

# QIKIQ15 BAFFIN REGION DEW LINE SITE MONITORING

# 2016 FOX-5 Monitoring Report

### Submitted to:

Department of National Defence ADM (Infrastructure & Environment) Ottawa, Ontario K1A 0K2

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# **Executive Summary**

Golder Associates Ltd. (Golder) has been contracted by Public Services and Procurement Canada (PSPC), on behalf of the Department of National Defence (DND), to complete the 2015-2018 Distant Early Warning (DEW) Line Sites Landfill Monitoring Program in the Baffin Region of Nunavut. The five DEW Line sites that were monitored in 2016 as part of the QIKIQ15 contract are FOX-2, FOX-3, FOX-4, FOX-5 and DYE-M. These sites are all now in the Post-Construction Monitoring Phase of their remedial program.

This Monitoring Report presents the 2016 post-construction inspection and monitoring results for the three landfills at FOX-5: Middle Site Non-Hazardous Waste Landfill (NHWL) and Tier II Disposal Facility, Main Landfill and Station Area NHWL. The 2016 monitoring was year 10 for FOX-5; remediation was completed in 2006. FOX-5 was last monitored in 2014. The next FOX-5 monitoring event is scheduled for 2021.

# Middle Site Non-Hazardous Waste Landfill and Tier II Disposal Facility

The Middle Site NHWL and Tier II Disposal Facility has exhibited some observed minor settlement, self-armouring erosion, cracking, tire tracks and a small hydrocarbon stain on the top of the northwest corner of the landfill. The landfill does not have any observed exposed waste or indications of slope instability. Observed cracking is either very weathered or likely caused by thaw creep and not considered to be of concern. All previously observed erosion appears to be self-armouring and has not changed from the last inspection in 2014 and therefore is not considered to be of concern. The small hydrocarbon stain appears to be from a fuel spill and the tire tracks are not causing erosion. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable".

At all five sampling locations, the concentrations of most metals were similar to or less than those observed in previous years. Concentrations of metal parameters in soil were highest overall at the deep MW-7 sample location. No detectable concentrations of cadmium, mercury, PHC or PCB were noted in any of the soil samples in 2016. None of the reported soil values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

In 2016, groundwater samples were collected from four of five monitoring wells adjacent to the landfill; no sample was collected at MW-7 because the well was dry. Zinc was detected at MW-5 and MW-8, at concentrations less than those observed in previous years. No detectable concentrations of other metals, PHC or PCB were noted in any of the groundwater samples in 2016.

Comparison of groundwater elevations based on estimated grade elevation and the measured water depth in the wells indicates that groundwater was highest at MW-5, and lowest towards the south at MW-8, which follows the topography in the area.

The historical graphs in Appendix C show concentration trends at the Middle Site NHWL and Tier II Disposal Facility. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at all five monitoring locations. There is no evident ongoing impact of the Middle Site NHWL and Tier II Disposal Facility on soil or groundwater quality. No modifications to the ongoing monitoring program at this landfill are recommended.



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## 2016 FOX-5 MONITORING REPORT

# **Main Landfill**

The Main Landfill located at the Station Area exhibited some observed erosion, debris and potential slope creep. No settlement, ponded water, cracking, sloughing or exposed waste were observed. There is some previously observed erosion along the northeast toe of the landfill (Feature D) that has been caused by upstream runoff draining down the steep slope around the toe of the landfill. At the time of 2016 visual inspection, the erosion along the northeast toe had not undermined the rip-rap protected landfill slope, nor was causing evident slope instability. The existing rip-rap on the landfill slope is quite large and is currently stable. Other previously observed erosion along the south, east and west toe of the landfill (Features F and H) does not appear to have changed significantly from the last inspection in 2014 and is not considered to be of concern. The inclination of the thermistor casings installed in the northeast slope of the landfill has been previously reported to potentially indicate slope creep (Feature A), however, the inclination angles have not previously been measured and therefore it cannot be determined if the inclination is an as-built condition or related to slope creep. The inclination angles of the thermistor casings were measured during the 2016 visual inspection for future reference. No other indications of slope instability were observed at the Main Landfill during the 2016 visual inspection. Observed metal and plastic debris around the toe of the landfill appears to be construction debris and is not exposed buried waste. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable".

The concentrations of most metals in soil were highest at the MW-11 sampling location, located immediately downgradient of the northeastern toe. At all five sampling locations, the concentrations of most metals were less than or similar to those reported in previous years. PHC were only detected at the MW-12 sampling location; the modified TPH concentration of 40.5 mg/kg remained below the range of concentrations reported from 2009 to 2012 (49 mg/kg to 91 mg/kg). No detectable concentrations of cadmium, arsenic, mercury or PCB were noted in any of the soil samples in 2016. None of the reported soil values exceeded their respective baseline mean concentrations plus 3 $\sigma$ .

In 2016, groundwater samples were collected from only one of the five monitoring wells adjacent to the landfill, MW-13. No metals, PHC F1 fraction or PCB were detected at this location in 2016.

The historical graphs in Appendix C show concentration trends at the Main Landfill. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at all four monitoring locations. There is no evident ongoing impact of the Main Landfill on soil or groundwater quality.

It is recommended that the inclination of all eight thermistors installed at the Main Landfill be measured on an annual basis until the next scheduled monitoring event in 2021 to help identify if there is any movement of the northeast slope. If this recommendation is put into effect, we also recommend that the erosion channels along the northeast toe of the landfill should be monitored at the same time to evaluate the risk of undermining the rip-rap landfill slope due to potential erosion (e.g., deep channel cutting). Consideration should also be given to setting up benchmarks (i.e., survey monuments) around the perimeter of the Main Landfill that could be surveyed on an annual basis along with the thermistors to determine if there is any ongoing slope movement. No other modifications to the ongoing soil and water monitoring program at this landfill are recommended.



# Station Area Non-Hazardous Waste Landfill

The Station Area NHWL exhibited some minor settlement, self-armouring erosion, cracking, tire tracks and debris. No ponded water, exposed waste or indications of slope instability were observed during the 2016 visual inspection. The previously observed minor settlement and self-armouring erosion does not appear to have changed since the last inspection and is not considered to be of concern. Previously observed cracking is weathered, does not appear to have changed since the last inspection and is not considered of concern. Previously observed steel cable and metal debris are not exposed buried waste. Previously observed tire tracks on the landfill surface do not appear to have changed since the last inspection and are not considered of concern. The Station Area NHWL was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable".

The concentrations of most metals in soil were highest overall at the deep MW-15 sampling location, located upgradient (cross-gradient) of the eastern toe and at the shallow MW-16 sampling location, located upgradient of the western toe. At MW-16, the concentrations of most metals were similar to those reported in previous years, with the exception of zinc, which exceeded the baseline mean concentration plus 3 $\sigma$  and represents a new historical maximum concentration. The concentration of chromium at the deep MW-15 sample location also marginally exceeded the baseline mean concentration plus 3 $\sigma$ , but remained less than the historical maximum concentration reported in previous years. PHC were only detected at the MW-16 sampling location; the modified TPH concentration of 80.5 mg/kg was similar to the range of concentrations reported in previous years (21 mg/kg to 264 mg/kg). No detectable concentrations of cadmium, mercury or PCB were noted in any of the soil samples in 2016.

In 2016, groundwater samples were collected from four of five monitoring wells adjacent to the landfill. The concentration of zinc at MW-16, the only parameter detected at any of the four locations sampled, was less than those observed in previous years.

Comparison of groundwater elevations based on estimated grade elevation and the measured water depth in the wells indicates that groundwater in was highest at MW-15, and lowest towards the south at MW-18, which follows the topography in the area.

The historical graphs in Appendix C show concentration trends at the Main Landfill. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at downgradient monitoring locations MW-17, MW-18 and MW-19. Slight increasing trends are observed for a number of metals (i.e. nickel, cobalt, lead, zinc and chromium) at the upgradient monitoring locations, which are largely attributed to increases at MW-16. Given that the environmental sampling results are largely the same as the previous sampling sessions, it is concluded that there is no evident impact of the landfill on soil quality. Similarly, there does not appear to be significant impact to groundwater quality from the landfill at the monitoring wells adjacent to the landfill. No modifications to the ongoing monitoring program at this landfill are recommended.





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# **APPENDIX B**

Field Records

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Laboratory Certificates of Analysis and QA/QC Reports

**Historical Monitoring Results** 

# **APPENDIX D**

Photograph Log



# 1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been contracted by Public Services and Procurement Canada (PSPC), on behalf of the Department of National Defence (DND), to complete the 2015-2018 Distant Early Warning (DEW) Line Sites Landfill Monitoring Program in the Baffin Region of Nunavut (hereafter referred to as the "Project"). The contract number with PSPC is W6837-151002/001/NCS. The DND file number for the Project is QIKIQ15. The contracted scope of work is in accordance with the project Terms of Reference (TOR) dated April 2015, Golder Proposal P1530908 dated June 16, 2015 ("Golder Proposal") and the minutes of the May 12, 2016 meeting attended by Golder and DND.

The five DEW Line sites that were monitored in 2016 as part of the QIKIQ15 contract are FOX-2, FOX-3, FOX-4, FOX-5 and DYE-M. These sites are all now in the Post-Construction Monitoring Phase of their remedial program. Post-Construction Monitoring was carried out in accordance with the TOR and implemented as per Golder's Logistics and Work Plan (LWP) dated July 25, 2016. Monitoring activities included geotechnical visual inspection, thermal monitoring, soil and groundwater sampling.

This monitoring report presents the 2016 post-construction inspection and monitoring results for FOX-5 (the Site). The 2016 monitoring event was Year 10 for FOX-5; remediation was completed in 2006.

Appendix A is a summary of the report limitations and forms part of the report.

# 1.1 Objective of the Study

The objective of the Landfill Monitoring Program is to collect sufficient information to assess the performance, integrity, and stability of the landfills from a geotechnical and environmental perspective for the protection of human health and the environment. The monitoring program is designed to monitor landfill integrity and to determine in the event of any evident deterioration impacts identified from sampling results, if remedial measures are required.

# 1.2 Scope of Work

The scope of work for this Project includes the following:

- 1) Project management including liaison with DND, project team coordination, scope management, cost management, schedule management and resource coordination;
- 2) Preparation of a site-specific Health Safety and Environment Plan (HASEP) and procurement of safety equipment and supplies (e.g., personal protective equipment, first aid kits and satellite phones);
- Development of a Logistics and Work Plan (LWP) for each field season that outlines the field schedule, travel plans, accommodation, hiring of local Inuit contract workers, all-terrain vehicle (ATV) and charter aircraft rental;
- 4) Completion of field work consisting of visual inspection, photographic documentation, thermistor data collection and soil and water sample collection;
- 5) Preparation of a Field Work Progress Report that summarizes field work activities completed each year (submitted under separate cover);





- 6) Preparation of a Consultant Inuit Participation Plan (CIPP) and Report (CIPR), that contains the Inuit employment and subcontracting content (submitted under separate cover); and,
- 7) Preparation of draft and final monitoring reports for each site with visual inspection results, photographic log, thermistor data collection, figures of inspection features and photograph locations, soil and groundwater quality monitoring results, Quality Analysis / Quality Control (QA/QC) and data interpretation.



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## 2016 FOX-5 MONITORING REPORT

# 2.0 BACKGROUND

# 2.1 Site Description

The FOX-5 Broughton Island DEW Line site is located on the southeastern edge of Broughton Island. Broughton Island is a small island off the east coast of the Cumberland Peninsula of Baffin Island. The FOX-5 site is located at 67° 33' north latitude and 63° 49' west longitude. The station is located approximately 10 km east of the community of Qikiqtarjuaq (formerly Broughton Island) and sits on a high point about 1.6 km inland of the Davis Strait. The station was accessible by an all-season road during site cleanup, however, this road has not been maintained since. A helipad is maintained in the vicinity of the operating North Warning System (NWS) Short Range Radar (SRR) station.

The Station Area is located at an elevation of approximately 550 metres above sea level (masl). A ridge and steep slope is located to the east of the station, within a distance of 450 m at its nearest approach. A ridge and slope leading northeast is located approximately 800 metres to the northeast. These slopes terminate at Davis Strait.

FOX-5 was originally an auxiliary station within the original DEW Line system that was decommissioned in 1991. A remotely operated NWS SRR station has been constructed in its vicinity. The environmental cleanup and demolition of facilities not required for the operation of the NWS SRR station commenced in 2001 and was completed during the summer of 2006.

The following three landfills, shown in plan on Figure FOX-5.1, are part of the FOX-5 long-term monitoring program:

- The Middle Site Non-Hazardous Waste Landfill Tier II Disposal Facility, located in the Middle Site Area, immediately west of the access road and approximately 5,500 m east of Qikiqtarjuaq;
- The Main Landfill located in the Station Area, approximately 900 m northwest of the station; and,
- The Station Area Non-Hazardous Waste Landfill located approximately 300 m north of the station.



PERMANENT BENCHMARKS							
No	COORDINATES		· ·	DECORUDION			
NO.	NORTHING	EASTING	ELEV.	DESCRIPTION			
BM-1	5 599.643	4 498.140	514.934	25mm DIA. STEEL PIPE			
BM-2	5 749.976	4 692.327	502.600	25mm DIA. STEEL PIPE			

NOTE: THE STATION AREA IS ON A SEPARATE COORDINATE SYSTEM.
IT IS NOT TIED—IN TO THE SITE SURVEY AT THE MIDDLE SITE, COMMUNITY BORROW, AIRSTRIP AND BEACH AREAS.

PERMANENT BENCHMARKS							
NO.	COORD	INATES	ELEV DECODIDATION				
110.	NORTHING	EASTING	ELEV.	DESCRIPTION			
BM-3	9 700.063	15 599.940	314.770	25mm DIA. STEEL PIPE			
BM-4	9 900.067	15 600.081	309.963	25mm DIA. STEEL PIPE			

THE MIDDLE SITE, COMMUNITY BORROW, AIRSTRIP AND BEACH AREAS ARE ON A SEPARATE COORDINATE SYSTEM.

THEY ARE NOT TIED-IN TO THE SITE SURVEY AT THE STATION AREA.

