



**PUBLIC SERVICES AND PROCUREMENT CANADA
ENVIRONMENT AND CLIMATE CHANGE CANADA**

Compliance Long-Term Monitoring at the Former Iqaluit Metal Dump and Community Landfill

PSPC Project R.098348.001

Final Report

March 28, 2019

Executive Summary

Dillon Consulting LTD./ Outcome Consultants Inc in joint venture (DOJV), was contracted by Public Services and Procurement Canada (PSPC) Environmental Services to complete compliance monitoring at the Iqaluit Former Military Dump (IQFMD) as per the Terms of Reference (ToR) document entitled “Compliance Long Term Monitoring for Transport Canada at the Former Iqaluit Metal Dump – Iqaluit, NU”, dated August 2018. Work was completed under the Northern Contaminated Site Environmental Clean-up Work/Services Supply Arrangement #EW699-170520/003/NCS and in accordance with the Nunavut Water Board (NWB) Water License 1BR-MDR1721.

Previous investigations identified sediment and surface water contamination at the site. A long-term monitoring plan (LTM) was developed in February 2018 by ARCADIS which outlined a sampling program to confirm that contaminants are attenuating naturally. As per the LTM, a Phase 1 ESA is required on site at years 1,3 and 5 following remediation. The 2018 monitoring program described in this report is Year 1 of the LTM program.

The 2018 field program took place on September 18th and 19th at the IQFMD. The program included observational monitoring for seepage and erosion; collecting surface water and sediment samples; and producing photographs to confirm assumptions of the long-term monitoring plan.

Results

Dillon-Outcome compared analytical results from the 2018 program with data previously collected during the 2017 remediation completed by ARCADIS.

Observational Monitoring

No major issues were detected on site during the visit. Two (2) minor (<0.1m deep, <0.1m wide and <1m long) erosional features were observed on the slope crest. No seepage observed on site, therefore no seepage samples were collected. Geese were observed at the toe of the main landfill and near Ponds 1 and 2.

Lab Results

Dillon-Outcome collected surface water samples from seven (7) predetermined LTM stations, LTM-1 through LTM-7. Surface water samples were analyzed for petroleum hydrocarbons (PHCs), Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc, polychlorinated biphenyls (PCBs), major ions (>1ppm), hardness, total dissolved solids (TDS), total suspended solids (TSS), pH, conductivity and temperature.

Also, seven (7) sediment samples were collected from the predetermined LTM locations. Sediment samples were analysed for petroleum hydrocarbons (PHCs), Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc and polychlorinated biphenyls (PCBs).

Concentrations of Cadmium, Zinc and Lead exceeded CCME guidelines in surface water samples collected from LTM stations 5 and 6. Also, LTM station 7 exceeded guidelines for Zinc.

The sediment sample collected from LTM station 5 exceeded guidelines for PHC F3, Cadmium, Zinc, Lead and total PCBs.

The sediment sample collected from LTM station 6 exceeded guidelines for Toluene, PHCs F2 & F3, Cadmium, Lead, Zinc and total PCBs.

The sediment sample collected from LTM station 7 exceeded guidelines for Zinc and total PCBs.

Trend Analysis

Dillon-Outcome recommends using the Mann-Kendall trend analysis to assess whether statistically significant increases or decreases to concentration were occurring. In general, three data points (e.g., three years of an LTM program) are the absolute minimum required to assess a trend. Since only two data points are available for surface water and one for sediment, Dillon-Outcome has observed that year over year the concentrations in Surface Water appear to have remained relatively constant with notable decreases in LTM stations 1, 2 and 7 for Metals in Surface Water.

Recommendations

The long-term monitoring program will require additional data to reveal trends in concentrations at the site. Dillon-Outcome recommends that the program should continue on the currently-proposed schedule. Also, it's recommended to continue monitoring the erosional features identified during the 2018 site investigation.

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1.0 Introduction

1.1 Purpose

Dillon Consulting Limited and Outcome Consultants in joint venture (Dillon-Outcome or DOJV) was retained by Public Services and Procurement Canada (PSPC) on behalf of Transportation Canada (TC) to perform Year 1 of the Long-Term Monitoring (LTM) program at the Former Iqaluit Metal Dump and Community Landfill (Site). The LTM program was developed in 2018 to evaluate the effectiveness of the environmental remediation completed in 2017 (ARCADIS, 2018) and to comply with Part K, condition 1 of Water Licence 1BR-MDR1721 issued by the Nunavut Water Board (NWB) on July 31, 2017.

The project was completed under the Northern Contaminated Site Environmental Clean-up Work/Services Supply Arrangement #EW699-170520/003/NCS and in accordance with Dillon-Outcome's proposal "*Compliance Monitoring at the Iqaluit Former Military Dump (IQFMD)*" submitted Sept 12, 2018.

1.2 Objective

The objective of the Project was to collect and interpret data with respect to applicable environmental quality guidelines (EQG) established in the long-term monitoring plan (LTM Plan) prepared by ARCADIS (ARCADIS, 2018). This objective was addressed through the execution of the sampling and analytical testing program at the previously-identified areas of environmental concern (AECs) at the Site. The LTM Plan will reassess the sources, pathways and receptors at the Site to confirm that the assumptions of the LTM Plan remain valid.

As per the Statement of Work by PSPC (August of 2018) upon which this project was based, "the goal of this Performance and LTM work is to ensure that present and future risks to human health and the environment from the site conditions post remedial work are negligible and that monitoring, at some point in the future, could be terminated with confidence, based on findings of no risk and no depreciation of site environmental status" (PSPC, 2018).

1.3 The Site and Relevant Background Information

The Iqaluit Former Metal Dump and Community Landfill (UTM coordinates E521904.94, N7067812.69) is located 1.7km southwest of the City of Iqaluit, on the border of Sylvia Grinnell Territorial Park and the Sylvia Grinnell River (ARCADIS, 2018). The Site acted as a metal dump for the United States Air Force from 1955 to 1963.

Environmental investigations dating back to 1988 have been conducted on the Site. Previously investigated contaminants included volatile organic compounds (VOCs), metals, polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs) and pesticides. Due to the presence of contaminants of concern, a remediation program was completed in

2017, and as such, past environmental site investigation results are not considered relevant and are not reported herein.

The environmental remediation program in 2017 focused on 4 Areas of Environmental Concern (AEC):

- AEC1: buried metal debris located up gradient of the vehicle dump
- AEC2: significant number of vehicles and was therefore referenced as the “Vehicle Dump”
- AEC3: main landfill area which contained graded debris spread over a steep outcrop
- AEC4: downgradient off-site and contained scattered buried debris

During the 2017 remediation work, non-Hazardous waste was consolidated, sorted, and landfilled. Areas containing hydrocarbon contaminated material (HCM) were subsequently excavated and prepared for off-site disposal. Metal contaminated soil was excavated for landfilling. PCB contaminated material was placed into Quatrex bags and shipped off-site. Material with lead-amended paint was collected and packaged in sea cans for transportation to an appropriate disposal facility. Tires were collected and sent off-site for disposal. Automotive or similar batteries were shipped south. All drums containing liquids were sorted and transported to the Qikigtuaaluk Environmental (Q.E.) facility. Additional hazardous materials including fire extinguishers, propane tanks, and oxygen cylinders were sent to the Q.E. facility for disposal. A small quantity of asbestos material was also sent off-site as part of the remediation.

A variety of aggregate types were transported to Site to be used in the modification of the AECs. AEC-1 was re-shaped and re-graded while AECs 2 and 3 were capped. Following the 2017 remediation work, the only structures remaining on-site were the capped landfill and associated drainage swales. Seven (7) long term monitoring stations were established on-site for the purpose of evaluating long term environmental quality at the Site following remediation, and in accordance with the ARCADIS Long-Term Monitoring Plan (LTM Plan) deliverable created by ARCADIS

2.0 Methodology

In brief, the field program took place between September 18 and 19, 2018 and was designed to include observational monitoring in addition to sediment and water sampling at each of the 7 predetermined monitoring stations in accordance with the LTM Plan. Further details of the methodology are presented in this section.

2.1 Health and Safety Plan

Dillon-Outcome created a site-specific Health and Safety Plan (HSP) for the work. The HSP conformed to applicable codes and regulations for the work. The field team was provided a copy of the HSP prior to the commencement of field work, and the HSP was reviewed before the field program began.

The HSP:

1. Identified site activities and potential hazards,
2. Described safe work practices and procedures,
3. Laid out required personal protective equipment (PPE)/safety levels,
4. Identified safety and first aid requirements, and
5. Identified emergency response procedures.

Dillon-Outcome provided the PSPC PM with a copy of the HSP prior to the initiation of field work.

2.2 Site Observations

Dillon-Outcome made observations across the Site during the field investigation, and collected photographs (Appendix C) from standard photo points as specified in the LTM program. Locations were confirmed with a Differential Global Positioning System unit during the field program and are shown in Figure 2 (Appendix A).

2.3 LTM Sampling

2.3.1 Surface Water Sampling and Analysis

Dillon-Outcome collected surface water samples by submerging the bottle under the surface of the water, removing the cap and allowing the bottle to fill, then recapping the bottle. Field parameters including pH, temperature, and conductivity were measured using a Horiba U-52 hand-held water quality meter, calibrated with standards provided, and recorded in field logs.

Dillon-Outcome collected surface water samples from seven (7) predetermined LTM stations, LTM-1 through LTM-7. Surface water samples were analyzed for petroleum hydrocarbons (PHCs), Arsenic,

Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc, polychlorinated biphenyls (PCBs), major ions (>1ppm), hardness, total dissolved solids (TDS), total suspended solids (TSS), pH, conductivity and temperature.

Samples were collected into laboratory-provided glass jars with screw-tight Teflon lids. Dillon-Outcome noted the different laboratory requirements for each analyte and prepared each jar accordingly.

2.3.2 Sediment Sampling

For each sediment sample collected, a depth measurement, GPS coordinates, and description of the sediment (including colour, odour, sheen, staining, and grain size), the presence of debris, and any unusual characteristics was recorded.

Dillon-Outcome collected sediment samples from seven (7) predetermined LTM locations, LTM-1 through LTM-7. Sediment samples were analysed for petroleum hydrocarbons (PHCs), Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc and polychlorinated biphenyls (PCBs).

Samples were collected into laboratory-provided glass jars with screw-tight Teflon lids. Dillon-Outcome noted the different laboratory requirements for each analyte and prepared each jar accordingly.

2.4 Quality Assurance and Quality Control

Samples were collected into laboratory-provided containers with appropriate preservative (where required). Samples were identified with numbers on their lids, and laboratory-provided labels indicating sample ID, date, and analysis.

Samples were placed into coolers with ice for preservation until shipment to the lab. Samples were shipped to the lab accompanied by chain of custody forms identifying samples, volumes, dates, and other pertinent information.

No field sampling equipment was used during the program; as a result, field equipment decontamination was not required.

Field duplicates are evaluated with the Relative Percent Difference (RPD). The RPD is calculated as follows and expressed as a percentage:

$$RPD = \frac{|parent - duplicate|}{\left(\frac{parent + duplicate}{2}\right)}$$

Dillon-Outcome defines the acceptable range for RPD in samples as below 40% for water, below 60% for soil and sediment, and below 50% for air. These values are based on those suggested in the CCME characterization guidance (CCME, 2016) and general industry practice.

2.4.1 Surface Water

Dillon-Outcome collected one field duplicate in the surface water sampling program:

- LTM1-SW8-18 was collected as a duplicate of LTM1-SW6-18 and analyzed for petroleum hydrocarbons (PHCs), Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc, polychlorinated biphenyls (PCBs), major ions (>1ppm), hardness, total dissolved solids (TDS), total suspended solids (TSS), pH, conductivity and temperature

2.4.2 Sediment

Dillon-Outcome collected one field duplicate in the sediment sampling program:

- LTM1-SD8-18 was collected as a duplicate of LTM1-SD6-18 and analyzed for petroleum hydrocarbons (PHCs), Arsenic, Cadmium, Cobalt, Chromium, Lead, Nickel, Zinc and polychlorinated biphenyls (PCBs).

2.5 Laboratory

Analysis of samples was performed at Maxxam's Ottawa location. Maxxam is certified by the Canadian Association for Laboratory Accreditation Inc. (CALA) and has an internal set of QA/QC protocols, including replicate analysis, blank spikes, matrix spikes, instrumentation calibration, internal standards, method blanks, and internal QC checks. All laboratory quality information was reviewed as part of the data review.

2.6 Mann-Kendall Trend Analysis

The 2017 program is the first year of the monitoring plan, which means that LTM sampling locations have two data points available for surface water and one for sediment. Additional sampling is required to establish a trend, as three data points are required for the Mann-Kendall trend analysis (USGS, 2002). Any trend analysis discussed herein is based on a limited data set and only applies to surface water, as sediments have only been sampled once since remediation.

2.7 EQG Selection

The LTM divided the site into three (3) sectors; the upper, lower eastern and lower western. Table 1 outlines each sector, the associated LTM stations and the EQG classification, as established in the Nunavut Water Board submissions and the LTM Plan prepared by others.

Table 1. EQG Classification for LTM Stations (Arcadis, 2017)

Sector	LTM Station(s)	EQG
Upper	7	Commercial, Freshwater, Coarse grained soil
Lower - Eastern portion	2, 5, 6	Wildland, Freshwater, Coarse grained soil
Lower - Western portion	1, 3, 4	Wildland, Lowest of Marine or Freshwater, Coarse grained soil

Based on the EQG, analytical results for sediment and surface water samples are compared to the appropriate CCME criteria.

The Interim Sediment Quality Guideline (ISQG) for freshwater and marine aquatic life was used to evaluate contaminant concentrations in Sediment samples (CCME, 1999).

The Canadian Soil Quality Guidelines (CSQG) for coarse-grained soils were used to evaluate BTEX concentrations in sediment, as no criteria exists for the freshwater and marine ISQG (CCME, 1999). Both parkland and commercial use CSQGs are considered for the land based on proximity to the airport. Similarly, the Canada-Wide Standards (CWS) for Petroleum Hydrocarbons is used to evaluate PHC contamination (CCME, 2008).

For surface water samples, the Canadian Water Quality Guidelines for the Protection of Aquatic Life are applied (CCME, 2003). The inland water samples are classified as freshwater, but the marine guidelines are also included for reference as there is a tidal impact on ponds closer to shore. The acting criteria is the lowest of marine or freshwater guidelines. Water samples with considerable amounts of PHCs are compared to the Alberta Tier 1 Groundwater Remediation Guidelines (Alberta Government, 2019).

Environmental Quality Guidelines (EQGs) and CCME criteria were established during previous investigations by ARCADIS (ARCADIS, 2017).

3.0 Results

3.1 Observational Monitoring

3.1.1 Visual Monitoring

Visual monitoring was completed September 18th, 2018. No major issues were detected on-site during the visit. Two (2) minor erosion features (<0.1m deep, <0.1m wide and <1m long) were observed on the slope crest.

3.1.2 Seepage Monitoring

No seepage was observed on-site, therefore no seepage samples were collected.

3.1.3 Natural Environment Monitoring

Geese were observed at the toe of the main landfill and near Ponds 1 and 2.

3.2 Lab Results

Table 2 summarizes all exceedances identified through the 2017 and 2018 field programs.

Table 2. Contaminant Exceedance Summarization

Sample Type	Contaminant	2017 Exceedances	2018 Exceedances
Surface Water	Cadmium	STN 2	STN 5, 6
	Lead	-	STN 5, 6
	Zinc	STN 2, 3, 5, 6, 7	STN 5, 6, 7
Sediment	Toluene	-	STN 6
	F2	-	STN 6
	F3	-	STN 5, 6
	Cadmium	-	STN 5, 6
	Lead	-	STN 5, 6
	Zinc	-	STN 5, 6, 7
	Total PCBs	-	STN 5, 6, 7

3.2.1 Surface Water

The seven surface sample locations are shown on Figure 2. Analytical results are presented in Table 2.

Concentrations of Cadmium, Zinc and Lead exceeded CCME guidelines in surface water samples collected from LTM stations 5 and 6. Also, LTM station 7 exceeded guidelines for Zinc.

Based on the 2017 results; Cadmium and Zinc concentrations from LTM stations 2 and 3 no longer exceed CCME guidelines, LTM stations 5 and 6 have seen an increase in Cadmium and Lead concentrations past the guidelines, and Zinc levels in LTM stations 5 through 7 has remained relatively constant.

Dillon-Outcome has observed that year over year the concentrations in Surface Water appear to have remained relatively constant with notable decreases in LTM stations 1, 2 and 7 for Metals in Surface Water.

3.2.2 Sediment Samples

The seven sediment sample locations are shown on Figure 2 (Appendix A). Analytical results are presented in Table 3 (Appendix B).

The sediment sample collected from LTM station 5 exceeded guidelines for PHC F3, Cadmium, Zinc, Lead and total PCBs.

The sediment sample collected from LTM station 6 exceeded guidelines for Toluene, PHCs F2 & F3, Cadmium, Lead, Zinc and total PCBs.

The sediment sample collected from LTM station 7 exceeded guidelines for Zinc and total PCBs.

No historical data exists for the sediment samples at LTM stations therefore a comparison cannot be completed.

3.3 QA/QC Results

As noted in Section 2.4, Dillon-Outcome defines the acceptable range for RPD in samples as below 40% for water, below 60% for soil and sediment, and below 50% for air. These values are based on those suggested in the CCME characterization guidance (CCME, 2016) and general industry practice.

3.3.1 Surface Water QA/QC Results

Duplicate RPDs in surface water ranged from 3% to 40%, within the acceptable range previously noted.

3.3.2 Sediment QA/QC Results

Duplicate RPDs in sediment ranged from 0% to 171%, which is above the acceptable value of 60%. This may be the result of heterogeneity in the duplicate sediment samples collected.

4.0 Conclusions

“The goal of this Performance and LTM work is to ensure that present and future risks to human health and the environment from the site conditions post remedial work are negligible and that monitoring, at some point in the future, could be terminated with confidence, based on findings of no risk and no depreciation of site environmental status” (PSPC, 2018). To fulfill the project objectives, Dillon-Outcome reviewed the land use, pathways and receptors, and completed an analysis of results relative to the EQG identified in the LTM Plan.

The following conclusions are presented from the results presented herein:

1. There were no observations made during this field program that would suggest a change in land use, exposure pathways, or receptors at the Site. In this respect, Dillon-Outcome considers the EQG from the LTM Plan to be suitable for use in the numerical comparison with analytical results obtained from the September, 2018 sampling event.
2. There have been several exceedances of contaminants of concern noted in the samples retrieved. The majority of these exceedances were observed in sediment, including both organic and inorganic contaminants of concern. There were exceedances of inorganic (metals) contaminants of concern in two water samples.
3. There is insufficient data available at this time to carry out a trend analysis or to draw substantial conclusions of the temporal presence of contaminants of concern in sediment and water at the LTM monitoring stations. Dillon-Outcome has, however, observed that year over year the concentrations in Surface Water appear to have remained relatively constant with notable decreases in LTM stations 1, 2 and 7 for Metals in Surface Water.
4. The quality control program resulted in RPD calculations of analytical results from duplicate sediment samples to fall outside of that which is considered to be an acceptable range. This may be a result of excessive sediment heterogeneity of this particular sediment sample.
5. Observations indicate that a minor amount of surface soil erosion has occurred at two areas since the remediation program in 2017.

5.0 Recommendations

The following recommendations derive from the results and conclusions contained herein:

- I. There were exceedances of several contaminants of concern in both sediment and water samples collected in September, 2018. The long-term monitoring program will require additional data to reveal trends in concentrations at the monitoring stations where such exceedances were observed. Notwithstanding the fact that ARCADIS recommended sampling in years 1, 3, and 5 of Phase 1 of the LTM program, it is recommended to carry out a third round of sampling in 2019 to determine if these exceedances represent a trend.
- II. Additional duplicate sediment samples are recommended for future sampling events due to the high range of RPD in concentrations observed from duplicate samples retrieved during this sampling event.
- III. It is recommended to continue monitoring the erosion features identified during the 2018 site investigation, and if these worsen, to evaluate the need to install erosion control measures.

