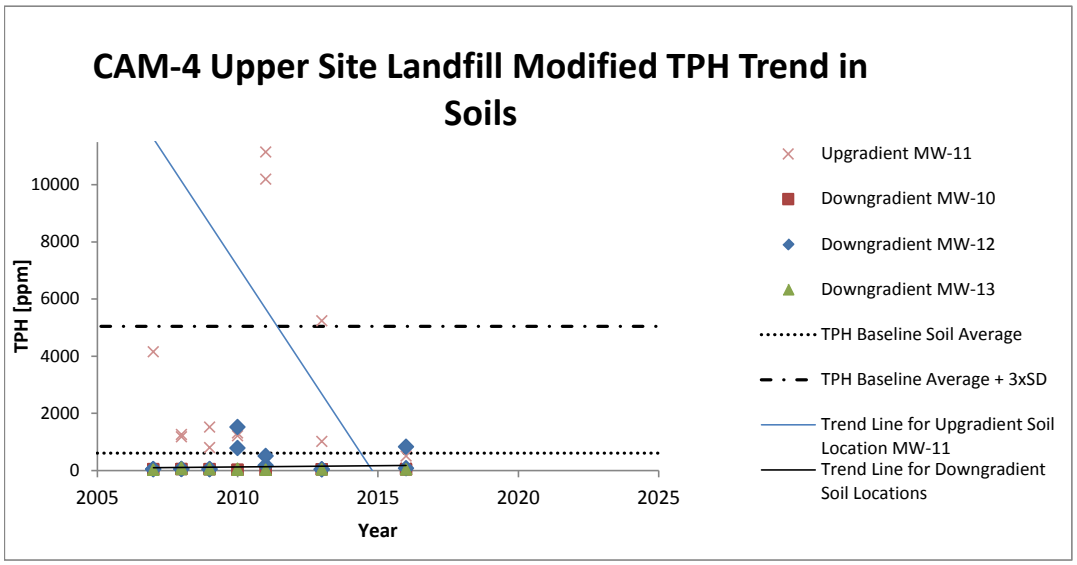
*Hg Baseline Avg SD = 0

CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)





CAM-4 Upper Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



The TPH value for Upgradient soil location MW-11 in 2007 was 48585 ppm. This value is not shown on this chart but the value was used in the calculation of the trendline.

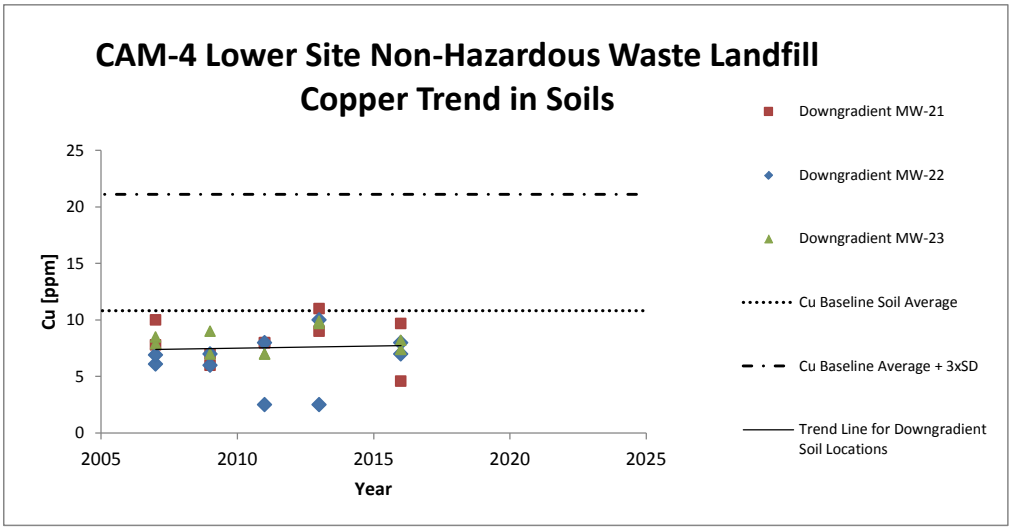
APPENDIX E4

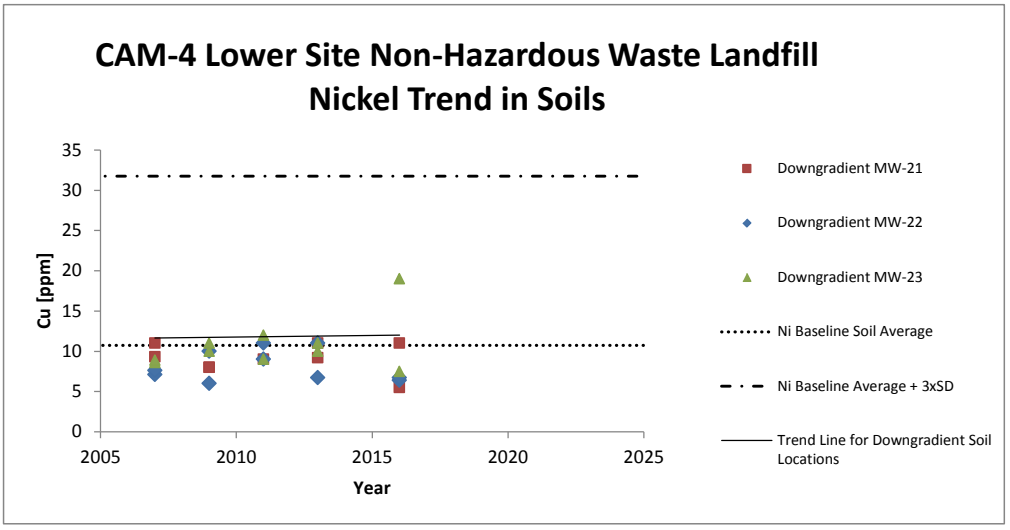
Lower Site Non-Hazardous Landfill

CAM-4 Lower Site Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

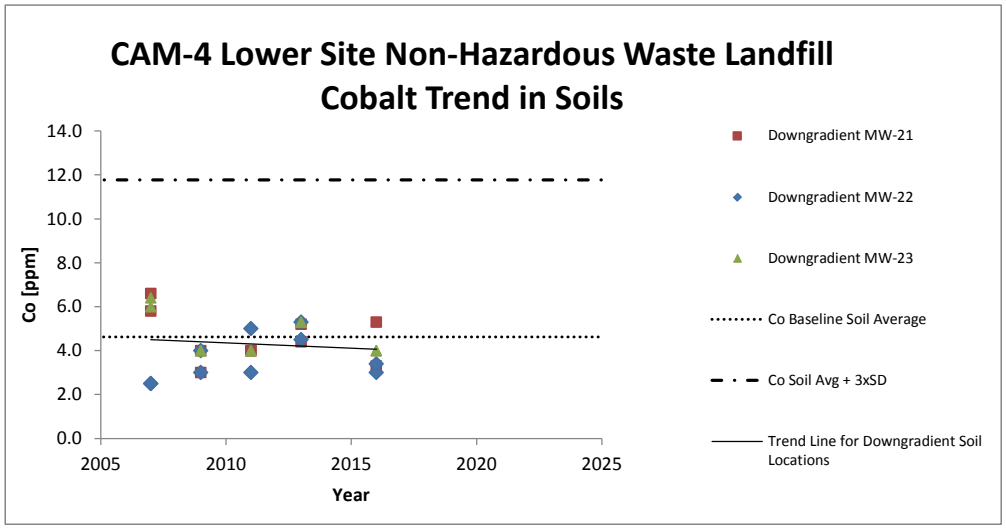
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.

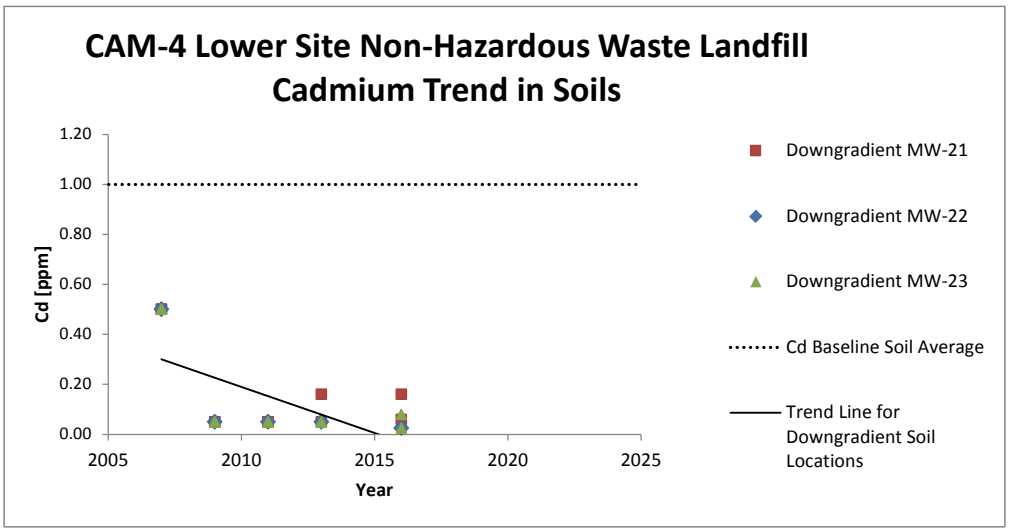
No Upgradient Locations at this landfill.



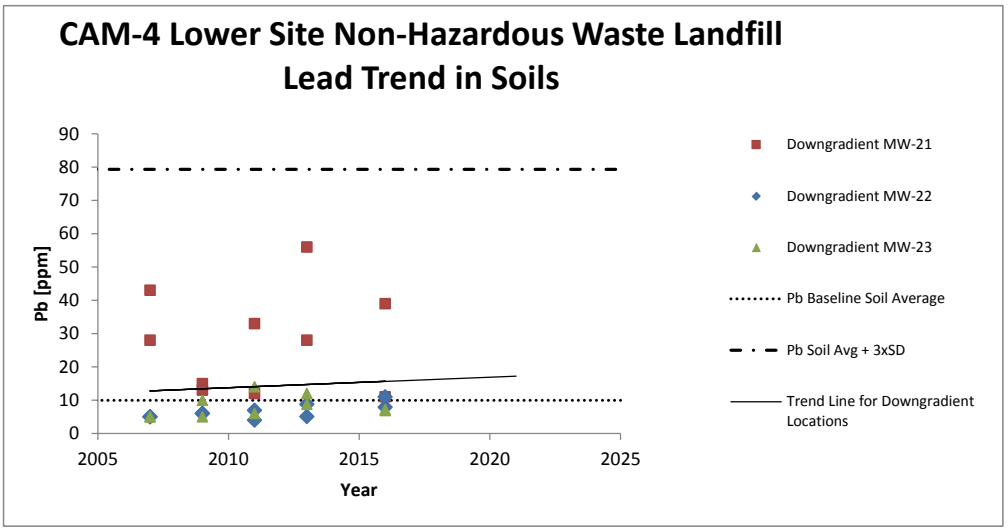


CAM-4 Lower Site Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

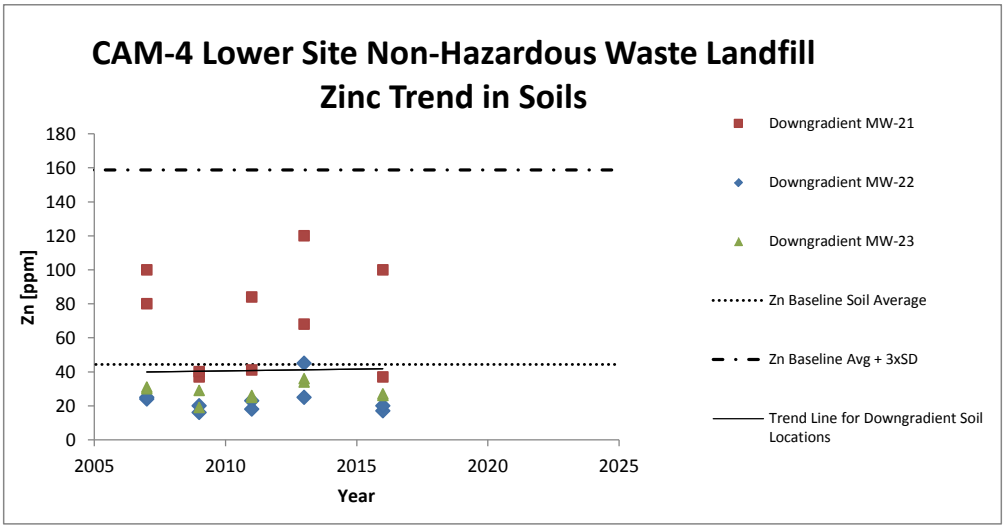


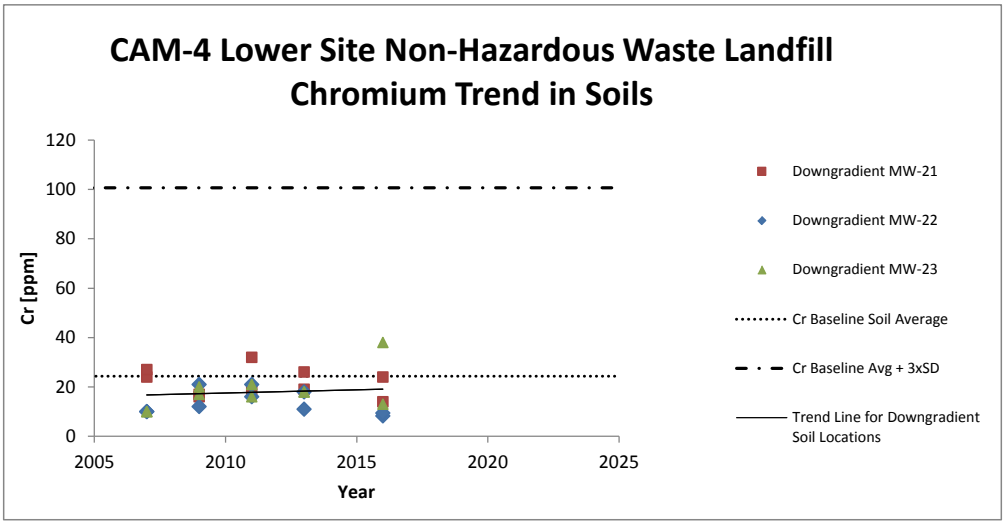


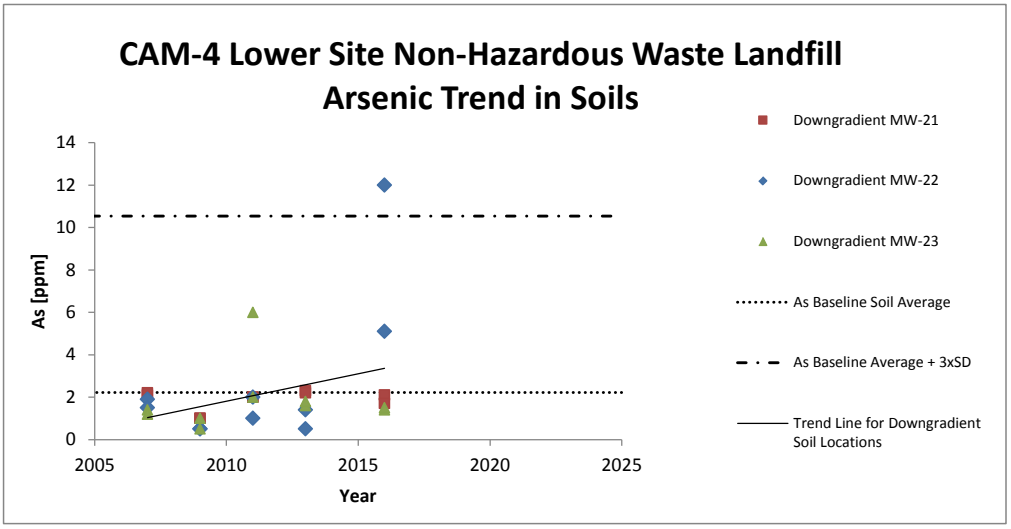
*Cd Baseline Avg SD = 0



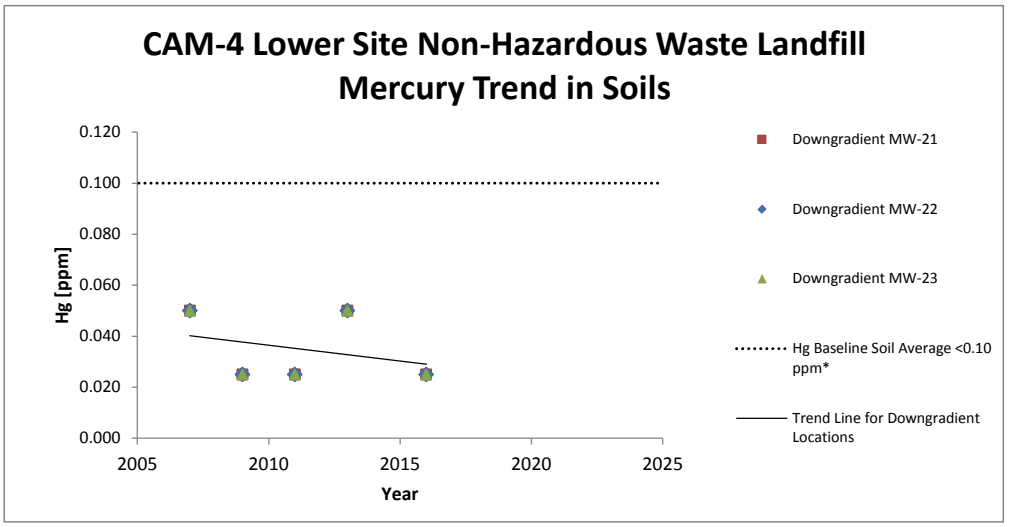
CAM-4 Lower Site Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