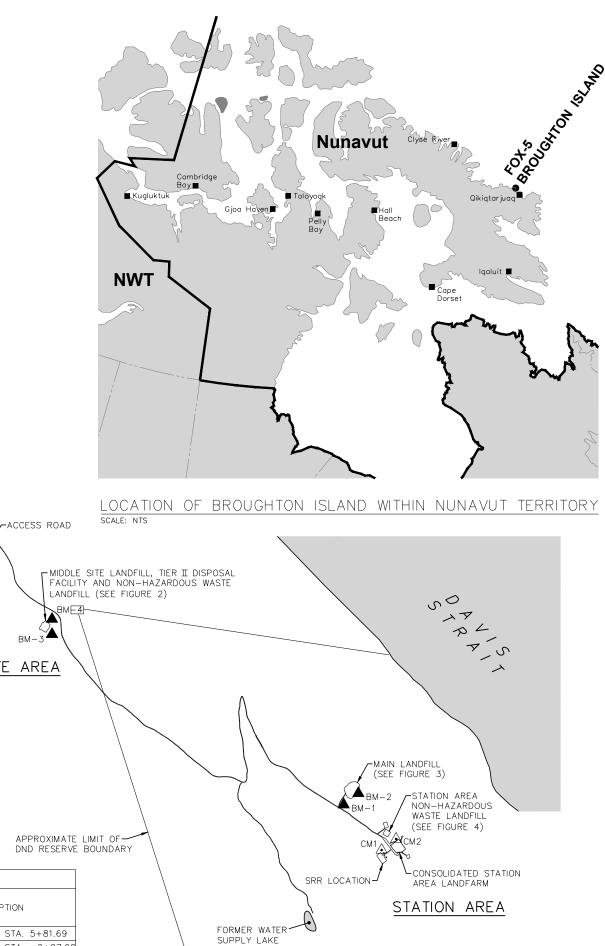
- HAMLET OF QIKIQTARJUAQ (BROUGHTON ISLAND)

-CONSOLIDATED AIRSTRIP AREA LANDFARM

BEACH AREA

-APPROXIMATE LIMIT OF NUNAVUT AIRPORT BOUNDARY

AIRSTRIP AREA



# LEGEND:

∆<sup>CM1</sup>

SURVEY CONTROL MONUMENT (2)

ABM-1

PERMANENT BENCHMARK LOCATION (4)

APPROXIMATE LOCATION OF PROPERTY BOUNDARY



BODY OF WATER

DEPARTMENT OF NATIONAL DEFENCE CANADA

CONSULTANT

2016 FOX-5 MONITORING REPORT

**OVERALL SITE PLAN** 

Golder Associates	
Associates	

YYYY-MM-DD	2016-10-06
DESIGNED	RM
PREPARED	TDR
REVIEWED	DCJ
APPROVED	DP
DE	FIGURE

PROJECT NO. PHASE 1530908 2000 FOX-5.1

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

THE STATION AREA IS ON A SEPARATE COORDINATE SYSTEM. IT IS NOT TIED-IN TO THE SITE SURVEY AT THE MIDDLE SITE, COMMUNITY BORROW, AIRSTRIP AND BEACH AREAS.

SURVEY CONTROL MONUMENTS						
NO. COORDINATES		FLEV.	DESCRIPTION			
NO.	NORTHING	EASTING	CLC V.	DESCRIPTION		
CM1	5 000.000	5 000.000	581.561	FOX-5 BASELINE STA. 5+81.69		
CM2	5 145.012	5 191.951	574.530	FOX-5 BASELINE STA2+07.90		

-HAMLET LANDFILL ACCESS

MIDDLE SITE AREA

COMMUNITY

BORROW AREA

-ACCESS TO HAMLET WATER RESERVOIR

# 2016 F

## 2016 FOX-5 MONITORING REPORT

# 2.2 Site Geology, Hydrogeology and Hydrology

The terrain is characterized by rolling hills on a high central plateau. A few small lakes are present on the island and small braided streams are found in the gentler grades of the valley bottoms. The surficial materials include marine sediments in lower-lying coastal regions, glacial till deposits in broad U-shaped valleys in the island interior, and boulder covered uplands in the Station Area.

The groundwater flow processes at the site are expected to be significantly influenced by the presence of continuous permafrost. Annual active thaw layers are typically limited to a few metres below ground surface, depending on ground cover, soil materials and surface water features. Shallow groundwater representing meltwater (both surficial and within the active layer) and infiltration from precipitation during the summer thaw is perched within the active layer during the short summer season. Movement of the groundwater is dictated by soil type, presence of shallow permafrost and hydraulic pressures resulting from topographic differences and distribution (elevation) of the water within the soils. Water elevations are only measured at some wells, and therefore the use of terms upgradient or downgradient may not be truly reflective of the actual flow direction. Nevertheless, for the purposes of this report, the terms upgradient and downgradient as they refer to the locations of the monitoring locations are used to maintain consistency with previous monitoring reports.

The peak elevation in the area of the Station Area Non-Hazardous Waste Landfill is approximately 572 masl; the elevation in the area of the Main Landfill is approximately 510 masl. These landfills are both located near the top of a ridge leading to a steep slope which extends to Davis Strait. The Main Landfill is notably located immediately adjacent to the ridge.

Based on the local topography, surface water at the Middle Site Landfill is expected to drain to the southwest towards a small stream located approximately 2.5 km from the landfill, and then west into Broughton Channel. Surface water at the Main and Station Area Non-Hazardous Landfills drains to the northeast into Davis Strait. It is noted that a number of erosion channels are present in the area of the Main Landfill, leading directly onto the nearby slope.

# 2.3 Land-Use Description

In the 1950s, DEW Line sites were constructed across a number of locations in the northern parts of Alaska, Canada and Greenland, between latitudes 65 and 70 degrees to maintain surveillance of the North American Airspace. In 1963, improvements in surveillance technology led to the closure of most of the DEW Line sites and their replacement with the NWS. Since the 1990s, investigations, decommissioning, and clean-up activities have been undertaken at the DEW line sites. Clean-up and decommissioning activities involved the demolition of surplus buildings and structures, excavation of contaminated soils, and the regrading of existing landfills. New engineered landfills were also constructed for the disposal of excavated soils and building materials.

Landfills at DEW Line sites can be categorized as follows:

- **Re-graded:** Existing landfills that were re-graded and capped with gravel;
- **Leachate Contained:** Existing landfills that were capped with gravel and provided with an impermeable membrane keyed into the permafrost (either only on the sides or over the entire surface), to contain leachate;
- New NH: New non-hazardous waste landfills; and,



New Tier II: New Tier II disposal facilities (used for the disposal of Tier II soils as described by the DEW Line Cleanup Criteria) have impermeable liners below and above the contaminated soil to encapsulate the contents and contain the leachate. Tier II landfills are designed with a saturated granular perimeter berm keyed into the permafrost and sufficient cover of granular material to promote permafrost aggradation into the landfilled materials.

The three landfills in the monitoring program at FOX-5 fall into the following categories:

- Middle Site Non-Hazardous Waste Landfill Tier II Disposal Facility (new NH and Tier II);
- Main Landfill (leachate contained); and,
- Station Area Non-Hazardous Waste Landfill (new NH).

There is an airstrip and beach landing area both located adjacent to the Hamlet of Qikiqtarjuaq that provide air transportation and marine shipping access for ongoing NWS operations and long-term monitoring.

# 2.4 Field Program Staff and Schedule

Table 2-1 presents a list of field personnel, roles, responsibilities and dates for the FOX-5 2016 monitoring program.

Table 2-1: Field Personnel and Roles

Name (Affiliation)	Role / Responsibility	Site	Date
Darrin Johnson (Golder)	Field Geotechnical Lead / Inspections	FOX-5	August 6-8, 2016
Kevin Rattray (Golder)	Field Environmental Lead / Soil and Water Sampling	FOX-5	August 6-8, 2016
JoAnne Bisson (Golder)	Environmental Field Technician / Soil and Water Sampling	FOX-5	August 6-8, 2016
Jaypootie Moesesie (Inuit Subcontractor)	Wildlife Monitor	FOX-5	August 6-8, 2016
Jeremiah Toomasie (Inuit Subcontractor)	Wildlife Monitor	FOX-5	August 6-8, 2016
Tony Atsanik (Inuit Subcontractor)	Environmental Assistant/ Soil and Water Sampling	FOX-5	August 8, 2016
Ricky Nookiguak (Inuit Subcontractor)	Environmental Assistant/ Soil and Water Sampling	FOX-5	August 6-8, 2016

# 2.5 Weather Conditions

Table 2-2 presents a summary of weather conditions on each day of the FOX-5 monitoring program.



# **\*\***\*\*

## 2016 FOX-5 MONITORING REPORT

Table 2-2: Summary of Weather Conditions

Date	Weather
August 6	Cloudy, 4-9 degrees Celsius
August 7	Cloudy, 3-5 degrees Celsius
August 8	Cloudy, 2-4 degrees Celsius

# 2.6 Project References

Canadian Council of Ministers of the Environment (CCME, 1993). "Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volumes I and II, Main Report and Analytical Methods".

Department of National Defence (DND, 2015). "Terms of Reference, DEW Line Monitoring Program CAM-5, FOX-M, 2, 3, 4, 5, DYE-M", QIKIQ15 Contract, April 2015.

Golder Associates Ltd. (Golder, 2015), "Solicitation No. W6837-151002/A Baffin Region Dew Line Sites Monitoring Program", Report P1530908, dated June 16, 2015.

Golder Associates Ltd. (Golder, 2016a). "Baffin Region DEW Line Site Monitoring Health Safety and Environment Plan", Report 1530908-2000-V2, dated July 25, 2016.

Golder Associates Ltd. (Golder, 2016b), "2016 Landfill Monitoring Program for QIKIQ15 Contract: Logistics and Work Plan", Report 1530908-2000-R1-V2, dated July 25, 2016.

Golder Associates Ltd. (Golder, 2016c). "2016 Baffin Region DEW Line Site Landfill Monitoring Field Work Progress Report", Report 1530908-2000-R2-V2, dated October 7, 2016.

# 2.7 Report Structure

This report describes the monitoring program carried out in August 2016 at FOX-5. Results from visual inspection activities, thermal monitoring, soil sampling and groundwater sampling are presented in accordance with the TOR.

Each of the landfills is described in separate sub-sections (Sections 4.1 to 4.3). Each section contains the following 2016 monitoring information:

- Scope deviations summary;
- Visual Inspection Checklist;
- Preliminary Stability Assessment Table;
- Table of visual inspection photographs;
- Landfill plan with photograph locations and observed features;
- Summary of thermal monitoring (if applicable for landfill);
- Summary of soil sampling analytical results;
- Summary of groundwater sampling analytical results (if applicable for landfill); and,
- Discussion of overall landfill performance based on available monitoring data.





Appendix A provides a Limitation of Responsibilities and forms part of the report. Thermal and groundwater monitoring field record sheets are included in Appendix B. Laboratory certificates of analysis, historical landfill monitoring results and QA/QC Reports are included in Appendix C. A photographic log is included in Appendix D. An electronic version of the report, tables, figures, full resolution photos and laboratory certificates of analysis is saved on a DVD-ROM, which is appended to the hardcopy of the report.





# 3.0 APPROACH & METHODOLOGY (GENERAL)

# 3.1 Summary of Work

# 3.1.1 Health and Safety

Golder developed a Health, Safety and Environment Plan (Golder, 2016b) for the QIKIQ15 field program, which describes potential hazards, risks and proposed mitigation measures. Unique health and safety risks included the potential for wildlife encounters, travel by air in light planes and on ATVs, long distances to the nearest emergency health care facilities and variable weather conditions. In addition, Golder developed a Logistics and Work Plan (Golder, 2016c) for the field program that contained the detailed schedule and travel plans, contact information, accommodation details, transportation, communications, field equipment and sampling protocols.

# 3.1.2 Field Program

Table 3-1 provides a summary of the monitoring schedule for the seven DEW Line sites that are part of the QIKIQ15 Project. FOX-5 was last monitored in 2014 (Year 8 post-remediation) and is not scheduled to be monitored again until 2021 (Year 15 post-remediation). The 2016 field monitoring program consisted of the following activities:

- Visual inspection (of three landfills) including photographic documentation of observed conditions;
- Thermal monitoring (i.e., datalogger downloading at landfills with thermistors) and datalogger reprogramming;
- Soil sampling; and,
- Groundwater sampling (at landfills with monitoring wells).

Table 3-2 provides a summary of monitoring activities by landfill.

Table 3-1: Summary of QIKIQ15 Project Monitoring Schedule

	Year					
DEW Line Site	2015	2016	2017	2018		
CAM-5 Mackar Inlet	Year 5		Year 7			
FOX-M Hall Beach			Year 10			
FOX-2 Longstaff Bluff	Year 4	Year 5		Year 7		
FOX-3 Dewar Lakes	Year 4 <sup>(a)</sup>	Year 5 <sup>(a)</sup>		Year 7		
FOX-4 Cape Hooper		Year 18		Year 20		
FOX-5 Broughton Island		Year 10				
DYE-M Cape Dyer	Year 2	Year 3	Year 4	Year 5		

Legend Phase I Monitoring
Phase II Monitoring

Note:

a) At FOX-3 in 2015 and 2016 (Years 4 and 5) - Complete a geotechnical inspection of the thermokarst regrade.





Table 3-2: Summary of Monitoring Requirements for Landfills at FOX-5

		Visual Inspection	Soil Sampling <sup>(a)</sup>	Groundwater Sampling	Thermal N	lonitoring
Landfill Designation	Type of Landfill	✓ = yes	Locations x Samples	# of Monitoring Wells	# of Thermistors	Change batteries & re-program <sup>(c)</sup>
FOX-5 Broughton Isla	and					
Middle Site Non-Hazardous Waste Landfill & Tier II Disposal Facility	New NH and Tier II	<b>~</b>	5 X 2	5	4 [see note (b)]	Yr. 10 re- program datalogger
Main Landfill	Leachate contained	1	5 X 2	5	8	Yr. 10 re- program datalogger
Station Area Non-Hazardous Waste Landfill	New NH	1	5 X 2	5	-	-
	TOTAL	3	30	15	12	-

### Notes:

# 3.1.3 Visual Inspection

At each of the FOX-5 landfill locations, a visual inspection was conducted to observe whether there were any visual signs of erosion, cracking, seepage, ponded water, stressed vegetation (potentially caused by the landfill) and for physical stability. Photographic records of the landfills were taken to document the observed conditions and other notable features. Northing and Easting coordinates were recorded for all photograph and feature locations using a Garmin GLO portable GPS receiver (2-5 m accuracy) with Bluetooth connection to a field tablet. It should be noted that there are some minor discrepancies between previously reported feature locations (that were referenced with a local coordinate system) and the 2016 visual inspection feature locations reported herein (that were referenced with UTM coordinates).

Visual inspection information was used to complete a Preliminary Stability Assessment for each landfill. Each observed feature was assigned a Severity Rating (Acceptable, Marginal, Significant or Unacceptable) and Extent (Isolated, Occasional, Numerous or Extensive) and then the landfill was assigned an overall Performance Rating (Acceptable, Marginal, Significant or Unacceptable). If a type of feature was not observed during the inspection, then the Severity Rating was reported as "Not Observed" in the Preliminary Stability Assessment. Definitions of these terms are as follows:



a) (# x #) Indicates the number of sampling points at each landfill. Samples are collected from two depths at each sampling point; from 0-15 cm and from 40-50 cm (or at refusal).

b) Reinstall datalogger VT-12 at FOX-5 Middle Site in 2016.

c) Re-program dataloggers at FOX-5 in 2016.