6.0 Closure

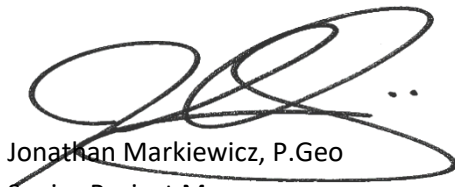
This report was prepared exclusively for the purpose outlined in the report. The report is based on information provided to, or obtained by Dillon-Outcome as indicated in the report, and applies solely to site conditions and the regulatory and planning frameworks existing at the time of the site investigation.

This report was prepared by Dillon-Outcome for the sole benefit of PSPC and TC. The material in it reflects Dillon-Outcome's best professional judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon- Outcome accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this information is satisfactory for your requirements.

Sincerely,

DILLON-OUTCOME JOINT VENTURE



Jonathan Markiewicz, P.Geo
Senior Project Manager



Michael Billowits, MSc.(Eng), P.Eng.
President, Outcome Consultants Inc.

7.0 References

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Appendix A

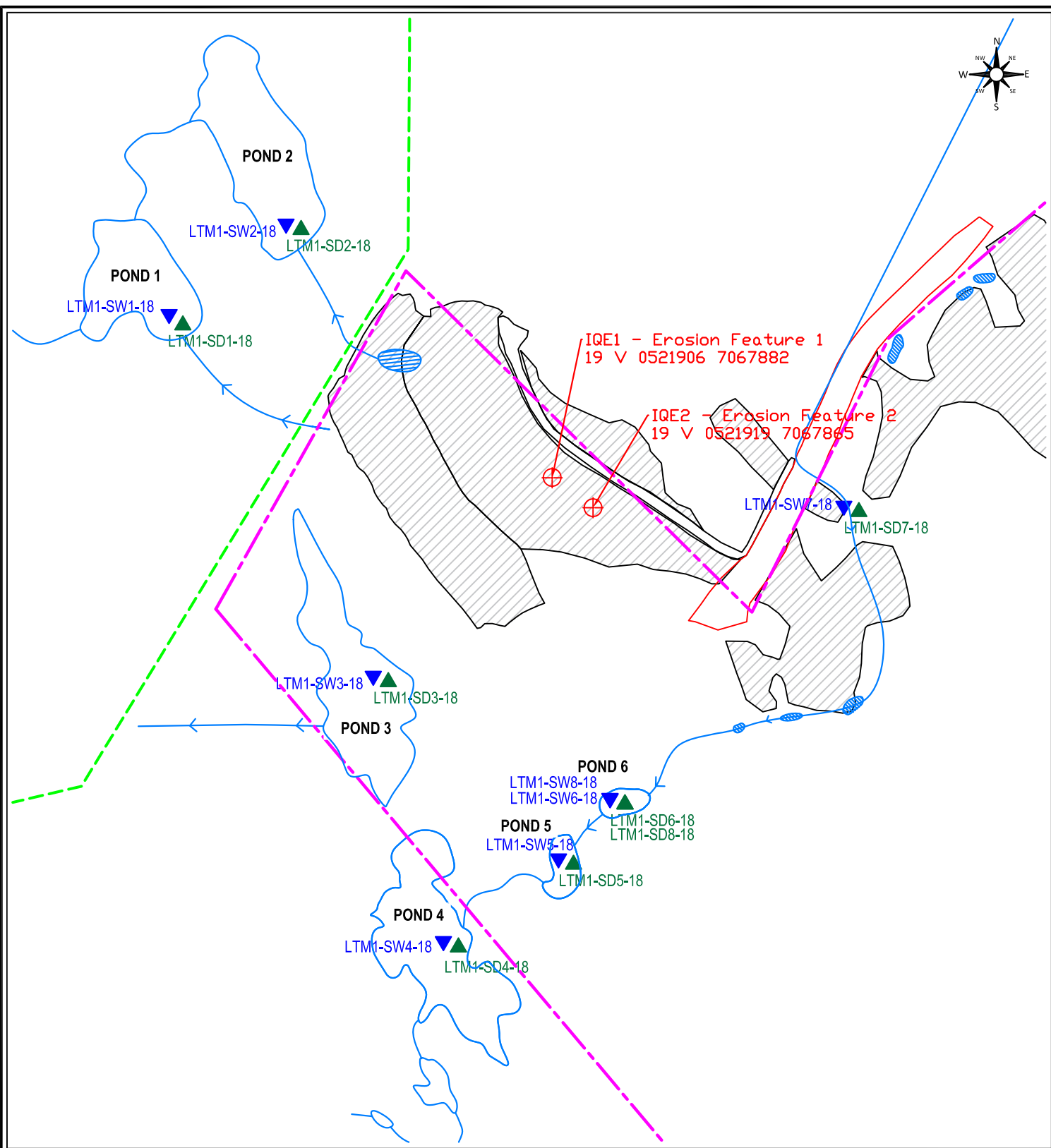
Figures



References:
Google Earth images, Retrieved January 2019

Title:	Site Location	
Project:	FORMER IQALUIT METAL DUMP AND COMMUNITY LANDFILL SITE REMEDIATION SUMMARY REPORT	
Client:	PSPC - TRANSPORT CANADA	
 	Date:	JANUARY 2019
	FIGURE 1	

TO BE PRINTED IN COLOUR ON 8.5"x11" PAPER ONLY - DO NOT SCALE



Legend

- POOLING WATER
- PROPERTY BOUNDARY
- PARK BOUNDARY
- STREAM/DRAINAGE

- EXTENT OF COMPLETED LANDFILL & CAPPING
- ACCESS ROAD

LONG TERM MONITORING SAMPLES

- LTM-SW4 SURFACE WATER SAMPLE STATION
- LTM-SD4 SEDIMENT SAMPLE STATION

Note: Adapted from Arcadis file:
102153-000_remediation_report_2018-01-04.dwg



Title: LONG TERM MONITORING
SAMPLE LOCATIONS

Project: FORMER IQALUIT METAL DUMP AND
COMMUNITY LANDFILL
SITE REMEDIATION SUMMARY REPORT

Client: PSPC - TRANSPORT CANADA



Date: JANUARY 2019

FIGURE 2

Appendix B

Analytical Results



Table 2. Surface Water Sample Lab Results

Maxxam ID	Units	CCME Freshwater ¹	CCME Marine ²	Alberta Tier ³	LTM1	DUP 1	LTM1-SW1-18	LTM2	LTM2	LTM1-SW2-18	LTM3	LTM3	LTM1-SW3-18	LTM4	LTM4	LTM1-SW4-18	LTM5	LTM5	LTM1-SW5-18	LTM6	LTM6	LTM1-SW6-18	LTM1-SW8-18	RPD	LTM7	LTM7	DUP2	LTM1-SW7-18
Station ID					1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	6		7	7	7	7
Date					21/Sep/17	21/Sep/17	19/Sep/18	21/Sep/17	3/Oct/17	19/Sep/18	21/Sep/17	3/Oct/17	19/Sep/18	21/Sep/17	3/Oct/17	19/Sep/18	21/Sep/17	3/Oct/17	19/Sep/18	21/Sep/17	3/Oct/17	19/Sep/18	19/Sep/18		21/Sep/17	3/Oct/17	3/Oct/17	19/Sep/18
Source					ARCADIS 2017	ARCADIS 2017	OCI	ARCADIS 2017	ARCADIS 2017	OCI	ARCADIS 2017	ARCADIS 2017	OCI	ARCADIS 2017	ARCADIS 2017	OCI	ARCADIS 2017	ARCADIS 2017	OCI	ARCADIS 2017	ARCADIS 2017	OCI	OCI		ARCADIS 2017	ARCADIS 2017	ARCADIS 2017	OCI
Parameter (ug/L)																												
PHCs, F1 to F4 (Including BTEX)																												
Benzene	ug/L	370	110		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	nc	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	ug/L	90	25		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.69	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	nc	<0.20	<0.20	<0.20	<0.20
Toluene	ug/L	2	215		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	nc	<0.20	<0.20	<0.20	<0.20
o-Xylene	ug/L	-	-		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	nc	<0.20	<0.20	<0.20	<0.20
m+p-Xylene	ug/L	-	-		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	nc	<0.40	<0.40	<0.40	<0.40
Xylenes (total)	ug/L	-	-		<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	nc	<0.40	<0.40	<0.40	<0.40
F1 (C6-C10)	ug/L	-	-	2200	<25	<25	<25	<25	<25	<25	<25	56	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	nc	<25	<25	<25	<25
F1 (C6-C10) minus BTEX	ug/L	-	-		<25	<25	<25	<25	<25	<25	<25	56	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	nc	<25	<25	<25	<25
F2 (C10-C16)	ug/L	-	-	1100	<100	<100	<100	<100	<100	<100	<100	220	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nc	<100	<100	<100	<100
F3 (C16-C34)	ug/L	-	-		<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	nc	<200	<200	<200	<200
F4 (C34-C50)	ug/L	-	-		<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	nc	<200	<200	<200	<200
Reached Baseline at C50	-	-	-		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Metals																												
Arsenic	ug/L	5	12.5		<1.0	<1.0	<1.0	<0.10	<0.10	<1.0	<0.50	0.6	<1.0	<0.10	<0.10	<1.0	<0.10	<0.10	<1.0	<0.10	<0.10	<1.0	<1.0	nc	0.15	0.17	0.17	<1.0
Cadmium	ug/L	0.09	0.12		<0.10	<0.10	<0.10	<0.010	0.111	<0.10	<0.050	0.017	<0.10	0.021	0.04	<0.10	0.035	0.043	0.14	0.025	0.043	0.15	<0.10	nc	<0.010	0.013	0.019	<0.1
Chromium	ug/L	-	-		<10	<10	<5	<1.0	<1.0	<5	<5.0	<1.0	<5	<1.0	<1.0	<5	<1.0	<1.0	<5	<1.0	<1.0	<5	<5	nc	<1.0	<1.0	<1.0	<5
Lead	ug/L	See Note 4			<2.0	<2.0	<0.5	0.64	2.31	<0.5	<1.0	12.9	<0.5	<0.20	<0.20	<0.5	0.26	<0.20	1.8	<0.20	<0.20	2.4	1.6	0.40	0.21	0.61	0.62	<0.5
Nickel	ug/L	See Note 4			<10	<10	<1	<1.0	1.3	<1	<5.0	2.5	<1	<1.0	<1.0	<1	<1.0	<1.0	<1	<1.0	<1.0	<1	<1	nc	<1.0	<1.0	1.3	<1
Zinc	ug/L	7	-		<50	<50	5.6	<5.0	14.7	<5	68	18.4	<5	<5.0	5.3	<5	5.7	28	16	14.4	9.1	16	13	0.21	40.8	223	254	57
PCBs and Pesticides																												
Aroclor 1016	ug/L	-	-		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05				<0.05	<0.05	<0.05	
Aroclor 1221	ug/L	-	-		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05				<0.05	<0.05	<0.05	
Aroclor 1232	ug/L	-	-		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05		<0.05	<0.05				<0.05	<0.05	<0.05	
Aroclor 1242	ug/L	-	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	nc	<0.05	<0.05	<0.05	<0.05
Aroclor 1248	ug/L	-	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	nc	<0.05	<0.05	<0.05	<0.05
Aroclor 1254	ug/L	-	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	nc	<0.05	<0.05	<0.05	<0.05
Aroclor 1260	ug/L	-	-		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	nc	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyls	ug/L	*	*		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	nc	<0.05	<0.05	<0.05	<0.05
Other																												
Total Dissolved Solid (TDS)	mg/L	-	-				1880			1340			4740			395			170			130	65					80
Low Level Total Suspended Solids (TSS)	mg/L	-	-				7			1			5			1			28			64	25					1
Hardness (CaCO3)	mg/L	-	-				350			250			840			110			46			44	44					50
Lead Criteria (Based on Hardness)	ug/L						7			7			7			3.59			1			1	1					1
Nickel Criteria (Based on Hardness)	ug/L						150			150			150			102.76			25			25	25					25
Temperature (field, °C)	-	-					3.11			1.01			1.48			0.76			1.01			0.92	0.92					1.68
pH (lab)		6.5-9	7-8.7		7.67	7.63	7.59	7.67	6.64	7.49	7.54	6.79	7.52	7.64	7.43	7.62	7.61	7.41	7.45	7.63	7.37	7.42	7.21	0.03	7.31	7.23	7.22	7.29
pH (field)							6.14			6.51			6.41			7.52			7.93			7.6	7.6					7.5
Conductivity	mS/cm						3.13			2.56			8.92			1.27			0.145			0.109	0.109					0.12

Notes:

¹ Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Freshwater. (Retrieved January 2019)

² Canadian Council of Ministers of the Environment (CCME), Water Quality Guidelines for the Protection of Aquatic Life. Marine. (Retrieved January 2019)

³ Alberta Government, Alberta Tier 1 Soil and Groundwater Guidelines. Table 2. Updated 2019

⁴ Guideline is hardness dependent

20= Denotes Exceedance of CCME Criteria for lowest value of Marine/Freshwater Guidelines

nc= not calculable

Table 3. Soil Sample Lab Results

Sample ID Station ID Source Sampling Date	UNITS	MDL	SQGPAL (Freshwater)		SQGPAL (Marine)		CCME Soil PL3	CCME Soil CL4	CWS Soil PL5	CWS Soil CL6	LTM-SD1-18 1 OCI	LTM-SD2-18 2 OCI	LTM-SD3-18 3 OCI	LTM-SD4-18 4 OCI	LTM-SD5-18 5 OCI	LTM-SD6-18 6 OCI	LTM-SD8-18 6 OCI	RPD	LTM-SD7-18 7 OCI
			ISQG	PEL	ISQG	PEL					9/19/2018	9/19/2018	9/19/2018	9/19/2018	9/19/2018	9/19/2018	9/19/2018		9/19/2018
Moisutre	%		-	-	-	-	-	-	-	-	19	15	16	21	89	82	84		72
PHCs, F1 to F4 (Including BTEX)																			
Benzene	ug/g	0.005	-	-	-	-	0.03	0.03	-	-	<0.0060	<0.0060	<0.0060	<0.0060	<0.036	<0.018	<0.024		<0.012
Toluene	ug/g	0.02	-	-	-	-	0.082	0.082	-	-	<0.020	<0.020	0.030	<0.020	<0.12	0.10	0.26	0.89	<0.040
Ethylbenzene	ug/g	0.01	-	-	-	-	0.37	0.37	-	-	<0.010	<0.010	<0.010	<0.010	<0.060	<0.030	<0.040		<0.020
o-Xylene	ug/g	0.02	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	<0.12	<0.060	<0.080		<0.040
p+m-Xylene	ug/g	0.04	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	<0.12	<0.060	<0.080		<0.040
Total Xylenes	ug/g	0.04	-	-	-	-	11	11	-	-	<0.020	<0.020	<0.020	<0.020	<0.12	<0.060	<0.080		<0.040
F1 (C6-C10)	ug/g	10	-	-	-	-	-	-	210	320	<10	<10	<10	<10	<60	<30	<40		<20
F1 (C6-C10) - BTEX	ug/g	10	-	-	-	-	-	-	-	-	<10	<10	<10	<10	<60	<30	<40		<20
F2 (C10-C16 Hydrocarbons)	ug/g	10	-	-	-	-	-	-	150	260	<10	<10	<10	<10	290	2700	210	1.71	<30
F3 (C16-C34 Hydrocarbons)	ug/g	50	-	-	-	-	-	-	300	1700	<50	<50	<50	<50	1400	1700	1200	0.34	290
F4 (C34-C50 Hydrocarbons)	ug/g	50	-	-	-	-	-	-	2800	3300	<50	<50	<50	<50	<500	540	420	0.25	<150
Metals																			
Arsenic (As)	ug/g	1.0	5.9	17.0	7.2	41.6	-	-	-	-	1.4	1.6	1.2	1.6	1.8	1.8	2.3	0.2	2.7
Cadmium (Cd)	ug/g	0.10	0.6	3.5	0.7	4.2	-	-	-	-	<0.10	0.2	<0.10	0.2	4.9	3.9	9.3	0.8	0.2
Chromium (Cr)	ug/g	1.0	37.3	90	52.3	160	-	-	-	-	28	22	19	17	23	28	35	0.22	43
Cobalt (Co)	ug/g	0.10	-	-	-	-	-	-	-	-	4.4	4.5	5.3	3.6	7.5	7.8	9.5	0.20	10
Lead (Pb)	ug/g	1.0	35.0	91.3	30.2	112	-	-	-	-	3.6	3.6	8.9	6.5	69	100	110	0.10	20
Nickel (Ni)	ug/g	0.50	-	-	-	-	-	-	-	-	7.5	8.2	5.5	5.3	14	12	16	0.29	15
Zinc (Zn)	ug/g	5.0	123	315	124	124	-	-	-	-	40	56	46	52	250	240	440	1	230
PCBs and Pesticides																			
Total PCB	ug/g	0.075	0.0341	0.277	0.0215	0.189	-	-	-	-	<0.010	<0.010	<0.010	<0.010	1.4	3.4	3.8	0.11	0.59
Aroclor 1242	ug/g	0.075	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.090	<0.60	<0.050		<0.040
Aroclor 1248	ug/g	0.075	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.090	<0.60	<0.050		<0.040
Aroclor 1254	ug/g	0.075	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.090	<0.60	<0.050		<0.040
Aroclor 1260	ug/g	0.075	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	1.4	3.4	3.8	0.11	0.59

Notes:

¹ CCME, Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Freshwater, ISQG (Retrieved February 2019)

² CCME, Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Freshwater, PEL (Retrieved February 2019)

³ CCME, Canadian Soil Quality Guidelines for the Protection of Environmental Health, Residential/Parkland Land-Use, coarse-grained soil (Retrieved February 2019)

⁴ CCME, Canadian Soil Quality Guidelines for the Protection of Environmental Health, Commercial Land-Use, coarse-grained soil (Retrieved February 2019)

⁵ CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - table 1, Tier 1 levels for PHCs, Residential/Parkland Use in coarse-grained surface soils

⁶ CCME (2008) Canadian-Wide Standards for Petroleum Hydrocarbons in Soil - table 1, Tier 1 levels for PHCs, Commercial Use in coarse-grained surface soils

20 =	Denotes exceedance of CCME for both freshwater/marine ISQG (or other criteria)
20 =	Denotes exceedance of CCME for freshwater ISQG
20 =	Denotes exceedance of CCME for marine ISQG
- =	No Guideline

Appendix C

Site Investigation Report

Iqaluit Former Military Dump – Compliance Monitoring Field Status Report

Field Report		Date: Wednesday September.19.2018 Consultant Name: DOJV
Author	Jonathan Markiewicz	Project Site/ Name: Iqaluit Former Military Dump – Compliance Monitoring
Distribution		Michael Brownlee, Jason Mauchan, Michael Billowits
Objective		Field Status Report
Reporting Items		
TOPIC		WORK ACTIVITY AND PROGRESS
Start and End Time		Tuesday September 18, 2018 – 4:00pm to 6:00pm Wednesday September 19, 2018 - 6:00am to 11:00am
Field Personnel on site		DR: Jonathan Markiewicz
Field Progress		- Observational Monitoring (Visual, Seepage, and Natural Environment) was completed on Sept 18, 2018 - No major issues observed, 2x MINOR (< 0.1m in depth, <0.1m in width and <1-m in length) erosion features observed on the slope crest that should be monitored overtime. - No Seepage observed – No Seepage (Soil or Water) samples required - Sampling was completed on Sept 19, 2018 - All seven LTM Stations were located - Surface Water quality readings were collected at each location - Surface water and sediment samples were collected at each location - Duplicate samples were collected from LTM Station No. 6. - Samples and equipment were shipped south
Schedule update		- Samples shipped south by priority, analyses by regular TAT, sample results received in 10-12 business days from September 19, 2018
Health /Safety		Daily Tailgate Completed - Slips and Trips - Carrying Loads over uneven surfaces
Deviations from workplan		- None
Notes: Include visitors, Any equipment issues etc		-
Weather & ground cover conditions		Sept 18 - Afternoon: 1°C, clear with some clouds Ground clear of snow Sept 19 - Morning: 0°C, clear and sunny Ground clear of snow
Lab summary		- Collected 1 Surface Water (SW) and one Sediment (SD) sample from each of the seven LTM stations - Collected one field duplicate for SW and SD at LTM station 6 and labelled LTM-8.