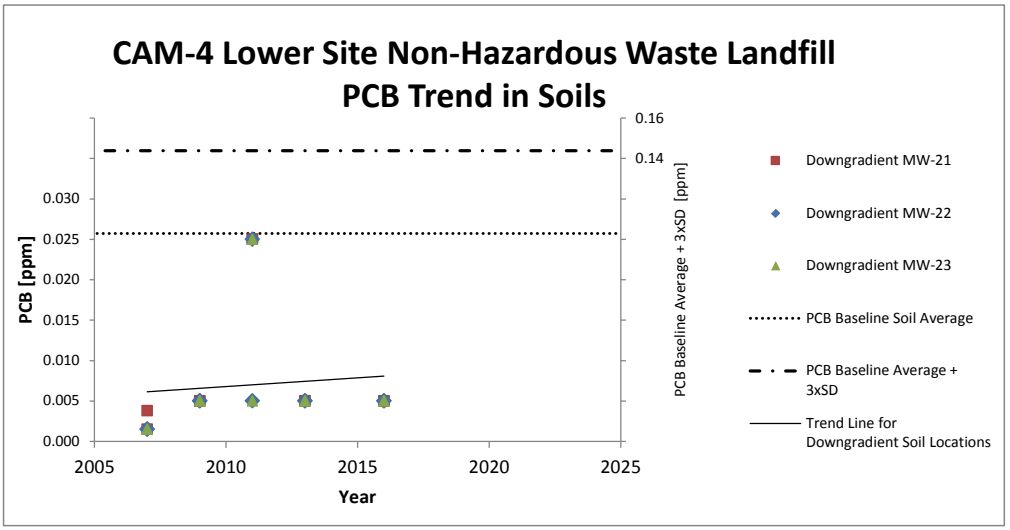


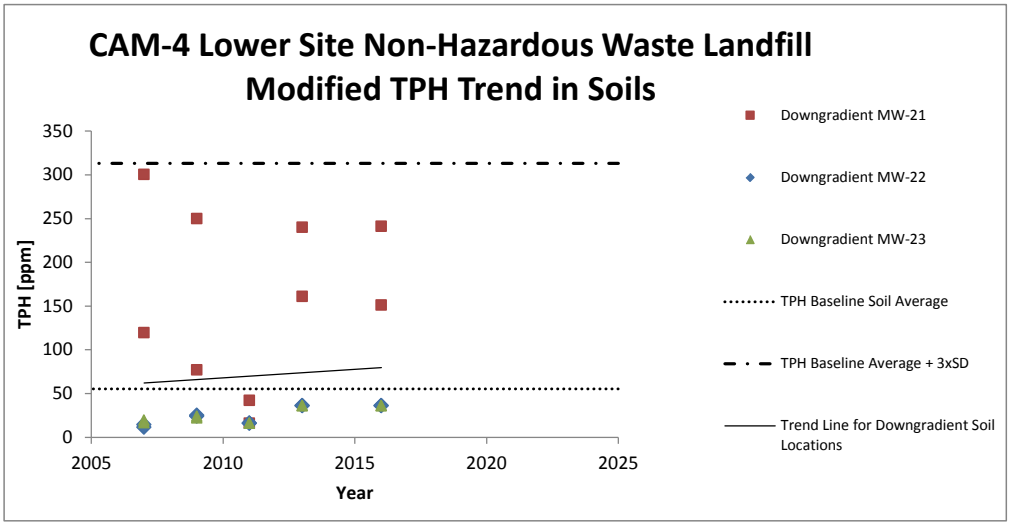


CAM-4 Lower Site Non-Hazardous Waste Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



*Hg Baseline Avg SD = 0



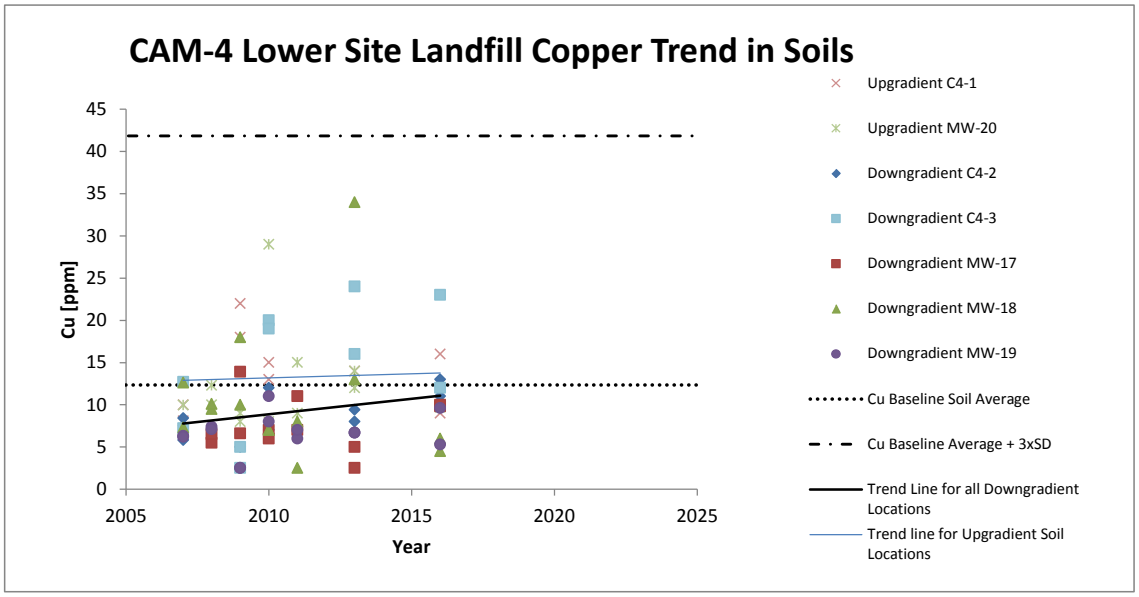


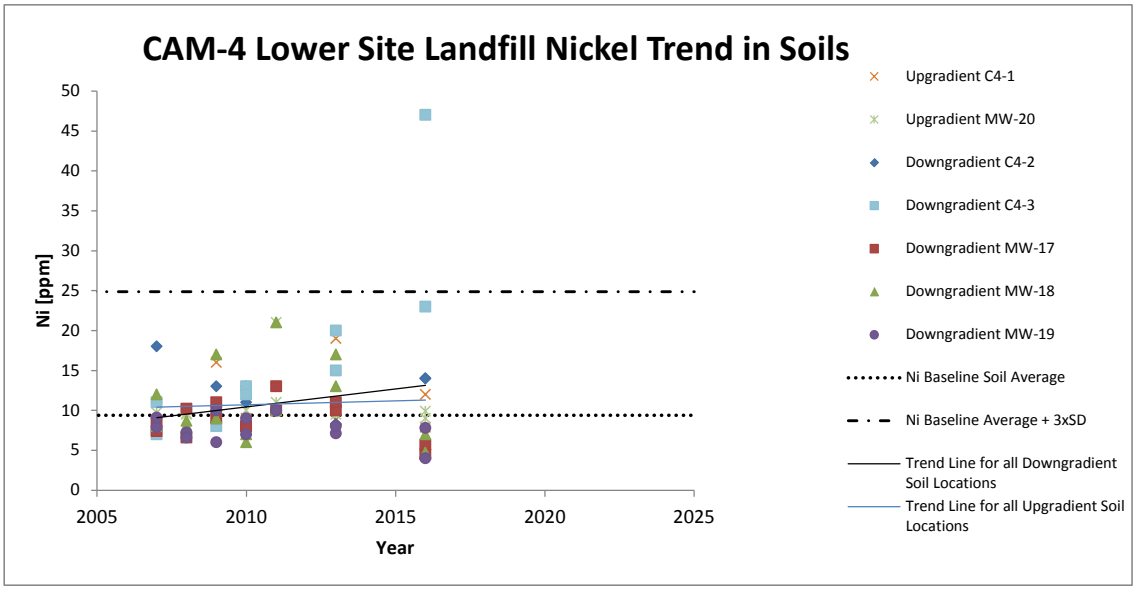
APPENDIX E5

Lower Site Landfill

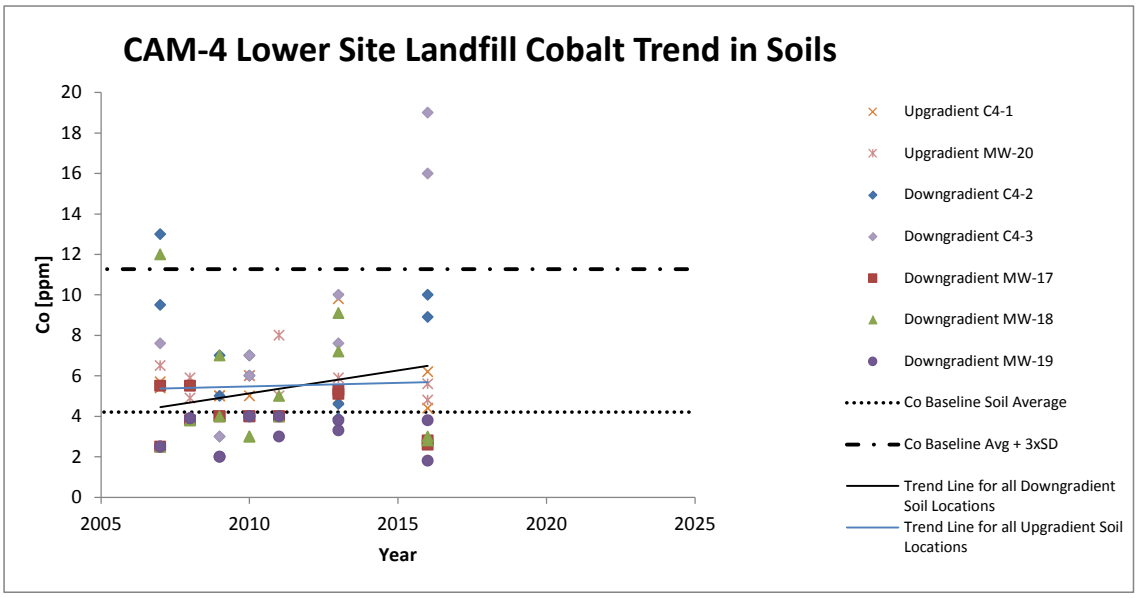
CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

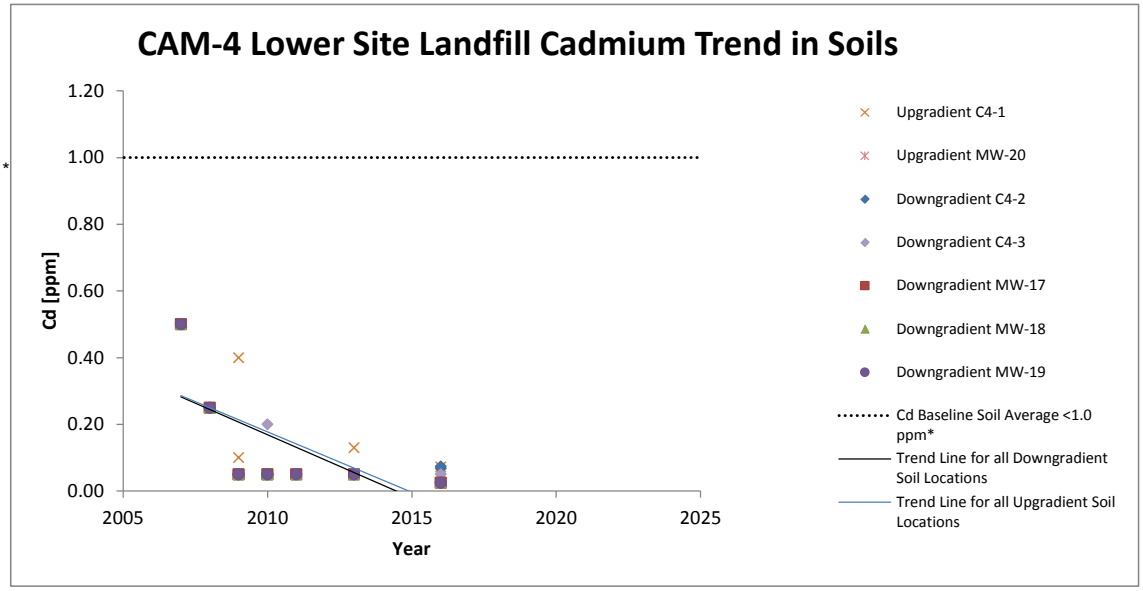
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.





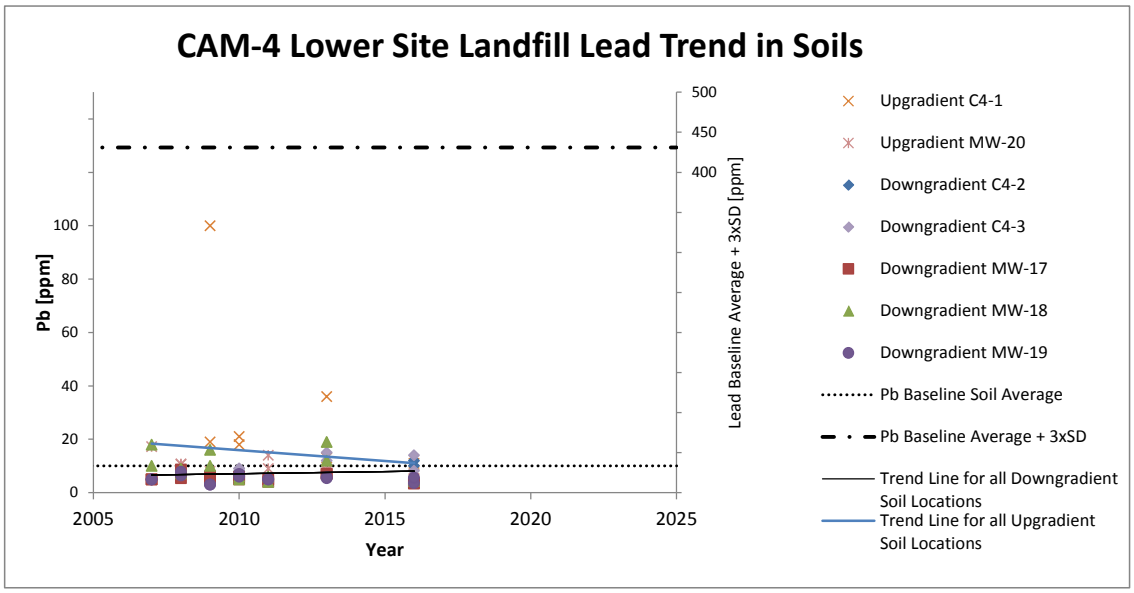
CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