Feature Severity Rating / Landfill Performance Rating	Description
Not Observed	This type of feature was not observed at the landfill during the inspection.
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include:  Debris exposed in erosion channels or areas of differential settlement.  Liner exposed.  Slope failure.
Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacting less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

# 3.1.4 Thermal Monitoring

The landfills that require leachate containment (e.g., Tier II Disposal Facility and Leachate Contained) and rely on permafrost aggradation incorporate ground temperature monitoring systems with vertical thermistor strings that measure temperature at various depths and automated dataloggers that allow for data collection. The data recorded on the dataloggers was downloaded using a laptop computer and Prolog software from Lakewood Systems Ltd. Thermistor inspection and data downloading details were recorded on field record sheets included in Appendix B.

At the FOX-5 site, thermistors and data loggers are installed at the Middle Site NHWL/Tier II Disposal Facility and the Main Landfill. All thermistor dataloggers were downloaded and then reprogrammed according to the instructions received from DND. The dataloggers were programmed with a 24 hour sampling frequency because we were unable to program the dataloggers with a 48 hour sampling rate as requested. Datalogger memory was approximately 80% full prior to reprogramming and reset to 0% (i.e., empty memory) after



reprogramming providing memory capacity for ongoing data collection. The VT-12 datalogger was reinstalled at the Middle Site NHWL/Tier II Disposal Facility with new ULB1 and ULB15 batteries.

# 3.1.5 Soil Sampling

Soil samples were collected in accordance with the TOR, the Golder Proposal, Logistics and Work Plan and Canadian Council of Ministers of the Environment (CCME) Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites – Volumes I and II, Main Report and Analytical Methods (CCME, 1993). Soil sampling procedures of note are as follows (deviations from the TOR are noted *in italics*):

- Soil samples were collected within 2 to 4 metres of monitoring wells (where applicable). Where there was no corresponding monitoring well soil samples were collected within 2 to 4 metres of previous sample locations. Previous consultants left pins and tags in the ground to indicate where they sampled soil. Golder sampled away from those locations and did not leave pins in the ground.
- Coordinates of the 2016 soil sampling locations were recorded using a field tablet equipped with a Garmin GPS and confirmed to be consistent with previous/required sampling locations prior to sampling.
- Test pits were dug with a shovel that was washed between sample locations. The shovel was decontaminated with soap and water, methyl hydrate and rinsed with distilled water before each use. Soil samples were collected by hand using a single-use disposable nitrile glove and placed into new/clean glass sample jars provided by the laboratory that were labelled with the sample location ID and depth.
- Soil samples were generally collected at 0 to 15 centimetres (cm) depth and at 40 to 50 cm depth at the locations in accordance with the TOR. At some locations, the sample collection depth was adjusted where soil was frozen or refusal on rock was encountered. Where refusal on a large rock(s) was encountered near surface, the sampling location was moved slightly to avoid the large rock(s). When rocks were encountered prior to reaching the target sampling depth, the test pit was enlarged and the rock(s) were excavated if possible. If the specified sampling depth could not be reached after expending reasonable effort to enlarge the hole in an attempt to remove rock(s), a sample was collected at or near the zone of refusal (in accordance with the TOR). If refusal was encountered after the shallow soil sample depth and even with additional effort it was not possible to remove the rock(s) causing refusal, then only one soil sample was collected at that location (noted as "refusal" in summary tables below).
- At locations where the ground was covered with snow and ice, excavation of the snow was attempted but, in general, it was impossible to dig through the ice and frozen ground beneath the snow and soil samples were not collected (noted as "frozen" in summary tables below).
- Inter-lab field duplicates were collected for approximately 10% of the total soil samples collected. The field duplicates were collected from relatively homogenous soil material in the test pit, such that the composition of the samples was the same and to minimize escape of volatile compounds.
- In order to assess the effectiveness of decontamination of the shovel used for soil sampling, an equipment rinsate (equipment blank) sample was completed following a typical decontamination procedure. This was conducted during sampling of the FOX-4 landfill, by pouring distilled water over the decontaminated shovel and capturing it in water sample bottles.



# 3.1.6 Groundwater Sampling

Groundwater samples were collected in accordance with the TOR, the Golder Proposal, Logistics and Work Plan and CCME (1993). Groundwater sampling procedures of note are as follows (*deviations in italics*):

- Water levels in the wells were measured with an interface probe that was decontaminated with soap and water, methyl hydrate and rinsed with distilled water before each use.
- At monitoring well locations where there was snow on the ground surrounding the well and no measurable water level or water that could be pumped with the peristaltic pump, water samples were not collected (noted as "frozen" in the summary tables below).
- At monitoring well locations that had no measurable water level or water that could be pumped with the peristaltic pump, water samples were not collected (noted as "dry" in summary tables below).
- In wells with limited water depth and/or slow recharge, purging was only carried out until the field parameters were observed to stabilize and then sampling was commenced in the priority order outlined in the TOR. The number of water sample bottles collected and parameters that could not be analysed are listed in footnotes following the respective summary tables below.
- Purging and sampling was carried out using a peristaltic pump and a low-flow purge rate of less than 100 mL/min was maintained. Peristaltic pump flexible tubing and nylon tubing extending down the well was single-use and disposed after use at each well (not reused). Sample tubing was removed from the wells after completion of the sampling event and disposed.
- Groundwater samples were pumped directly from the well into analysis-specific bottles provided by the laboratory that were labelled with the sample location ID. Groundwater samples were not field filtered and were not field-acidified or preserved (in accordance with the TOR).
- Where groundwater was insufficient, sampling was prioritized in the following order:
  - Petroleum hydrocarbons: F1 fraction;
  - Inorganic elements total concentrations: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc and mercury. Samples were not filtered (which is why low turbidity is so important) or preserved;
  - Petroleum hydrocarbons: F2, F3 and F4 fractions; and,
  - PCBs (polychlorinated biphenyls Total Aroclor analysis).
- Inter-lab duplicates were collected for 10% of the total groundwater samples collected.
- A field blank was filled in the field with distilled water and analyzed for all parameters.
- A travel blank of laboratory prepared water accompanied the sampling containers for the whole duration of the program, and analyzed for the entire suite of parameters.
- In order to assess the effectiveness of decontamination of the groundwater level / interface probe, an equipment rinsate (equipment blank) sample was completed following a typical decontamination procedure. This was conducted during sampling of the FOX-2 landfill, by pouring distilled water over the decontaminated probe and capturing it in water sample bottles.
- No equipment blanks were required for the sample collection tubing as new tubing was used at each sampling location.



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# 3.2 Field Notes and Data

Visual inspection photographs, features, locations and notes were recorded in the field with a tablet computer equipped with a camera and Global Positioning System (GPS). Field data and photographs from the tablet were uploaded to an online Geographic Information System (GIS) database that was used to generate the photograph log and figures presented in this report.

Thermistor inspection and monitoring data was recorded on field record sheets included in Appendix B. Thermistor locations were recorded with either the field tablet or a hand-held GPS. The angle of inclined thermistor protective casings above ground surface at the Main Landfill were measured and recorded.

Soil sampling locations were photographed before test pit excavation, at the maximum depth of the test pit excavation and after backfilling. Soil sampling locations were recorded with either the field tablet or a hand-held GPS.

Groundwater monitoring data was recorded on field record sheets included in Appendix B. Monitoring well locations were recorded with either the field tablet or a hand-held GPS.

# 3.3 QA/QC

Quality Assurance (QA) is the system of validation checks performed to measure quality in order to determine if the quality objectives have been met. Quality control (QC) is the set of procedures which are incorporated into the project's standard operating procedures to ensure that it achieves its quality objectives.

The QC procedures incorporated into the monitoring program carried out at FOX-5 included:

- Using only ISO 17025 certified environmental labs to perform the soil and groundwater analyses. Golder used Paracel Laboratories Ltd. (Paracel) of Ottawa as the primary lab and AGAT Environmental (AGAT) of Mississauga for the duplicate samples. Both of these laboratories are ISO 17025 certified for the analyses performed. The laboratories also exchanged their "Standard Methods" for the analyses in the program to harmonize their procedures for the duplicate analysis;
- The field sampling for soil and groundwater was completed by a two-person team, which helped to ensure that all of the sampling and field identification procedures were followed in order;
- Duplicate soil samples were collected from relatively homogenous soil material in the test pit, such that the composition of the samples was the same and to minimize escape of petroleum hydrocarbon (F1 fraction) compounds;
- Duplicate groundwater samples were prepared by alternately filling bottles for each lab for each parameter type; the yield of the wells in some cases prevented filling the whole suite of sample bottles;
- To minimize the possibility of cross contamination, soil samples were collected directly from the test pits with nitrile gloved hands, at the designated depth intervals, and placed into lab-supplied sample jars leaving no headspace. New gloves were used for each sample. The shovel and trowel used to open the test pits were cleaned manually then rinsed with methyl-hydrate and distilled water;





- To minimize the risk of cross-contamination, groundwater samples were pumped from the monitoring wells using dedicated tubing inserted into the well and another dedicated length of tubing between the rollers in the peristaltic pump. Staff holding the sample bottles wore nitrile gloves. Samples were labelled at the monitoring well with identification, time and date;
- Groundwater samples were neither filtered nor preserved in the field. The low-flow sampling technique was employed to minimize the presence of sediment in the water sample;
- Soil samples were not preserved in the field;
- To minimize the time delay from actual sample collection to receipt at the lab, Golder sent coolers from the site to the staging point every time a resupply flight occurred. From the staging point communities, the coolers were sent via First Air to Ottawa Airport where Golder picked them up and took them to Golder's office in Ottawa, where they were checked for breakage, legibility of the labels and accuracy and completeness of the chain of custody. After being checked in Ottawa, the samples were dispatched to the primary and duplicate labs. The maximum allowable hold times for samples were largely met; where they were exceeded, it was due to the logistical limitations of flying in and out of the sites and the long chain of transport from the staging points to the labs.

QA was measured by the duplicate analysis and review of the QA/QC data contained in each laboratory certificate of results. In addition to the duplicate analyses, a field blank (consisting of bottles filled with distilled water in the field) was submitted to Paracel for analysis of all specified parameters. Trip blanks consisted of bottles filled with distilled water and sealed at the laboratory. A trip blank was brought to the field for the overall 2016 program and back, then submitted to Paracel for analysis of all specified parameters.

The soil samples and groundwater samples were collected with only dedicated single-use equipment. The water sampling tubing was single-use from the well to sample bottle, and soil samples were collected from the test pits into sample jars using single-use gloves. This was possible because the texture of the soil samples was generally loose sandy soil. Nevertheless, equipment blanks were prepared for each type of sample. For groundwater sampling, the equipment blank was a sample of water poured over the water level probe, after it had been washed off, and for soil sampling it was a sample of water poured over the trowel after it had been washed between samples.

A discussion of the QA/QC results is provided in Section 5.





# 4.0 2016 MONITORING PROGRAM RESULTS

Photographs 1 through 159 (in Appendix D) document the observed conditions during the visual inspection including features on the cover/toe of the landfills, the groundwater monitoring wells, soil sample locations before excavation, after excavation and after backfilling as well as the condition of thermistors. The photographs taken at each of the landfill sites to document the observed conditions are organized as follows:

- Middle Site Non-Hazardous Waste Landfill and Tier II Disposal Facility Photographs 1 through 63;
- Main Landfill Photographs 64 through 109; and,
- Station Area Non-Hazardous Waste Landfill Photographs 110 through 159.

A complete log of all photographs is included in Appendix D. Copies of all digital photograph files are included on a DVD attached to this report. Visual inspection photographs are identified by an "ATT number" in the file name which are noted in brackets in the visual inspection photograph log tables.

Many of the acceptable features observed during the inspection do not appear to be related to landfill performance. For example, shallow depressions that appear to be unchanged since construction of the landfill (i.e., as-built condition) or minor hydrocarbon staining from post-construction anthropogenic activities (e.g., ATV use). These acceptable features that do not appear to be related to landfill performance have been reported as "not a concern". Self-armouring erosion, minor water ponding and seepage without staining have also been reported as "not a concern" because they are not indicative of deteriorating landfill performance and/or may be weather related. In addition, some minor cracking that appears to be related to thaw creep does not indicate slope instability and is not considered to be a concern at the present time. Significant features that are related to landfill performance have been photographed and described in detail.

The monitoring program results are listed for each landfill in the sections below. In the tables, data which exceed the arithmetic mean background data and baseline arithmetic mean are identified by <u>underlined</u> and **bold** fonts, respectively. The background arithmetic mean limits for each landfill have been previously established using the arithmetic mean concentrations for soil samples collected outside of area of the landfills in 1984 and 1990. The baseline arithmetic mean limits were calculated were based on the concentrations for soil samples collected at each of the current soil sampling locations of area adjacent to the landfills, between 1998 and 2006. Soil and groundwater quality data are also compared to the baseline concentration plus three standard deviations (3 $\sigma$ ) and exceedances are shaded. This limit is based on the "three-sigma rule of thumb", wherein it is expected that nearly all values lie within three standard deviations of the arithmetic mean.

A modified total petroleum hydrocarbons (TPH) value, calculated as the sum of the PHC F1, F2 and F3 fractions, is discussed throughout this report to allow for comparison to TPH baseline data.

Historical soil and groundwater results and charts are included in Appendix C. It should be noted that there are discrepancies in the highlighting of baseline and background arithmetic mean exceedances between the 2016 soil and groundwater data summary tables within the body of the report and the historical chemistry tables in Appendix C; exceedances noted in the data tables within the body of the report are considered the correct interpretation of the 2016 results. Discussion of the 2016 data in this report focused on identifying trends, as well as identifying data results for locations where concentrations significantly different (typically greater) than previous years are observed, or locations where concentrations exceeded the baseline concentration plus 3σ.



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## 2016 FOX-5 MONITORING REPORT

Duplicate soil samples were collected at two locations at FOX-5. This included the deep MW-7 (40-50 cm) and shallow MW-18 (0-15 cm) sample locations at the Middle Site NHWL and Tier II Disposal Facility and Station Area Main Landfill, respectively. A duplicate groundwater sample was also collected at monitoring well MW-5 located at the Middle Site NHWL and Tier II Disposal Facility. For these duplicate sample locations, the average of the two concentrations are presented in the tables and used to discuss in the results in Section 4. The reproducibility of the duplicate sample results is discussed in Section 5.