**Photo 1: Sign at south access to the Iqaluit FMD
(looking southwest)**



**Photo 2: Surface water monitoring and Sampling at LTM station 2, Pond 2
(looking north west)**



Photo 3: Main Landfill (looking north east).



**Photo 4: Main landfill crest at centre line.
(looking north)**



**Photo 5: Main Landfill and notification sign.
(looking southeast)**



**Photo 6: Swale located on south side of the Main Landfill
(looking west).**



**Photo 7: Secondary capped area – Vehicle Storage Area.
(looking southeast)**



Photo 8: Geese observed at the toe of the Main Landfill and near Ponds 1 and 2.

Appendix D

Laboratory Certificates of Analysis and Chain of Custody Forms

Your P.O. #: E2018-06
Your Project #: 1QFMD
Your C.O.C. #: 683278-01-01, 683278-02-01

Attention: Jonathan Marciewicz

Outcome Consultants Inc.
151 Holland Avenue
Suite 200
Ottawa, ON
CANADA K1A 0Y2

Report Date: 2018/10/10
Report #: R5434531
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B808860

Received: 2018/09/21, 16:00

Sample Matrix: Soil
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydrocarbons F2-F4 in Soil (1, 2)	8	2018/09/25	2018/09/26	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric) (1)	1	2018/09/29	2018/09/29	CAM SOP-00316	CCME PHC-CWS m
Strong Acid Leachable Metals by ICPMS (1)	6	2018/09/26	2018/09/26	CAM SOP-00447	EPA 6020B m
Strong Acid Leachable Metals by ICPMS (1)	2	2018/09/26	2018/09/27	CAM SOP-00447	EPA 6020B m
Moisture (1)	8	N/A	2018/09/26	CAM SOP-00445	Carter 2nd ed 51.2 m
Polychlorinated Biphenyl in Soil (1)	7	2018/09/25	2018/09/26	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Soil (1)	1	2018/09/25	2018/09/27	CAM SOP-00309	EPA 8082A m
Volatile Organic Compounds and F1 PHCs (1)	3	N/A	2018/09/27	CAM SOP-00230	EPA 8260 m
Volatile Organic Compounds and F1 PHCs (1)	5	N/A	2018/09/28	CAM SOP-00230	EPA 8260 m

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Chloride by Automated Colourimetry (1)	8	N/A	2018/09/26	CAM SOP-00463	EPA 325.2 m
Free (WAD) Cyanide (1)	8	N/A	2018/09/27	CAM SOP-00457	OMOE E3015 m
Total Cyanide (1)	8	2018/09/26	2018/09/27	CAM SOP-00457	OMOE E3015 5 m
Petroleum Hydro. CCME F1 & BTEX in Water (1)	8	N/A	2018/09/25	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	8	2018/09/27	2018/09/28	CAM SOP-00316	CCME PHC-CWS m
Fluoride (1)	3	2018/09/24	2018/09/26	CAM SOP-00449	SM 23 4500-F C m
Fluoride (1)	5	2018/09/25	2018/09/27	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO ₃) (1)	3	N/A	2018/09/27	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO ₃) (1)	5	N/A	2018/09/28	CAM SOP 00102/00408/00447	SM 2340 B
Total Metals Analysis by ICPMS (1)	8	N/A	2018/09/28	CAM SOP-00447	EPA 6020B m
Total Ammonia-N (1)	7	N/A	2018/09/26	CAM SOP-00441	EPA GS I-2522-90 m
Total Ammonia-N (1)	1	N/A	2018/09/28	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (1, 3)	3	N/A	2018/09/25	CAM SOP-00440	SM 23 4500-NO ₃ /NO ₂ B
Nitrate (NO ₃) and Nitrite (NO ₂) in Water (1, 3)	5	N/A	2018/09/26	CAM SOP-00440	SM 23 4500-NO ₃ /NO ₂ B

Your P.O. #: E2018-06
Your Project #: 1QFMD
Your C.O.C. #: 683278-01-01, 683278-02-01

Attention: Jonathan Marciewicz

Outcome Consultants Inc.
151 Holland Avenue
Suite 200
Ottawa, ON
CANADA K14 0Y2

Report Date: 2018/10/10
Report #: R5434531
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B808860

Received: 2018/09/21, 16:00

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Polychlorinated Biphenyl in Water (1)	6	2018/09/25	2018/09/26	CAM SOP-00309	EPA 8082A m
Polychlorinated Biphenyl in Water (1)	1	2018/09/25	2018/09/27	CAM SOP-00309	EPA 8082A m
pH (1)	3	N/A	2018/09/26	CAM SOP-00413	SM 4500H+ B m
pH (1)	5	N/A	2018/09/27	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Colourimetry (1)	8	N/A	2018/09/26	CAM SOP-00464	EPA 375.4 m
Sulphide (1)	6	N/A	2018/09/25	CAM SOP-00455	SM 23 4500-S G m
Sulphide (1)	2	N/A	2018/09/26	CAM SOP-00455	SM 23 4500-S G m
Total Dissolved Solids (1)	8	2018/09/25	2018/09/26	CAM SOP-00428	SM 23 2540C m
Low Level Total Suspended Solids (1)	8	2018/09/26	2018/09/27	CAM SOP-00428	SM 23 2540D m

Remarks:

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

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

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

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

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

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

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

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

Your P.O. #: E2018-06
Your Project #: 1QFMD
Your C.O.C. #: 683278-01-01, 683278-02-01

Attention: Jonathan Marciewicz

Outcome Consultants Inc.
151 Holland Avenue
Suite 200
Ottawa, ON
CANADA K14 0Y2

Report Date: 2018/10/10
Report #: R5434531
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B808860

Received: 2018/09/21, 16:00

- (1) This test was performed by Maxxam Analytics Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

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

Sara Singh, B.Sc, Senior Project Manager

Email: sarasingh@maxxam.ca

Phone# (905)817-5827

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

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HVD228	HVD229	HVD230	HVD231	HVD232	HVD233		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01	683278-02-01	683278-02-01	683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	LTM1-SD4-18	LTM1-SD5-18	LTM1-SD6-18	RDL	QC Batch

Inorganics									
Moisture	%	19	15	16	21	89	82	1.0	5751935

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam ID		HVD234	HVD235		
Sampling Date		2018/09/19	2018/09/19		
COC Number		683278-02-01	683278-02-01		
	UNITS	LTM1-SD7-18	LTM1-SD8-18	RDL	QC Batch

Inorganics					
Moisture	%	72	84	1.0	5751935

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HVD228	HVD229	HVD230	HVD231		HVD232		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19		2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01	683278-02-01		683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	LTM1-SD4-18	QC Batch	LTM1-SD5-18	RDL	QC Batch

Metals

Acid Extractable Arsenic (As)	ug/g	1.4	1.6	1.2	1.6	5751450	1.8	1.0	5751463
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.18	<0.10	0.20	5751450	4.9	0.10	5751463
Acid Extractable Chromium (Cr)	ug/g	28	22	19	17	5751450	23	1.0	5751463
Acid Extractable Cobalt (Co)	ug/g	4.4	4.5	5.3	3.6	5751450	7.5	0.10	5751463
Acid Extractable Lead (Pb)	ug/g	3.6	3.6	8.9	6.5	5751450	69	1.0	5751463
Acid Extractable Nickel (Ni)	ug/g	7.5	8.2	5.5	5.3	5751450	14	0.50	5751463
Acid Extractable Zinc (Zn)	ug/g	40	56	46	52	5751450	250	5.0	5751463

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam ID		HVD233		HVD234	HVD235		
Sampling Date		2018/09/19		2018/09/19	2018/09/19		
COC Number		683278-02-01		683278-02-01	683278-02-01		
	UNITS	LTM1-SD6-18	QC Batch	LTM1-SD7-18	LTM1-SD8-18	RDL	QC Batch

Metals

Acid Extractable Arsenic (As)	ug/g	1.8	5751463	2.7	2.3	1.0	5751450
Acid Extractable Cadmium (Cd)	ug/g	3.9	5751463	0.22	9.3	0.10	5751450
Acid Extractable Chromium (Cr)	ug/g	28	5751463	43	35	1.0	5751450
Acid Extractable Cobalt (Co)	ug/g	7.8	5751463	10	9.5	0.10	5751450
Acid Extractable Lead (Pb)	ug/g	100	5751463	20	110	1.0	5751450
Acid Extractable Nickel (Ni)	ug/g	12	5751463	15	16	0.50	5751450
Acid Extractable Zinc (Zn)	ug/g	240	5751463	230	440	5.0	5751450

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD228	HVD229	HVD230			HVD231		
Sampling Date		2018/09/19	2018/09/19	2018/09/19			2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01			683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	RDL	QC Batch	LTM1-SD4-18	RDL	QC Batch
Volatile Organics									
Acetone (2-Propanone)	ug/g						<0.50	0.50	5754773
Benzene	ug/g	<0.0060	<0.0060	<0.0060	0.0060	5751433	<0.0060	0.0060	5754773
Bromodichloromethane	ug/g						<0.050	0.050	5754773
Bromoform	ug/g						<0.050	0.050	5754773
Bromomethane	ug/g						<0.050	0.050	5754773
Carbon Tetrachloride	ug/g						<0.050	0.050	5754773
Chlorobenzene	ug/g						<0.050	0.050	5754773
Chloroform	ug/g						<0.050	0.050	5754773
Dibromochloromethane	ug/g						<0.050	0.050	5754773
1,2-Dichlorobenzene	ug/g						<0.050	0.050	5754773
1,3-Dichlorobenzene	ug/g						<0.050	0.050	5754773
1,4-Dichlorobenzene	ug/g						<0.050	0.050	5754773
Dichlorodifluoromethane (FREON 12)	ug/g						<0.050	0.050	5754773
1,1-Dichloroethane	ug/g						<0.050	0.050	5754773
1,2-Dichloroethane	ug/g						<0.050	0.050	5754773
1,1-Dichloroethylene	ug/g						<0.050	0.050	5754773
cis-1,2-Dichloroethylene	ug/g						<0.050	0.050	5754773
trans-1,2-Dichloroethylene	ug/g						<0.050	0.050	5754773
1,2-Dichloropropane	ug/g						<0.050	0.050	5754773
cis-1,3-Dichloropropene	ug/g						<0.030	0.030	5754773
trans-1,3-Dichloropropene	ug/g						<0.040	0.040	5754773
Ethylbenzene	ug/g	<0.010	<0.010	<0.010	0.010	5751433	<0.010	0.010	5754773
Ethylene Dibromide	ug/g						<0.050	0.050	5754773
Hexane	ug/g						<0.050	0.050	5754773
Methylene Chloride(Dichloromethane)	ug/g						<0.050	0.050	5754773
Methyl Isobutyl Ketone	ug/g						<0.50	0.50	5754773
Methyl Ethyl Ketone (2-Butanone)	ug/g						<0.50	0.50	5754773
Methyl t-butyl ether (MTBE)	ug/g						<0.050	0.050	5754773
Styrene	ug/g						<0.050	0.050	5754773
1,1,1,2-Tetrachloroethane	ug/g						<0.050	0.050	5754773
1,1,2,2-Tetrachloroethane	ug/g						<0.050	0.050	5754773
Tetrachloroethylene	ug/g						<0.050	0.050	5754773
Toluene	ug/g	<0.020	<0.020	0.030	0.020	5751433	<0.020	0.020	5754773
1,1,1-Trichloroethane	ug/g						<0.050	0.050	5754773
1,1,2-Trichloroethane	ug/g						<0.050	0.050	5754773
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD228	HVD229	HVD230			HVD231		
Sampling Date		2018/09/19	2018/09/19	2018/09/19			2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01			683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	RDL	QC Batch	LTM1-SD4-18	RDL	QC Batch
Trichloroethylene	ug/g						<0.010	0.010	5754773
Vinyl Chloride	ug/g						<0.020	0.020	5754773
p+m-Xylene	ug/g	<0.020	<0.020	<0.020	0.020	5751433	<0.020	0.020	5754773
o-Xylene	ug/g	<0.020	<0.020	<0.020	0.020	5751433	<0.020	0.020	5754773
Total Xylenes	ug/g	<0.020	<0.020	<0.020	0.020	5751433	<0.020	0.020	5754773
Trichlorofluoromethane (FREON 11)	ug/g						<0.050	0.050	5754773
F1 (C6-C10)	ug/g	<10	<10	<10	10	5751433	<10	10	5754773
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	10	5751433	<10	10	5754773
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	92	94	91		5751433	81		5754773
D10-o-Xylene	%	86	138 (1)	133 (1)		5751433	88		5754773
D4-1,2-Dichloroethane	%	110	112	112		5751433	118		5754773
D8-Toluene	%	93	92	93		5751433	89		5754773
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									
(1) The recovery for the extraction surrogate compound was above the upper control limit. Visible loss of methanol was observed in this sample, with abnormally low soil weight calculated. As a result, there is a high bias associated with the values reported, for results that were not detected (ND), this bias has no impact.									

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD231		HVD232		HVD233		HVD234		
Sampling Date		2018/09/19		2018/09/19		2018/09/19		2018/09/19		
COC Number		683278-02-01		683278-02-01		683278-02-01		683278-02-01		
	UNITS	LTM1-SD4-18 Lab-Dup	RDL	LTM1-SD5-18	RDL	LTM1-SD6-18	RDL	LTM1-SD7-18	RDL	QC Batch

Volatile Organics										
Acetone (2-Propanone)	ug/g	<0.50	0.50	3.7	3.0	<1.5	1.5	<1.0	1.0	5754773
Benzene	ug/g	<0.0060	0.0060	<0.036	0.036	<0.018	0.018	<0.012	0.012	5754773
Bromodichloromethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Bromoform	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Bromomethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Carbon Tetrachloride	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Chlorobenzene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Chloroform	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Dibromochloromethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,2-Dichlorobenzene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,3-Dichlorobenzene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,4-Dichlorobenzene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,1-Dichloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,2-Dichloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,1-Dichloroethylene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,2-Dichloropropane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	<0.18	0.18	<0.090	0.090	<0.060	0.060	5754773
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	<0.24	0.24	<0.12	0.12	<0.080	0.080	5754773
Ethylbenzene	ug/g	<0.010	0.010	<0.060	0.060	<0.030	0.030	<0.020	0.020	5754773
Ethylene Dibromide	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Hexane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	<3.0	3.0	<1.5	1.5	<1.0	1.0	5754773
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	<3.0	3.0	<1.5	1.5	<1.0	1.0	5754773
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Styrene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Tetrachloroethylene	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Toluene	ug/g	<0.020	0.020	<0.12	0.12	0.10	0.060	<0.040	0.040	5754773
1,1,1-Trichloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD231		HVD232		HVD233		HVD234		
Sampling Date		2018/09/19		2018/09/19		2018/09/19		2018/09/19		
COC Number		683278-02-01		683278-02-01		683278-02-01		683278-02-01		
	UNITS	LTM1-SD4-18 Lab-Dup	RDL	LTM1-SD5-18	RDL	LTM1-SD6-18	RDL	LTM1-SD7-18	RDL	QC Batch
1,1,2-Trichloroethane	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	<0.10	0.10	5754773
Trichloroethylene	ug/g	<0.010	0.010	<0.060	0.060	<0.030	0.030	0.062	0.020	5754773
Vinyl Chloride	ug/g	<0.020	0.020	<0.12	0.12	<0.060	0.060	<0.040	0.040	5754773
p+m-Xylene	ug/g	<0.020	0.020	<0.12	0.12	<0.060	0.060	<0.040	0.040	5754773
o-Xylene	ug/g	<0.020	0.020	<0.12	0.12	<0.060	0.060	<0.040	0.040	5754773
Total Xylenes	ug/g	<0.020	0.020	<0.12	0.12	<0.060	0.060	<0.040	0.040	5754773
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	<0.30	0.30	<0.15	0.15	0.36	0.10	5754773
F1 (C6-C10)	ug/g	<10	10	<60	60	<30	30	<20	20	5754773
F1 (C6-C10) - BTEX	ug/g	<10	10	<60	60	<30	30	<20	20	5754773
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	80		80		85		87		5754773
D10-o-Xylene	%	87		90		89		102		5754773
D4-1,2-Dichloroethane	%	121		121		122		88		5754773
D8-Toluene	%	87		88		89		89		5754773
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
Lab-Dup = Laboratory Initiated Duplicate										

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD235		
Sampling Date		2018/09/19		
COC Number		683278-02-01		
	UNITS	LTM1-SD8-18	RDL	QC Batch
Volatile Organics				
Acetone (2-Propanone)	ug/g	<2.0	2.0	5754773
Benzene	ug/g	<0.024	0.024	5754773
Bromodichloromethane	ug/g	<0.20	0.20	5754773
Bromoform	ug/g	<0.20	0.20	5754773
Bromomethane	ug/g	<0.20	0.20	5754773
Carbon Tetrachloride	ug/g	<0.20	0.20	5754773
Chlorobenzene	ug/g	<0.20	0.20	5754773
Chloroform	ug/g	<0.20	0.20	5754773
Dibromochloromethane	ug/g	<0.20	0.20	5754773
1,2-Dichlorobenzene	ug/g	<0.20	0.20	5754773
1,3-Dichlorobenzene	ug/g	<0.20	0.20	5754773
1,4-Dichlorobenzene	ug/g	<0.20	0.20	5754773
Dichlorodifluoromethane (FREON 12)	ug/g	<0.20	0.20	5754773
1,1-Dichloroethane	ug/g	<0.20	0.20	5754773
1,2-Dichloroethane	ug/g	<0.20	0.20	5754773
1,1-Dichloroethylene	ug/g	<0.20	0.20	5754773
cis-1,2-Dichloroethylene	ug/g	<0.20	0.20	5754773
trans-1,2-Dichloroethylene	ug/g	<0.20	0.20	5754773
1,2-Dichloropropane	ug/g	<0.20	0.20	5754773
cis-1,3-Dichloropropene	ug/g	<0.12	0.12	5754773
trans-1,3-Dichloropropene	ug/g	<0.16	0.16	5754773
Ethylbenzene	ug/g	<0.040	0.040	5754773
Ethylene Dibromide	ug/g	<0.20	0.20	5754773
Hexane	ug/g	<0.20	0.20	5754773
Methylene Chloride(Dichloromethane)	ug/g	<0.20	0.20	5754773
Methyl Isobutyl Ketone	ug/g	<2.0	2.0	5754773
Methyl Ethyl Ketone (2-Butanone)	ug/g	<2.0	2.0	5754773
Methyl t-butyl ether (MTBE)	ug/g	<0.20	0.20	5754773
Styrene	ug/g	<0.20	0.20	5754773
1,1,1,2-Tetrachloroethane	ug/g	<0.20	0.20	5754773
1,1,2,2-Tetrachloroethane	ug/g	<0.20	0.20	5754773
Tetrachloroethylene	ug/g	<0.20	0.20	5754773
Toluene	ug/g	0.26	0.080	5754773
1,1,1-Trichloroethane	ug/g	<0.20	0.20	5754773
1,1,2-Trichloroethane	ug/g	<0.20	0.20	5754773
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		HVD235		
Sampling Date		2018/09/19		
COC Number		683278-02-01		
	UNITS	LTM1-SD8-18	RDL	QC Batch
Trichloroethylene	ug/g	<0.040	0.040	5754773
Vinyl Chloride	ug/g	<0.080	0.080	5754773
p+m-Xylene	ug/g	<0.080	0.080	5754773
o-Xylene	ug/g	<0.080	0.080	5754773
Total Xylenes	ug/g	<0.080	0.080	5754773
Trichlorofluoromethane (FREON 11)	ug/g	<0.20	0.20	5754773
F1 (C6-C10)	ug/g	<40	40	5754773
F1 (C6-C10) - BTEX	ug/g	<40	40	5754773
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	98		5754773
D10-o-Xylene	%	106		5754773
D4-1,2-Dichloroethane	%	92		5754773
D8-Toluene	%	101		5754773
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HVD228	HVD229	HVD230	HVD231		HVD232		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19		2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01	683278-02-01		683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	LTM1-SD4-18	RDL	LTM1-SD5-18	RDL	QC Batch
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	10	290	100	5751223
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	<50	50	1400	500	5751223
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	<50	50	<500	500	5751223
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes		Yes		5751223
Surrogate Recovery (%)									
o-Terphenyl	%	109	105	101	97		97		5751223
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