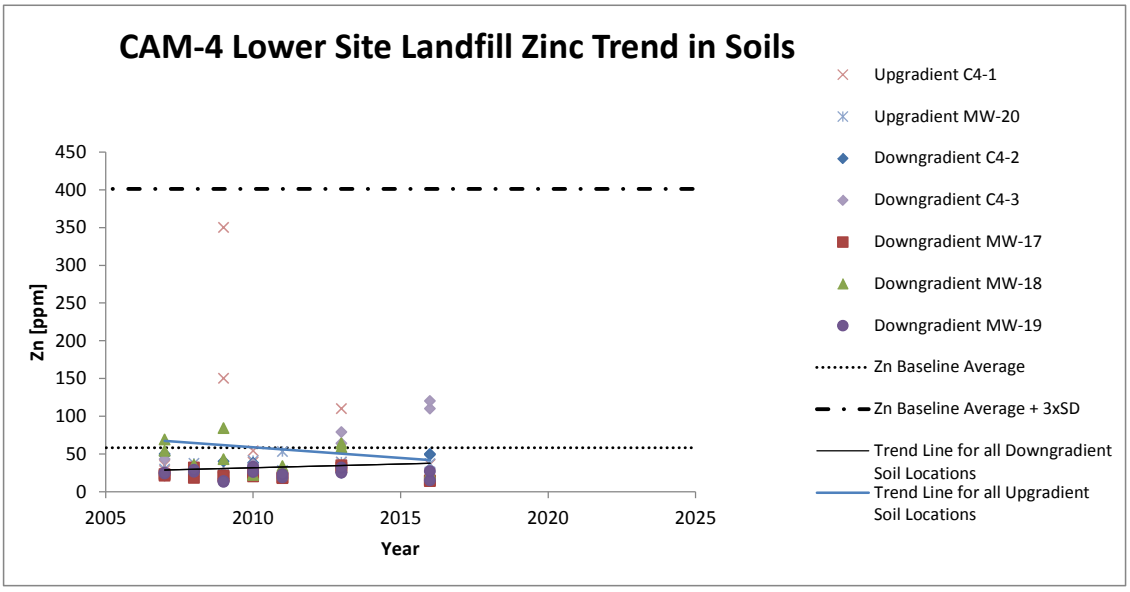




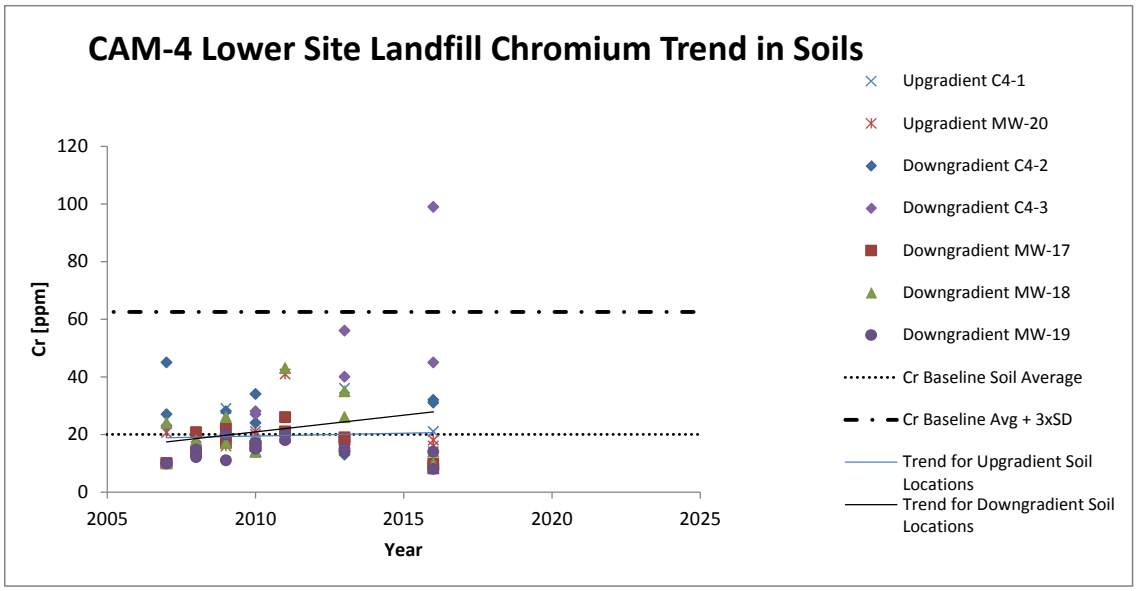
*Cd Baseline soil average SD=0

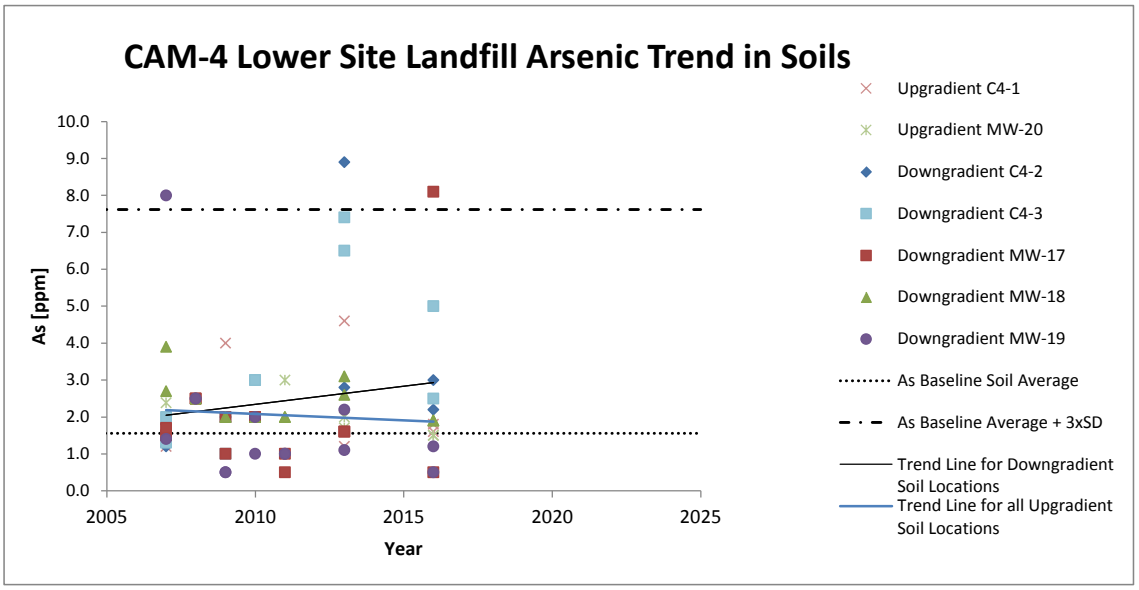
CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



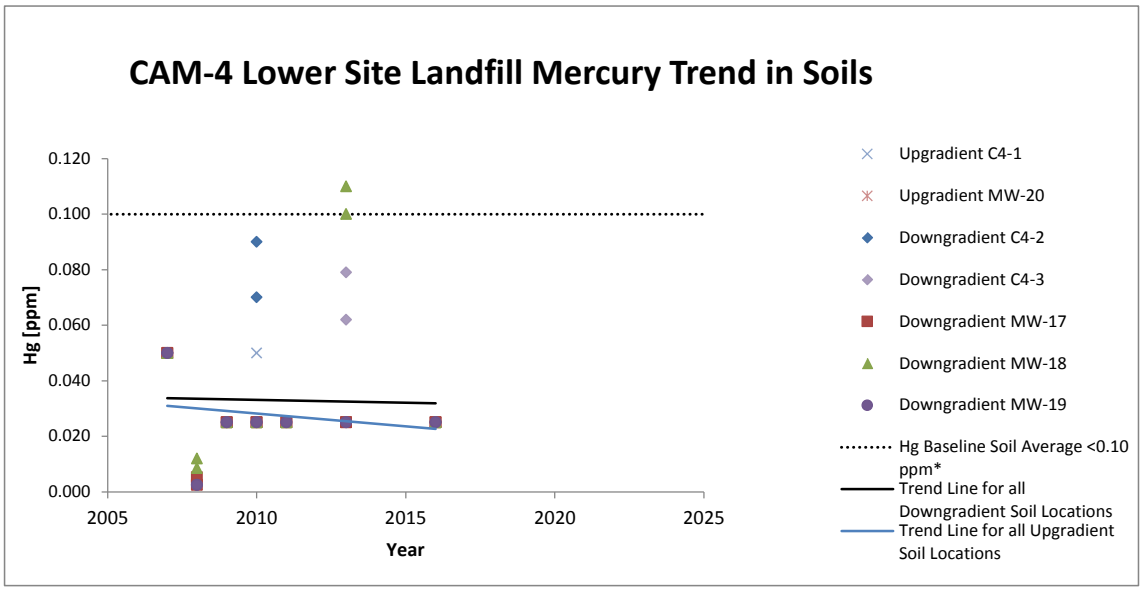


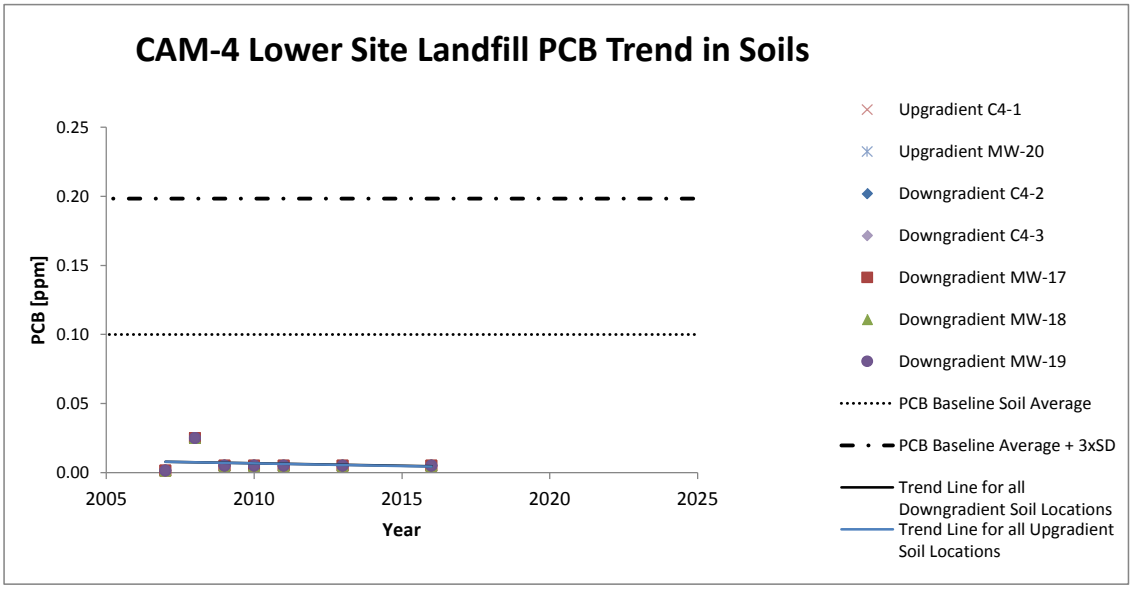
CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)





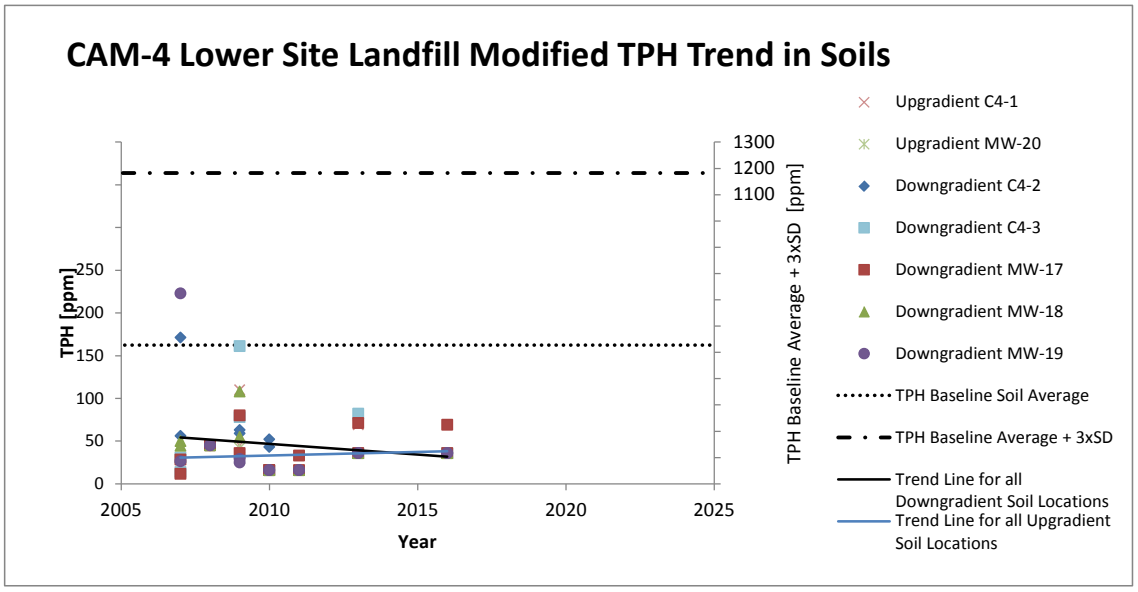
CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)





PCB results have been below detection. Trend lines reflect changes in detection limits.

CAM-4 Lower Site Landfill Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



APPENDIX F

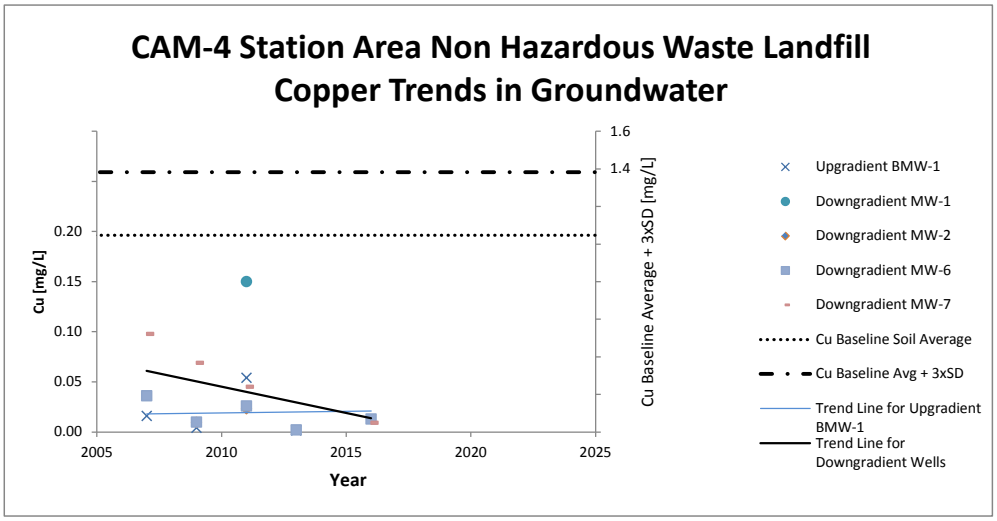
Groundwater Trend Analysis Graphs

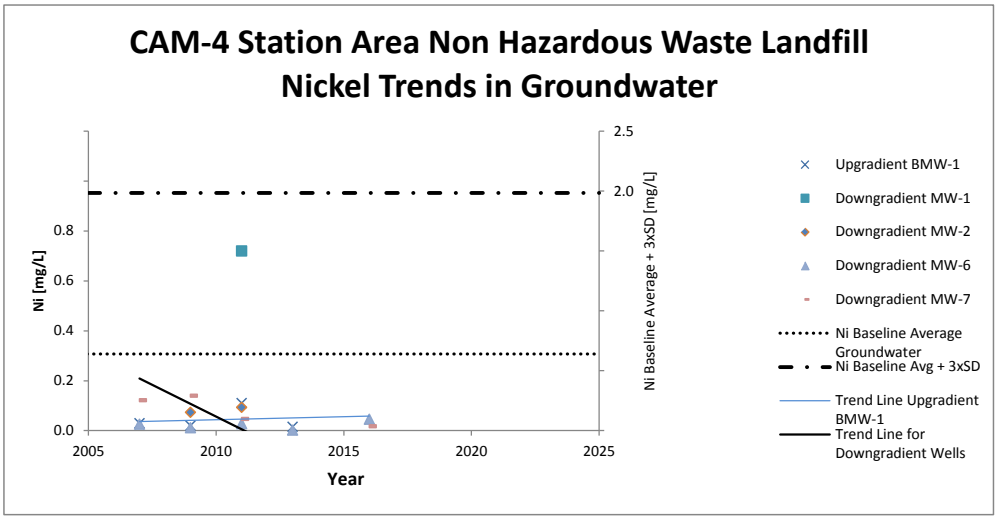
APPENDIX F1

Station Area Non-Hazardous Waste Landfill

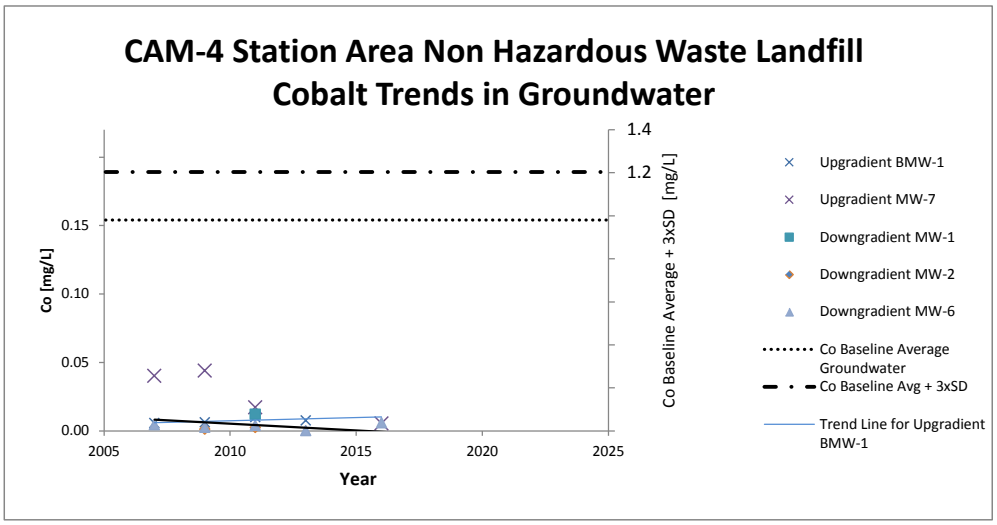
CAM-4 Station Area Non Hazardous Waste Landfill South Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

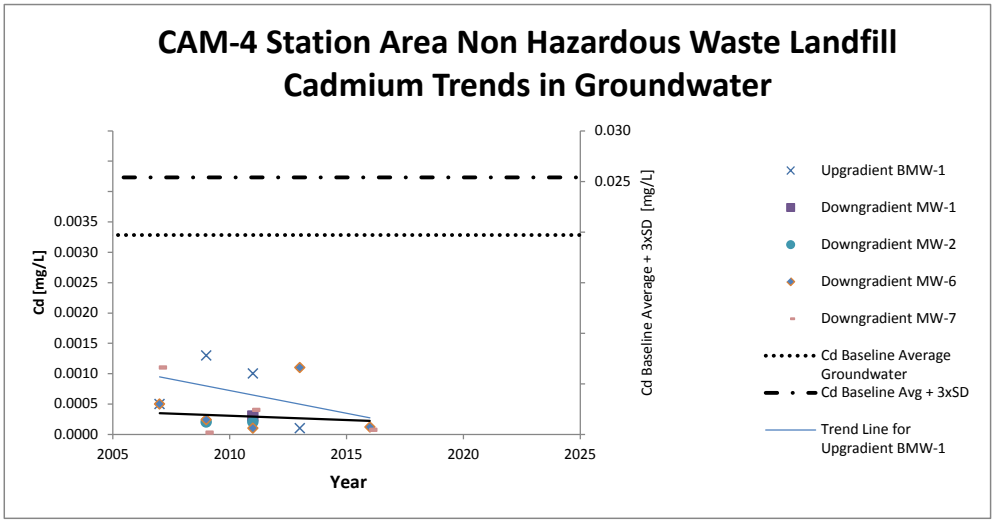
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.