# 4.1 Middle Site Non-Hazardous Waste Landfill and Tier II Disposal Facility

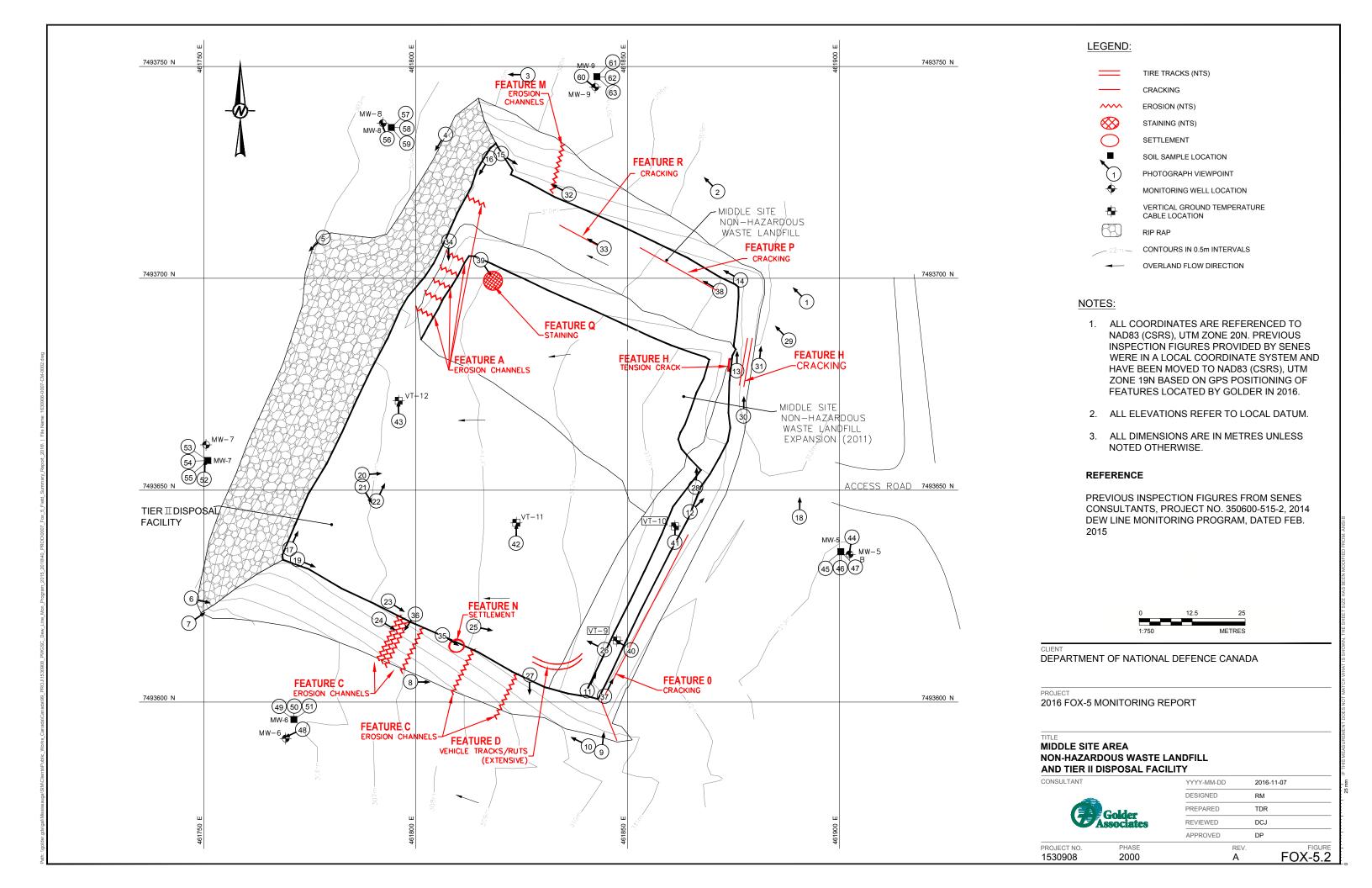
# 4.1.1 Landfill Description

The Middle Site Non-Hazardous Waste Landfill (NHWL) and Tier II Disposal Facility is located west of the road between the station and the community of Qikiqtarjuaq, at a distance of approximately 5.5 km from the community of Qikiqtarjuaq. The landfill is located approximately 40 m from the road, as illustrated on Figure FOX-5.2. Local grades range from 312 masl to the east near the road, to 303 masl to the northwest, at the toe of the landfill slope. Surface water drainage from the area is generally to the northeast.

The conjoined facility was constructed to contain non-hazardous waste derived from demolition and surface debris pickup and also to dispose of Tier II contaminated soil. The landfill was constructed with two separate cells, based on differing containment requirements. The non-hazardous landfill is located to the northeast, whereas the Tier II landfill is located to the southwest. The non-hazardous waste cell construction included compacted perimeter berms and the placement of a compacted granular fill cover over the landfilled material. The Tier II cell construction consisted of the placement of saturated and compacted low-permeability soil berms, the installation of a liner system over the berms and along the landfill base and the placement of a surface liner system over the landfill contents, followed by the placement of overlying sufficient granular fill to promote freeze-back of the landfilled waste. The combined landfill cells have an area of approximately 12,750 m², including the side slopes. Five groundwater monitoring wells were installed around the landfill perimeter (MW-5 through MW-9), and four thermistors were installed within the Tier II Disposal Facility (VT-9 through VT-12).

The long term monitoring plan at this landfill site consists of visual monitoring, the collection of soil and groundwater samples, and monitoring of subsurface ground temperatures of the landfill. There are five soil and groundwater monitoring locations, MW-5 through MW-9 at this landfill. Approximate locations for the collection of soil and groundwater samples, and thermistor installation locations are identified on Figure FOX-5.2.





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# 4.1.2 Visual Inspection

The Middle Site NHWL and Tier II Disposal Facility has exhibited some minor settlement, erosion, cracking and staining features. The landfill does not exhibit any observed exposed waste or indications of slope instability. Table 4-1 presents a summary of observed visual inspection features and Table 4-2 presents the Preliminary Stability Assessment results. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable." Table 4-3 is a log of photographs taken during the 2016 visual inspection.

Cracking has been observed on the northeast slope, north crest and southeast slope. Previously observed cracking on the northeast slope (previous Feature H) consists of many small parallel cracks that are likely caused by thaw creep. The observed tension cracks along the north crest edge (new Feature R and new Feature P) are both quite weathered and there are no other indications of slope movement so they are not considered to be of concern. Previously observed tension crack (Feature L) on the north slope was not observed in 2016. The thin tension cracks observed on the southeast crest and slope (new Feature O) are likely caused by thaw creep and there are no other indications of slope movement so they are not considered a concern. All of the observed cracking is assessed as "Acceptable" and not considered to be of concern.

Some previously observed minor self-armouring erosion is still evident on the west, south and north slopes (Features A, C and M) that does not appear to have changed from the last inspection in 2014 and is not considered to be of concern. Previously reported settlement on the southeast slope (Feature E) was observed to be an area of rough grading during the 2016 visual inspection and is not considered settlement. The other previously observed area of minor settlement on the south crest surface (Feature N) is shallow and not considered to be a concern.

There is a small hydrocarbon stain on the northwest crest surface (Feature Q) that appears to be caused by a post-construction motorized vehicle fuel spill and is not related to landfill performance. Previously observed tire tracks on the majority of the landfill crest and slopes (Feature D) have not caused any erosion of the granular cover material. Previously observed ponded water on the crest surface (Feature B) was not observed during the 2016 visual inspection.

Previously observed erosion channels (Features F and I) and the minor settlement (Feature E) on the east slope were not observed in 2016. Previously observed natural staining (Feature G) was not observed in 2016 and may have been moisture (Photo 28). Previously observed minor settlement (Features J and K) on the north slope were not observed in 2016.





Table 4-1: Visual Inspection Checklist – Middle Site

SITE NAME: FOX-5 Broughton Island

LANDFILL DESIGNATION: Middle Site Non-Hazardous Waste Landfill and Tier II

**Disposal Facility** 

**DATE OF INSPECTION: August 7, 2016** 

**DATE OF PREVIOUS INSPECTION: August 9, 2014** 

**INSPECTED BY: Darrin Johnson** 

**REPORT PREPARED BY: Darrin Johnson** 

**MONITORING EVENT NUMBER: 7** 

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





Table 4-1: Visual Inspection Checklist – Middle Site NHWL and Tier II Disposal Facility

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description	Comparison to Historical Observations	Photos
		E	Southeast slope	-	-	-	-	-	-	Rough grading previously described as settlement	Not observed in 2016	9
Settlement	Y	N	South crest	461802.3	7493620.0	0.5	0.5	0.1	0.002%	Minor settlement (Acceptable)	to Historical Observations  eviously tlement 2016  Previously observed, no change  erosion ptable)  Previously observed, no change  New  Previously observed, no change	35
		А	West slope	461807.8	7493708.8	20	10	0.10	1.6%	Self- armouring erosion channels (Acceptable)	observed, no	34
Erosion	Y	С	South slope	461774.2	7493633.6	10	30	0.1	2.3%	Self- armouring erosion channels (Acceptable)	observed, no	23, 24, 36
		М	North slope	461836.1	7493719.9	10	5	0.1	0.4%	Self- armouring erosion channels (Acceptable)  Self- armouring erosion (Acceptable)  Previously observed, no change		32
Lateral Movement	N	-	-	-	-	-	-	-	-	-	-	-
Frost Action	N	-	-	-	-	-	-	-	-	-	-	-
Sloughing	N	-	-	-	-	-	-	-	-	-	-	-
		Н	Northeast slope	461877.3	7493667.5	10	5	0.05	0.4%	Parallel cracking (Acceptable)	observed, no	30
		R	North crest 5 m from edge	461844.4	7493707.1	10	0.05	0.02	0.004%	Weathered tension crack (Acceptable)	New	33
Cracking	Y	0	Southeast slope at corner and along crest edge	461844.5	7493601.4	50	0.01	0.01	0.004%	Thin tension crack (Acceptable)	New	37
		Р	Northeast crest 4 m from edge	461871.7	7493697.1	20	0.01	0.01	0.002%	Weathered tension crack (Acceptable)	New	38





Table 4-1: Visual Inspection Checklist – Middle Site NHWL and Tier II Disposal Facility

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description	Comparison to Historical Observations	Photos
Animal Burrows	N	-	-	-	-	-	-	-	-	-	-	-
Vegetation	N	-	-	-	-	-	-	-	-	-	-	-
Staining	Y	Q	Northwest crest surface	461815.3	7493704.4	1	0.30	-	0.002%	Hydrocarbon staining from fuel spill (Acceptable)	New	39
Vegetation Stress	N	-	-	-	-	-	-	-	-	-	-	-
Seepage or Ponded Water	N	В	Crest surface	461799.1	7493634.5	-	-	-	-	Ponded water	Not observed in 2016	20
Debris and/or Liner Exposed	N	-	-	-	-	-	-	-	-	-	-	-
Presence / Condition of Monitoring Instruments	Y	VT-9 to 12 MW-5 to 9	-	-	-	-	-	-	-	Thermistor and monitoring well casings - intact		40-44, 48, 52, 56, 60
Features of Note / Other Observations	Υ	D	Crest and slope surfaces	461813.6	7493617.9	100	50	0.01	39%	Tire tracks from trucks, quads, and dirt bikes (Acceptable)	Previously observed, no change	25

Landfill Area = 12,750 m<sup>2</sup>





Table 4-2: Preliminary Stability Assessment – Middle Site NHWL and Tier II Disposal Facility

Feature	Severity Rating	Extent	
Settlement	Acceptable	Isolated	
Erosion	Acceptable	Occasional	
Lateral Movement	Not observed	-	
Frost Action	Not observed	-	
Sloughing	Not observed	-	
Cracking	Acceptable	Occasional	
Animal Burrows	Not observed	-	
Vegetation Establishment	Not observed	-	
Staining	Acceptable	Isolated	
Vegetation Stress	Not observed	-	
Seepage/Ponded Water	Not observed	-	
Debris and/or Liner Exposure	Not observed	-	
Other	Acceptable	Numerous	
Overall Landfill Performance Acceptable			

Table 4-3: Summary Table of Photographic Log – Middle Site NHWL and Tier II Disposal Facility

Photo	Description (file name)	Easting	Northing	Date
1	FOX 5 – Middle Site NHWL / Tier II DF – East corner facing northwest (ATT3_Photo3.jpg)	461892.2	7493694.5	7-Aug-2016
2	FOX 5 – Middle Site NHWL / Tier II DF - North toe facing northwest (ATT4_Photo4.jpg)	461871.2	7493720.5	7-Aug-2016
3	FOX 5 – Middle Site NHWL / Tier II DF - North toe facing west (ATT5_Photo5.jpg)	461826.4	7493748.0	7-Aug-2016
4	FOX 5 – Middle Site NHWL / Tier II DF - Northwest toe facing southwest (ATT6_Photo6.jpg)	461807.0	7493734.0	7-Aug-2016
5	FOX 5 – Middle Site NHWL / Tier II DF - West toe facing southwest (ATT7_Photo7.jpg)	461778.1	7493709.6	7-Aug-2016
6	FOX 5 – Middle Site NHWL / Tier II DF - Southwest toe facing east (ATT8_Photo8.jpg)	461747.0	7493624.5	7-Aug-2016
7	FOX 5 – Middle Site NHWL / Tier II DF - Southwest toe facing northeast (ATT9_Photo9.jpg)	461746.4	7493618.6	7-Aug-2016
8	FOX 5 – Middle Site NHWL / Tier II DF - South toe facing east (ATT10_Photo10.jpg)	461798.7	7493604.8	7-Aug-2016
9	FOX 5 – Middle Site NHWL / Tier II DF - Southeast toe facing north – Previously observed settlement (Feature E) likely just rough grading (ATT11_Photo11.jpg)	461843.8	7493588.3	7-Aug-2016





Table 4-3: Summary Table of Photographic Log – Middle Site NHWL and Tier II Disposal Facility

Photo	Description (file name)	Easting	Northing	Date
10	FOX 5 – Middle Site NHWL / Tier II DF - Southeast toe facing northwest (ATT12_Photo12.jpg)	461843.8	7493588.3	7-Aug-2016
11	FOX 5 – Middle Site NHWL / Tier II DF – Crest facing northeast towards VT-9 (ATT13_Photo13.jpg)	461843.8	7493601.5	7-Aug-2016
12	FOX 5 – Middle Site NHWL / Tier II DF - Crest facing northeast – Previously observed erosion channels (Feature F) were not observed in 2016 and could have been early self-armouring, north end of thin minor crack along crest edge (Feature O) (ATT14_Photo14.jpg)	461864.7	7493644.9	7-Aug-2016
13	FOX 5 – Middle Site NHWL / Tier II DF - Crest facing north – Previously observed natural staining (Feature G) was not observed in 2016 and could have been moisture (ATT15_Photo15.jpg)	461875.7	7493678.2	7-Aug-2016
14	FOX 5 – Middle Site NHWL / Tier II DF - Crest edge facing northwest – Previously observed settlement (Feature J) considered rough grading (ATT16_Photo16.jpg)	461876.6	7493699.6	7-Aug-2016
15	FOX 5 – Middle Site NHWL / Tier II DF - Crest edge facing southeast (ATT17_Photo17.jpg)	461820.0	7493729.9	7-Aug-2016
16	FOX 5 – Middle Site NHWL / Tier II DF - Crest edge facing southwest (ATT18_Photo18.jpg)	461820.0	7493730.0	7-Aug-2016
17	FOX 5 – Middle Site NHWL / Tier II DF - West crest edge facing northeast (ATT19_Photo19.jpg)	461771.0	7493635.4	7-Aug-2016
18	FOX 5 – Middle Site NHWL / Tier II DF – East toe facing north (ATT2_Photo2.jpg)	461890.5	7493643.7	7-Aug-2016
19	FOX 5 – Middle Site NHWL / Tier II DF - South crest edge facing southeast (ATT20_Photo20.jpg)	461770.9	7493635.6	7-Aug-2016
20	FOX 5 – Middle Site NHWL / Tier II DF - Crest surface facing east towards VT-11 - Previously ponded water (Feature B) not observed in 2016 (ATT21_Photo21.jpg)	461787.3	7493653.7	7-Aug-2016
21	FOX 5 – Middle Site NHWL / Tier II DF - Crest surface facing southeast towards VT-9 (ATT22_Photo22.jpg)	461787.3	7493653.7	7-Aug-2016
22	FOX 5 – Middle Site NHWL / Tier II DF - Crest surface facing northeast towards VT-12 (ATT23_Photo23.jpg)	461787.3	7493653.7	7-Aug-2016
23	FOX 5 – Middle Site NHWL / Tier II DF – South slope facing southeast – Feature C – Self-armouring erosion, multiple channels (Acceptable) (ATT43_Photo43.jpg)	461799.1	7493634.5	7-Aug-2016
24	FOX 5 – Middle Site NHWL / Tier II DF – South slope facing southeast – Feature C – Self-armouring erosion (Acceptable) (ATT42_Photo42.jpg)	461774.2	7493633.6	7-Aug-2016
25	FOX 5 – Middle Site NHWL / Tier II DF – Southeast crest surface facing southeast – Feature D – Vehicle tracks from trucks, quads and dirt bikes are present over most of the landfill surfaces (Acceptable) (ATT45_Photo45.jpg)	461813.6	7493617.9	7-Aug-2016