Maxxam ID		HVD233		HVD234			HVD235		
Sampling Date		2018/09/19		2018/09/19			2018/09/19		
COC Number		683278-02-01		683278-02-01			683278-02-01		
	UNITS	LTM1-SD6-18	RDL	LTM1-SD7-18	RDL	QC Batch	LTM1-SD8-18	RDL	QC Batch
F2-F4 Hydrocarbons									
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g						1100	530	5758758
F2 (C10-C16 Hydrocarbons)	ug/g	2700	50	<30	30	5751223	210	50	5751223
F3 (C16-C34 Hydrocarbons)	ug/g	1700	250	290	150	5751223	1200	250	5751223
F4 (C34-C50 Hydrocarbons)	ug/g	540	250	<150	150	5751223	420	250	5751223
Reached Baseline at C50	ug/g	Yes		Yes		5751223	No		5751223
Surrogate Recovery (%)									
o-Terphenyl	%	99		99		5751223	97		5751223
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HVD228	HVD229	HVD230	HVD231		HVD232		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19		2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-02-01	683278-02-01		683278-02-01		
	UNITS	LTM1-SD1-18	LTM1-SD2-18	LTM1-SD3-18	LTM1-SD4-18	RDL	LTM1-SD5-18	RDL	QC Batch
PCBs									
Aroclor 1242	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	<0.090	0.090	5751178
Aroclor 1248	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	<0.090	0.090	5751178
Aroclor 1254	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	<0.090	0.090	5751178
Aroclor 1260	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	1.4	0.090	5751178
Total PCB	ug/g	<0.010	<0.010	<0.010	<0.010	0.010	1.4	0.090	5751178
Surrogate Recovery (%)									
Decachlorobiphenyl	%	99	99	102	102		126		5751178
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

Maxxam ID		HVD233		HVD234		HVD235		
Sampling Date		2018/09/19		2018/09/19		2018/09/19		
COC Number		683278-02-01		683278-02-01		683278-02-01		
	UNITS	LTM1-SD6-18	RDL	LTM1-SD7-18	RDL	LTM1-SD8-18	RDL	QC Batch
PCBs								
Aroclor 1242	ug/g	<0.60	0.60	<0.040	0.040	<0.050	0.050	5751178
Aroclor 1248	ug/g	<0.60	0.60	<0.040	0.040	<0.050	0.050	5751178
Aroclor 1254	ug/g	<0.60	0.60	<0.040	0.040	<0.050	0.050	5751178
Aroclor 1260	ug/g	3.4	0.60	0.59	0.040	3.8	0.050	5751178
Total PCB	ug/g	3.4	0.60	0.59	0.040	3.8	0.050	5751178
Surrogate Recovery (%)								
Decachlorobiphenyl	%	102		108		127		5751178
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

RESULTS OF ANALYSES OF WATER

Maxxam ID		HVD220			HVD221			HVD221		
Sampling Date		2018/09/19			2018/09/19			2018/09/19		
COC Number		683278-01-01			683278-01-01			683278-01-01		
	UNITS	LTM1-SW1-18	RDL	QC Batch	LTM1-SW2-18	RDL	QC Batch	LTM1-SW2-18 Lab-Dup	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO ₃)	mg/L	350	1.0	5747790	250	1.0	5747790			
Inorganics										
Total Ammonia-N	mg/L	<0.25 (1)	0.25	5750254	<0.25 (1)	0.25	5750254			
Total Dissolved Solids	mg/L	1880	10	5751063	1340	10	5751063			
Fluoride (F ⁻)	mg/L	0.21	0.10	5750472	<0.10	0.10	5750472	<0.10	0.10	5750472
pH	pH	7.59		5750482	7.49		5750482	7.36		5750482
Total Suspended Solids	mg/L	7	1	5750360	1	1	5750360			
Dissolved Sulphate (SO ₄)	mg/L	150	1.0	5749658	95	1.0	5749658	96	1.0	5749658
Sulphide	mg/L	<0.020	0.020	5749317	<0.020	0.020	5749317			
Total Cyanide (CN)	mg/L	<0.0050	0.0050	5752288	<0.0050	0.0050	5752288			
WAD Cyanide (Free)	mg/L	<0.0010	0.0010	5752300	<0.0010	0.0010	5752300			
Dissolved Chloride (Cl ⁻)	mg/L	1100	15	5749651	680	10	5749651	680	10	5749651
Nitrite (N)	mg/L	<0.010	0.010	5749901	<0.010	0.010	5749907			
Nitrate (N)	mg/L	<0.10	0.10	5749901	0.40	0.10	5749907			
Nitrate + Nitrite (N)	mg/L	<0.10	0.10	5749901	0.40	0.10	5749907			
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
Lab-Dup = Laboratory Initiated Duplicate										
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.										

RESULTS OF ANALYSES OF WATER

Maxxam ID		HVD222			HVD223			HVD224		
Sampling Date		2018/09/19			2018/09/19			2018/09/19		
COC Number		683278-01-01			683278-01-01			683278-01-01		
	UNITS	LTM1-SW3-18	RDL	QC Batch	LTM1-SW4-18	RDL	QC Batch	LTM1-SW5-18	RDL	QC Batch
Calculated Parameters										
Hardness (CaCO ₃)	mg/L	840	1.0	5747790	110	1.0	5748063	46	1.0	5748063
Inorganics										
Total Ammonia-N	mg/L	<0.25 (1)	0.25	5750254	<0.050	0.050	5750254	<0.050	0.050	5751569
Total Dissolved Solids	mg/L	4740	20	5751063	395	10	5751063	170	10	5751063
Fluoride (F ⁻)	mg/L	0.19	0.10	5750472	<0.10	0.10	5750472	<0.10	0.10	5750472
pH	pH	7.52		5750482	7.62		5750482	7.45		5750482
Total Suspended Solids	mg/L	5	1	5750360	1	1	5750360	28	1	5750360
Dissolved Sulphate (SO ₄)	mg/L	320	2.0	5749658	39	1.0	5749658	6.4	1.0	5749658
Sulphide	mg/L	<0.020	0.020	5749317	<0.020	0.020	5749317	<0.020	0.020	5749317
Total Cyanide (CN)	mg/L	<0.0050	0.0050	5752288	<0.0050	0.0050	5752288	<0.0050	0.0050	5752288
WAD Cyanide (Free)	mg/L	<0.0010	0.0010	5752300	<0.0010	0.0010	5752300	<0.0010	0.0010	5752300
Dissolved Chloride (Cl ⁻)	mg/L	2700	40	5749651	230	3.0	5749651	12	1.0	5749651
Nitrite (N)	mg/L	<0.010	0.010	5749907	<0.010	0.010	5749907	<0.010	0.010	5749901
Nitrate (N)	mg/L	0.47	0.10	5749907	0.26	0.10	5749907	0.35	0.10	5749901
Nitrate + Nitrite (N)	mg/L	0.47	0.10	5749907	0.26	0.10	5749907	0.35	0.10	5749901
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.										

RESULTS OF ANALYSES OF WATER

Maxxam ID		HVD225			HVD225			HVD226	HVD227		
Sampling Date		2018/09/19			2018/09/19			2018/09/19	2018/09/19		
COC Number		683278-01-01			683278-01-01			683278-01-01	683278-01-01		
	UNITS	LTM1-SW6-18	RDL	QC Batch	LTM1-SW6-18 Lab-Dup	RDL	QC Batch	LTM1-SW7-18	LTM1-SW8-18	RDL	QC Batch
Calculated Parameters											
Hardness (CaCO ₃)	mg/L	44	1.0	5748063				50	44	1.0	5748063
Inorganics											
Total Ammonia-N	mg/L	<0.050	0.050	5750254				0.72	<0.050	0.050	5750254
Total Dissolved Solids	mg/L	130	10	5751063				80	65	10	5751063
Fluoride (F ⁻)	mg/L	<0.10	0.10	5748478				<0.10	<0.10	0.10	5748478
pH	pH	7.42		5748489				7.29	7.21		5748489
Total Suspended Solids	mg/L	64	1	5750360				1	25	1	5750360
Dissolved Sulphate (SO ₄)	mg/L	4.7	1.0	5749903	4.8	1.0	5749903	4.0	4.9	1.0	5749658
Sulphide	mg/L	<0.020	0.020	5749317				<0.020	<0.020	0.020	5750464
Total Cyanide (CN)	mg/L	<0.0050	0.0050	5752288				<0.0050	<0.0050	0.0050	5752288
WAD Cyanide (Free)	mg/L	<0.0010	0.0010	5752300				<0.0010	<0.0010	0.0010	5752300
Dissolved Chloride (Cl ⁻)	mg/L	8.1	1.0	5749897	8.5	1.0	5749897	7.1	8.5	1.0	5749651
Nitrite (N)	mg/L	<0.010	0.010	5748504				<0.010	<0.010	0.010	5748504
Nitrate (N)	mg/L	0.32	0.10	5748504				0.30	0.32	0.10	5748504
Nitrate + Nitrite (N)	mg/L	0.32	0.10	5748504				0.30	0.32	0.10	5748504
RDL = Reportable Detection Limit											
QC Batch = Quality Control Batch											
Lab-Dup = Laboratory Initiated Duplicate											

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		HVD220	HVD221	HVD222	HVD223	HVD224	HVD225		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01		
	UNITS	LTM1-SW1-18	LTM1-SW2-18	LTM1-SW3-18	LTM1-SW4-18	LTM1-SW5-18	LTM1-SW6-18	RDL	QC Batch

Metals									
Total Arsenic (As)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	5750065
Total Cadmium (Cd)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00015	0.00010	5750065
Total Chromium (Cr)	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	5750065
Total Cobalt (Co)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	0.00068	0.00050	5750065
Total Lead (Pb)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.0018	0.0024	0.00050	5750065
Total Nickel (Ni)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	5750065
Total Zinc (Zn)	mg/L	0.0056	<0.0050	<0.0050	<0.0050	0.016	0.016	0.0050	5750065

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam ID		HVD226	HVD227		
Sampling Date		2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01		
	UNITS	LTM1-SW7-18	LTM1-SW8-18	RDL	QC Batch

Metals					
Total Arsenic (As)	mg/L	<0.0010	<0.0010	0.0010	5750065
Total Cadmium (Cd)	mg/L	<0.00010	<0.00010	0.00010	5750065
Total Chromium (Cr)	mg/L	<0.0050	<0.0050	0.0050	5750065
Total Cobalt (Co)	mg/L	<0.00050	0.00053	0.00050	5750065
Total Lead (Pb)	mg/L	<0.00050	0.0016	0.00050	5750065
Total Nickel (Ni)	mg/L	<0.0010	<0.0010	0.0010	5750065
Total Zinc (Zn)	mg/L	0.057	0.013	0.0050	5750065

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HVD220	HVD221	HVD222	HVD223	HVD224	HVD225		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01		
	UNITS	LTM1-SW1-18	LTM1-SW2-18	LTM1-SW3-18	LTM1-SW4-18	LTM1-SW5-18	LTM1-SW6-18	RDL	QC Batch
BTEX & F1 Hydrocarbons									
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5748765
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5748765
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5748765
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5748765
p+m-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	5748765
Total Xylenes	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	5748765
F1 (C6-C10)	ug/L	<25	<25	<25	<25	<25	<25	25	5748765
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	<25	<25	25	5748765
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	<100	100	5755215
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	<200	200	5755215
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	<200	200	5755215
Reached Baseline at C50	ug/L	Yes	Yes	Yes	Yes	Yes	Yes		5755215
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	102	99	101	101	101	101		5748765
4-Bromofluorobenzene	%	101	103	102	101	100	100		5748765
D10-Ethylbenzene	%	88	84	84	87	88	86		5748765
D4-1,2-Dichloroethane	%	90	89	91	89	90	89		5748765
o-Terphenyl	%	97	92	98	96	90	96		5755215
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HVD226	HVD227		
Sampling Date		2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01		
	UNITS	LTM1-SW7-18	LTM1-SW8-18	RDL	QC Batch
BTEX & F1 Hydrocarbons					
Benzene	ug/L	<0.20	<0.20	0.20	5748765
Toluene	ug/L	<0.20	<0.20	0.20	5748765
Ethylbenzene	ug/L	<0.20	<0.20	0.20	5748765
o-Xylene	ug/L	<0.20	<0.20	0.20	5748765
p+m-Xylene	ug/L	<0.40	<0.40	0.40	5748765
Total Xylenes	ug/L	<0.40	<0.40	0.40	5748765
F1 (C6-C10)	ug/L	<25	<25	25	5748765
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	5748765
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	5755215
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	5755215
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	5755215
Reached Baseline at C50	ug/L	Yes	Yes		5755215
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	101	101		5748765
4-Bromofluorobenzene	%	101	100		5748765
D10-Ethylbenzene	%	89	88		5748765
D4-1,2-Dichloroethane	%	91	90		5748765
o-Terphenyl	%	97	97		5755215
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HVD220	HVD221	HVD223	HVD224	HVD225	HVD225		
Sampling Date		2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01	683278-01-01		
	UNITS	LTM1-SW1-18	LTM1-SW2-18	LTM1-SW4-18	LTM1-SW5-18	LTM1-SW6-18	LTM1-SW6-18 Lab-Dup	RDL	QC Batch

PCBs									
Aroclor 1242	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	5749287
Aroclor 1248	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	5749287
Aroclor 1254	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	5749287
Aroclor 1260	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	5749287
Total PCB	ug/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	5749287

Surrogate Recovery (%)

Decachlorobiphenyl	%	83	105	87	106	91	105		5749287
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RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HVD226	HVD227		
Sampling Date		2018/09/19	2018/09/19		
COC Number		683278-01-01	683278-01-01		
	UNITS	LTM1-SW7-18	LTM1-SW8-18	RDL	QC Batch

PCBs					
Aroclor 1242	ug/L	<0.05	<0.05	0.05	5749287
Aroclor 1248	ug/L	<0.05	<0.05	0.05	5749287
Aroclor 1254	ug/L	<0.05	<0.05	0.05	5749287
Aroclor 1260	ug/L	<0.05	<0.05	0.05	5749287
Total PCB	ug/L	<0.05	<0.05	0.05	5749287

Surrogate Recovery (%)

Decachlorobiphenyl	%	79	82		5749287
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RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

GENERAL COMMENTS

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

Package 1	8.3°C
Package 2	6.0°C
Package 3	6.3°C
Package 4	6.3°C

Soil sample(s) analysis completed from soil jar, due to insufficient volumes provided in methanol vials. Proceeded with analyzes as per client request.

Report Revised [2018/10/10]: Metals units revised as per client request.

Sample HVD232 [LTM1-SD5-18] : F2-F4 Analysis: Detection limits were adjusted for high moisture content.

PCB Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content.

Sample HVD233 [LTM1-SD6-18] : PCB Analysis: Due to high concentrations of the target analytes, sample required dilution. Detection limits were adjusted accordingly. In addition, detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content.

Sample HVD234 [LTM1-SD7-18] : F2-F4 Analysis: Detection limits were adjusted for high moisture content.

PCB Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content.

Sample HVD235 [LTM1-SD8-18] : PCB Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content.

F4G: Due to the sample matrix, detection limit was adjusted accordingly.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

Outcome Consultants Inc.
Client Project #: 1QFMD
Your P.O. #: E2018-06
Sampler Initials: JM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5748765	1,4-Difluorobenzene	2018/09/25	100	70 - 130	97	70 - 130	101	%				
5748765	4-Bromofluorobenzene	2018/09/25	104	70 - 130	104	70 - 130	99	%				
5748765	D10-Ethylbenzene	2018/09/25	82	70 - 130	102	70 - 130	85	%				
5748765	D4-1,2-Dichloroethane	2018/09/25	87	70 - 130	94	70 - 130	89	%				
5749287	Decachlorobiphenyl	2018/09/26	89	60 - 130	98	60 - 130	92	%				
5751178	Decachlorobiphenyl	2018/09/26	85	60 - 130	91	60 - 130	93	%				
5751223	o-Terphenyl	2018/09/26	102	60 - 130	99	60 - 130	100	%				
5751433	4-Bromofluorobenzene	2018/09/27	102	60 - 140	101	60 - 140	94	%				
5751433	D10-o-Xylene	2018/09/27	85	60 - 130	73	60 - 130	84	%				
5751433	D4-1,2-Dichloroethane	2018/09/27	107	60 - 140	105	60 - 140	108	%				
5751433	D8-Toluene	2018/09/27	102	60 - 140	104	60 - 140	93	%				
5754773	4-Bromofluorobenzene	2018/09/27	98	60 - 140	101	60 - 140	80	%				
5754773	D10-o-Xylene	2018/09/27	100	60 - 130	104	60 - 130	93	%				
5754773	D4-1,2-Dichloroethane	2018/09/27	111	60 - 140	112	60 - 140	113	%				
5754773	D8-Toluene	2018/09/27	103	60 - 140	106	60 - 140	90	%				
5755215	o-Terphenyl	2018/09/27	98	60 - 130	98	60 - 130	94	%				
5748478	Fluoride (F-)	2018/09/26	104	80 - 120	96	80 - 120	<0.10	mg/L	NC	20		
5748489	pH	2018/09/26			101	98 - 103			0.40	N/A		
5748504	Nitrate (N)	2018/09/25	99	80 - 120	100	80 - 120	<0.10	mg/L	NC	20		
5748504	Nitrite (N)	2018/09/25	104	80 - 120	104	80 - 120	<0.010	mg/L	NC	20		
5748765	Benzene	2018/09/25	72	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
5748765	Ethylbenzene	2018/09/25	75	70 - 130	98	70 - 130	<0.20	ug/L	NC	30		
5748765	F1 (C6-C10) - BTEX	2018/09/25					<25	ug/L	NC	30		
5748765	F1 (C6-C10)	2018/09/25	90	70 - 130	85	70 - 130	<25	ug/L	NC	30		
5748765	o-Xylene	2018/09/25	74	70 - 130	93	70 - 130	<0.20	ug/L	NC	30		
5748765	p+m-Xylene	2018/09/25	75	70 - 130	98	70 - 130	<0.40	ug/L	NC	30		
5748765	Toluene	2018/09/25	77	70 - 130	101	70 - 130	<0.20	ug/L	NC	30		
5748765	Total Xylenes	2018/09/25					<0.40	ug/L	NC	30		
5749287	Aroclor 1242	2018/09/26					<0.05	ug/L	NC	30		
5749287	Aroclor 1248	2018/09/26					<0.05	ug/L	NC	30		