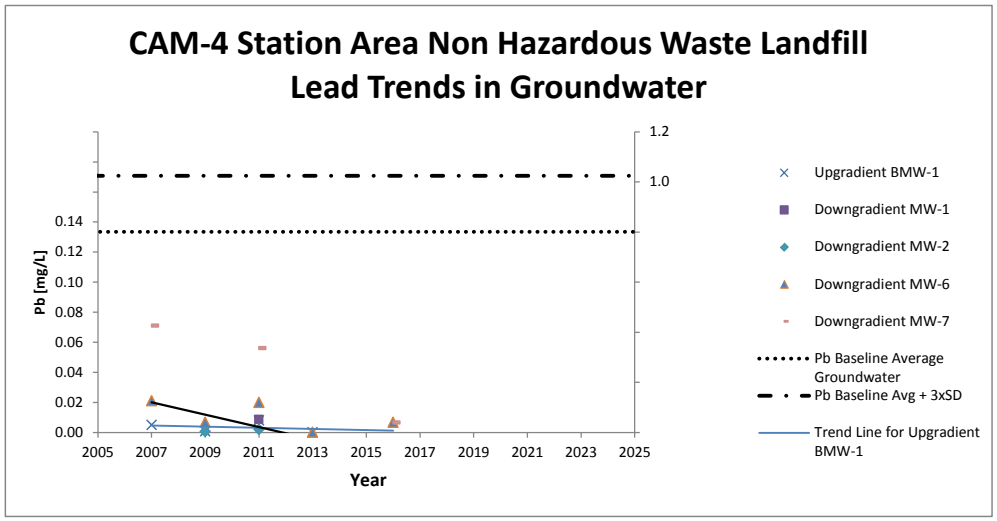




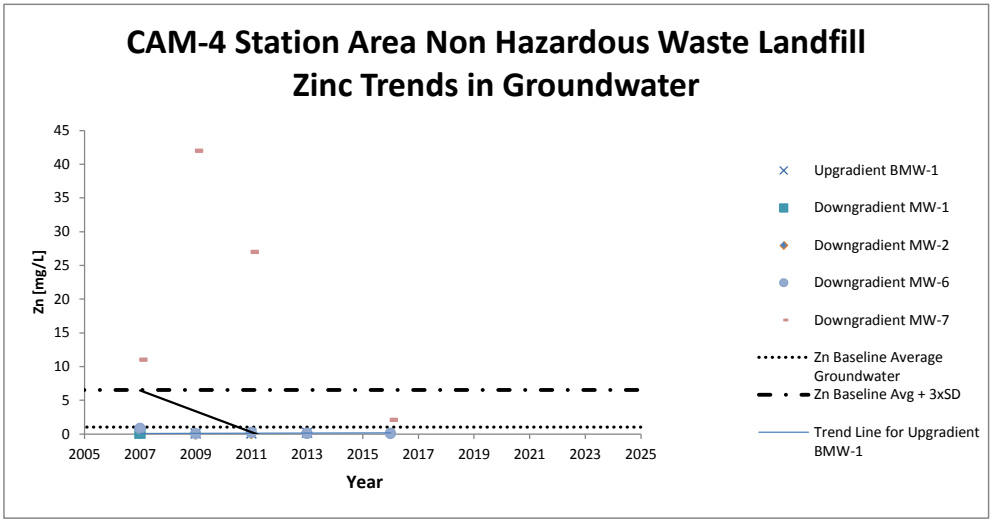
CAM-4 Station Area Non Hazardous Waste Landfill South Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

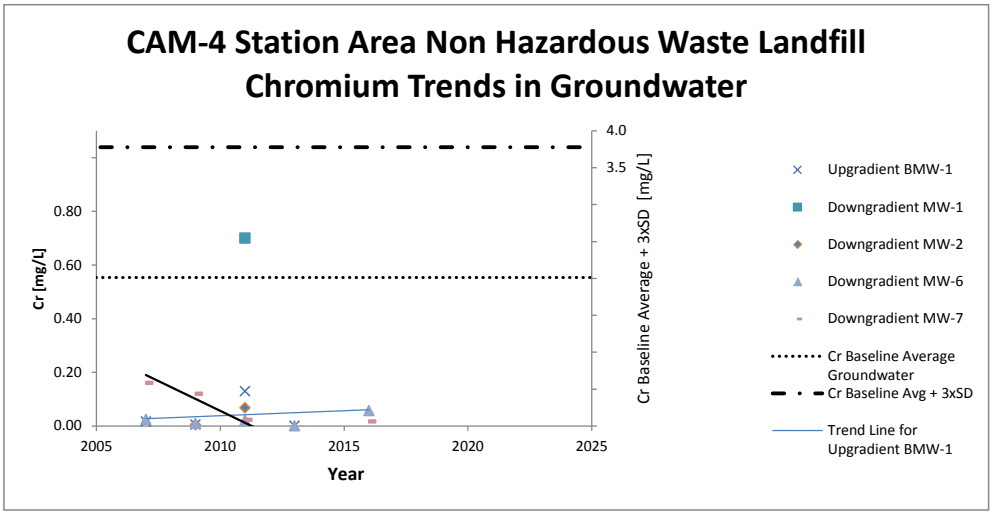




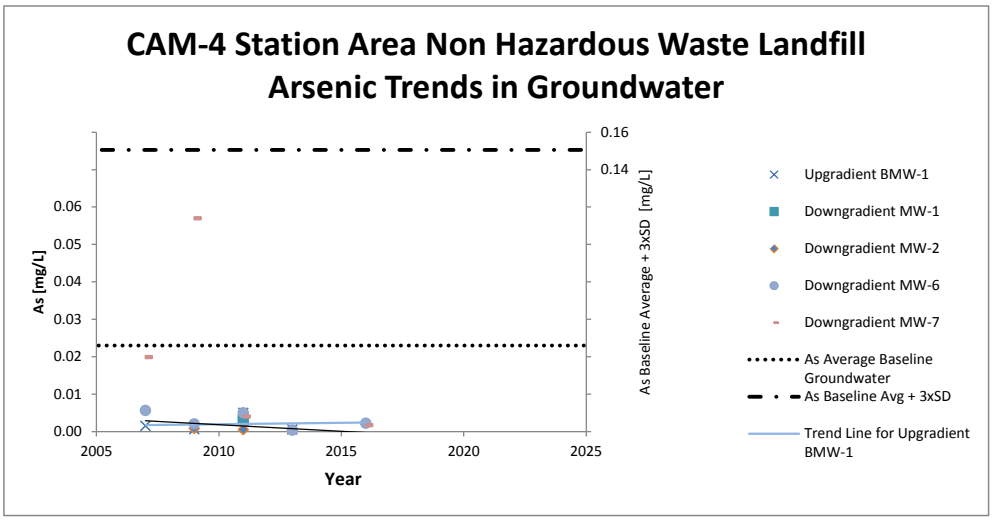


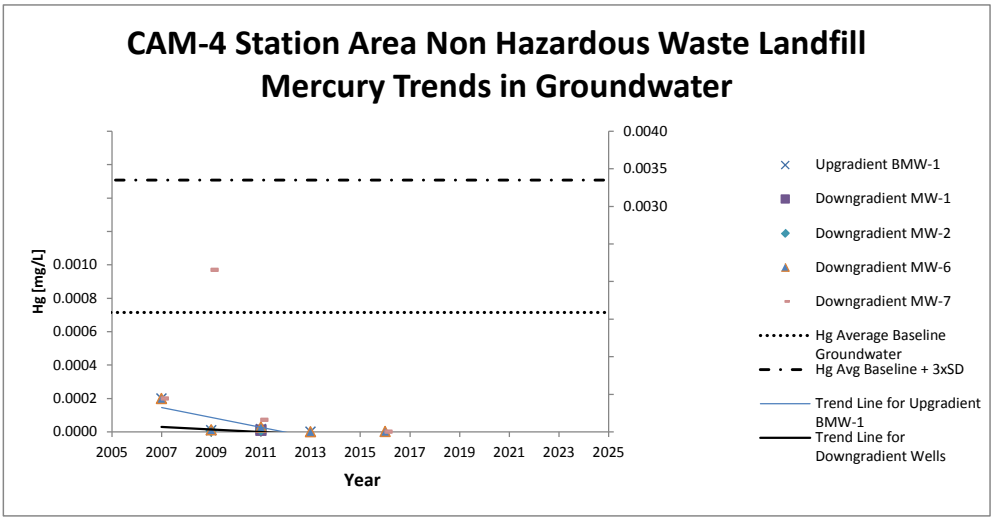
CAM-4 Station Area Non Hazardous Waste Landfill South Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



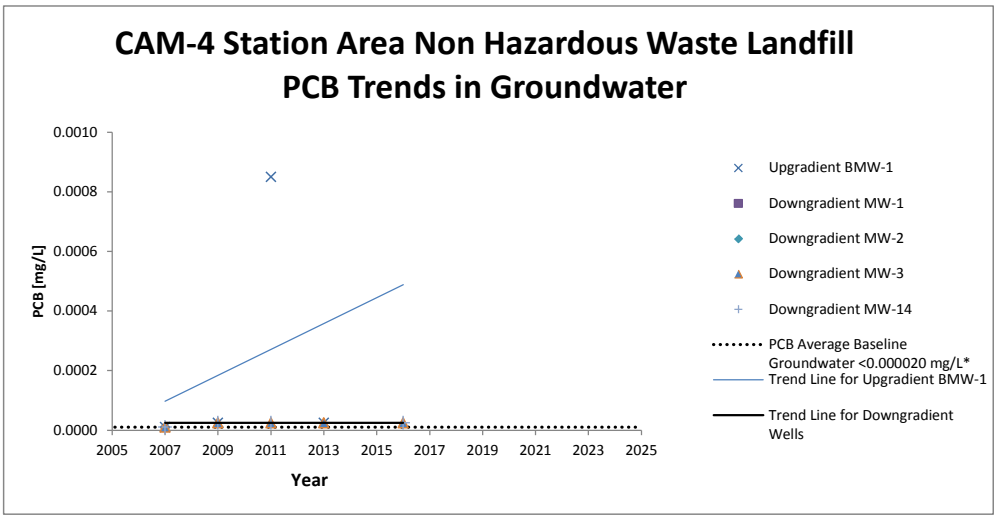


CAM-4 Station Area Non Hazardous Waste Landfill South Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

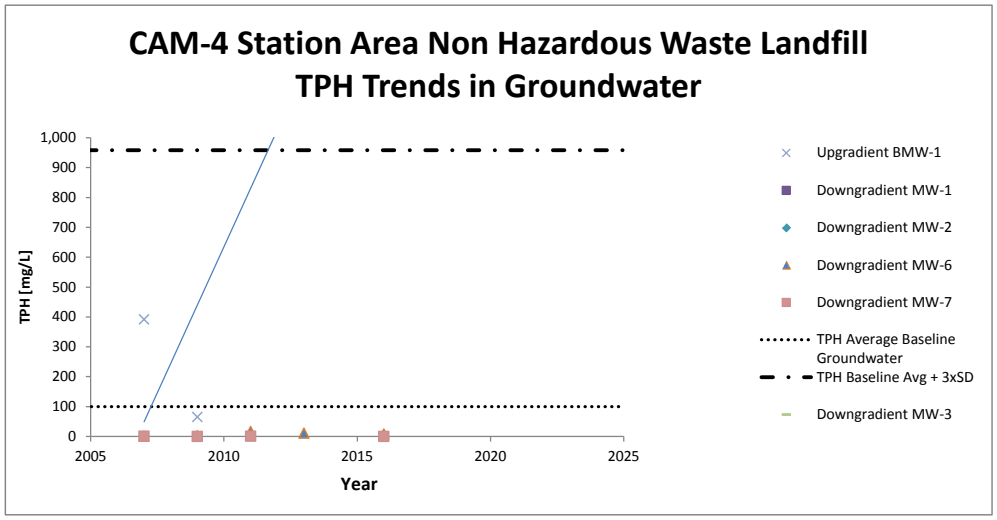




CAM-4 Station Area Non Hazardous Waste Landfill South Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



*PCB Baseline Avg SD = 0



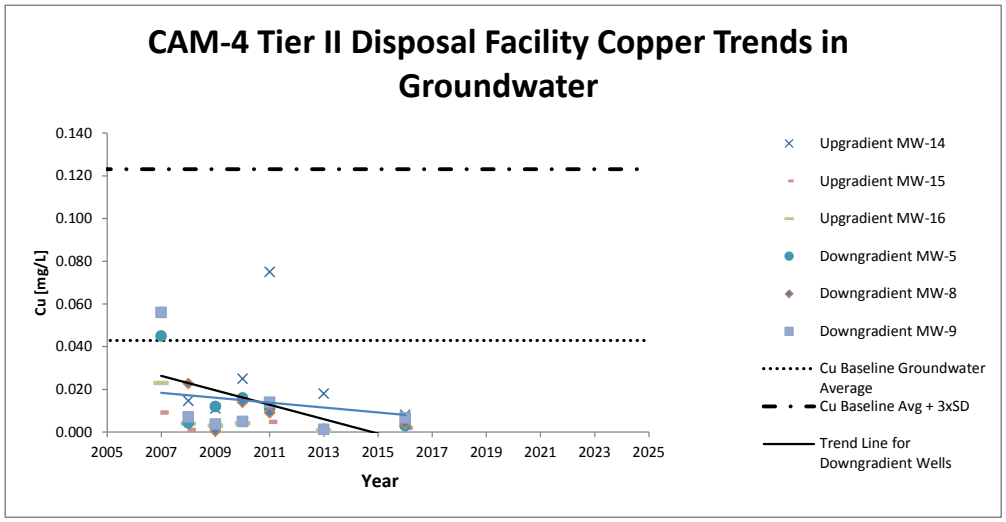
Elevated levels of TPH in 2013 are not shown on this chart but were used in the calculation of the trend lines; 1069ppm from upgradient BMW-1 and 1106000ppm at MW-3 (free product)