Table 4-3: Summary Table of Photographic Log – Middle Site NHWL and Tier II Disposal Facility

Photo	Description (file name)	Easting	Northing	Date
26	FOX 5 – Middle Site NHWL / Tier II DF – Crest surface facing northwest towards VT-11 (ATT48_Photo48.jpg)	461844.5	7493612.4	7-Aug-2016
27	FOX 5 – Middle Site NHWL / Tier II DF – Southeast corner facing southeast (ATT47_Photo47.jpg)	461826.9	7493606.4	7-Aug-2016
28	FOX 5 – Middle Site NHWL / Tier II DF – Northeast corner facing north – Previously observed natural staining (Feature G) not observed in 2016 may have been moisture (ATT50_Photo50.jpg)	461866.0	7493650.7	7-Aug-2016
29	FOX 5 – Middle Site NHWL / Tier II DF – Northeast toe facing northwest – Moist ground but no ponded water at toe (ATT53_Photo53.jpg)	461888.0	7493685.4	7-Aug-2016
30	FOX 5 – Middle Site NHWL / Tier II DF – Northeast slope facing north – Feature H – Parallel cracking on slope (Acceptable) (ATT52_Photo52.jpg)	461877.3	7493667.5	7-Aug-2016
31	FOX 5 – Middle Site NHWL / Tier II DF – Northeast slope facing north (ATT51_Photo51.jpg)	461880.9	7493679.4	7-Aug-2016
32	FOX 5 – Middle Site NHWL / Tier II DF – North slope facing northwest – Previously observed Feature M erosion channels have self-armoured (Acceptable) (ATT56_Photo56.jpg)	461836.1	7493719.9	7-Aug-2016
33	FOX 5 – Middle Site NHWL / Tier II DF – North end crest surface facing northwest – Feature R – weathered tension crack about 5 m from crest edge (Acceptable) (ATT55_Photo55.jpg)	461844.4	7493707.1	7-Aug-2016
34	FOX 5 – Middle Site NHWL / Tier II DF – Northwest slope facing south – Feature A - self armouring erosion channels (Acceptable) (ATT57_Photo57.jpg)	461807.8	7493708.8	7-Aug-2016
35	FOX 5 – Middle Site NHWL / Tier II DF – South crest edge facing southeast – Feature N – minor settlement at crest edge (Acceptable) (ATT44_Photo44.jpg)	461802.3	7493620.0	7-Aug-2016
36	FOX 5 – Middle Site NHWL / Tier II DF – South slope facing southwest – Feature C – self armouring erosion channels (Acceptable) (ATT46_Photo46.jpg)	461802.9	7493619.4	7-Aug-2016
37	FOX 5 – Middle Site NHWL / Tier II DF – Southeast slope facing northeast – Feature O – tension crack with sharp edges extending from toe to crest at corner of landfill and along crest edge (Acceptable) (ATT49_Photo49.jpg)	461844.5	7493601.4	7-Aug-2016
38	FOX 5 – Middle Site NHWL / Tier II DF – Northeast crest facing northwest – Feature P – weathered tension crack about 4 m from crest edge (Acceptable) (ATT54_Photo54.jpg)	461871.7	7493697.1	7-Aug-2016
39	FOX 5 – Middle Site NHWL / Tier II DF – Northwest crest surface facing southeast – Feature Q – hydrocarbon staining not related to landfill performance (Acceptable) (ATT58_Photo58.jpg)	461815.3	7493704.4	7-Aug-2016





Table 4-3: Summary Table of Photographic Log – Middle Site NHWL and Tier II Disposal Facility

Photo	Description (file name)	Easting	Northing	Date
40	FOX 5 – Middle Site NHWL / Tier II DF – VT-9 (ATT61_Photo61.jpg)	461848.5	7493614.7	7-Aug-2016
41	FOX 5 – Middle Site NHWL / Tier II DF – VT-10 (ATT62_Photo62.jpg)	461861.7	7493640.7	7-Aug-2016
42	FOX 5 – Middle Site NHWL / Tier II DF – VT-11 (ATT60_Photo60.jpg)	461823.7	7493642.3	7-Aug-2016
43	FOX 5 – Middle Site NHWL / Tier II DF – VT-12 (ATT59_Photo59.jpg)	461796.5	7493670.3	7-Aug-2016
44	FOX 5 – Middle Site NHWL / Tier II DF – MW-5 – monitoring well (ATT63_Photo63.jpg)	461902.7	7493636.2	7-Aug-2016
45	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 before excavation (ATT68_Photo68.jpg)	461900.3	7493635.5	7-Aug-2016
46	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 after excavation (ATT69_Photo69.jpg)	461900.3	7493635.5	7-Aug-2016
47	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 after backfilling (ATT70_Photo70.jpg)	461900.3	7493635.5	7-Aug-2016
48	FOX 5 – Middle Site NHWL / Tier II DF – MW-6 – monitoring well (ATT64_Photo64.jpg)	461771.9	7493595.4	7-Aug-2016
49	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 before excavation (ATT71_Photo71.jpg)	461771.2	7493595.9	7-Aug-2016
50	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 after excavation (ATT72_Photo72.jpg)	461771.2	7493595.9	7-Aug-2016
51	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 after backfilling (ATT73_Photo73.jpg)	461771.2	7493595.9	7-Aug-2016
52	FOX 5 – Middle Site NHWL / Tier II DF – MW-7 – monitoring well (ATT65_Photo65.jpg)	461750.0	7493652.6	7-Aug-2016
53	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 before excavation (ATT74_Photo74.jpg)	461750.9	7493657.0	7-Aug-2016
54	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 after excavation (ATT75_Photo75.jpg)	461750.9	7493657.0	7-Aug-2016
55	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 after backfilling (ATT76_Photo76.jpg)	461750.9	7493657.0	7-Aug-2016
56	FOX 5 – Middle Site NHWL / Tier II DF – MW-8 – monitoring well (ATT66_Photo66.jpg)	461793.2	7493732.9	7-Aug-2016
57	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 before excavation (ATT77_Photo77.jpg)	461794.2	7493735.6	7-Aug-2016
58	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 after excavation (ATT78_Photo78.jpg)	461794.2	7493735.6	7-Aug-2016
59	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 after backfilling (ATT79_Photo79.jpg)	461794.2	7493735.6	7-Aug-2016
60	FOX 5 – Middle Site NHWL / Tier II DF – MW-9 – monitoring well (ATT67_Photo67.jpg)	461839.8	7493747.6	7-Aug-2016





Table 4-3: Summary Table of Photographic Log – Middle Site NHWL and Tier II Disposal Facility

Photo	Description (file name)	Easting	Northing	Date
61	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 before excavation (ATT80_Photo80.jpg)	461842.7	7493747.6	7-Aug-2016
62	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 after excavation (ATT81_Photo81.jpg)	461842.7	7493747.6	7-Aug-2016
63	FOX 5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 after backfilling (ATT82_Photo82.jpg)	461842.7	7493747.6	7-Aug-2016

# 4.1.3 Thermal Monitoring

The data recorded on the thermistor dataloggers located at the Middle Site NHWL and Tier II Disposal Facility (VT-9 through VT-12) was downloaded using a laptop computer and Prolog software from Lakewood Systems Ltd. Thermistor inspection and data downloading details were recorded on field record sheets included in Appendix B.

# 4.1.4 Summary of Sampling Deviations

The field work was conducted as per the TOR with the following exceptions:

- The deep soil sample at MW-9 could not be collected due to refusal on rock;
- PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-6 due to insufficient recovery of water; and,
- The groundwater sample at MW-7 could not be collected because the well was dry.

# 4.1.5 Soil Sampling

Table 4-4 presents a summary of analytical results for soil samples collected at the Middle Site Non-Hazardous Waste Landfill. MW-5 represents an upgradient sampling location, whereas MW-6, MW-7, MW-8 and MW-9 represent downgradient or cross-gradient sampling locations, based on topography.

Table 4-4 also lists the arithmetic mean background and baseline values for the landfill, in addition to the baseline mean plus  $3\sigma$  limits. The background arithmetic means for copper, nickel, zinc and mercury for this landfill are greater than the baseline arithmetic means.

## **MW-5**

Sampling location MW-5 is located upgradient of the landfill, approximately 32 m east of the toe. The estimated elevation of this sampling point is 313 masl. As shown in Photos 45 and 46, the area consists of boulders and rocks, infilled with sand and gravel and established vegetation. The soils consisted of a brown sand, gravel and stone.

For the shallow sample at MW-5 (0-15 cm), the concentrations of most metals were between the range of concentrations observed in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus 3σ.



For the deep sample at MW-5 (30-40 cm), the concentrations of most metals were between the range of concentrations observed in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus 3σ.

## **MW-6**

Sampling location MW-6 is located downgradient (cross-gradient) of the landfill, approximately 20 m south of the toe. The estimated elevation of this sampling point is 306 masl. As shown in Photos 49 and 50, the area consists of boulders and rocks, infilled with sand and gravel and is not vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-6 (0-15 cm), the concentrations of most metals were less than those observed in 2014 and continued a general decreasing trend observed at this location since 2008. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep sample at MW-6 (40-50 cm), the concentrations of many metals (i.e. copper, nickel, lead, zinc and chromium) represent new historical minimum concentrations. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

## **MW-7**

Sampling location MW-7 is located downgradient of the landfill, approximately 7 m west of the toe. The estimated elevation of this sampling point is 302 masl. As shown in Photos 53 and 54, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand with gravel and stone.

For the shallow sample at MW-7 (0-15 cm), the concentrations of most metals were similar to those reported in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep samples at MW-7 (40-50 cm, duplicate location), the average concentrations of most metals were between the range of concentrations observed in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

# **MW-8**

Sampling location MW-8 is located downgradient of the landfill, approximately 11 m west of the toe. The estimated elevation of this sampling point is 303.5 masl. As shown in Photos 57 and 58, the area consists of boulders and rocks, infilled with sand and gravel and sparse vegetation. The soils consisted of brown sand, gravel and stone.

For the shallow sample at MW-8 (0-15 cm), the concentrations of most metals were similar to those reported in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .





For the deep sample at MW-8 (40-50 cm), the concentrations of most metals were between the range of concentrations observed in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

### **MW-9**

Sampling location MW-9 is located downgradient (cross-gradient) of the landfill, approximately 15 m north of the toe. The estimated elevation of this sampling point is 306.5 masl. As shown in Photos 61 and 62, the area consists of boulders and rocks, infilled with sand and gravel and sparse vegetation. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-9 (0-15 cm), the concentrations of most metals were less than or similar to those reported in 2012 and 2014 and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

As noted above, the deep sample at MW-9 was not collected due to refusal on rock.





Table 4-4: Soil Chemical Analysis Results – Middle Site NHWL and Tier II Disposal Facility

ID	Depth (cm)	Cu (mg/kg)	Ni (mg/kg)	Co (mg/kg)	Cd (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Cr (mg/kg)	As (mg/kg)	Hg (mg/kg)	Total PCBs (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
Background	<u>Mean</u>	<u>10</u>	<u>5.3</u>	<u>4.0</u>	<u>1.0</u>	<u>5.0</u>	<u>46</u>	<u>19</u>	<u>1.93</u>	<u>0.5</u>	<u>0.001</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Baseline Me	an	7.6	5.2	5.0	1.0	10.0	31.7	20.0	2.0	0.1	0.003	NA	NA	NA	NA
Baseline + 3	σ	11.8	10.6	9.8	1.0	10.0	50.6	20.0	3.8	0.1	0.003	NA	NA	NA	NA
Upgradie	ent														
MW-5b	0-15	6.8	<u>6.2</u>	4.0	<0.5	<u>7.6</u>	32.8	14.3	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-5a	30-40	6.9	<u>6.2</u>	<u>4.1</u>	<0.5	<u>6.9</u>	33	14.1	<1.0	<0.1	<0.05	<7	<4	<8	<6
Downgra	dient														
MW-6b	0-15	5.5	4.9	3.5	<0.5	<u>6.6</u>	27.6	12.2	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-6a	40-50	5.5	5.3	3.5	<0.5	<u>6.4</u>	27.4	12.1	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-7b	0-15	6.7	<u>5.6</u>	3.9	<0.5	<u>7.2</u>	32.4	13.4	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-7a	40-50	7.8	<u>6.9</u>	<u>4.6</u>	<0.5	<u>7.4</u>	39.3	16.1	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-7a dup	40-50	9	<u>7</u>	<u>4.2</u>	<0.5	<u>7</u>	41	15	<u>2</u>	<0.10	<0.05	<5	<10	<50	<50
MW-7a (Dup Avg)	40-50	8	<u>7</u>	<u>4.4</u>	<0.5	<u>7</u>	40	16	1.5	<0.1	<0.05	<6	<7	<29	<28
MW-8b	0-15	5.5	5.2	3.4	<0.5	<u>6</u>	26.4	12.4	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-8a	40-50	5.9	<u>5.6</u>	3.4	<0.5	<u>5.8</u>	27	12.6	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-9a	0-15	7.2	5	3.3	<0.5	<u>6.6</u>	25.8	11.3	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-9 (d	eep) <sup>1</sup>														

Notes:

NA: Not available

ID: Soil sample location ID.

<u>Underlined values</u>: Results exceed Background arithmetic mean.

Bold Values: Results exceed Baseline arithmetic mean.

1: The deep soil sample at MW-9 could not be collected due to refusal.