QUALITY ASSURANCE REPORT(CONT'D)

Outcome Consultants Inc.
Client Project #: 1QFMD
Your P.O. #: E2018-06
Sampler Initials: JM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5749287	Aroclor 1254	2018/09/26					<0.05	ug/L	NC	30		
5749287	Aroclor 1260	2018/09/26	100	60 - 130	95	60 - 130	<0.05	ug/L	NC	30		
5749287	Total PCB	2018/09/26	100	60 - 130	95	60 - 130	<0.05	ug/L	NC	40		
5749317	Sulphide	2018/09/25	87	80 - 120	87	80 - 120	<0.020	mg/L	NC	20		
5749651	Dissolved Chloride (Cl-)	2018/09/26	NC	80 - 120	103	80 - 120	<1.0	mg/L	0.13	20		
5749658	Dissolved Sulphate (SO4)	2018/09/26	NC	75 - 125	105	80 - 120	<1.0	mg/L	0.37	20		
5749897	Dissolved Chloride (Cl-)	2018/09/26	110	80 - 120	100	80 - 120	<1.0	mg/L	4.5	20		
5749901	Nitrate (N)	2018/09/26	97	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
5749901	Nitrite (N)	2018/09/26	111	80 - 120	105	80 - 120	<0.010	mg/L	NC	20		
5749903	Dissolved Sulphate (SO4)	2018/09/26	106	75 - 125	104	80 - 120	<1.0	mg/L	1.5	20		
5749907	Nitrate (N)	2018/09/26	95	80 - 120	98	80 - 120	<0.10	mg/L	NC	20		
5749907	Nitrite (N)	2018/09/26	102	80 - 120	102	80 - 120	<0.010	mg/L	NC	20		
5750065	Total Arsenic (As)	2018/10/01	101	80 - 120	98	80 - 120	<0.0010	mg/L				
5750065	Total Cadmium (Cd)	2018/10/01	101	80 - 120	102	80 - 120	<0.00010	mg/L				
5750065	Total Chromium (Cr)	2018/10/01	101	80 - 120	98	80 - 120	<0.0050	mg/L				
5750065	Total Cobalt (Co)	2018/10/01	100	80 - 120	97	80 - 120	<0.00050	mg/L				
5750065	Total Lead (Pb)	2018/10/01	98	80 - 120	103	80 - 120	<0.00050	mg/L				
5750065	Total Nickel (Ni)	2018/10/01	95	80 - 120	94	80 - 120	<0.0010	mg/L				
5750065	Total Zinc (Zn)	2018/10/01	101	80 - 120	101	80 - 120	<0.0050	mg/L				
5750254	Total Ammonia-N	2018/09/26	96	75 - 125	100	80 - 120	<0.050	mg/L	NC	20		
5750360	Total Suspended Solids	2018/09/27					<1	mg/L	0	25	97	85 - 115
5750464	Sulphide	2018/09/26	98	80 - 120	98	80 - 120	<0.020	mg/L	NC	20		
5750472	Fluoride (F-)	2018/09/27	104	80 - 120	94	80 - 120	<0.10	mg/L	NC	20		
5750482	pH	2018/09/27			101	98 - 103			1.7	N/A		
5751063	Total Dissolved Solids	2018/09/26					<10	mg/L	0.89	25	100	90 - 110
5751178	Aroclor 1242	2018/09/26					<0.010	ug/g	NC	50		
5751178	Aroclor 1248	2018/09/26					<0.010	ug/g	NC	50		
5751178	Aroclor 1254	2018/09/26					<0.010	ug/g	NC	50		
5751178	Aroclor 1260	2018/09/26	111	30 - 130	117	30 - 130	<0.010	ug/g	NC	50		
5751178	Total PCB	2018/09/26	111	30 - 130	117	30 - 130	<0.010	ug/g	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

Outcome Consultants Inc.
Client Project #: 1QFMD
Your P.O. #: E2018-06
Sampler Initials: JM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5751223	F2 (C10-C16 Hydrocarbons)	2018/09/26	103	50 - 130	96	80 - 120	<10	ug/g	NC	30		
5751223	F3 (C16-C34 Hydrocarbons)	2018/09/26	107	50 - 130	102	80 - 120	<50	ug/g	NC	30		
5751223	F4 (C34-C50 Hydrocarbons)	2018/09/26	105	50 - 130	99	80 - 120	<50	ug/g	NC	30		
5751433	Benzene	2018/09/27	86	60 - 140	78	60 - 130	<0.0060	ug/g	NC	50		
5751433	Ethylbenzene	2018/09/27	84	60 - 140	77	60 - 130	<0.010	ug/g	NC	50		
5751433	F1 (C6-C10) - BTEX	2018/09/27					<10	ug/g	NC	30		
5751433	F1 (C6-C10)	2018/09/27	88	60 - 140	95	80 - 120	<10	ug/g	NC	30		
5751433	o-Xylene	2018/09/27	85	60 - 140	81	60 - 130	<0.020	ug/g	NC	50		
5751433	p+m-Xylene	2018/09/27	81	60 - 140	75	60 - 130	<0.020	ug/g	NC	50		
5751433	Toluene	2018/09/27	83	60 - 140	76	60 - 130	<0.020	ug/g	12	50		
5751433	Total Xylenes	2018/09/27					<0.020	ug/g	NC	50		
5751450	Acid Extractable Arsenic (As)	2018/09/26	113	75 - 125	100	80 - 120	<1.0	ug/g	6.2	30		
5751450	Acid Extractable Cadmium (Cd)	2018/09/26	111	75 - 125	103	80 - 120	<0.10	ug/g	NC	30		
5751450	Acid Extractable Chromium (Cr)	2018/09/26	NC	75 - 125	103	80 - 120	<1.0	ug/g	0.19	30		
5751450	Acid Extractable Cobalt (Co)	2018/09/26	110	75 - 125	106	80 - 120	<0.10	ug/g	0.70	30		
5751450	Acid Extractable Lead (Pb)	2018/09/26	107	75 - 125	100	80 - 120	<1.0	ug/g	0.98	30		
5751450	Acid Extractable Nickel (Ni)	2018/09/26	113	75 - 125	105	80 - 120	<0.50	ug/g	0.12	30		
5751450	Acid Extractable Zinc (Zn)	2018/09/26	NC	75 - 125	98	80 - 120	<5.0	ug/g	1.2	30		
5751463	Acid Extractable Arsenic (As)	2018/09/27	108	75 - 125	102	80 - 120	<1.0	ug/g	9.1	30		
5751463	Acid Extractable Cadmium (Cd)	2018/09/27	106	75 - 125	99	80 - 120	<0.10	ug/g	13	30		
5751463	Acid Extractable Chromium (Cr)	2018/09/27	NC	75 - 125	97	80 - 120	<1.0	ug/g	4.3	30		
5751463	Acid Extractable Cobalt (Co)	2018/09/27	104	75 - 125	100	80 - 120	<0.10	ug/g	0.92	30		
5751463	Acid Extractable Lead (Pb)	2018/09/27	105	75 - 125	100	80 - 120	<1.0	ug/g	0.11	30		
5751463	Acid Extractable Nickel (Ni)	2018/09/27	110	75 - 125	102	80 - 120	<0.50	ug/g	2.0	30		
5751463	Acid Extractable Zinc (Zn)	2018/09/27	NC	75 - 125	103	80 - 120	<5.0	ug/g	0.14	30		
5751569	Total Ammonia-N	2018/09/28	94	75 - 125	99	80 - 120	<0.050	mg/L	NC	20		
5751935	Moisture	2018/09/26							4.2	20		
5752288	Total Cyanide (CN)	2018/09/27	96	80 - 120	98	80 - 120	<0.0050	mg/L	NC	20		
5752300	WAD Cyanide (Free)	2018/09/27	102	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20		
5754773	1,1,1,2-Tetrachloroethane	2018/09/28	102	60 - 140	103	60 - 130	<0.050	ug/g	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

Outcome Consultants Inc.
Client Project #: 1QFMD
Your P.O. #: E2018-06
Sampler Initials: JM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5754773	1,1,1-Trichloroethane	2018/09/28	99	60 - 140	101	60 - 130	<0.050	ug/g	NC	50		
5754773	1,1,2,2-Tetrachloroethane	2018/09/28	100	60 - 140	104	60 - 130	<0.050	ug/g	NC	50		
5754773	1,1,2-Trichloroethane	2018/09/28	107	60 - 140	107	60 - 130	<0.050	ug/g	NC	50		
5754773	1,1-Dichloroethane	2018/09/28	102	60 - 140	103	60 - 130	<0.050	ug/g	NC	50		
5754773	1,1-Dichloroethylene	2018/09/28	99	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
5754773	1,2-Dichlorobenzene	2018/09/28	93	60 - 140	94	60 - 130	<0.050	ug/g	NC	50		
5754773	1,2-Dichloroethane	2018/09/28	105	60 - 140	106	60 - 130	<0.050	ug/g	NC	50		
5754773	1,2-Dichloropropane	2018/09/28	96	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
5754773	1,3-Dichlorobenzene	2018/09/28	94	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
5754773	1,4-Dichlorobenzene	2018/09/28	89	60 - 140	91	60 - 130	<0.050	ug/g	NC	50		
5754773	Acetone (2-Propanone)	2018/09/28	87	60 - 140	99	60 - 140	<0.50	ug/g	NC	50		
5754773	Benzene	2018/09/28	94	60 - 140	95	60 - 130	<0.0060	ug/g	NC	50		
5754773	Bromodichloromethane	2018/09/28	99	60 - 140	101	60 - 130	<0.050	ug/g	NC	50		
5754773	Bromoform	2018/09/28	98	60 - 140	102	60 - 130	<0.050	ug/g	NC	50		
5754773	Bromomethane	2018/09/28	104	60 - 140	100	60 - 140	<0.050	ug/g	NC	50		
5754773	Carbon Tetrachloride	2018/09/28	100	60 - 140	102	60 - 130	<0.050	ug/g	NC	50		
5754773	Chlorobenzene	2018/09/28	94	60 - 140	95	60 - 130	<0.050	ug/g	NC	50		
5754773	Chloroform	2018/09/28	101	60 - 140	103	60 - 130	<0.050	ug/g	NC	50		
5754773	cis-1,2-Dichloroethylene	2018/09/28	95	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
5754773	cis-1,3-Dichloropropene	2018/09/28	90	60 - 140	88	60 - 130	<0.030	ug/g	NC	50		
5754773	Dibromochloromethane	2018/09/28	100	60 - 140	102	60 - 130	<0.050	ug/g	NC	50		
5754773	Dichlorodifluoromethane (FREON 12)	2018/09/28	119	60 - 140	119	60 - 140	<0.050	ug/g	NC	50		
5754773	Ethylbenzene	2018/09/28	84	60 - 140	88	60 - 130	<0.010	ug/g	NC	50		
5754773	Ethylene Dibromide	2018/09/28	99	60 - 140	100	60 - 130	<0.050	ug/g	NC	50		
5754773	F1 (C6-C10) - BTEX	2018/09/28					<10	ug/g	NC	30		
5754773	F1 (C6-C10)	2018/09/28	91	60 - 140	99	80 - 120	<10	ug/g	NC	30		
5754773	Hexane	2018/09/28	99	60 - 140	99	60 - 130	<0.050	ug/g	NC	50		
5754773	Methyl Ethyl Ketone (2-Butanone)	2018/09/28	81	60 - 140	96	60 - 140	<0.50	ug/g	NC	50		
5754773	Methyl Isobutyl Ketone	2018/09/28	80	60 - 140	93	60 - 130	<0.50	ug/g	NC	50		
5754773	Methyl t-butyl ether (MTBE)	2018/09/28	90	60 - 140	92	60 - 130	<0.050	ug/g	NC	50		

QUALITY ASSURANCE REPORT(CONT'D)

Outcome Consultants Inc.
Client Project #: 1QFMD
Your P.O. #: E2018-06
Sampler Initials: JM

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5754773	Methylene Chloride(Dichloromethane)	2018/09/28	96	60 - 140	96	60 - 130	<0.050	ug/g	NC	50		
5754773	o-Xylene	2018/09/28	87	60 - 140	92	60 - 130	<0.020	ug/g	NC	50		
5754773	p+m-Xylene	2018/09/28	84	60 - 140	90	60 - 130	<0.020	ug/g	NC	50		
5754773	Styrene	2018/09/28	88	60 - 140	96	60 - 130	<0.050	ug/g	NC	50		
5754773	Tetrachloroethylene	2018/09/28	97	60 - 140	100	60 - 130	<0.050	ug/g	NC	50		
5754773	Toluene	2018/09/28	92	60 - 140	95	60 - 130	<0.020	ug/g	NC	50		
5754773	Total Xylenes	2018/09/28					<0.020	ug/g	NC	50		
5754773	trans-1,2-Dichloroethylene	2018/09/28	97	60 - 140	99	60 - 130	<0.050	ug/g	NC	50		
5754773	trans-1,3-Dichloropropene	2018/09/28	105	60 - 140	100	60 - 130	<0.040	ug/g	NC	50		
5754773	Trichloroethylene	2018/09/28	93	60 - 140	95	60 - 130	<0.010	ug/g	NC	50		
5754773	Trichlorofluoromethane (FREON 11)	2018/09/28	102	60 - 140	103	60 - 130	<0.050	ug/g	NC	50		
5754773	Vinyl Chloride	2018/09/28	104	60 - 140	105	60 - 130	<0.020	ug/g	NC	50		
5755215	F2 (C10-C16 Hydrocarbons)	2018/09/28	107	50 - 130	105	60 - 130	<100	ug/L	NC	30		
5755215	F3 (C16-C34 Hydrocarbons)	2018/09/28	106	50 - 130	107	60 - 130	<200	ug/L	NC	30		
5755215	F4 (C34-C50 Hydrocarbons)	2018/09/28	101	50 - 130	101	60 - 130	<200	ug/L	NC	30		
5758758	F4G-sg (Grav. Heavy Hydrocarbons)	2018/09/29	111	65 - 135	99	65 - 135	<100	ug/g	0	50		

N/A = Not Applicable

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

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

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

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

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

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

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

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

VALIDATION SIGNATURE PAGE

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



Brad Newman, Scientific Service Specialist

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



Maxxam Analytics International Corporation o/a Maxxam Analytics
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CHAIN OF CUSTODY RECORD

Page 1 of 2

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name: #34798 Outcome Consultants Inc.		Company Name:		Quotation #: B84523		Maxxam Job #:	
Attention: Jonathan Marciewicz		Attention:		P.O. #: 52018-19 P2018-06 IQEMD		Bottle Order #:	
Address: 151 Holland Avenue Suite 200		Address:		Project:		COC #:	
Ottawa ON K1A 0Y2		Address:		Project Name:		Project Manager:	
Tel: (613) 729-2402		Tel:		Site #:		Sara Singh	
Fax:		Fax:		Sampled By:		Turnaround Time (TAT) Required:	
Email: jmarkiewicz@outcomeinc.ca		Email:				Please provide advance notice for rush projects	

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

Regulation 153 (2811)		Other Regulations		Special Instructions	
☐ Table 1	☐ Res/Park	☐ Medium/Fine	☒ CCME	☐ Sanitary Sewer Bylaw	
☐ Table 2	☐ Ind/Comm	☐ Coarse	☐ Reg 558	☐ Storm Sewer Bylaw	
☐ Table 3	☐ Agri/Other	☐ For RSC	☐ MISA	Municipality	
☐ Table			☐ PWQO		
			☐ Other		

Include Criteria on Certificate of Analysis (Y/N)?

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / CrVI	Cyanide (Total and WAD) in water	Polychlorinated Biphenyl (PCB) in water	TSS/TDS in water	Sulphide in water	PHC F1-F4/BTEX/gas/diesel in water	Total As, Cd, Co, Cr, Pb, Ni, Zn in water	hard/CUF/H/NO3/SC4/NH4 in water	PHC F1-F4 BTEX in soil	Polychlorinated Biphenyl in Soil	As, Cd, Co, Cr, Pb, Ni, Zn in soil	# of Bottles	Comments
1	LTM1-SW1-18	19 SEPT		SW		X	X	X	X	X	X	X				13	21-Sep-18 16:00 Sara Singh B808860 URE ENV-746
2	LTM1-SW2-18					X	X	X	X	X	X	X					
3	LTM1-SW3-18					X	X	X	X	X	X	X					
4	LTM1-SW4-18					X	X	X	X	X	X	X					
5	LTM1-SW5-18					X	X	X	X	X	X	X					
6	LTM1-SW6-18					X	X	X	X	X	X	X					
7	LTM1-SW7-18					X	X	X	X	X	X	X					
8	LTM1-SW8-18					X	X	X	X	X	X	X					On ice
9	LTM1-SO1-18	19 SEPT		SED									X	X	X	5	
10	LTM1-SO2-18												X	X	X	5	

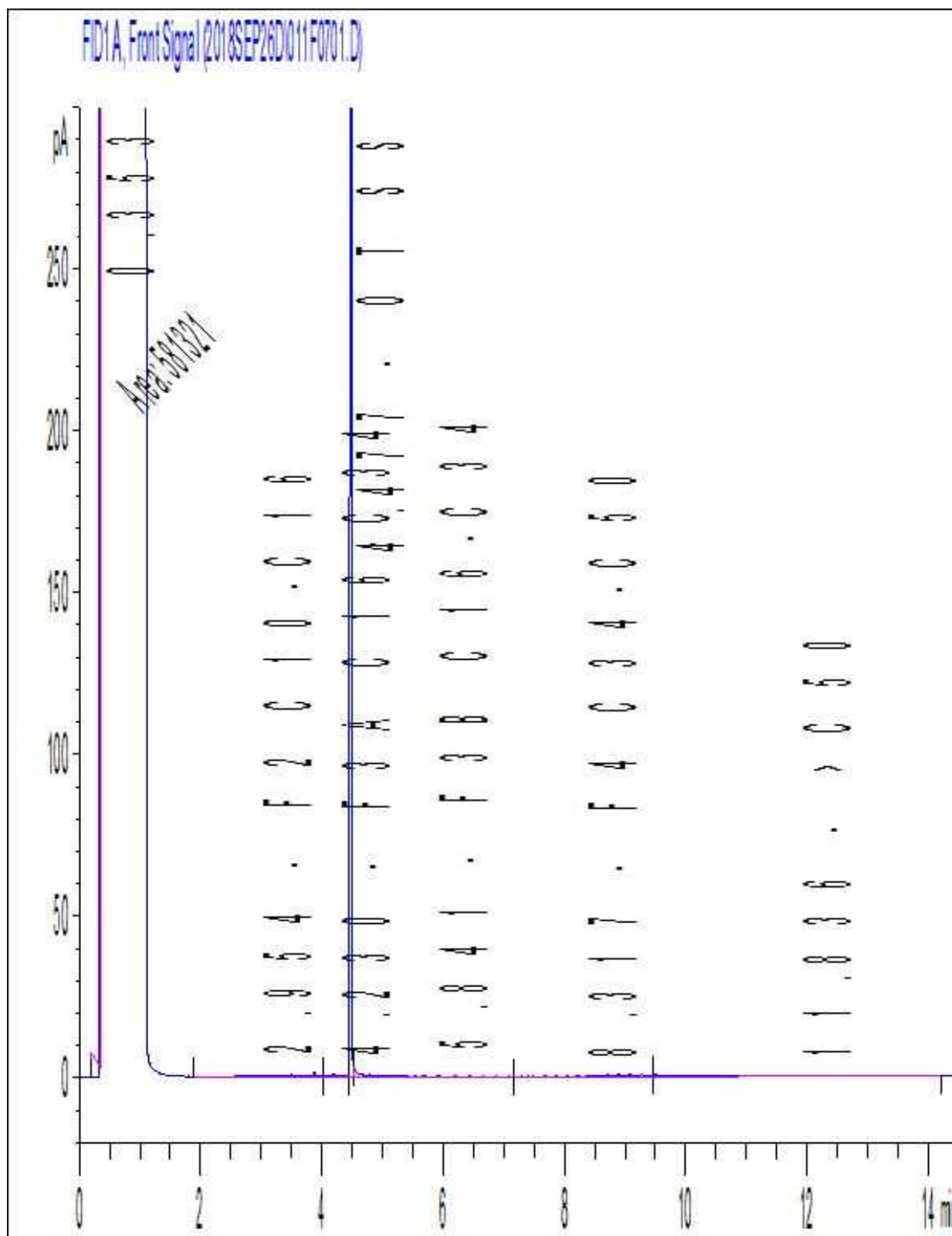
RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)		Time		# jars used and not submitted		Laboratory Use Only	
Jonathan Marciewicz		18/09/19		16:00		08:11		Time Sensitive	
Mariana Viana		20/09/19		16:00		08:11		Temperature (°C) on Receipt	
Mariana Viana		20/09/19		16:00		08:11		Custody Seal Present	
								Intact	
								Yes	
								No	