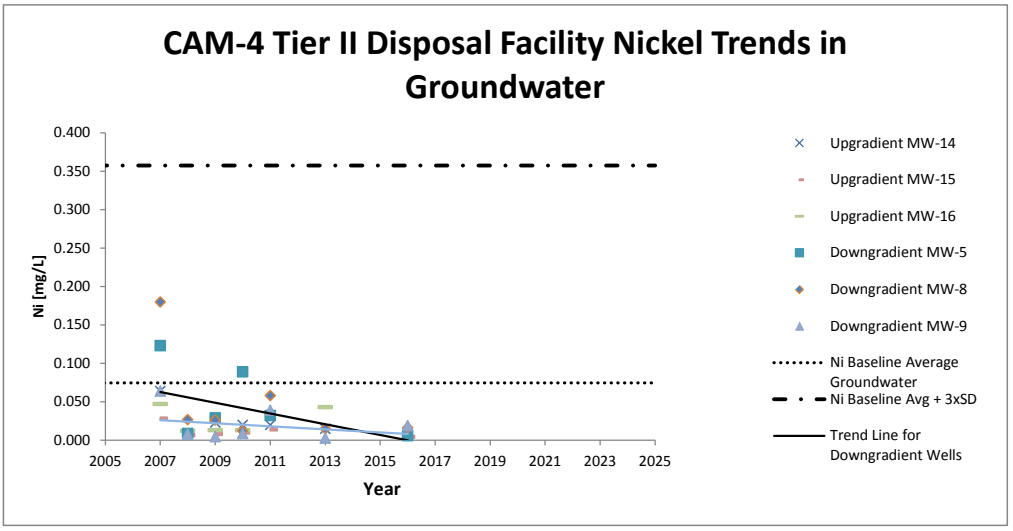
APPENDIX F2

Tier II Disposal Facility

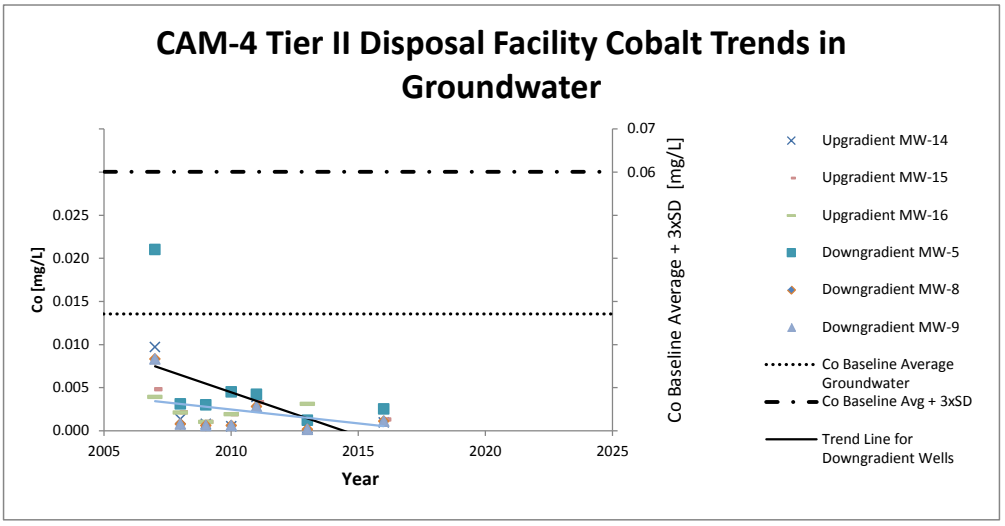
CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

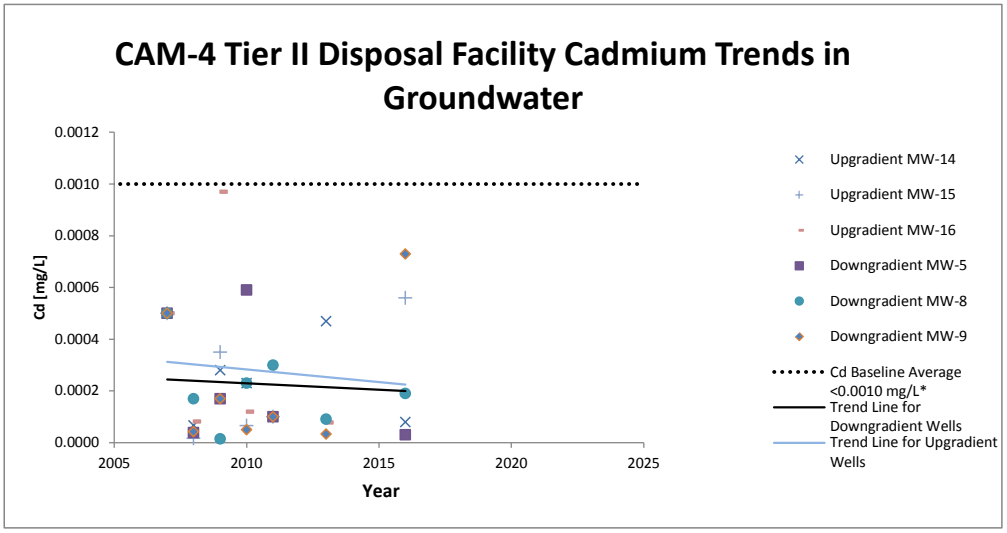
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.





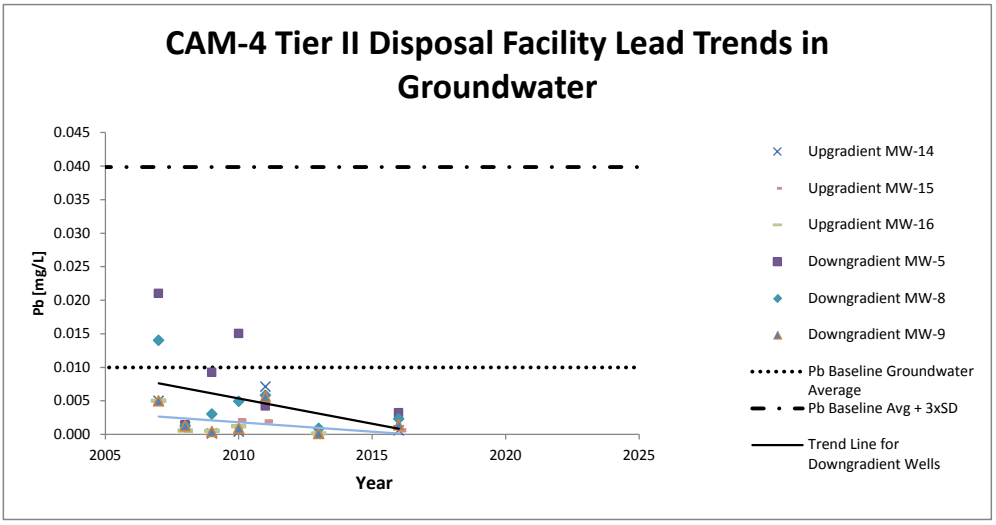
CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

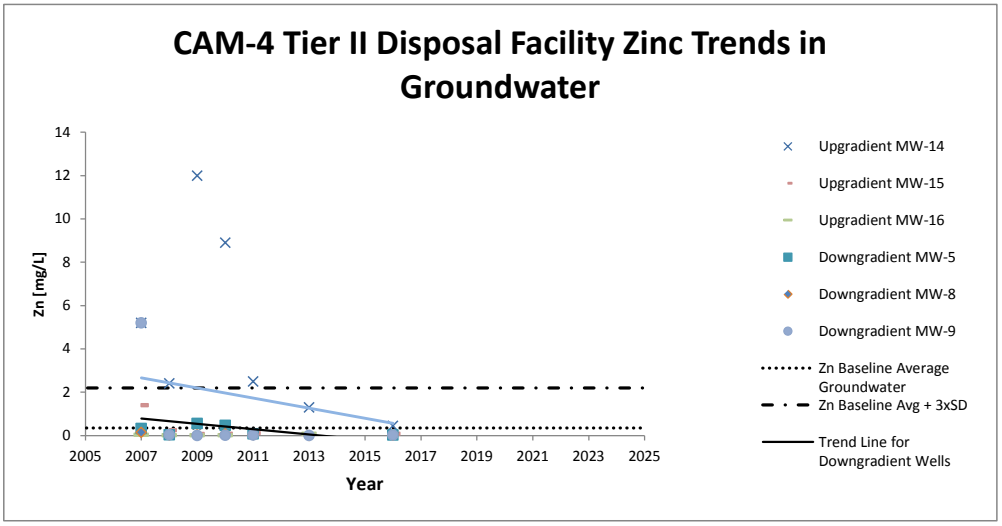




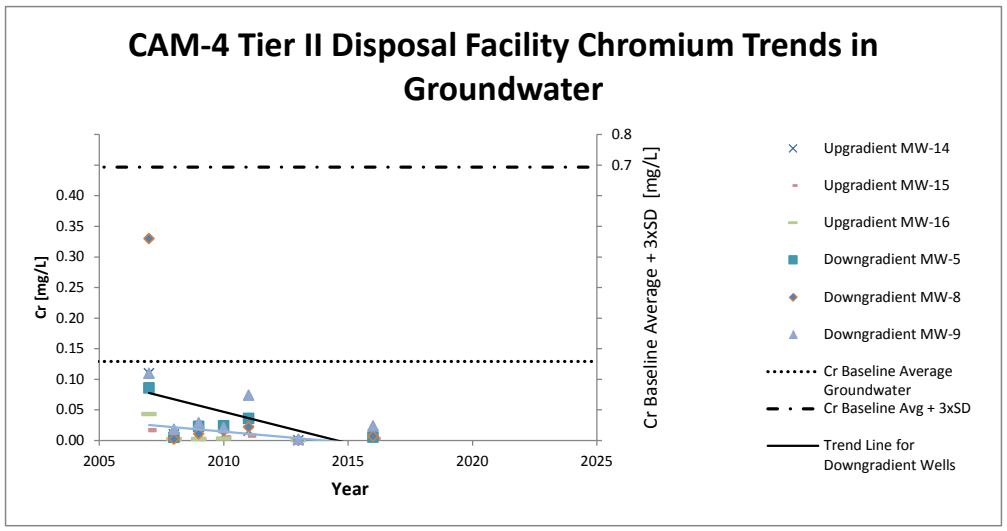
* Cd Baseline SD = 0

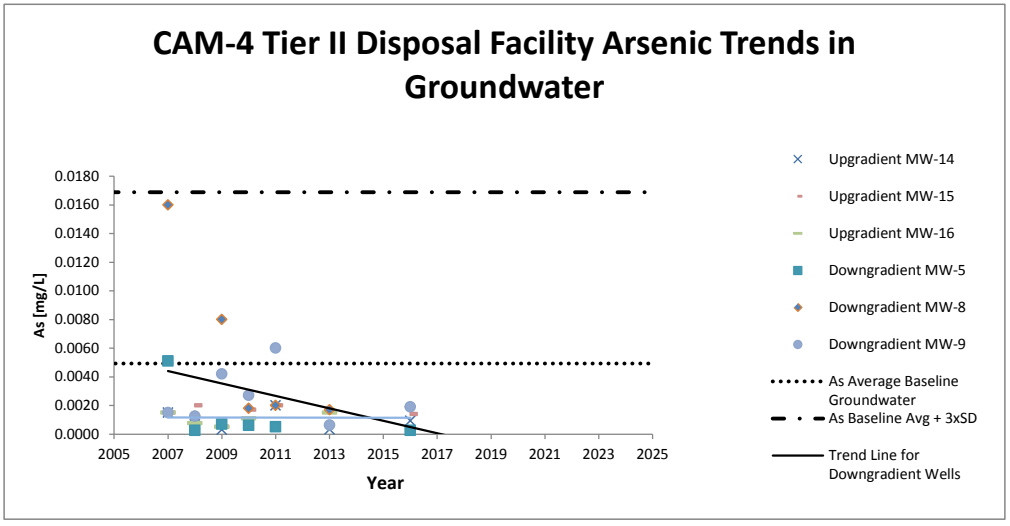
CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



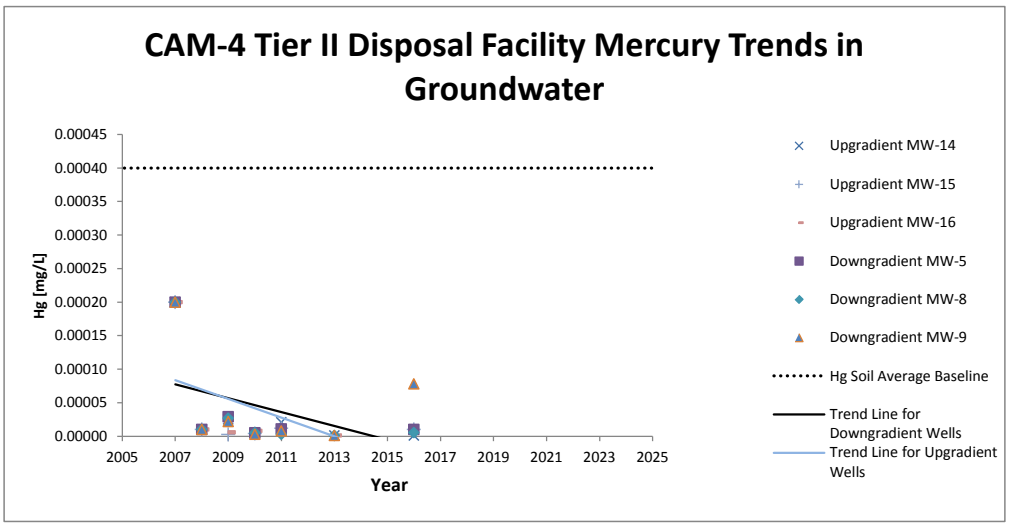


CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

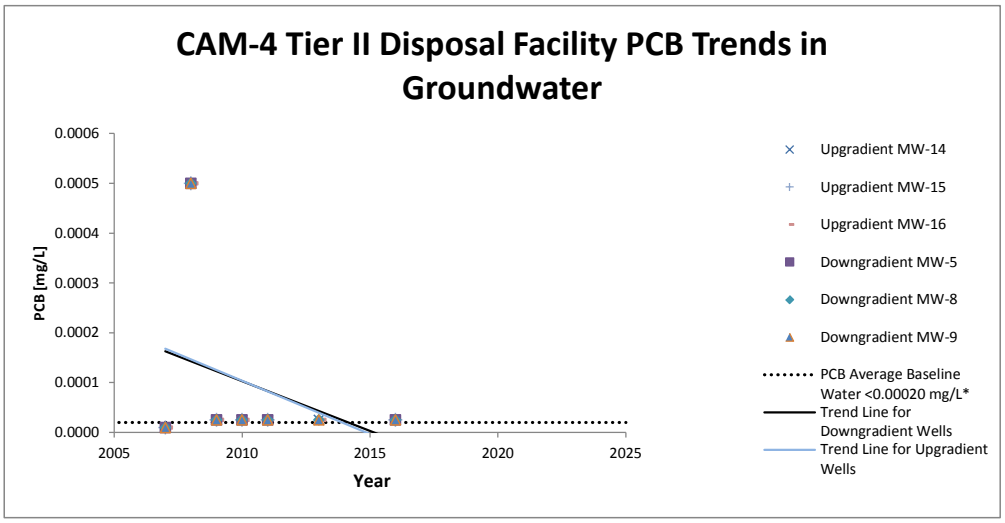




CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

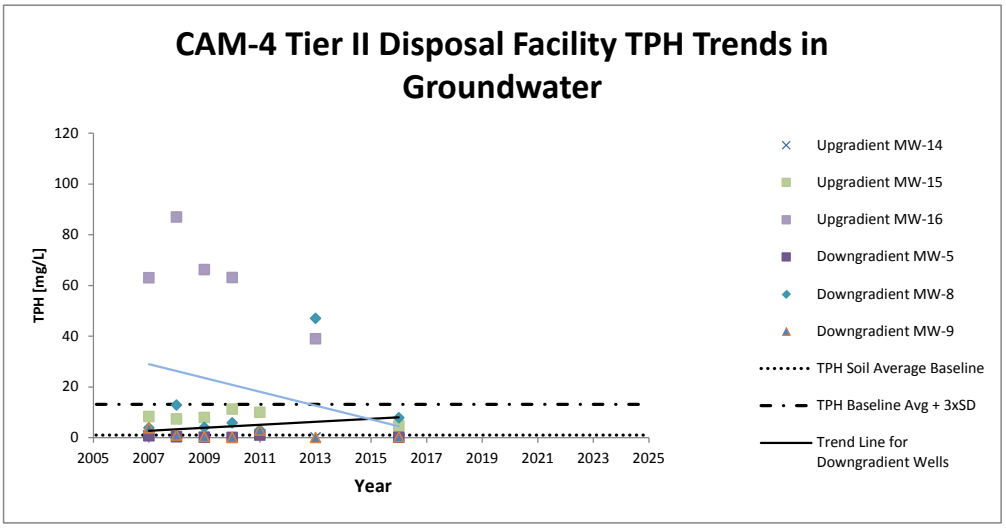


Hg Baseline SD = 0



* PCB Baseline Average SD = 0

CAM-4 Tier II Disposal Facility Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