## 4.1.6 Groundwater Sampling

Groundwater sampling and monitoring well inspection field records are included in Appendix B. Table 4-5 presents a summary of groundwater levels and analytical results for groundwater samples collected at the Non-Hazardous Waste Landfill.

#### **MW-5**

The depth to groundwater measured at MW-5 (duplicate location) in 2016 was 1.48 m below grade. The concentration of zinc, the only metal detected at MW-5, was less than those observed in previous years. No PHC or PCB were detected at this location in 2016.

#### **MW-6**

The depth to groundwater measured at MW-6 in 2016 was 1.92 m below grade. No metals or PHC F1 were detected at this location in 2016. PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-6 due to insufficient recovery of water.

#### **MW-8**

The depth to groundwater measured at MW-8 in 2016 was 1.37 m below grade. The concentration of zinc, the only metal detected at MW-8, was less than those observed in previous years. No PHC or PCB were detected at this location in 2016.

#### **MW-9**

The depth to groundwater measured at MW-9 in 2016 was 1.69 m below grade. No metals, PHC or PCB were detected at this location in 2016.

None of the reported values in any of the groundwater samples exceeded their respective baseline mean concentrations plus  $3\sigma$ .





Table 4-5: Monitoring Well Groundwater Levels and Groundwater Chemical Analysis Results - Middle Site NHWL and Tier II Disposal Facility

ID	GW Depth BGS (m)	Cu (mg/L)	Ni (mg/L)	Co (mg/L)	Cd (mg/L)	Pb (mg/L)	Zn (mg/L)	Cr (mg/L)	As (mg/L)	Hg (mg/L)	Total PCBs (mg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)
Baseline Mean		0.012	0.043	0.003	0.001	0.01	0.063	0.084	0.003	0.0004	0.00002	NA	NA	NA	NA
Baseline + 3σ		0.039	0.187	0.006	0.001	0.01	0.357	0.36	0.003	0.0004	0.00002	NA	NA	NA	NA
Upgradier	nt														
MW-5	1.48	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
MW-5 dup	1.48	<0.005	<0.005	<0.0005	<0.0001	<0.0001	0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.1	<0.1	<0.1
MW-5 (Dup Avg)	1.48	<0.003	<0.003	<0.0005	<0.0001	<0.0001	0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.1	<0.1	<0.1
Downgrad	lient														
MW-6	1.92	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	NA <sup>1</sup>	<0.025	NA <sup>1</sup>	NA <sup>1</sup>	NA <sup>1</sup>
MW-7 <sup>2</sup>															
MW-8	1.37	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	0.006	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
MW-9	1.69	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100

Notes:

ID: Monitoring well location ID.

GW: Groundwater.

BGS: Below ground surface.

NA: Not available

**Bold Values**: Results exceed Baseline arithmetic mean.

Shaded Values: Results exceed the Baseline arithmetic mean plus 3o.

1: PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-6 due to insufficient recovery of water.

2: The groundwater sample at MW-7 could not be collected because the well was dry.



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#### 2016 FOX-5 MONITORING REPORT

## 4.1.7 Conclusions and Overall Performance of the Middle Site NHWL and Tier II Disposal Facility

The Middle Site NHWL and Tier II Disposal Facility has exhibited some observed minor settlement, self-armouring erosion, cracking, tire tracks and a small hydrocarbon stain on the top of the northwest corner of the landfill. The landfill does not have any observed exposed waste or indications of slope instability. Observed cracking is either very weathered or likely caused by thaw creep and not considered to be of concern. All previously observed erosion appears to be self-armouring and has not changed from the last inspection in 2014 and therefore is not considered to be of concern. The small hydrocarbon stain appears to be from a fuel spill and the tire tracks are not causing erosion. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable".

Samples were collected from nine of the ten designated locations; the deep sample at MW-9 was not collected due to refusal on rock. At all five locations, the concentrations of most metals were similar to or less than those observed in previous years. No detectable concentrations of cadmium, mercury, PHC or PCB were noted in any of the soil samples in 2016. Concentrations of metal parameters in soil were highest overall at the deep MW-7 sample location. None of the reported soil values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

In 2016, groundwater samples were collected from four of five monitoring wells adjacent to the landfill; no sample was collected at MW-7 because the well was dry. Zinc was detected at MW-5 and MW-8, at concentrations less than those observed in previous years. No detectable concentrations of other metals, PHC or PCB were noted in any of the groundwater samples in 2016.

Comparison of groundwater elevations based on estimated grade elevation and the measured water depth in the wells indicates that groundwater was highest at MW-5, and lowest towards the south at MW-8, which follows the topography in the area.

The historical graphs in Appendix C show concentration trends at the Middle Site NHWL and Tier II Disposal Facility. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at all five monitoring locations. There is no evident ongoing impact of the Middle Site NHWL and Tier II Disposal Facility on soil or groundwater quality.

## 4.1.8 Recommendations for the Middle Site NHWL and Tier II Disposal Facility

No modifications to the ongoing monitoring program at this landfill are recommended.





## 4.2 Main Landfill

## 4.2.1 Landfill Description

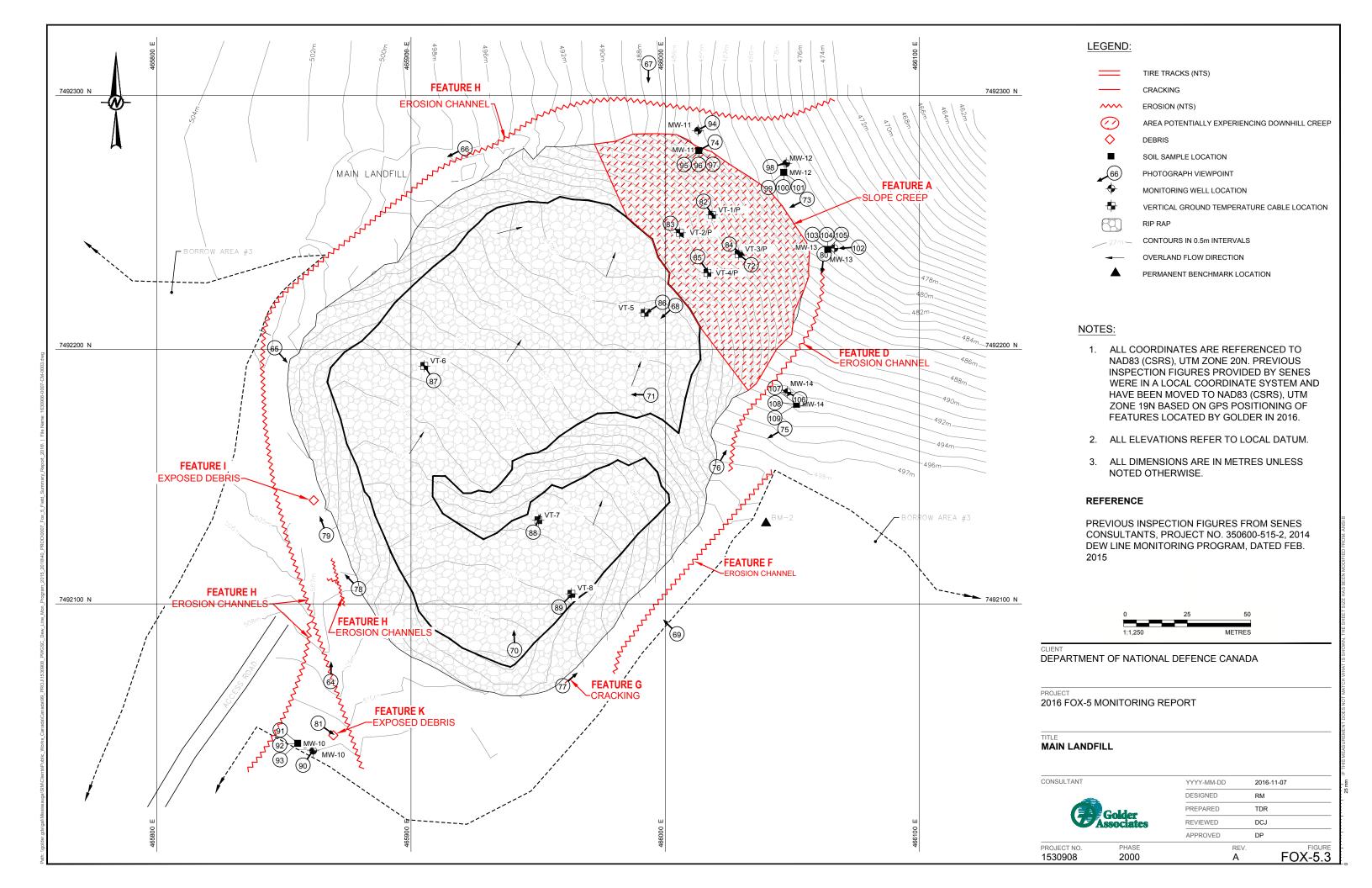
The Main Landfill is located approximately 900 km northwest of the Station Area, on the northeast side of the Station Area access road.

The landfill is located within a broad valley and immediately adjacent to a steep slope leading to the northeast. Local elevations range from approximately 510 masl to the west of the landfill, to less than 480 masl at the northeast toe of the landfill. The natural slope is moderate (5%) in the western part of the site but steepens to the northeast, near MW-11 and MW-14, to a grade of approximately 15%. Surface water drainage runs around both sides of the landfill commencing in the southwest corner and extending to the northeast toe.

The landfill originally covered an area about 10,000 m² with a depth of waste estimated to be on average 1.5 to 2 m thick. Migration of contamination from the landfill was detected prior to remediation. The remediation of the Main Landfill consisted of the construction of a leachate containment system, consisting of perimeter berms with a synthetic liner and placement of sufficient granular fill at surface to cause aggradation of permafrost through the landfill contents. Existing drainage channels for surface water were backfilled and drainage was re-routed around the landfill. The current Main Landfill is approximately 29,900 m² in area, including the side slopes. Five groundwater monitoring wells were installed around the landfill perimeter, and eight thermistors were installed within the landfill footprint to monitor freeze-back conditions. Four of these thermistors are located in the northeast slope of the landfill.

The long term monitoring plan consists of visual monitoring, collection of soil and groundwater samples, and monitoring of subsurface ground temperatures. There are five soil and groundwater monitoring locations, MW-10 through MW-14 at the landfill. Approximate locations for the collection of soil samples, thermistors and monitoring well installations are identified on Figure FOX-5.3.





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#### 2016 FOX-5 MONITORING REPORT

## 4.2.2 Visual Inspection

The Main Landfill exhibits observed erosion, debris and potential slope creep. No settlement, ponded water, cracking, sloughing or exposed waste were observed. Table 4-6 presents a summary of observed visual inspection features and Table 4-7 presents the Preliminary Stability Assessment results. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable." Table 4-8 is a log of photographs taken during the 2016 visual inspection.

There is previously observed erosion along the northeast toe of the landfill (Feature D) that has been caused by upstream runoff draining down the steep slope around the toe of the landfill. It appears that vehicle or ATV tracks/ruts may have initially contributed to creating the erosion (see two parallel ruts/channels visible in Photo 80 in Appendix D). However, gravel and cobble sized rock appears to be helping to self-armour the erosion. At the time of 2016 visual inspection, the erosion along the northeast toe had not started to undermine the rip-rap protected landfill slope or cause slope instability. This erosion feature (D) was assessed as "Acceptable" and no immediate action is recommended based on conditions observed during the 2016 visual inspection. The existing rip-rap on the landfill slope is quite large and is currently stable based on the absence of any other visual evidence such as tension cracks. We note, however, that should continued erosion be observed, for example deep channel cutting resulting in the risk of undermining the rip-rap landfill slope, some placement of erosion protection in the channel along the northeast toe of the landfill may be required. Other previously observed erosion along the south, east and west toe of the landfill (Features F and H) does not appear to have changed significantly from the last inspection in 2014 and is not considered to be of concern.

The observed inclination of the thermistor casings installed in the northeast slope of the landfill has been previously reported to potentially indicate slope creep (Feature A). It is considered possible that the instrumentation was drilled perpendicular to ground surface and recorded as "vertical" in as-built report. However, the ground surface slopes 10-20 degrees which would have resulted in the thermistors being inclined approximately the same from vertical. Previous 2009 and 2010 inspection reports noted that the thermistors were observed to be inclined consistent with 2008. Since the inclination angles for each thermistor have not previously been measured there is no way to confirm if the inclination is an as-built condition or is related to slope creep. The inclination angles of the thermistor casings were measured during the 2016 visual inspection for future reference. No other indications of slope instability were observed at the Main Landfill during the 2016 visual inspection. Previously observed cracking (Feature G) is minor thaw cracking beyond the toe of the landfill that is not related to landfill performance or indicative of slope instability.

There are several locations where metal construction debris around the toe of the landfill has been previously observed (Features B and E), but it is not exposed buried waste. Some new metal debris was observed along the west toe that appears to have become exposed by erosion (new Feature I), but the metal debris is not exposed buried waste. Many pieces of partially buried shredded plastic were observed in the south toe area (new Feature K), but the shredded plastic is not exposed buried waste.

Previously observed exposed debris (Features C and J) were not observed in 2016.