White: Maxxam Yellow: Client

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

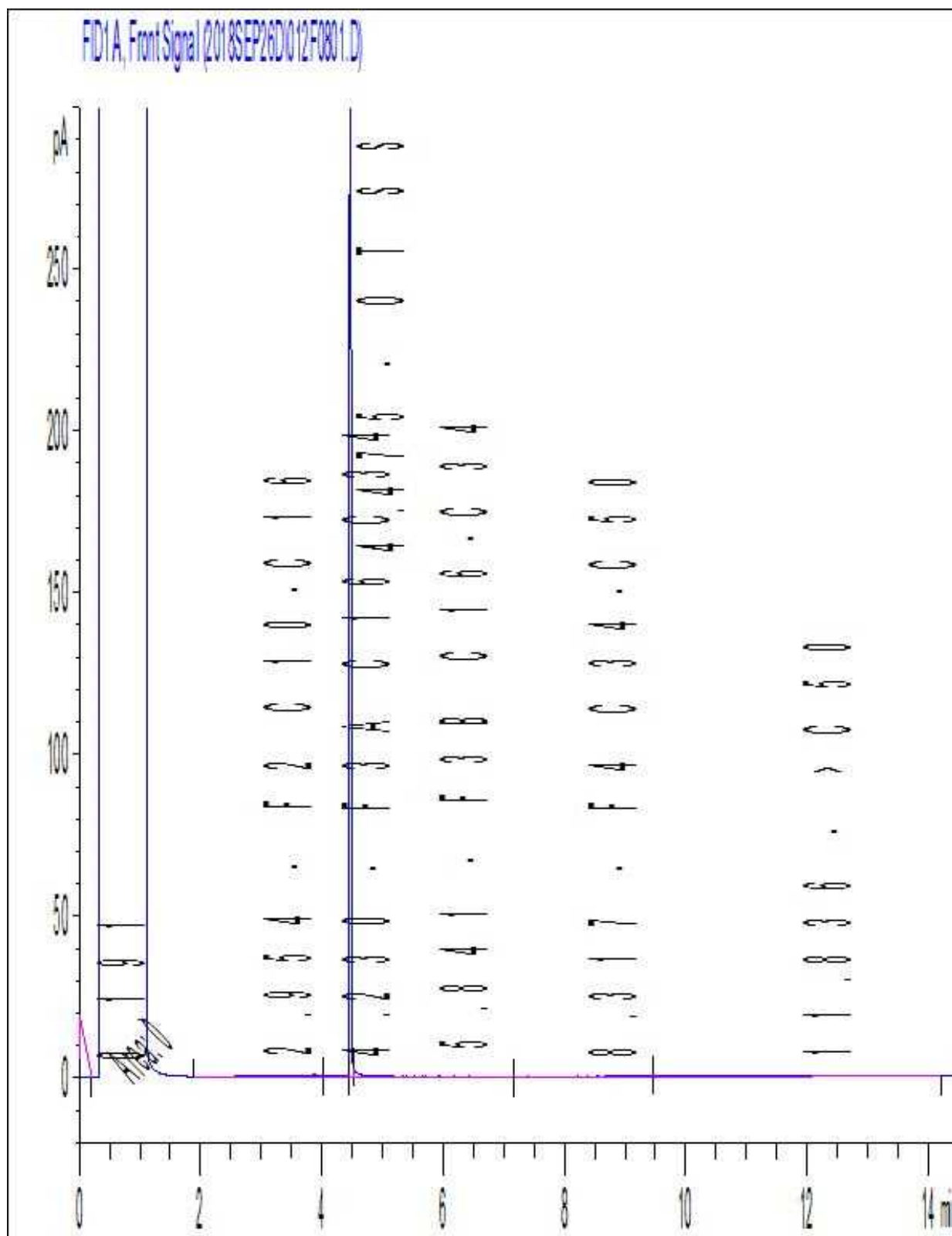
INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:									
Company Name: #34798 Outcome Consultants Inc. Attention: Jonathan Marciewicz Address: 151 Holland Avenue Suite 200 Ottawa ON K14 0Y2 Tel: (613) 729-2402 Fax: _____ Email: jmarkiewicz@outcomeinc.ca		Company Name: _____ Attention: _____ Address: _____ Tel: _____ Fax: _____ Email: _____		Quotation #: B84523 P.O. #: 2018-10- P2018-06 Project: _____ Project Name: _____ Site #: _____ Sampled By: _____		Maxxam Job #: _____ Bottle Order #:  683278 COC #:  C683278-02-01 Project Manager: Sara Singh									
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY				ANALYSIS REQUESTED (PLEASE BE SPECIFIC)											
Regulation 153 (2011) ☐ Table 1 ☐ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☐ Table _____		Other Regulations ☒ CCME ☐ Sanitary Sewer Bylaw ☐ Reg 558 ☐ Storm Sewer Bylaw ☐ MISA Municipality _____ ☐ PWQO ☐ Other _____		Special Instructions _____ _____ _____		Turnaround Time (TAT) Required: Please provide advance notice for rush projects Regular (Standard) TAT: (will be applied if Rush TAT is not specified). Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (call lab for #) # of Bottles: _____ Comments: _____									
Include Criteria on Certificate of Analysis (Y/N)?				Field Filtered (please circle): Metals / Hg / Cr / V											
Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Cyanide (Total and WAD) in water	Polychlorinated Biphenyl (PCB) in water	TSSTDS in water	Sulphide in water	PHC F1-F4 BTEX/gas/diesel in water	Total As, Cd, Co, Cr, Pb, Ni, Zn in water	hard/Cl/F/Br/HNO3/SO4/NH4 in water	PHC F1-F4 BTEX in soil	Polychlorinated Biphenyl in Soil	As, Cd, Co, Cr, Pb, Ni, Zn in soil	
1	LTM1-S03-18	19 SEPT		SED								X	X	X	5
2	LTM1-S04-18	1										X	X	X	1
3	LTM1-S05-18											X	X	X	
4	LTM1-S06-18											X	X	X	
5	LTM1-S07-18											X	X	X	
6	LTM1-S08-18											X	X	X	
7															
8															
9															
10															
RELINQUISHED BY: (Signature/Print)  J. MARCIEWICZ		Date: (YY/MM/DD) 18/09/19		Time _____		RECEIVED BY: (Signature/Print) See Page 1		Date: (YY/MM/DD) _____		Time _____		# Jars used and not submitted _____		Laboratory Use Only Time Sensitive ☐ Temperature (°C) on Reel ☐ Custody Seal ☐ Yes ☐ No ☐ Present ☐ Intact ☐	
* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.MAXXAM.CA/TERMS. * IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS. ** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.														White: Maxxa Yellow: Client	
SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM															

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



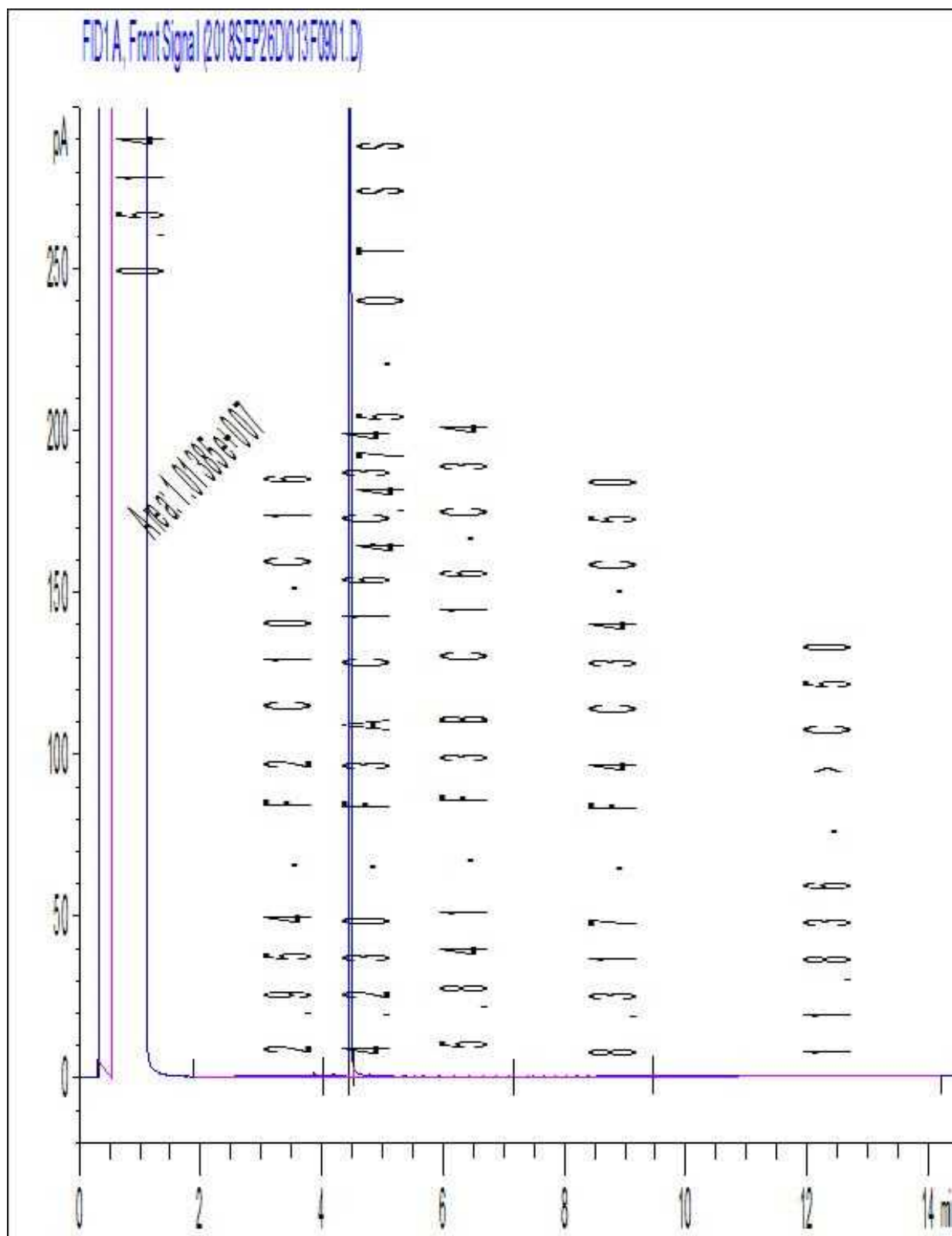
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



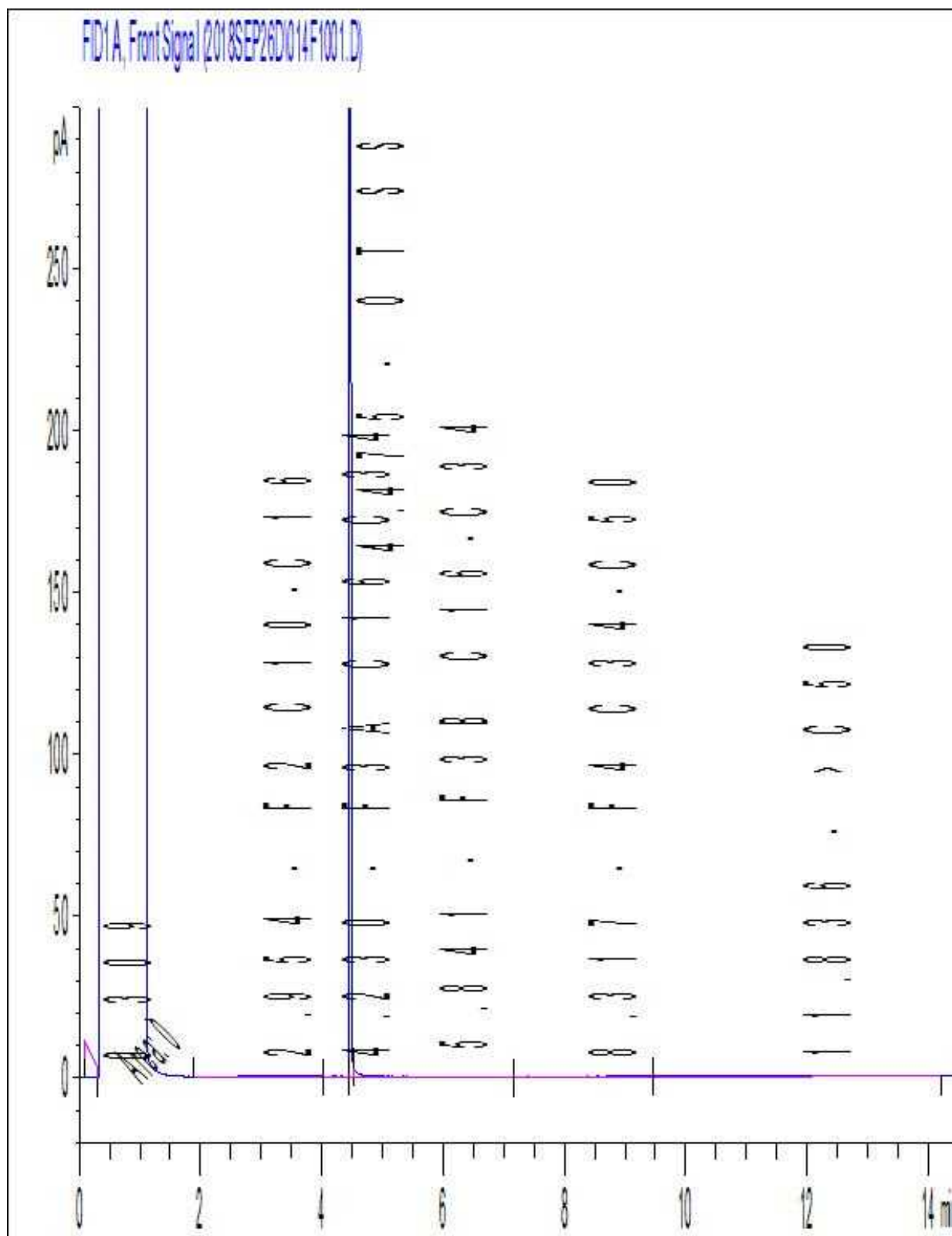
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



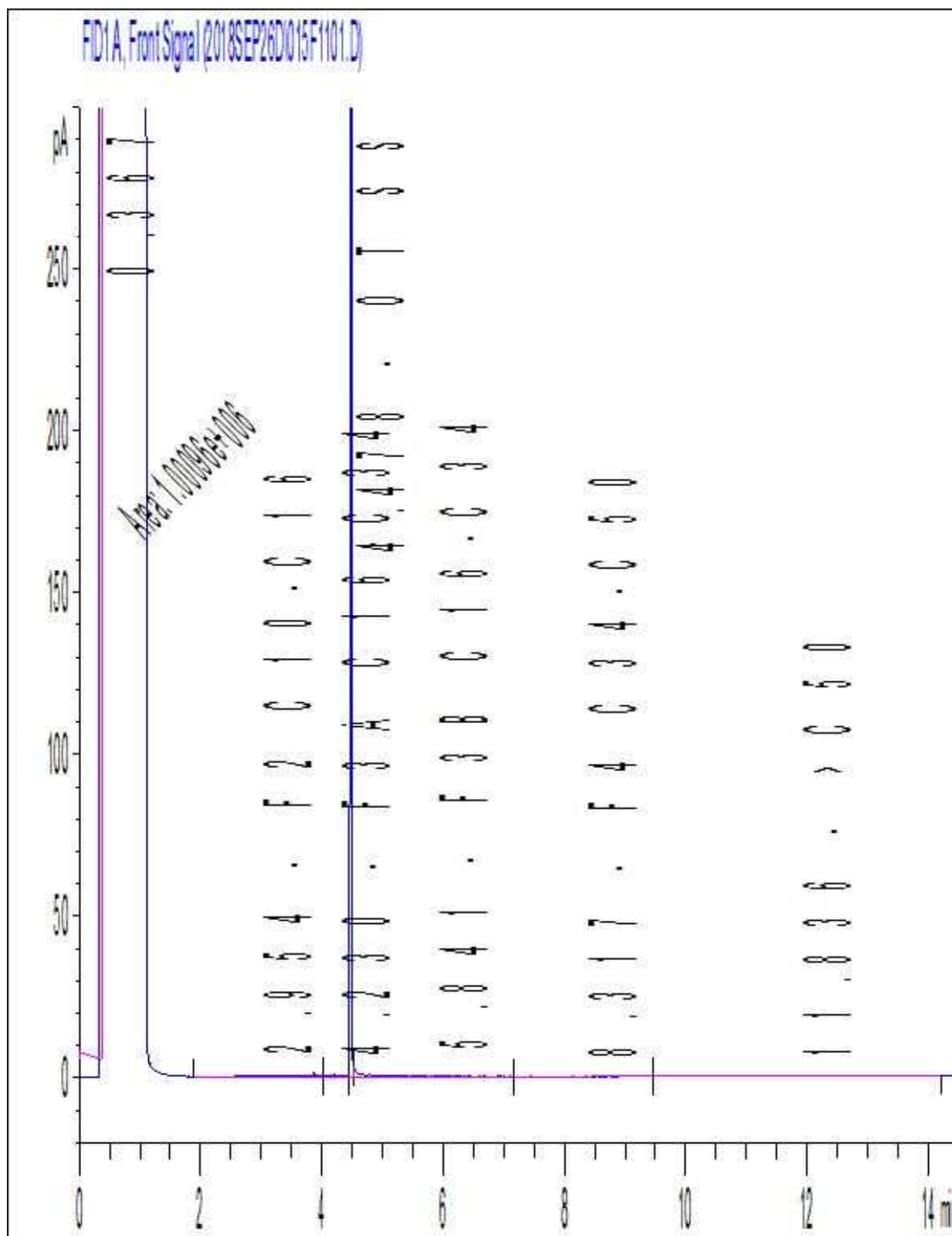
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