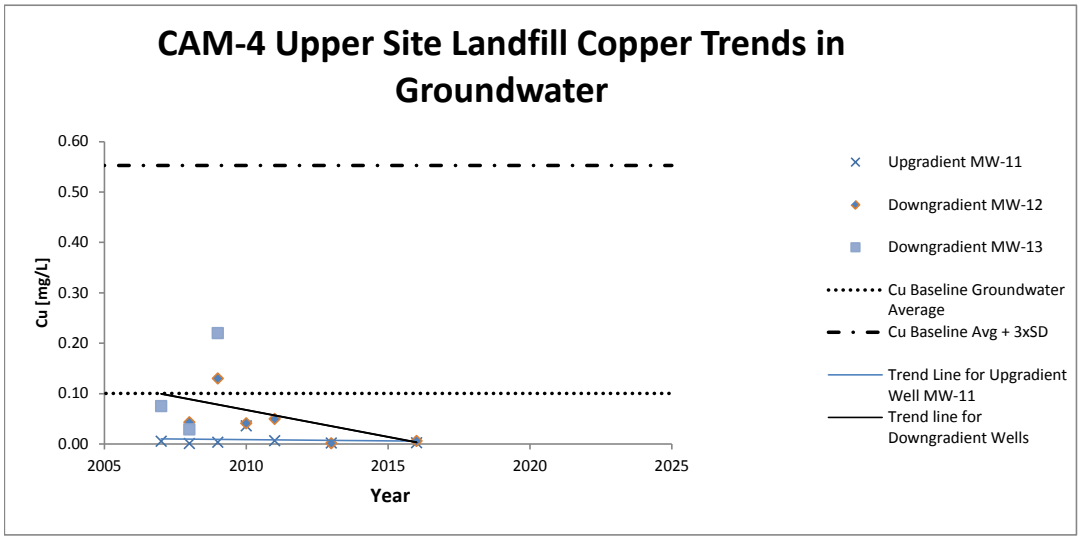


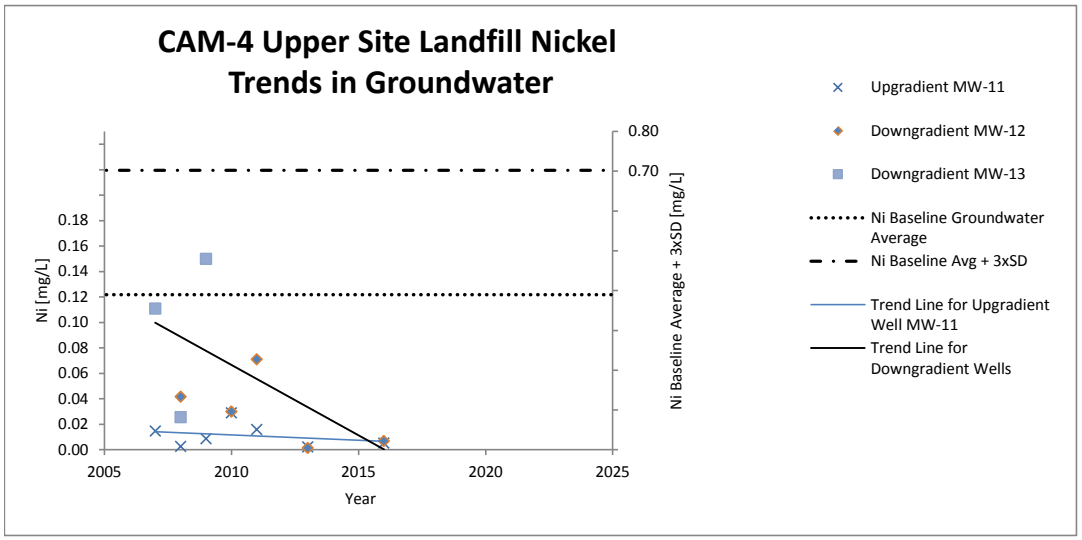
APPENDIX F3

Upper Site Landfill

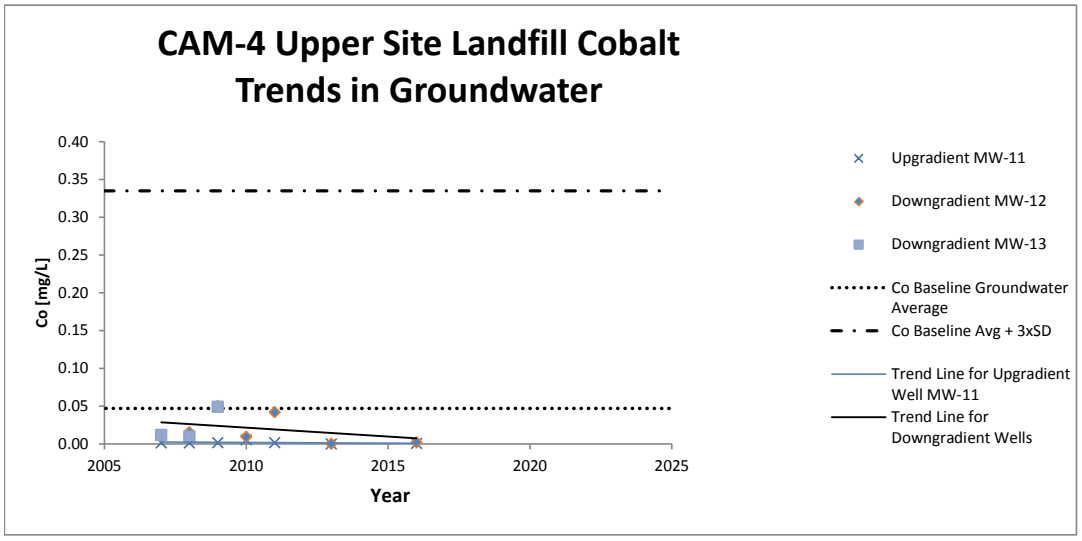
CAM-4 Upper Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

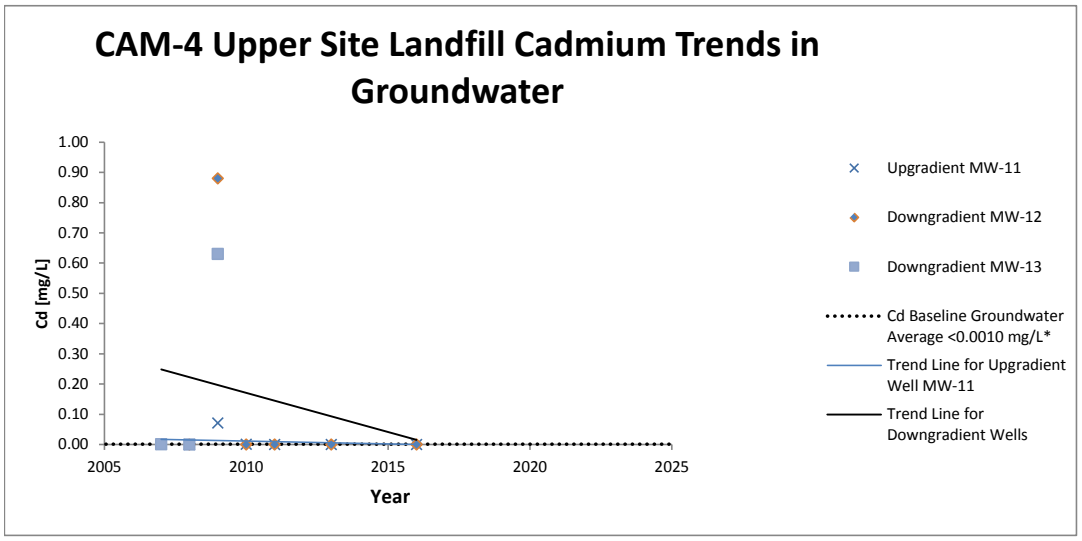
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.





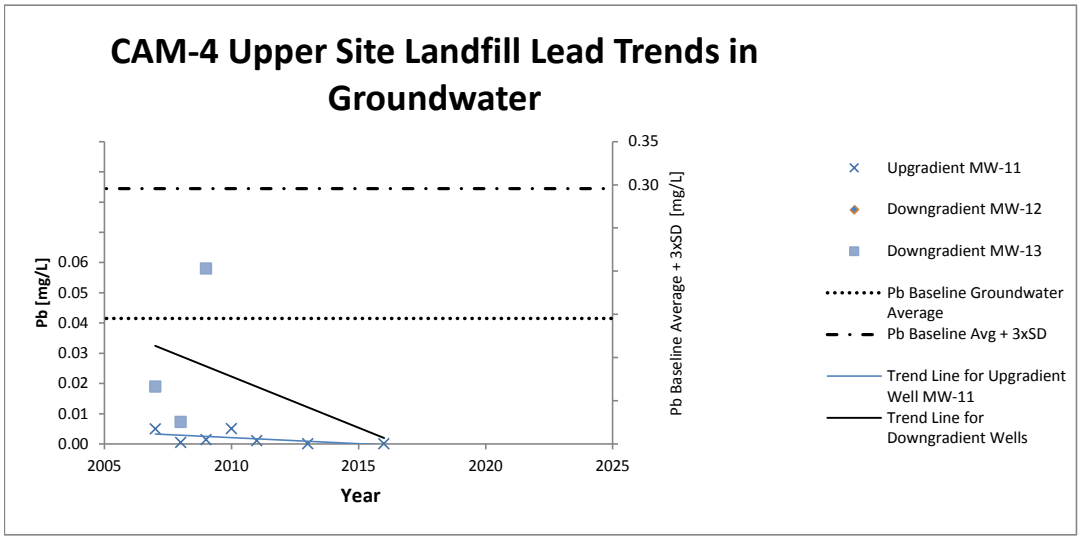
CAM-4 Upper Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

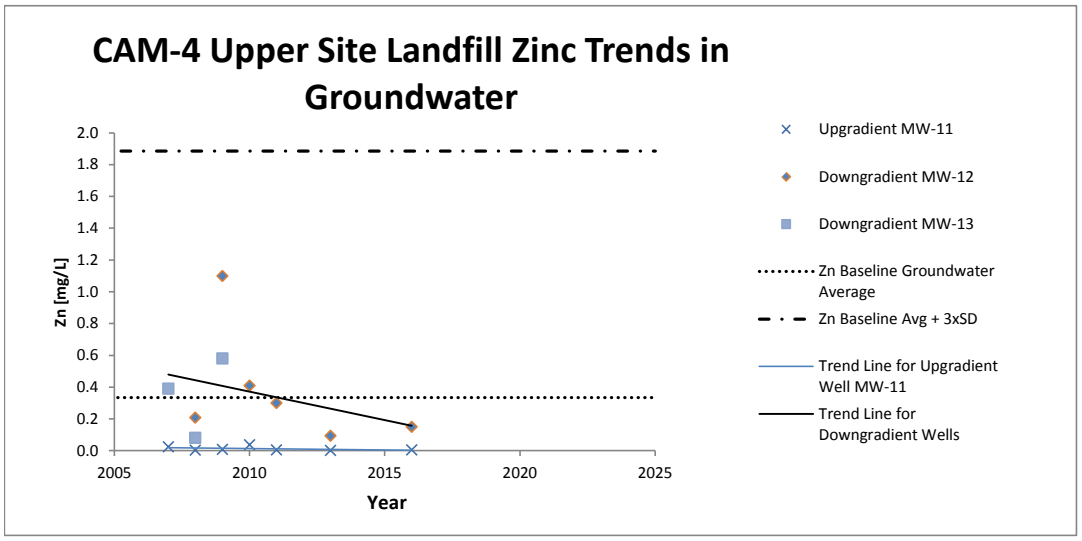




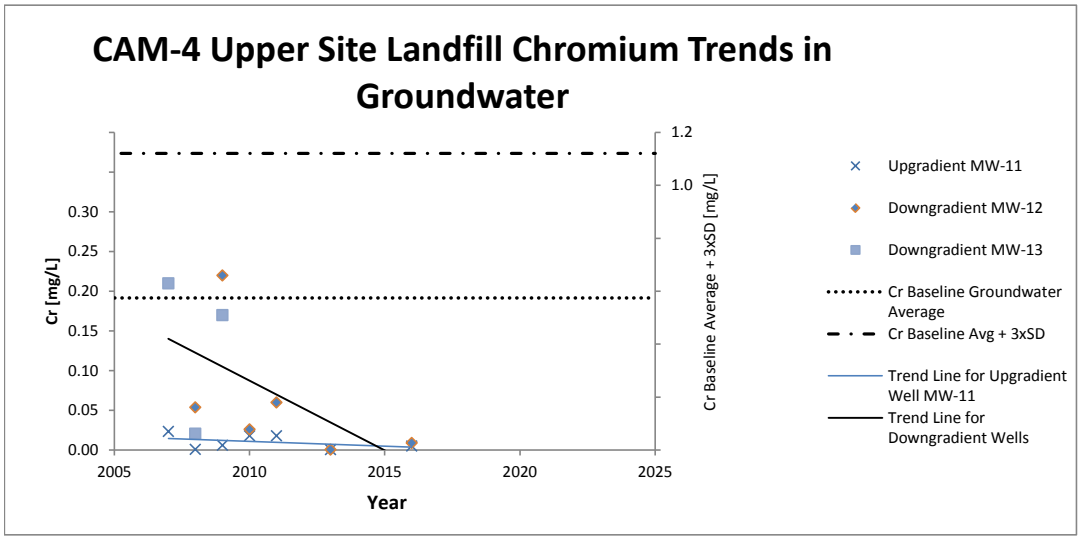
*Cd Baseline Avg SD = 0

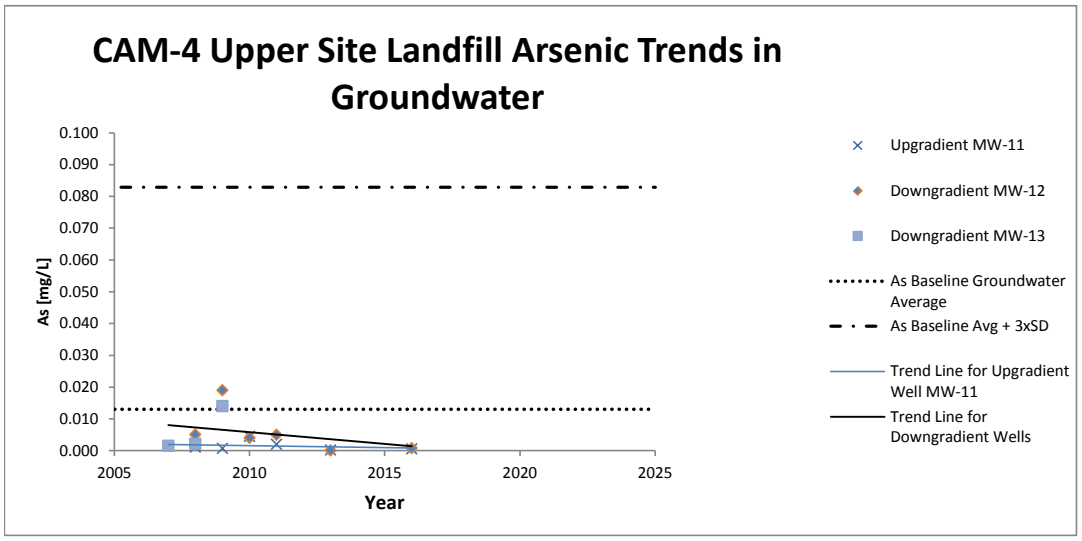
CAM-4 Upper Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