Table 4-6: Visual Inspection Checklist – Main Landfill

SITE NAME: FOX-5 Broughton Island

**LANDFILL DESIGNATION: Main Landfill** 

**DATE OF INSPECTION: August 6, 2016** 

**DATE OF PREVIOUS INSPECTION: August 20, 2014** 

**INSPECTED BY: Darrin Johnson** 

**REPORT PREPARED BY: Darrin Johnson** 

**MONITORING EVENT NUMBER: 7** 

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





Table 4-6: Visual Inspection Checklist – Main Landfill

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description (Severity Rating)	Comparison to Historical Observations	Photos
Settlement	N	-	-	-	-	-	-	-	-	-	-	-
		D	Northeast toe	466033.0	7492267.2	100	5	0.2	1.7%	Erosion along toe (Acceptable)	Previously observed, no change	76, 80
Erosion	Y	F	Southeast toe	466020.2	7492153.9	100	5	0.2	1.7%	Erosion along toe (Acceptable)	Previously observed, no change	69
		Н	South and west toe	465879.3	7492106.0	400	2	0.1	2.7%	Erosion along toe (Acceptable)	Previously observed, no change	64, 66, 78
Lateral Movement	Y (Potential)	А	North slope in vicinity of thermistors VT- 1 to -4	-		80	50	-	13.4%	Inclined thermistors may indicate potential slope creep (Acceptable)	Previously observed, measured angles in 2016 for future reference	82-85
Frost Action	N	-	-	-	-	-	-	-	-	-	-	-
Sloughing	N	-	-	-	-	-	-	-	-	-	-	-
Cracking	N	G	South toe	465959.6	7492067.8	0.5	0.02	0.01	<0.1%	Minor thaw cracking beyond rip-rap at toe	Previously observed, no change	77
Animal Burrows	N	-	-	-	-	-	-	-	-	-	-	-
Vegetation	N	-	-	-	-	-	-	-	-	-	-	-
Staining	N	-	-	-	-	-	-	-	-	-	-	-
Vegetation Stress	N	-	-	-	-	-	-	-	-	-	-	-





Table 4-6: Visual Inspection Checklist – Main Landfill

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description (Severity Rating)	Comparison to Historical Observations	Photos
Seepage or Ponded Water	N	-	-	-	-	-	-	-	-	-	-	-
		В	East toe near MW-12	466055.8	7492259.2	3	1	-	0.010%	Steel cable and construction	Previously observed waste  New  Previously observed waste  New  Previously observed, measured angles in 2016 for future reference	73
Debris and/or Liner Exposed		Е	East toe near MW-14	466047.0	7492168.9	2	1	-	0.007%	debris (Acceptable)		75
	Y	I	West toe	465866.7	7492127.1	10	5	-	0.17%	Metal debris exposed by erosion, not exposed buried waste (Acceptable)	New	79
		К	South toe near MW-10	465863.4	7492053.1	50	50	-	8.4%	Shredded plastic debris, not exposed buried waste (Acceptable)	New	81
Presence / Condition of Monitoring Instruments	Y	А	VT-1 to -8	-	-	-	-	-	-	Inclined thermistors may indicate potential slope creep (Acceptable)	observed, measured angles in 2016 for future	82-89
		-	MW-10 to -14	-	-	-	-	-	-	Monitoring wells intact	-	90, 94, 98, 102, 106
Features of Note/Other Observations	N	-	-	-					-	-	-	-

Landfill Area = 29,900 m<sup>2</sup>





Table 4-7: Preliminary Stability Assessment – Main Landfill

Feature	Severity Rating	Extent
Settlement	Not observed	-
Erosion	Acceptable	Occasional
Lateral Movement	Acceptable	Occasional
Frost Action	Not observed	-
Sloughing	Not observed	-
Cracking	Not observed	-
Animal Burrows	Not observed	-
Vegetation Establishment	Not observed	-
Staining	Not observed	-
Vegetation Stress	Not observed	-
Seepage/Ponded Water	Not observed	-
Debris and/or Liner Exposure	Acceptable	Occasional
Other	Not observed	-
Overall Landfill Performance	Į.	Acceptable

Table 4-8: Summary Table of Photographic Log – Main Landfill

Photo	Description (file name)	Easting	Northing	Date
64	FOX 5 – Main Landfill – Drainage ditch, west of landfill, facing north – Feature H – erosion channel (ATT34_Photo34.jpg)	465868.4	7492069.5	6-Aug-2016
65	FOX 5 – Main Landfill – Boulder rip rap on west slope facing southeast (ATT35_Photo35.jpg)	465846.3	7492200.7	6-Aug-2016
66	FOX 5 – Main Landfill – North toe facing southwest – Figure H – erosion channel along toe (ATT36_Photo36.jpg)	465921.2	7492279.2	6-Aug-2016
67	FOX 5 – Main Landfill – Northeast slope with inclined thermistors facing south (ATT37_Photo37.jpg)	465993.5	7492312.7	6-Aug-2016
68	FOX 5 – Main Landfill – East crest surface facing southwest with boulder rip rap (ATT38_Photo38.jpg)	466004.0	7492217.3	6-Aug-2016
69	FOX 5 – Main Landfill – Southeast toe facing northwest with boulder rip rap slope in background – Feature F erosion channel along toe in foreground (ATT39_Photo39.jpg)	466004.6	7492088.2	6-Aug-2016
70	FOX 5 – Main Landfill – South crest surface facing north with boulder rip rap (ATT40_Photo40.jpg)	465940.7	7492081.9	6-Aug-2016
71	FOX 5 – Main Landfill – Crest surface facing west, boulder rip rap with sand and gravel on top (ATT41_Photo41.jpg)	465994.3	7492182.1	6-Aug-2016
72	FOX 5 – Main Landfill – Feature A – Inclined thermistors facing VT-3 (ATT107_Photo107.jpg)	466029.5	7492235.0	6-Aug-2016



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Table 4-8: Summary Table of Photographic Log – Main Landfill

Photo	Description (file name)	Easting	Northing	Date
73	FOX 5 – Main Landfill – Steel rebar at east toe near MW-12 – Previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT109_Photo109.jpg)	466055.8	7492259.2	6-Aug-2016
74	FOX 5 – Main Landfill – Scattered metal debris at northeast toe near MW-11 - Previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT106_Photo106.jpg)	466016.6	7492279.7	6-Aug-2016
75	FOX 5 – Main Landfill – Steel cable at east toe - Example of previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT111_Photo111.jpg)	466047.0	7492168.9	6-Aug-2016
76	FOX 5 – Main Landfill – East toe facing northeast – Feature D – south end of erosion channel along north east toe (Acceptable) (ATT110_Photo110.jpg)	466020.2	7492153.9	6-Aug-2016
77	FOX 5 – Main Landfill – South toe facing northeast – Previously observed cracking (Feature G) beyond rip rap at toe is not related to landfill performance (ATT112_Photo112.jpg)	465959.6	7492067.8	6-Aug-2016
78	FOX 5 – Main Landfill – Southwest toe facing northwest – Previously observed erosion (Feature H) around toe of landfill (Acceptable) (ATT104_Photo104.jpg)	465879.3	7492106.0	6-Aug-2016
79	FOX 5 – Main Landfill – West toe facing northwest – Feature I – metal debris exposed by erosion around toe of landfill (Acceptable) (ATT105_Photo105.jpg)	465866.7	7492127.1	6-Aug-2016
80	FOX 5 – Main Landfill – Northeast toe facing south – Feature D – north end of erosion channel along toe (Acceptable) (ATT108_Photo108.jpg)	466062.5	7492237.6	6-Aug-2016
81	FOX 5 – Main Landfill – South toe facing southeast – Feature K – exposed shredded plastic debris around MW-10 (Acceptable) (ATT103_Photo103.jpg)	465863.4	7492053.1	6-Aug-2016
82	FOX 5 – Main Landfill – VT-1 – inclined 76 degrees to northeast (ATT117_Photo117.jpg)	466017.8	7492251.5	6-Aug-2016
83	FOX 5 – Main Landfill – VT-2 inclined 77 degrees to northeast (ATT118_Photo118.jpg)	466005.8	7492245.2	6-Aug-2016
84	FOX 5 – Main Landfill – VT-3 – inclined 70 degrees to northeast (ATT116_Photo116.jpg)	466027.8	7492235.8	6-Aug-2016
85	FOX 5 – Main Landfill – VT-4 – inclined 63 degrees to northeast (ATT119_Photo119.jpg)	466016.5	7492231.4	6-Aug-2016
86	FOX 5 – Main Landfill – VT-5 – inclined 84 degrees (ATT120_Photo120.jpg)	465998.9	7492218.6	6-Aug-2016
87	FOX 5 – Main Landfill – VT-6 – inclined 84 degrees (ATT115_Photo115.jpg)	465905.2	7492193.6	6-Aug-2016





Table 4-8: Summary Table of Photographic Log – Main Landfill

Photo	Description (file name)	Easting	Northing	Date
88	FOX 5 – Main Landfill – VT-7 – inclined 85 degrees (ATT113_Photo113.jpg)	465948.0	7492128.2	6-Aug-2016
89	FOX 5 – Main Landfill – VT-8 – inclined 87 degrees (ATT114_Photo114.jpg)	465962.2	7492103.8	6-Aug-2016
90	FOX 5 – Main Landfill – MW-10 – monitoring well (ATT22_Photo22.jpg)	465856.4	7492042.8	6-Aug-2016
91	FOX 5 – Main Landfill – Soil sampling location MW-10 before excavation (ATT23_Photo23.jpg)	465855.4	7492045.2	6-Aug-2016
92	FOX 5 – Main Landfill – Soil sampling location MW-10 after excavation (ATT24_Photo24.jpg)	465855.4	7492045.2	6-Aug-2016
93	FOX 5 – Main Landfill – Soil sampling location MW-10 after backfilling (ATT25_Photo25.jpg)	465855.4	7492045.2	6-Aug-2016
94	FOX 5 – Main Landfill – MW-11 – monitoring well (ATT38_Photo38.jpg)	466015.0	7492284.1	6-Aug-2016
95	FOX 5 – Main Landfill – Soil sampling location MW-11 before excavation (ATT39_Photo39.jpg)	466013.2	7492278.3	6-Aug-2016
96	FOX 5 – Main Landfill – Soil sampling location MW-11 after excavation (ATT40_Photo40.jpg)	466013.2	7492278.3	6-Aug-2016
97	FOX 5 – Main Landfill – Soil sampling location MW-11 after backfilling (ATT41_Photo41.jpg)	466013.2	7492278.3	6-Aug-2016
98	FOX 5 – Main Landfill – MW-12 – monitoring well (ATT34_Photo34.jpg)	466046.3	7492270.2	6-Aug-2016
99	FOX 5 – Main Landfill – Soil sampling location MW-12 before excavation (ATT35_Photo35.jpg)	466046.6	7492269.7	6-Aug-2016
100	FOX 5 – Main Landfill – Soil sampling location MW-12 after excavation (ATT36_Photo36.jpg)	466046.6	7492269.7	6-Aug-2016
101	FOX 5 – Main Landfill – Soil sampling location MW-12 after backfilling (ATT37_Photo37.jpg)	466046.6	7492269.7	6-Aug-2016
102	FOX 5 – Main Landfill – MW-13 – monitoring well (ATT30_Photo30.jpg)	466071.6	7492239.6	6-Aug-2016
103	FOX 5 – Main Landfill – Soil sampling location MW-13 before excavation (ATT31_Photo31.jpg)	466063.9	7492239.4	6-Aug-2016
104	FOX 5 – Main Landfill – Soil sampling location MW-13 after excavation (ATT32_Photo32.jpg)	466063.9	7492239.4	6-Aug-2016
105	FOX 5 – Main Landfill – Soil sampling location MW-13 after backfilling (ATT33_Photo33.jpg)	466063.9	7492239.4	6-Aug-2016
106	FOX 5 – Main Landfill – MW-14 – monitoring well with previously observed wood debris (Feature E) that is not exposed waste (ATT26_Photo26.jpg)	466052.9	7492180.6	6-Aug-2016
107	FOX 5 – Main Landfill – Soil sampling location MW-14 before excavation (ATT27_Photo27.jpg)	466051.6	7492178.5	6-Aug-2016
108	FOX 5 – Main Landfill – Soil sampling location MW-14 after excavation (ATT28_Photo28.jpg)	466051.6	7492178.5	6-Aug-2016





Table 4-8: Summary Table of Photographic Log – Main Landfill

Photo	Description (file name)	Easting	Northing	Date
109	FOX 5 – Main Landfill – Soil sampling location MW-14 after backfilling (ATT29_Photo29.jpg)	466051.6	7492178.5	6-Aug-2016

## 4.2.3 Thermal Monitoring

The data recorded on the thermistor dataloggers located at the Main Landfill (VT-1 through VT-8) was downloaded using a laptop computer and Prolog software from Lakewood Systems Ltd. Thermistor inspection and data downloading details were recorded on field record sheets included in Appendix B. The inclination angles of thermistors are listed in the table below.

Thermistor	Inclination Angle (degrees)
VT-1	76
VT-2	77
VT-3	70
VT-4	63
VT-5	84
VT-6	84
VT-7	85
VT-8	87

## 4.2.4 Summary of Sampling Deviations

The field work was conducted as per the TOR with the following exceptions:

- The deep soil samples at MW-11, MW-12, MW-13 and MW-14 could not be collected due to refusal on rock;
- The groundwater samples at MW-10, MW-11 and MW-12 could not be collected because the wells were dry;
- PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-13 due to insufficient recovery of water; and,
- The groundwater sample at MW-14 could not be collected because the groundwater in the well was frozen.

## 4.2.5 Soil Sampling

Table 4-9 presents a summary of analytical results for soil samples collected at the Main Landfill. MW-10 represents an upgradient sampling location, whereas MW-11, MW-12, MW-13 and MW-14 represent downgradient sampling locations.

Table 4-9 also lists the arithmetic mean background and baseline values for the landfill, in addition to the baseline mean plus  $3\sigma$  limits. The background arithmetic means for copper, nickel, zinc and mercury at this landfill are greater than the baseline arithmetic means.



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#### MW-10

Sampling location MW-10 is located upgradient of the landfill, approximately 50 m southwest of the toe. The estimated elevation of this sampling point is 511 masl. As shown in Photos 91 and 92, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-10 (0-15 cm), the concentrations of most metals were less than or similar to those reported in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep sample at MW-10 (40-50 cm), the concentrations of all detected metals were less than the concentrations reported 2014, and generally less than those reported in previous years. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

#### MW-11

Sampling location MW-11 is located downgradient of the landfill, immediately northeast of the toe. The estimated elevation of this sampling point is 485 masl. As shown in Photos 95 and 96, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand, gravel and stone.

For the shallow sample at MW-11 (0-15 cm), the concentrations of all detected metals were less than the concentrations reported 2014, and generally less than those reported in previous years. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

#### MW-12

Sampling location MW-12 is located downgradient of the landfill, approximately 10 m northeast of the toe. The estimated elevation of this sampling point is 480 masl. As shown in Photos 98 and 100, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-12 (0-15 cm), the concentrations of all detected metals were greater than the concentrations reported 2014 but less than those reported between 2008 and 2012. A modified TPH concentration of 40.5 mg/kg was reported in 2016, which remains below the range of concentrations reported from 2009 to 2012 (49 mg/kg to 91 mg/kg). Concentrations of PHC F3 and F4 fractions were 35 mg/kg and 18 mg/kg, respectively. No cadmium, arsenic, mercury or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ . It is noted that PCB concentrations between 0.013 mg/kg and 0.43 mg/kg were reported at this location from 2010 to 2014, and therefore the 2016 result represents a decline from this recent trend.

#### MW-13

Sampling location MW-13 is located downgradient of the landfill, approximately 8 m east of the toe. The estimated elevation of this sampling point is 481 masl. As shown in Photos 103 and 104, the area consists of sand and gravel with some rocks and boulders and is not vegetated. The soils consisted of brown sand with some gravel and stone.





For the shallow sample at MW-13 (0-15 cm), the concentrations of most metals were similar to those reported in 2012 and 2014, and less than the concentrations observed from 2008 to 2010. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus 3σ.

#### MW-14

Sampling location MW-14 is located downgradient of the landfill, approximately 12 m east of the toe. The estimated elevation of this sampling point is 493.5 masl. As shown in Photos 107 and 108, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand, gravel and stone.

For the shallow sample at MW-14 (0-15 cm), the concentrations of all metals were less than or similar to those reported in previous years. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .