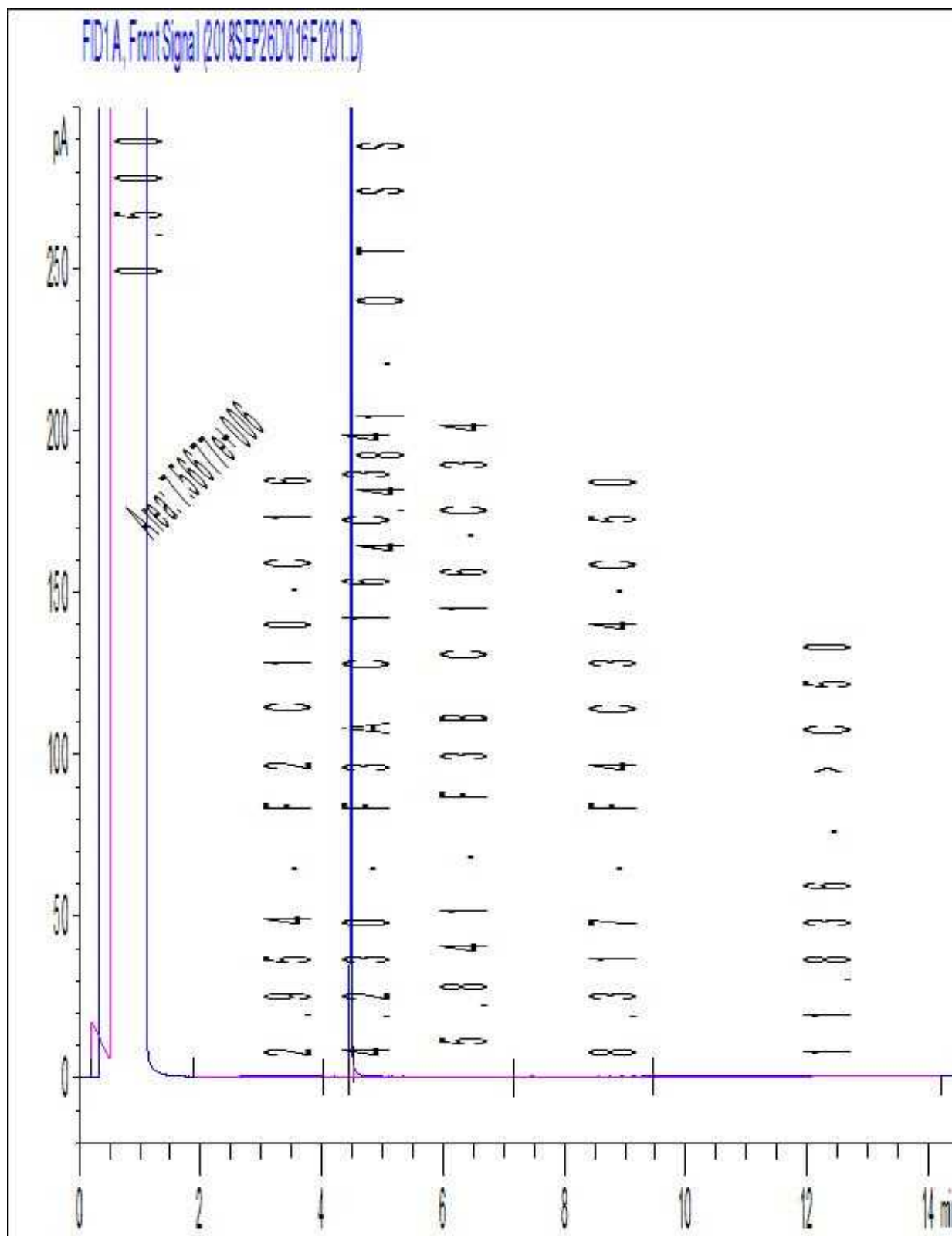
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



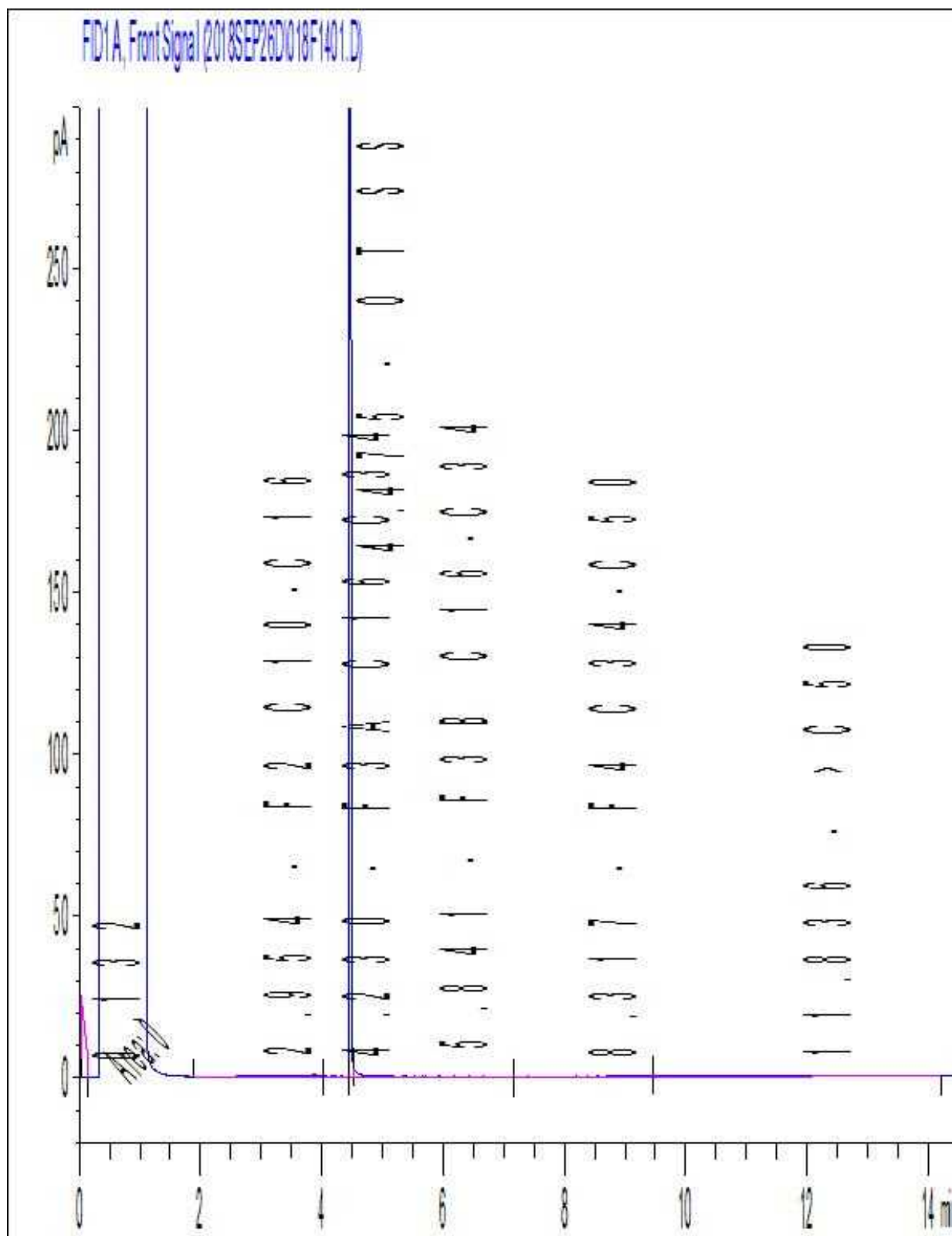
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



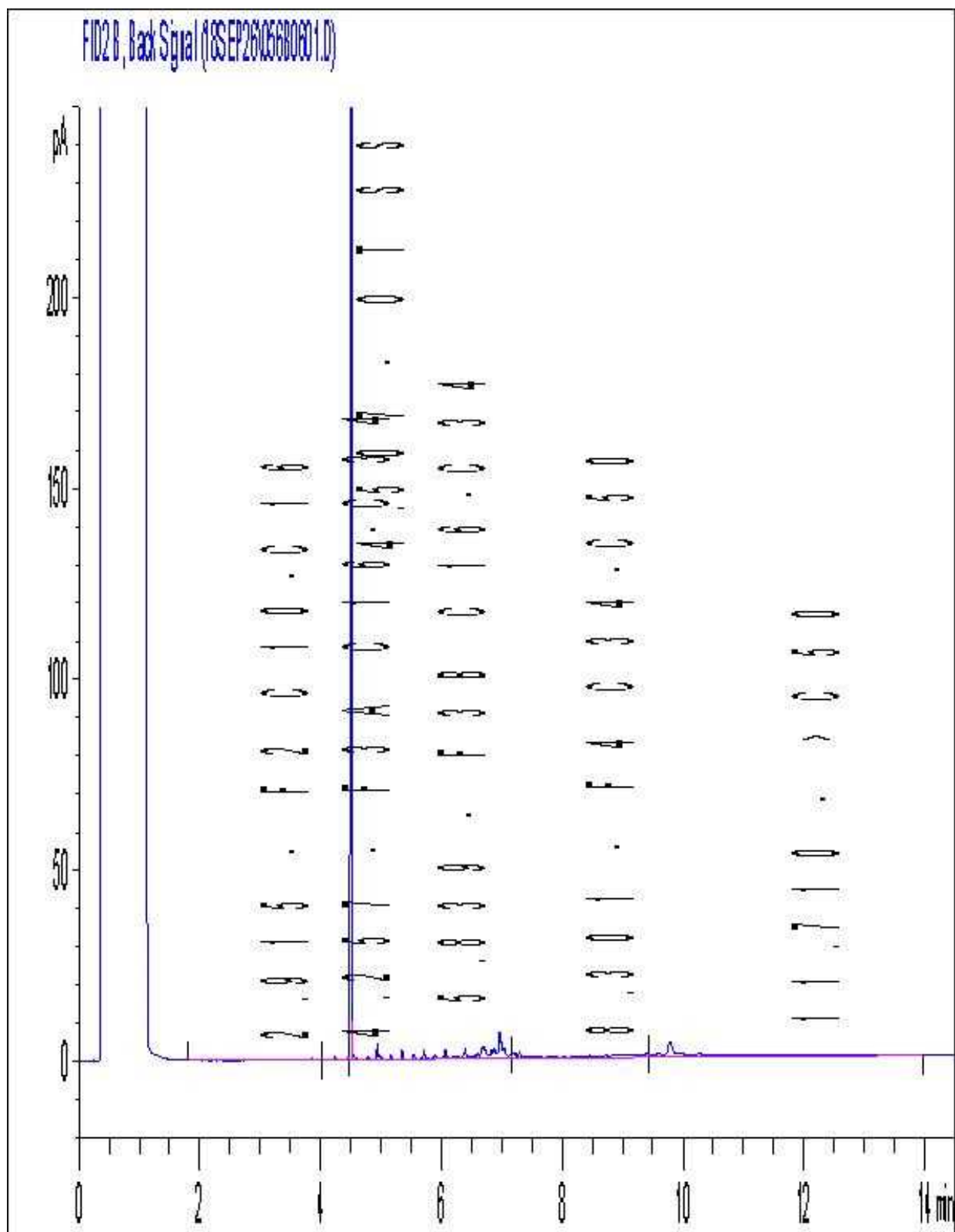
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Petroleum Hydrocarbons F2-F4 in Water Chromatogram



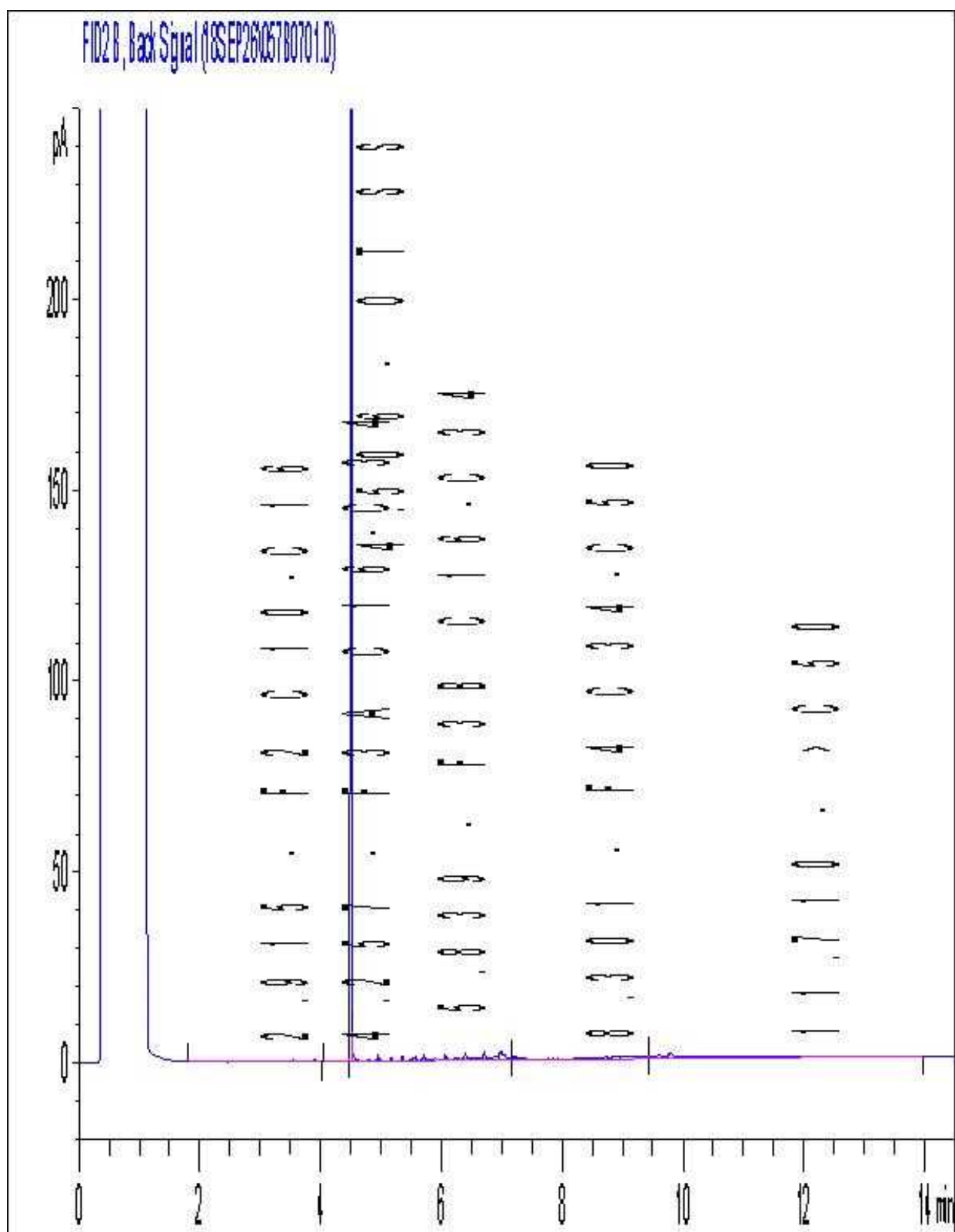
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



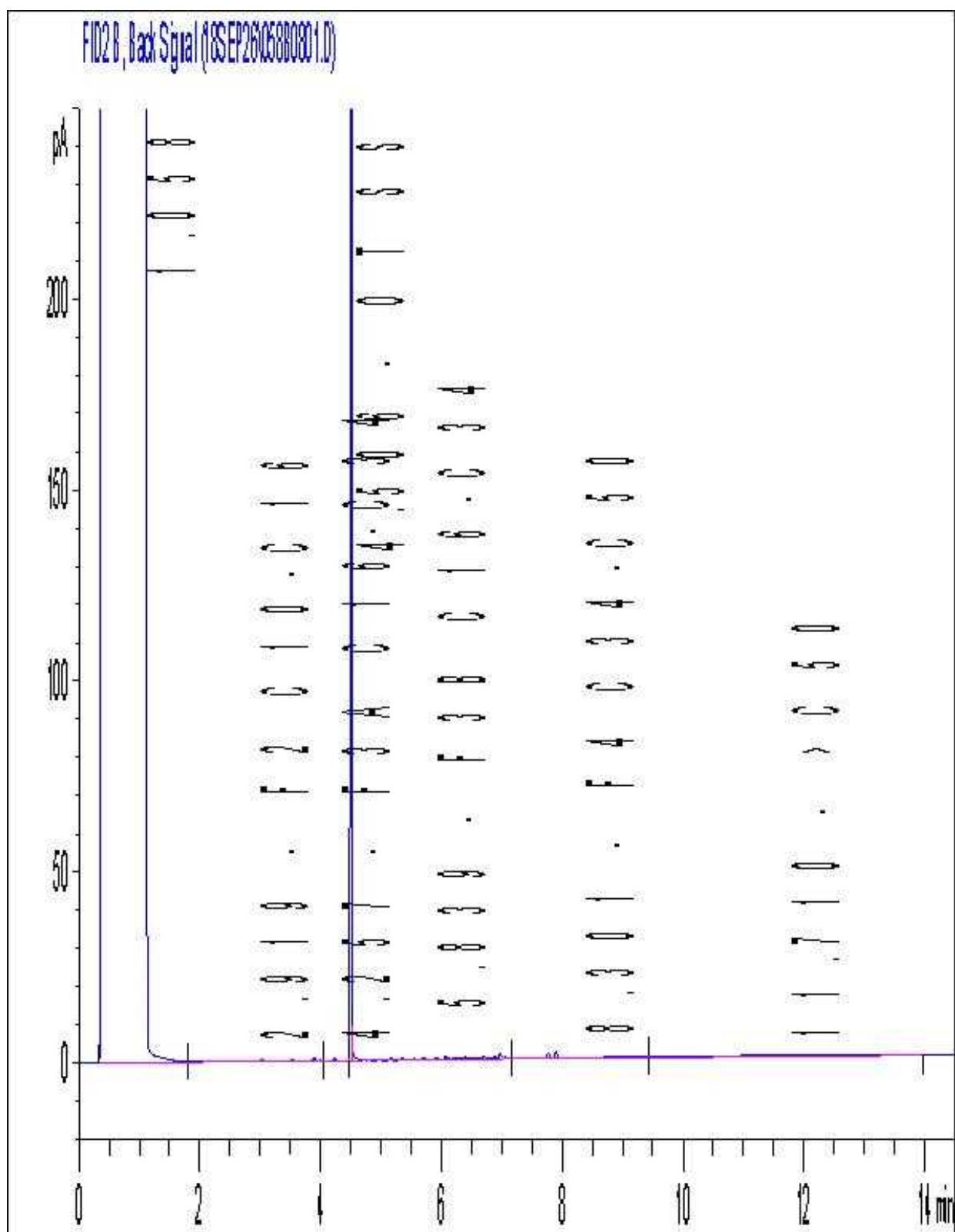
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