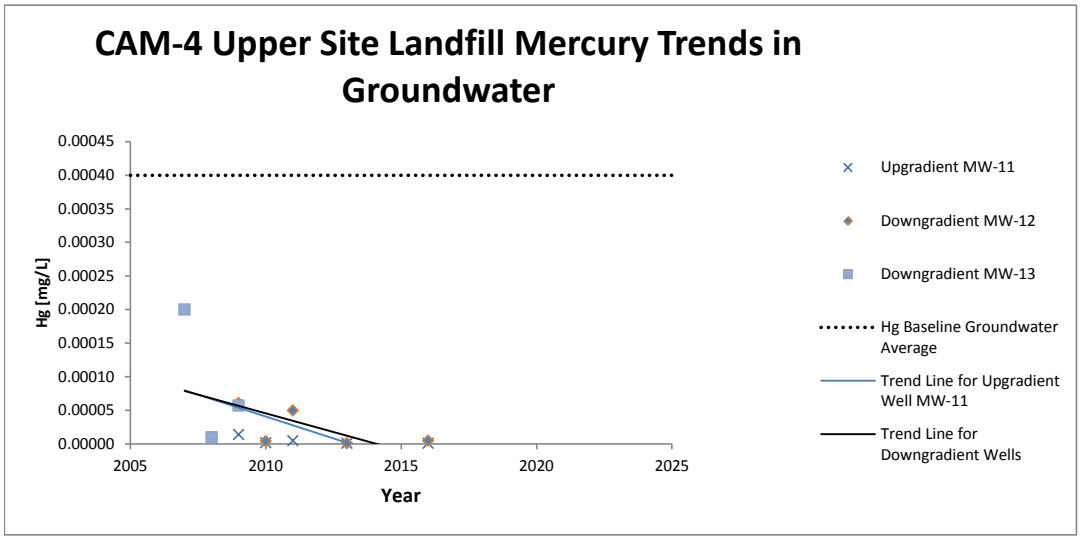


CAM-4 Upper Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

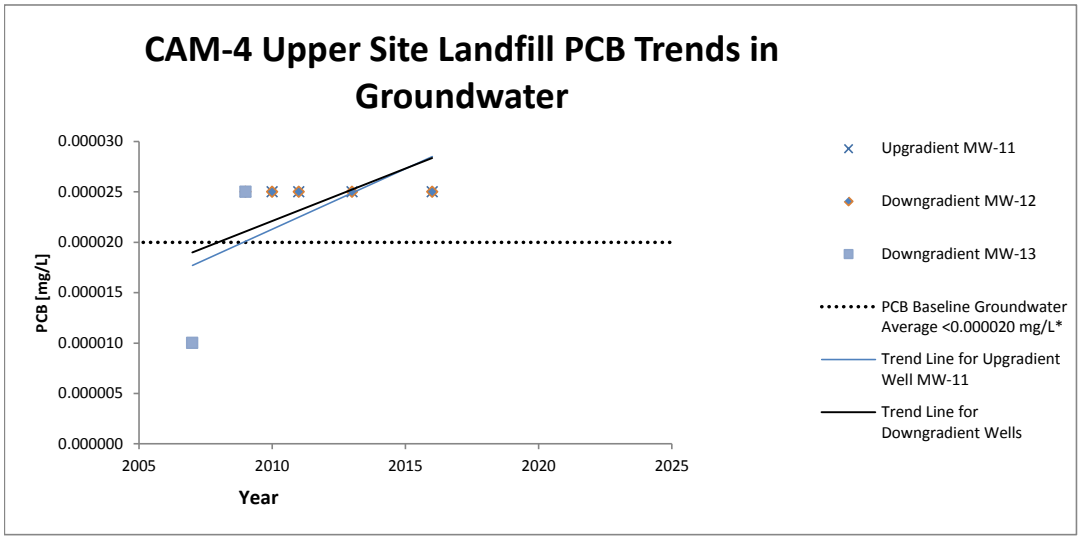




CAM-4 Upper Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



Hg Baseline SD = 0



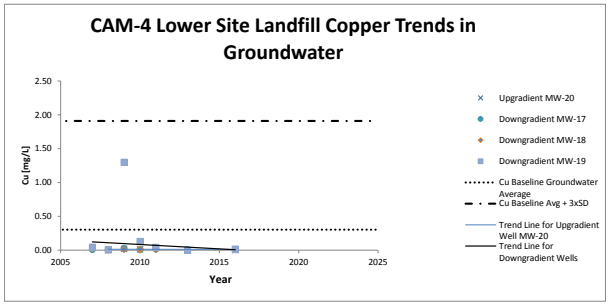
*PCB Baseline Avg SD = 0
higher 2008 detection limits have been removed from the chart.
PCB results have been below detection. Trend line reflects changes in detection limits

APPENDIX F4

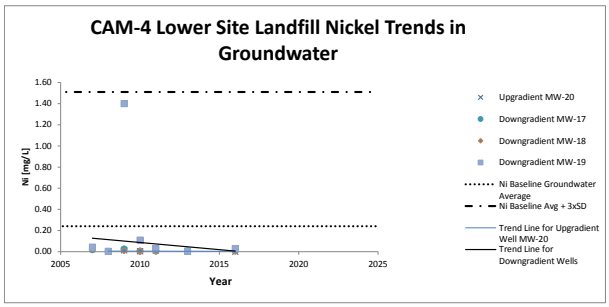
Lower Site Landfill

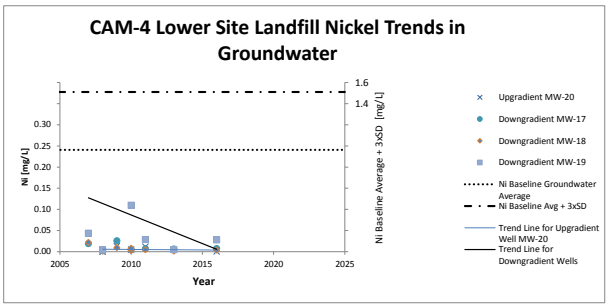
CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.

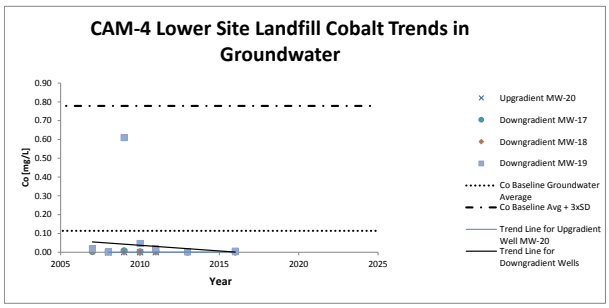


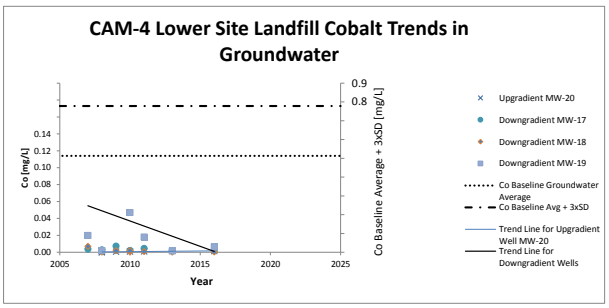
CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples





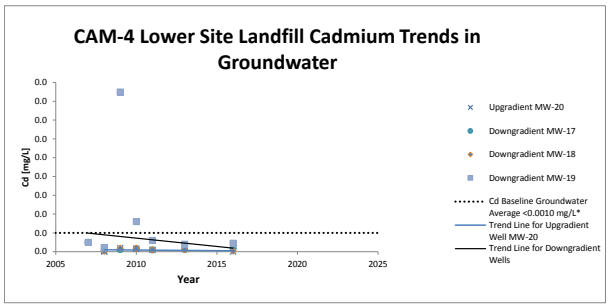
Nickel Trend with 2009 MW-19 result (1.4ppm) not shown.



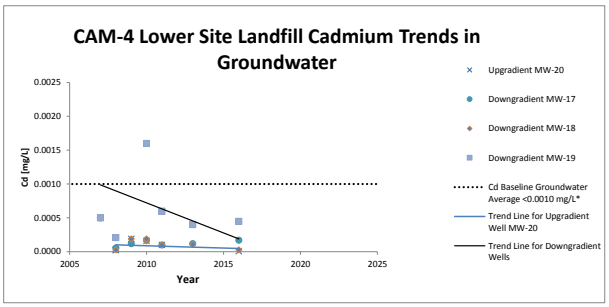


Cobalt Trend with 2009 MW-19 result (0.61 ppm) not shown.

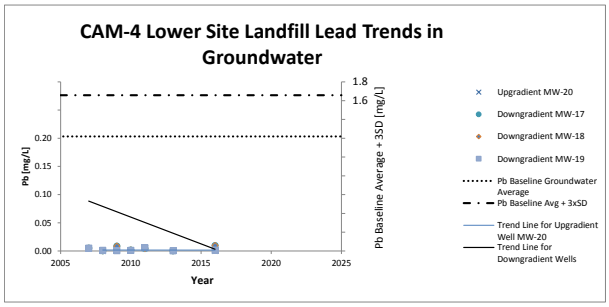
CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



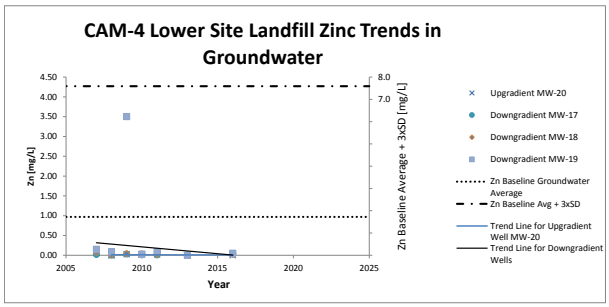
*Cd Baseline Avg SD = 0

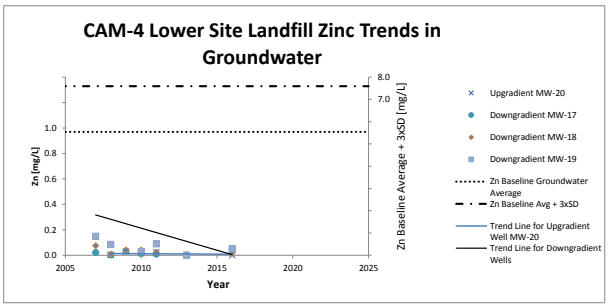


Cadmium Trend with 2009 MW-19 result (0.0085 ppm) not shown

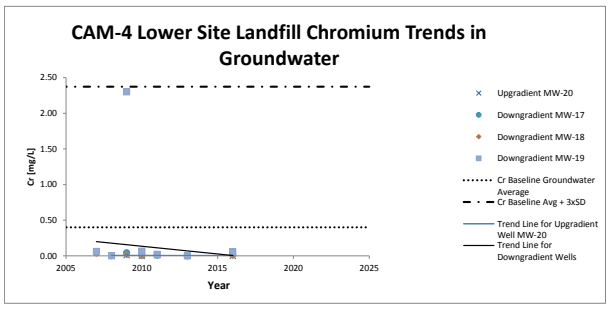


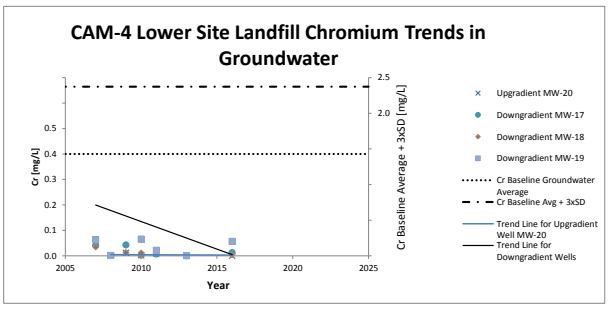
CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples





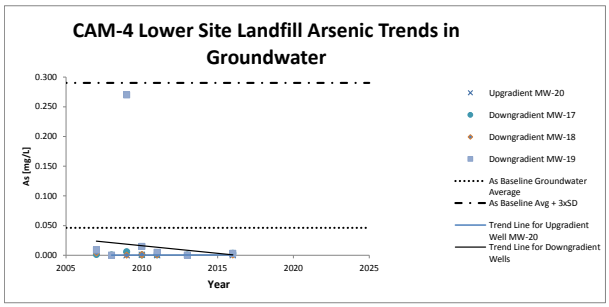
Zinc Trend with 2009 MW-19 result (3.5 ppm) not shown

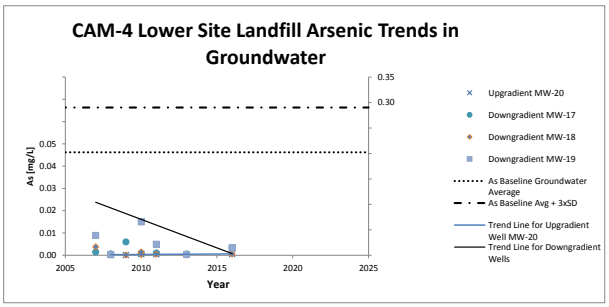




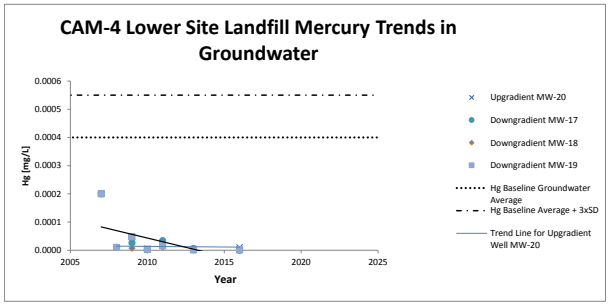
Chromium Trend with 2009 MW-19 result (2.3ppm) not shown

CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

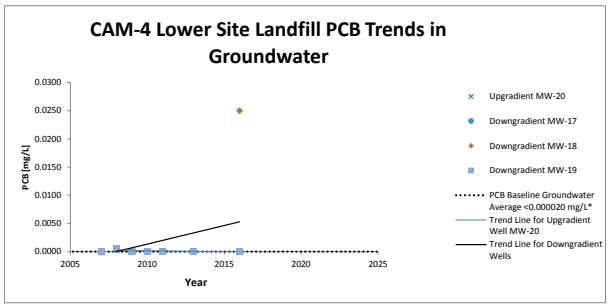




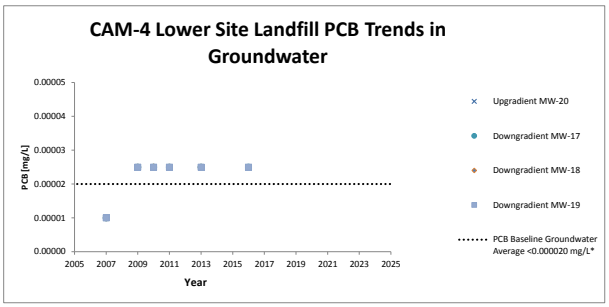
Arsenic Trend with 2009 MW-19 result (0.27 ppm) not shown



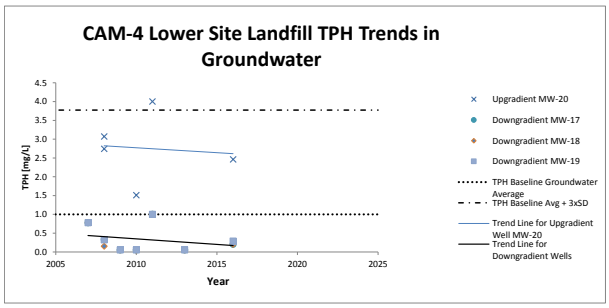
CAM-4 Lower Site Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



*PCB Baseline Avg SD = 0



PCB Trend with higher 2008 detection limits (0.001 ppm) not shown



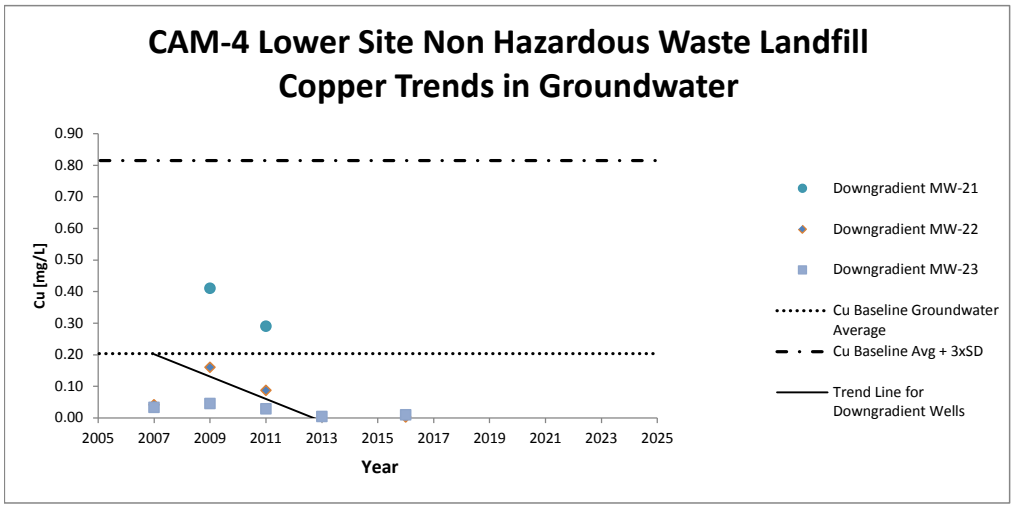
APPENDIX F5

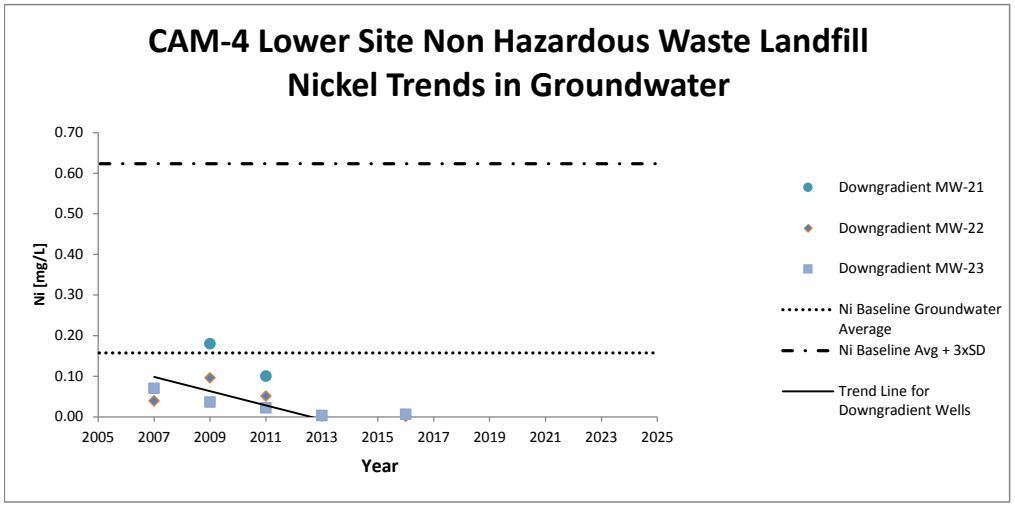
Lower Site Non Hazardous Waste Landfill

CAM-4 Lower Site Non Hazardous Waste Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

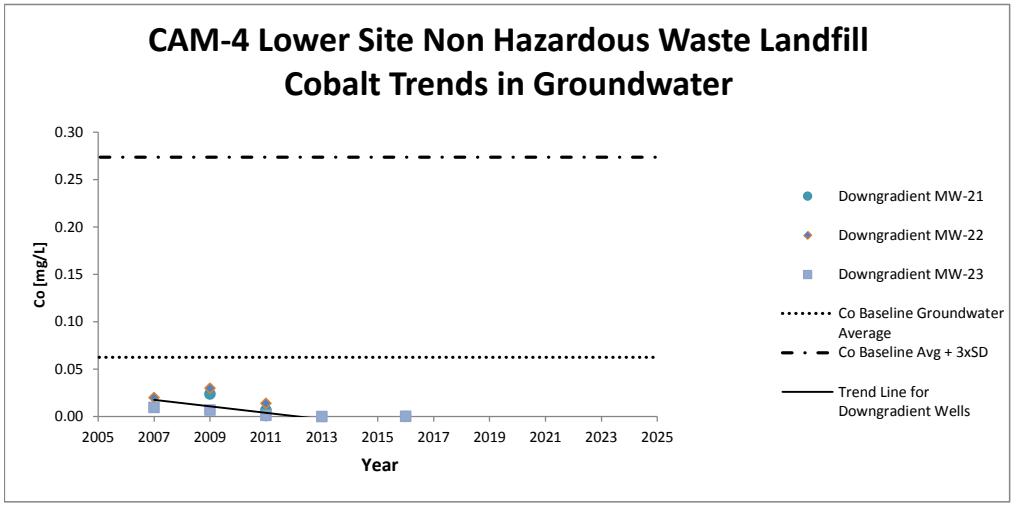
Trendlines are intended for visual interpretation of temporal trends. When all monitoring results are below detection, trendlines are a reflection of changes in detection limit. Users should refer to data tables.
Where results are below detection, half of the detection limit has been used in the charts.

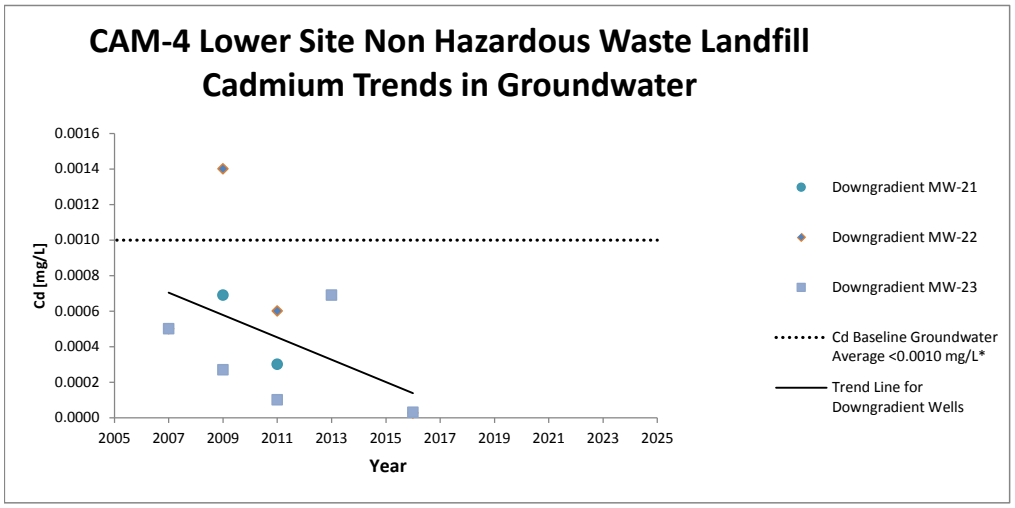
There are no upgradient locations at this landfill.





CAM-4 Lower Site Non Hazardous Waste Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples





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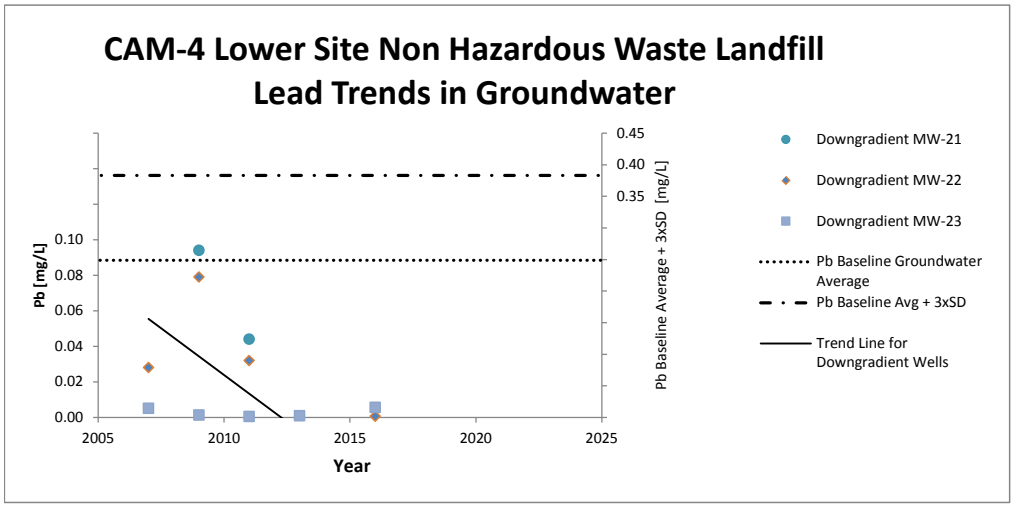
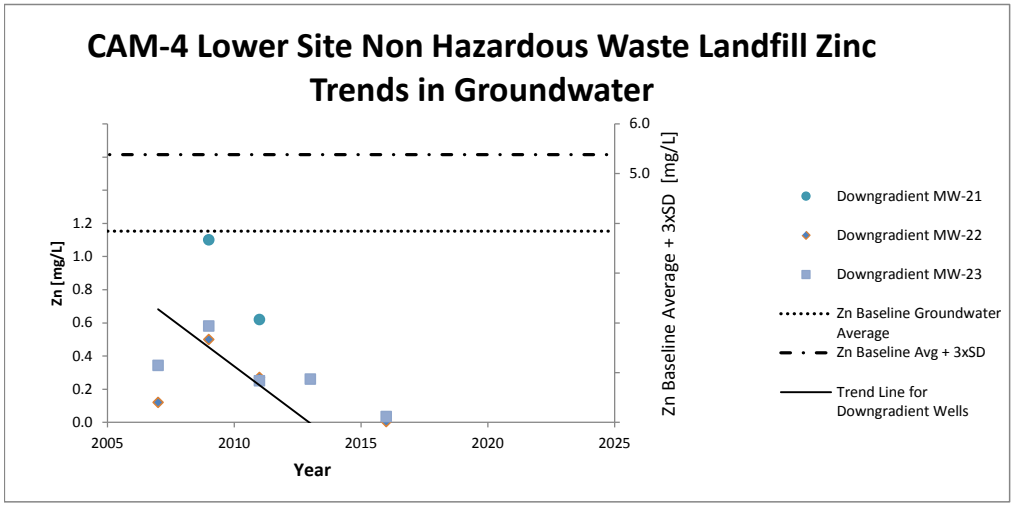
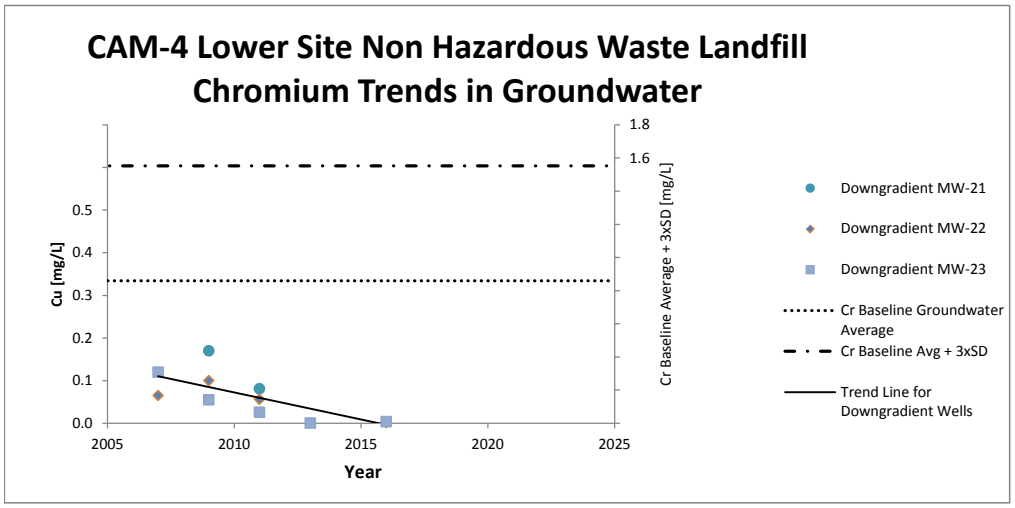
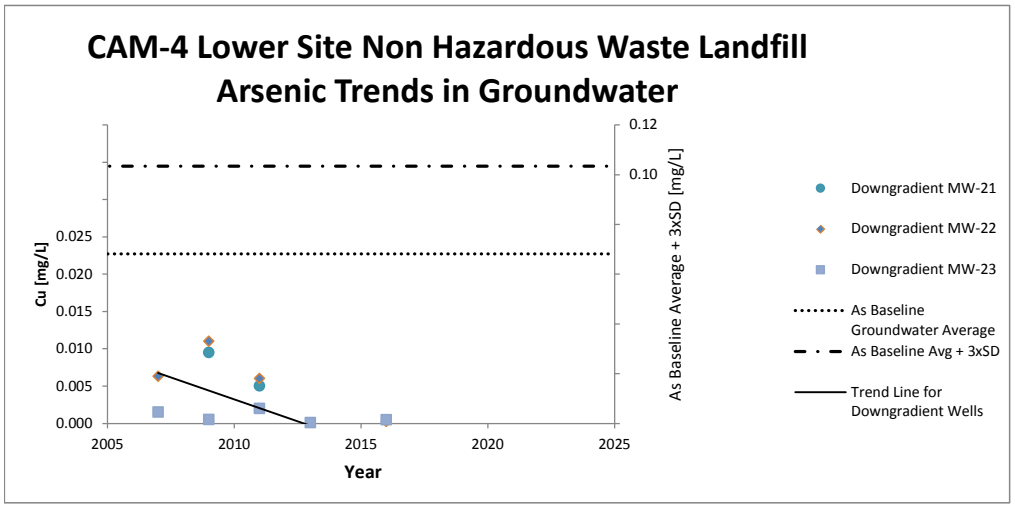


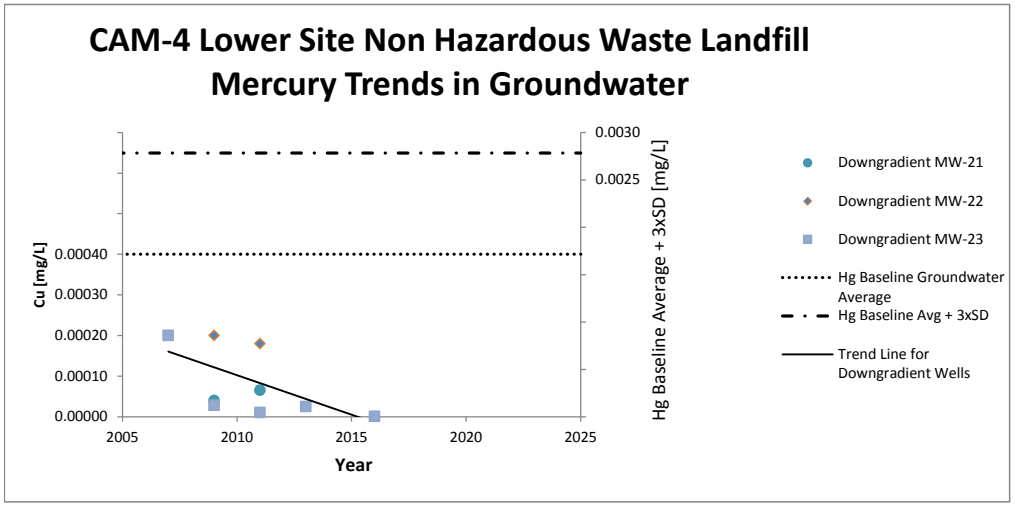
CAM-4 Lower Site Non Hazardous Waste Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

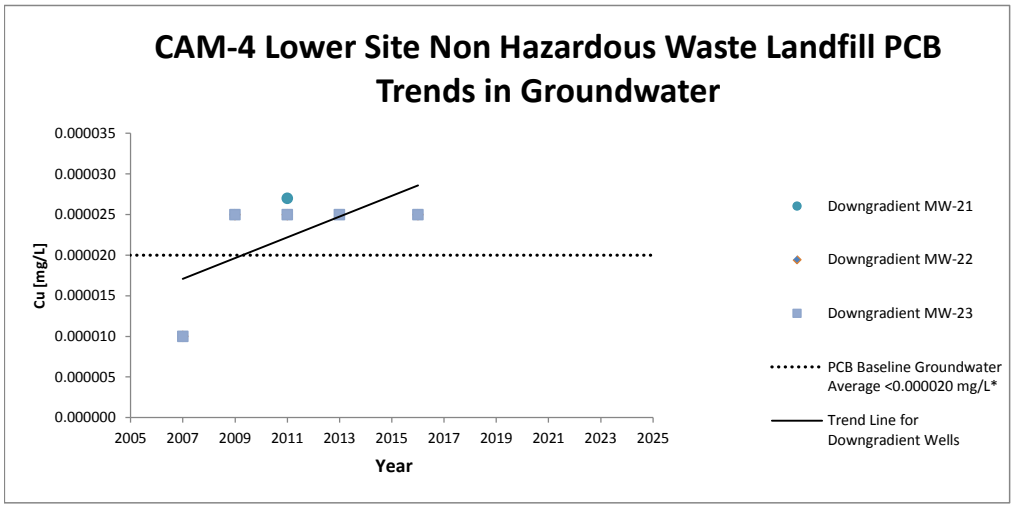




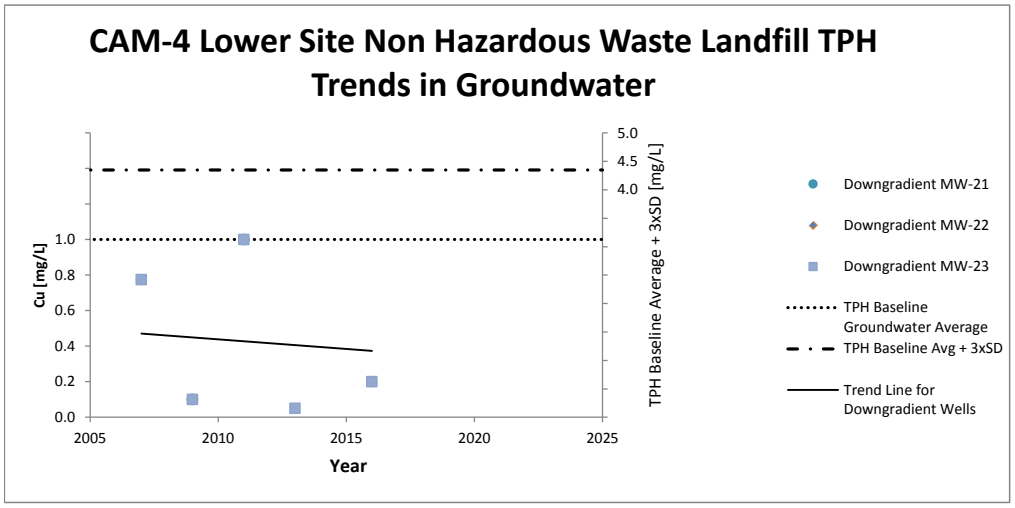


CAM-4 Lower Site Non Hazardous Waste Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples





*PCB Baseline Avg SD = 0



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