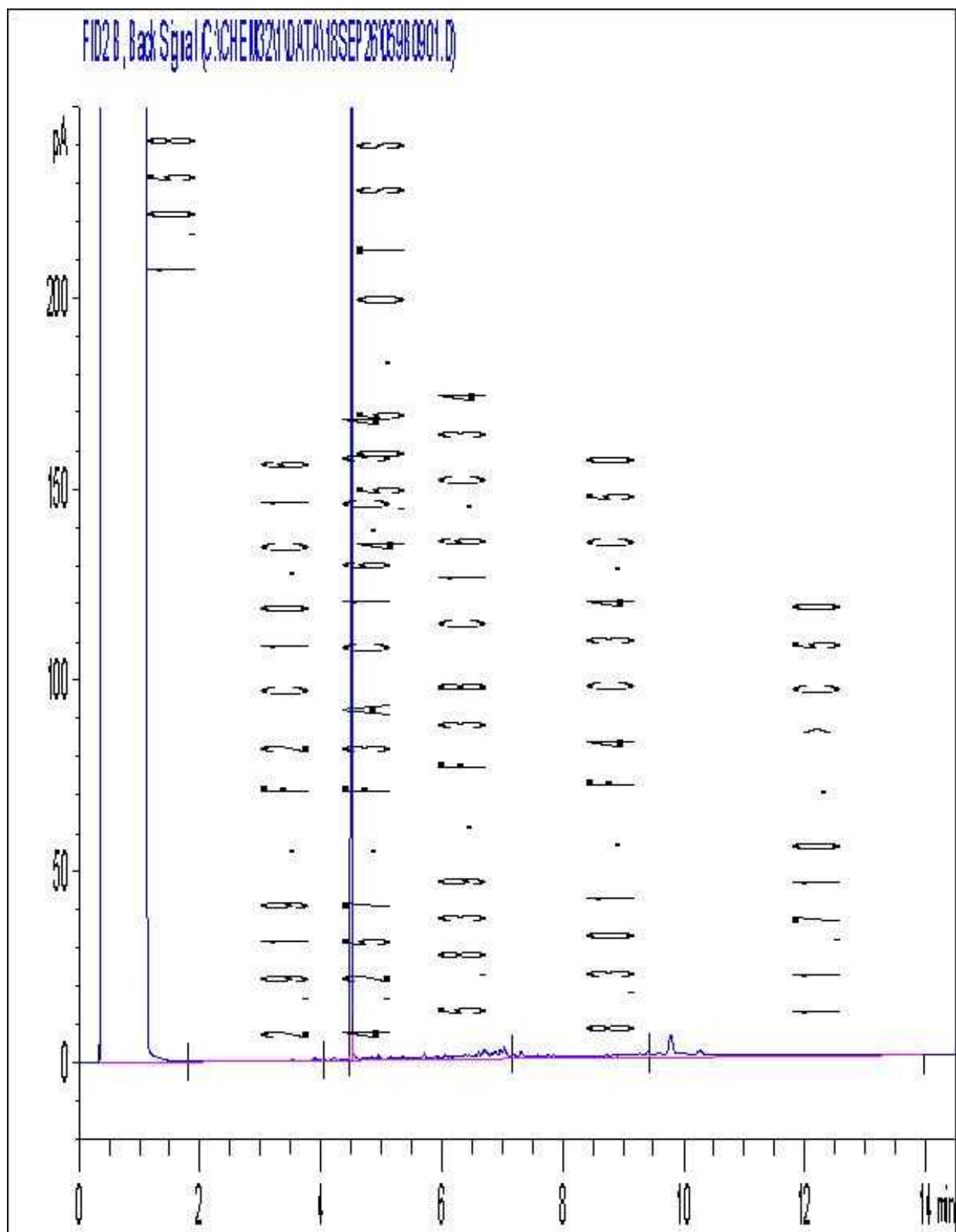
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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



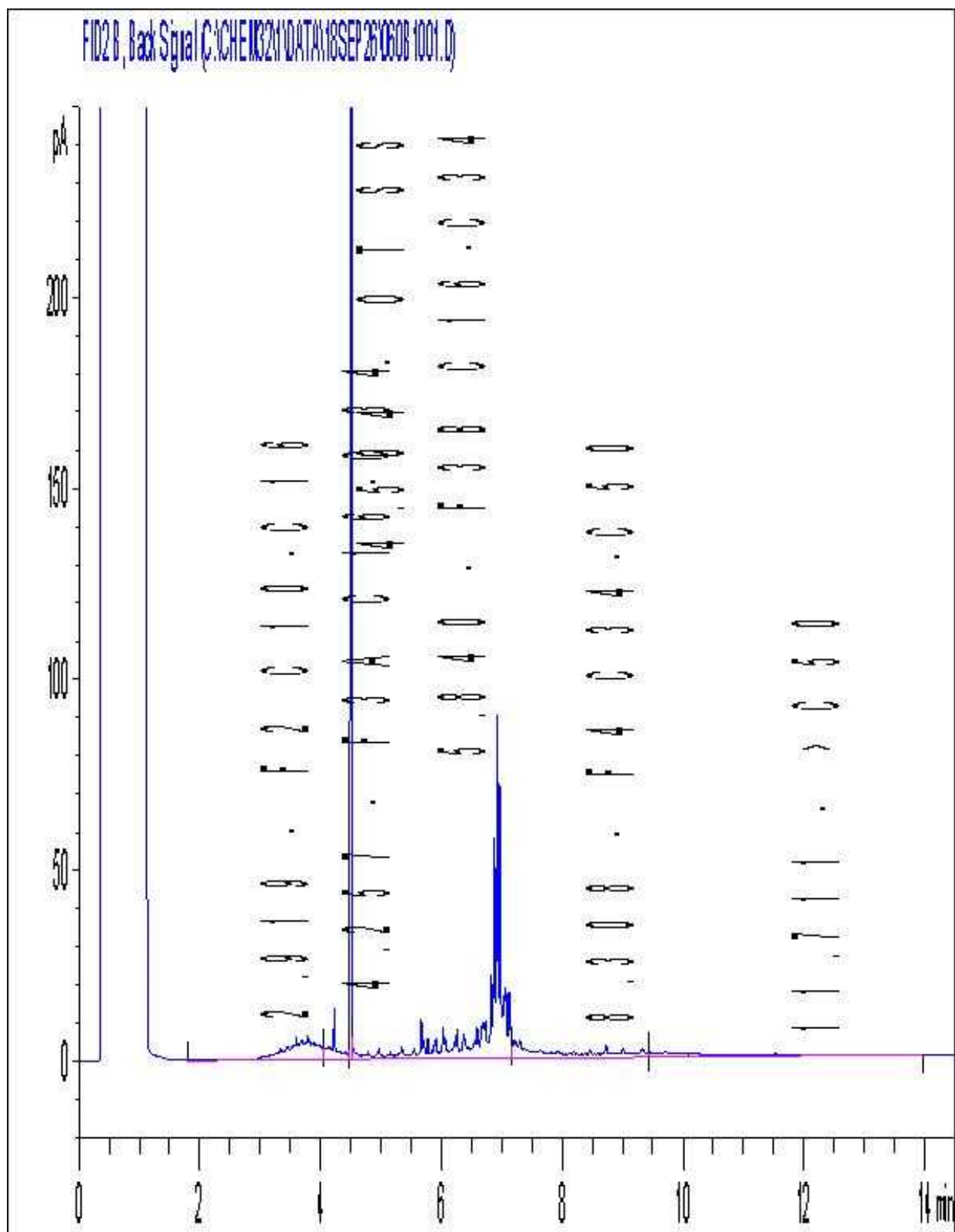
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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



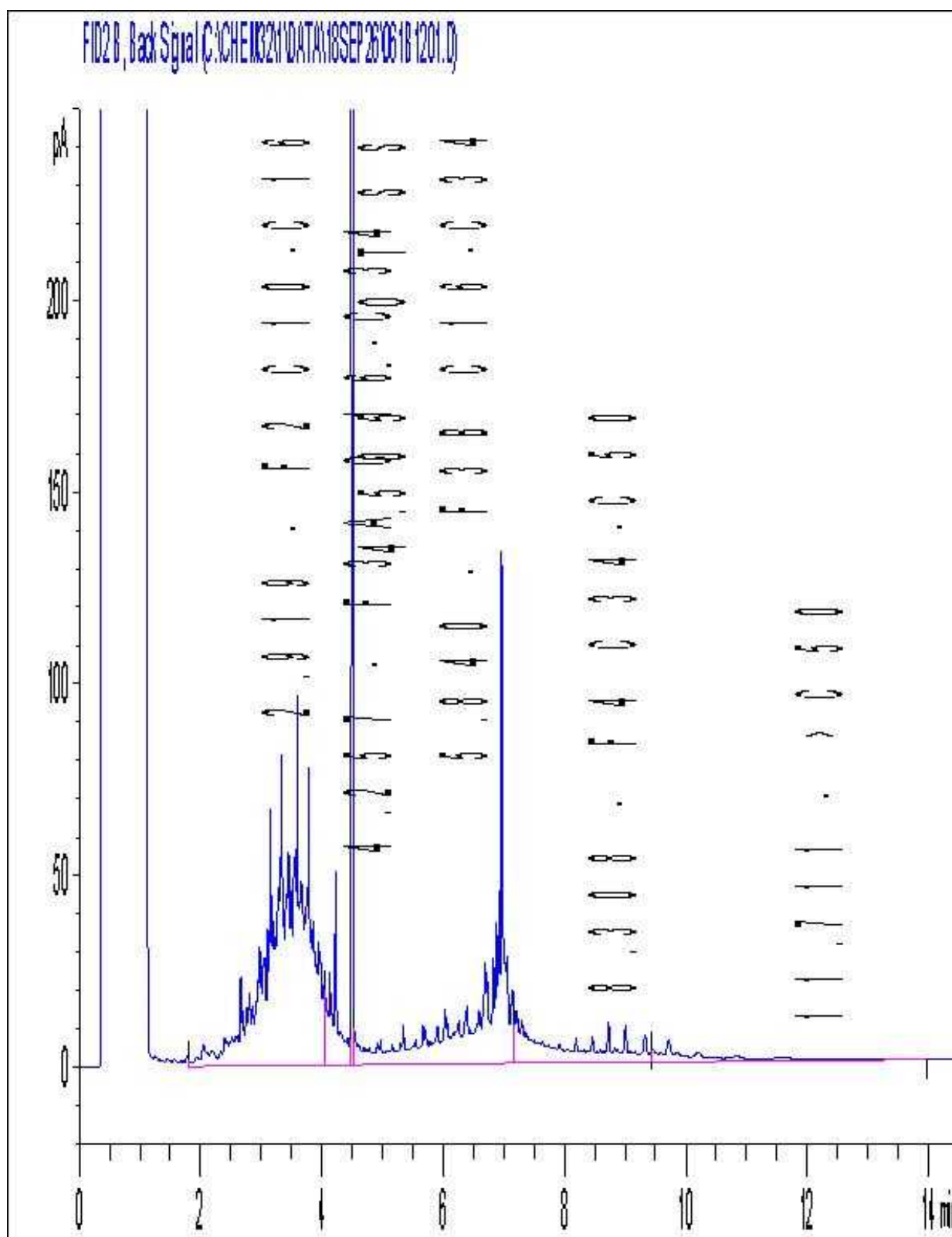
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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



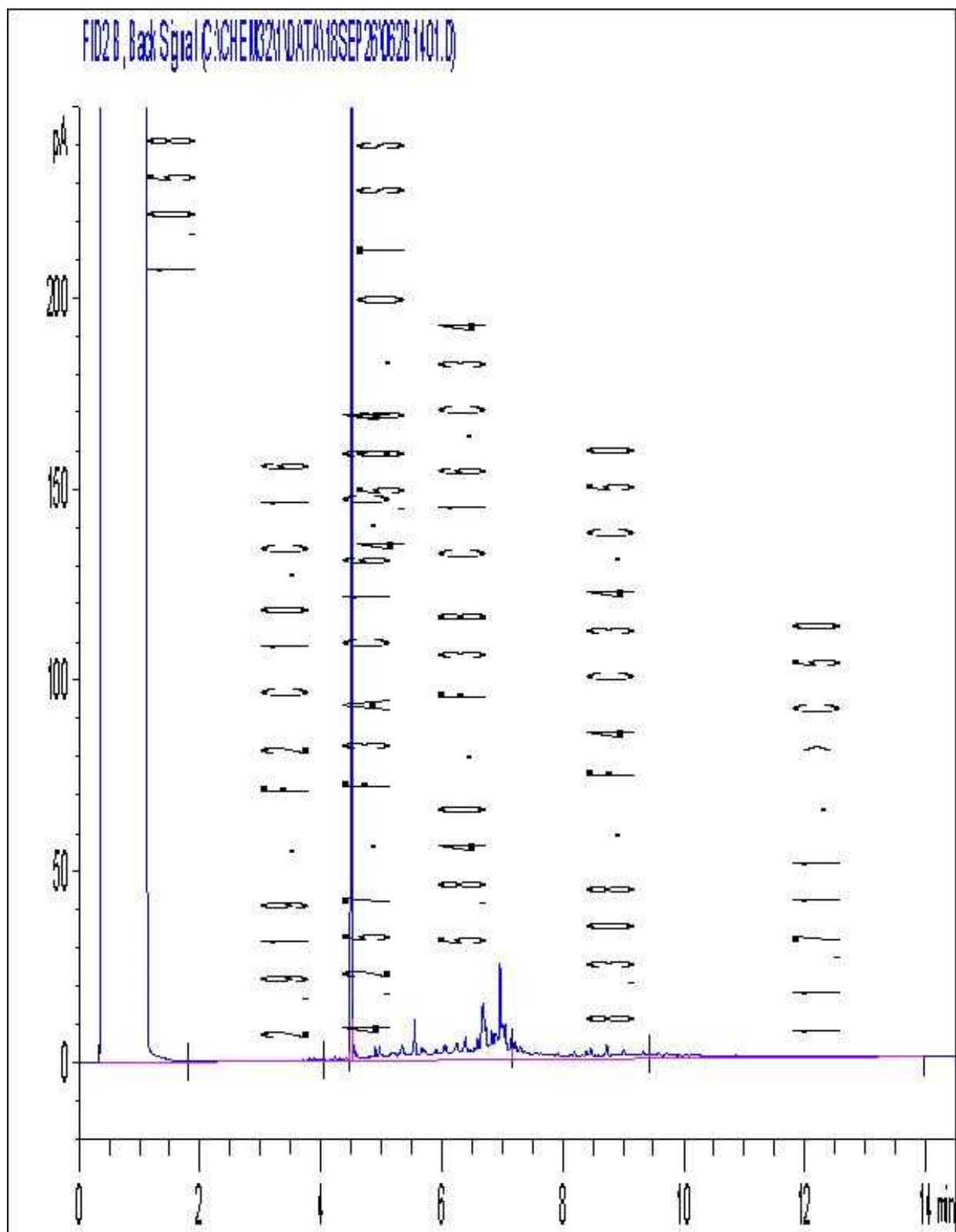
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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



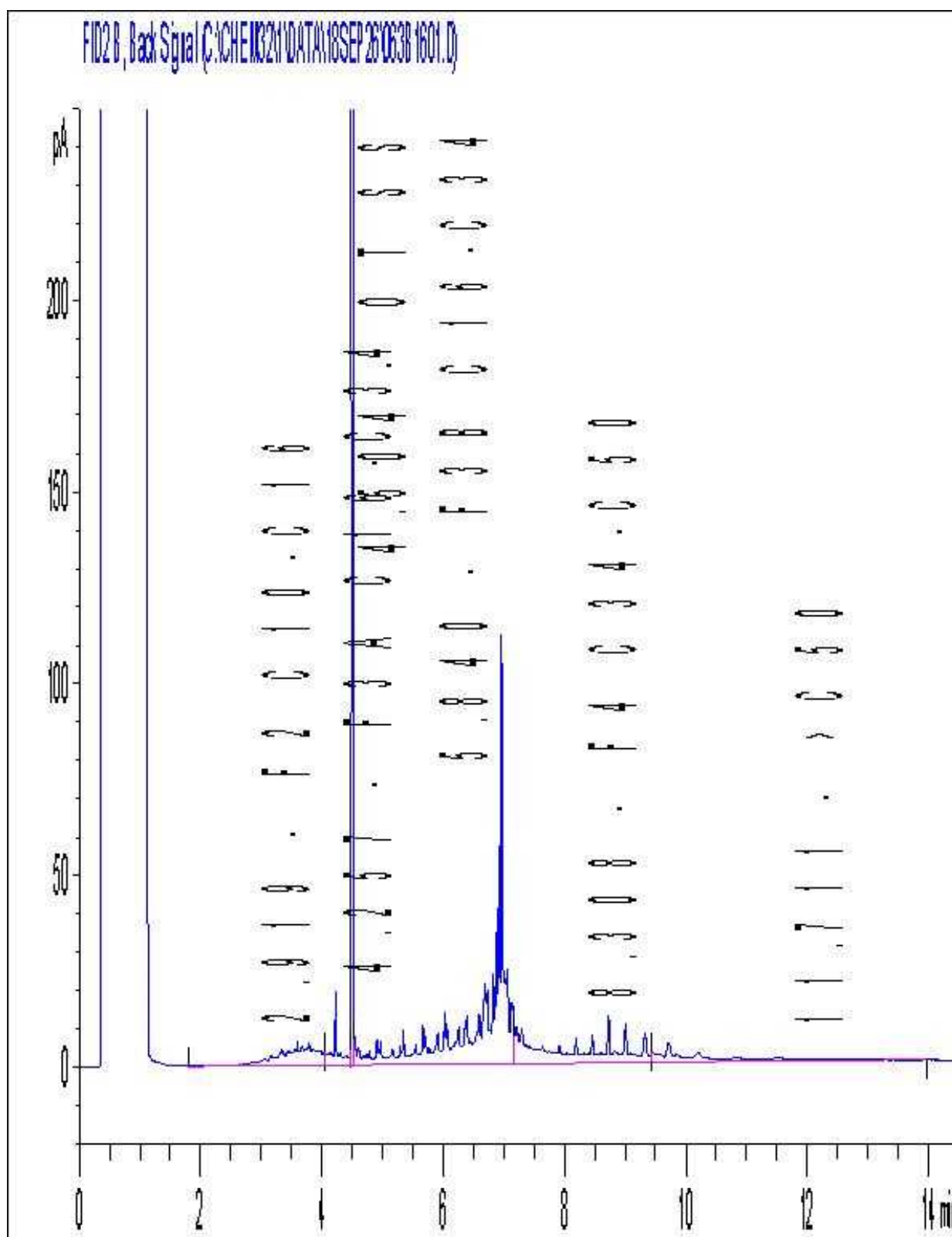
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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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Appendix E

Photo Log

Photo Log



Photo 1

Date

18.Sept.18

Description

West Slope of Landfill
Cap

Viewing Direction

South-East



Photo 2

Date

18.Sept.18

Description

South-West Slope of
Landfill Cap

Viewing Direction

East



Photo 3

Date

18.Sept.18

Description

South Slope of Landfill
Cap

Viewing Direction

North-East



Photo 4

Date
18.Sept.18

Description
South-East Slope of
Landfill Cap

Viewing Direction
North



Photo 5

Date
18.Sept.18

Description
East Slope of Landfill Cap

Viewing Direction
North-West



Photo 6

Date
18.Sept.18

Description
East Toe of Landfill Cap

Viewing Direction
North-West

**Photo 7****Date**

18.Sept.18

Description

East Toe of Landfill Cap

Viewing Direction

South-East

**Photo 8****Date**

18.Sept.18

Description

South Toe of Landfill Cap

Viewing Direction

South-East

**Photo 9****Date**

18.Sept.18

DescriptionSouth-West Toe of
Landfill Cap**Viewing Direction**

North



Photo 10

Date

18.Sept.18

Description

East Slope Swale - Top

Viewing Direction

North-East



Photo 11

Date

18.Sept.18

Description

East Slope Swale - Mid

Viewing Direction

North-East



Photo 12

Date

18.Sept.18

Description

East Slope Swale - Bottom

Viewing Direction

**Photo 13****Date**

18.Sept.18

Description

Top of Landfill

Viewing Direction

South-East

**Photo 14****Date**

18.Sept.18

Description

Top of Landfill

Viewing Direction

North-West

**Photo 15****Date**

18.Sept.18

Description

Upper Landfill Cap

Viewing Direction

South-East

**Photo 16****Date**

18.Sept.18

Description

Former Vehicle Dump

Viewing Direction

North

**Photo 17****Date**

18.Sept.18

Description

Former Vehicle Dump

Viewing Direction

West

**Photo 18****Date**

18.Sept.18

Description

Former Vehicle Dump

Viewing Direction

South

**Photo 19****Date**

19.Sept.18

Description

Pond # beyond the Toe of the Landfill Cap

Viewing Direction

South-West

**Photo 20****Date**

19.Sept.18

Description

Sampling at Pond #2 – LTM1-SW2 /SD2

Viewing Direction

West

**Photo 21****Date**

19.Sept.18

Description

Foot prints of Geese at Pond #1

Viewing Direction

N/A