Table 4-9: Soil Chemical Analysis Results – Main Landfill

ID	Depth (cm)	Cu (mg/kg)	Ni (mg/kg)	Co (mg/kg)	Cd (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Cr (mg/kg)	As (mg/kg)	Hg (mg/kg)	Total PCBs (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
Background	Mean_	<u>11</u>	<u>5.3</u>	<u>5.0</u>	<u>1.0</u>	<u>10</u>	<u>46</u>	<u>20</u>	<u>1.9</u>	<u>0.5</u>	<u>0.010</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Baseline M	ean	8.5	5.0	5.0	1.0	10	38	20	2	0.10	0.003	NA	NA	NA	NA
Baseline + 3	Βσ	19.7	11.9	6.8	1.3	29.5	119.0	25.1	6.2	0.10	0.303	NA	NA	NA	NA
Upgradi	ent														
MW-10b	0-15	6.3	5.2	3.6	<0.5	7	31.7	11.7	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-10a	40-50	6.3	<u>5.5</u>	3.6	<0.5	7.9	32.3	12.6	<1.0	<0.1	<0.05	<7	<4	<8	<6
Downgra	adient														
MW-11a	0-15	6.8	<u>5.4</u>	3.7	<0.5	<u>13</u>	29.8	13.3	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-11	(deep) <sup>1</sup>														
MW-12a	0-15	5.5	3.8	2.7	<0.5	9.6	40.6	8.5	<1.0	<0.1	<0.05	<7	<4	35	18
MW-12	(deep) <sup>1</sup>														
MW-13a	0-15	5.7	3.9	2.9	<0.5	9.2	30.8	9	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-13	(deep) <sup>1</sup>														
MW-14a	0-15	4.2	3.5	2.8	<0.5	8.7	25.5	7.3	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-14	(deep) <sup>1</sup>														

Notes:

NA: Not available.

ID: Soil sample location ID.

<u>Underlined values</u>: Results exceed Background arithmetic mean.

**Bold Values**: Results exceed Baseline arithmetic mean.

Shaded Values: Results exceed the Baseline arithmetic mean plus 3o.

1: The deep soil samples at MW-11, MW-12, MW-13 and MW-14 could not be collected due to refusal on rock.





## 4.2.6 Groundwater Sampling

Groundwater sampling and monitoring well inspection field records are included in Appendix B. Table 4-10 presents a summary of groundwater levels and analytical results for groundwater samples collected at the Tier II Disposal Facility.

#### MW-13

The depth to groundwater measured at MW-13 in 2016 was 1.52 m below grade. No metals, PHC F1 fraction or PCB were detected at this location in 2016. PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-13 due to insufficient recovery of water.

As noted above, groundwater samples could not be collected from the other wells at this site.





Table 4-10: Monitoring Well Groundwater Levels and Groundwater Chemical Analysis Results - Main Landfill

ID	GW Depth BGS (m)	Cu (mg/L)	Ni (mg/L)	Co (mg/L)	Cd (mg/L)	Pb (mg/L)	Zn (mg/L)	Cr (mg/L)	As (mg/L)	Hg (mg/L)	Total PCBs (mg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)
Baseline Mean		0.062	0.047	0.003	0.001	0.01	0.11	0.084	0.003	0.0004	0.00002	NA	NA	NA	NA
Baseline + 3σ		0.27	0.16	0.048	0.001	0.01	0.52	0.39	0.017	0.0004	0.00002	NA	NA	NA	NA
Upgradient															
MW-	10 <sup>1</sup>														
Downgradier	nt														
MW-	11 <sup>1</sup>														
MW-12 <sup>1</sup>															
MW-13	1.52	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	NA <sup>2</sup>	<0.025	NA <sup>2</sup>	NA <sup>2</sup>	NA <sup>2</sup>
MW-14 <sup>3</sup>															

Notes:

ID: Monitoring well location ID.

GW: Groundwater.

BGS: Below ground surface.

NA: Not available

Bold Values: Results exceed Baseline arithmetic mean.

- 1: The groundwater samples at MW-10, MW-11 and MW-12 could not be collected because the well was dry.
- 2: PHC F2-F4 and PCB could not be analyzed from the groundwater sample at MW-13 due to insufficient recovery of water.
- 3: The groundwater sample at MW-14 could not be collected because the groundwater in the well was dry or frozen.



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#### 2016 FOX-5 MONITORING REPORT

#### 4.2.7 Conclusions and Overall Performance of the Main Landfill

The Main Landfill has exhibited observed erosion, debris and potential slope creep. No settlement, ponded water, cracking, sloughing or exposed waste were observed. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable". There is some previously observed erosion along the northeast toe of the landfill (Feature D) that has been caused by upstream runoff draining down the steep slope around the toe of the landfill. At the time of 2016 visual inspection, the erosion along the northeast toe had not started to undermine the rip-rap protected landfill slope or cause other evident visual features associated with slope instability (e.g., tension cracks on the slope or near the crest, bulging). The existing rip-rap on the landfill slope is guite large and appears to currently be stable. Other previously observed erosion along the south, east and west toe of the landfill (Features F and H) does not appear to have changed significantly from the last inspection in 2014 and is not considered to be of concern. Inclination of the thermistor casings installed in the northeast slope of the landfill has been previously reported to potentially indicate slope creep (Feature A). however as the inclination angles have not previously been measured, it is not possible to determine if the inclination is an as-built condition or related to ongoing slope creep. The inclination angles of the thermistor casings were measured during the 2016 visual inspection for future reference. No other indications of slope instability were observed at the Main Landfill during the 2016 visual inspection. Observed metal and plastic debris around the toe of the landfill appears to be construction debris and is not exposed buried waste.

In 2016, soil samples were collected from six of the ten designated locations. At all sampling locations, the concentrations of most metals were less than or similar to those reported in previous years. PHC were only detected at the MW-12 sampling location; the modified TPH concentration of 40.5 mg/kg remained below the range of concentrations reported from 2009 to 2012 (49 mg/kg to 91 mg/kg). The concentrations of most metals in soil were highest at the MW-11 sampling location, located immediately downgradient of the eastern toe. No detectable concentrations of cadmium, arsenic, mercury or PCB were noted in any of the soil samples in 2016. None of the reported soil values exceeded their respective baseline mean concentrations plus 3 $\sigma$ .

In 2016, groundwater samples were collected from only one of the five monitoring wells adjacent to the landfill, MW-13. No metals, PHC F1 fraction or PCB were detected at this location in 2016.

The historical graphs in Appendix C show concentration trends at the Main Landfill. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at all four monitoring locations. There is no evident ongoing impact of the Middle Site Non-Hazardous Waste Landfill on soil or groundwater quality.

#### 4.2.8 Recommendations for the Main Landfill

It is recommended that the inclination of all eight thermistors installed at the Main Landfill be measured on an annual basis until the next scheduled monitoring event in 2021 to help identify if there is any movement of the northeast slope. If this recommendation is put into effect, we also recommend that the erosion channels along the northeast toe of the landfill should be monitored at the same time to evaluate the risk of undermining the rip-rap landfill slope due to potential erosion (e.g., deep channel cutting). Consideration should also be given to setting up benchmarks (i.e., survey monuments) around the perimeter of the Main Landfill that could be surveyed on an annual basis along with the thermistors to determine if there is any ongoing slope movement.

No other modifications to the ongoing soil and water monitoring program at this landfill are recommended.





## 4.3 Station Area Non-Hazardous Waste Landfill

### 4.3.1 Landfill Description

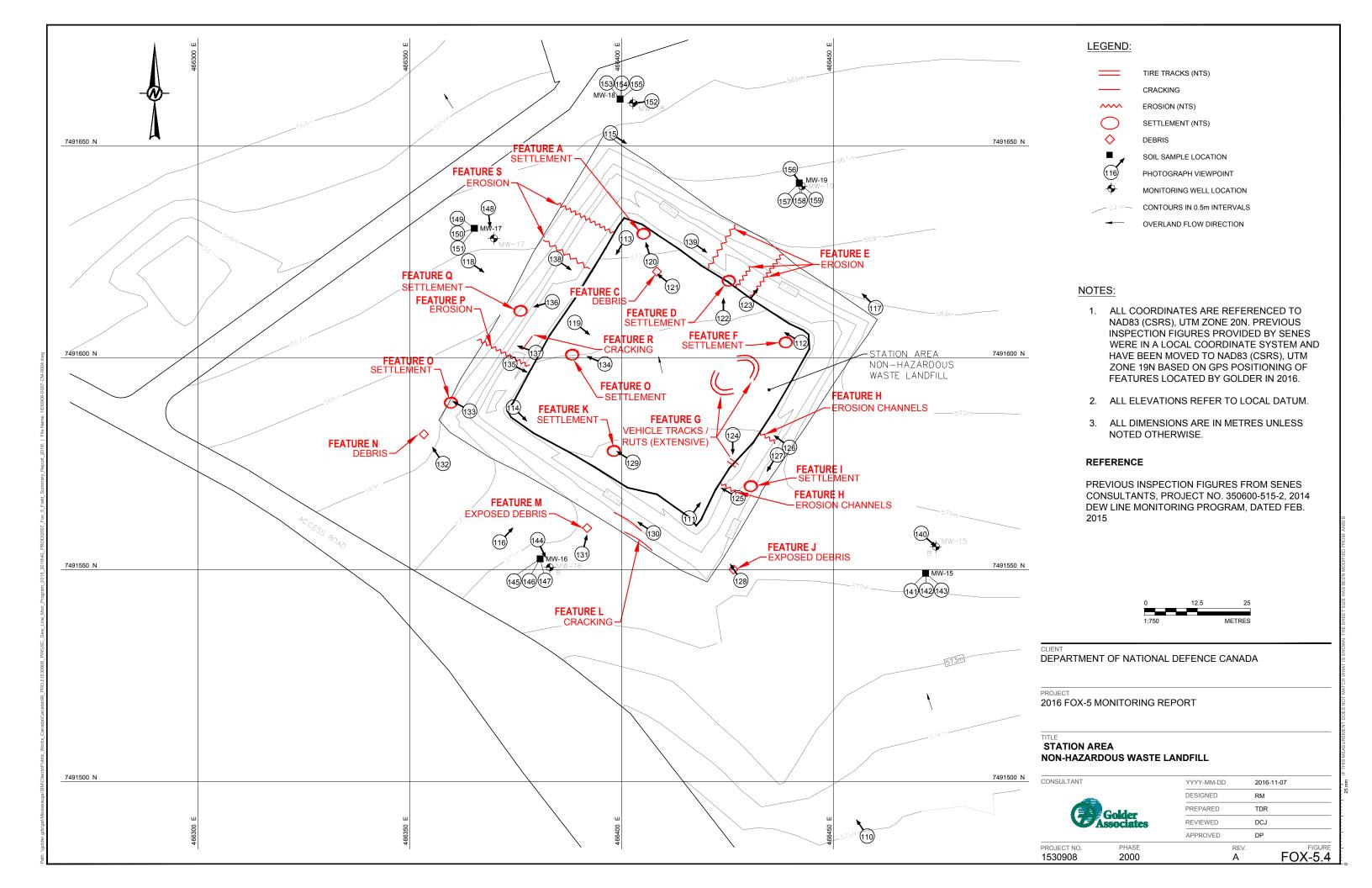
The Station Area Non-Hazardous Waste Landfill (NHWL) was constructed during remediation of the FOX-5 Broughton Island site. It is located in the Station Area, northeast of the main access road.

The Station Area is near the peak of this local headland, approximately 350 m from the top of a slope leading to the northeast, and a sharp slope located approximately 700 m to the northeast. Local elevations range from approximately 572 masl southeast of the landfill, to less than 566 masl at the northwest toe of the landfill. Drainage in the area of the landfill is generally to the northeast to east, ultimately leading to the shores of Davis Strait, located approximately 1,300 m to the northeast.

The Station Area NHWL was constructed to contain non-hazardous waste materials generated during demolition of facilities not required for the operation of the SRR, site debris collected during the cleanup and for Tier I contaminated soil. The design of the Station Area NHWL includes compacted perimeter berms and placement of a compacted granular fill cover over the landfilled material. The Station Area Non-Hazardous Waste Landfill is approximately 5,800 m<sup>2</sup> in area, including the side slopes.

Five groundwater monitoring wells were installed around the landfill perimeter (MW-15 through MW-19). The long-term monitoring plan for this landfill consists of visual monitoring, and the collection of soil and groundwater samples. Approximate locations for the collection of soil and groundwater samples are identified on Figure FOX -5.4.







## 4.3.2 Visual Inspection

The Station Area Non-Hazardous Waste Landfill has some observed minor settlement, minor self-armouring erosion, cracking, tire tracks and debris. No ponded water, exposed waste or indications of slope instability were observed during the visual inspection. Table 4-11 presents a summary of observed visual inspection features and Table 4-12 presents the Preliminary Stability Assessment results. This landfill was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable." Table 4-13 is a log of photographs taken during the 2016 visual inspection.

None of the previously observed minor settlement areas (Features A, D, F, I, K, O and Q) appear to have changed from the last inspection in 2014 and they are not considered to be of concern. Previously observed erosion (Features E, H, P and S) is self-armouring and is not considered to be of concern. Previously observed cracking (Features L and R) is weathered, does not appear to have changed since the last inspection and is not considered of concern. Previously observed steel cable and metal debris (Features C, J, M and N) are not exposed buried waste. Previously observed tire tracks on the landfill surface (Feature G) do not appear to have changed since the last inspection and are not considered of concern.

It should be noted that at the FOX-5 site there are some minor discrepancies between previously reported feature locations (that were referenced with a local coordinate system) and the 2016 visual inspection feature locations reported herein (that were referenced with UTM coordinates). In some cases, where previously observed minor settlement (e.g., Feature A) and/or debris (e.g., Feature C) was observed to be insignificant the 2016 visual inspection photographs documented similar nearby features to illustrate the range of conditions at the landfill (i.e., for features not considered of concern). Feature B was not observed during the 2016 visual inspection.





## Table 4-11: Visual Inspection Checklist - Station Area Non-Hazardous Waste Landfill

SITE NAME: FOX-5 Broughton Island

**LANDFILL DESIGNATION: Station Area NHWL** 

**DATE OF INSPECTION: August 6, 2016** 

DATE OF PREVIOUS INSPECTION: August 19 and 20, 2014

**INSPECTED BY: Darrin Johnson** 

**REPORT PREPARED BY: Darrin Johnson** 

**MONITORING EVENT NUMBER: 7** 

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





Table 4-11: Visual Inspection Checklist - Station Area Non-Hazardous Waste Landfill

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description (Severity Rating)	Comparison to Historical Observations	Photos
		А	Northeast crest	466402.1	7491622.9	5	5	0.3	0.43%			120
		D	Northeast crest and slope	466423.9	7491609.5	3	3	0.1	0.000%			122
		F	Northeast crest	466432.5	7491602.0	5	5	0.3	0.43%	Minor	concern	112
Settlement	Y	I	Southeast slope near toe	466436.7	7491577.1	1	1	0.3	0.02%	settlement and/or possible rough grading		127
		K	Southwest crest	466402.6	7491575.4	3	3	0.2	0.16%	(Acceptable)		129
		0	Northwest crest and slope	466364.1	7491587.5	15	15	0.3	3.9%			133, 134
		Q	Northwest slope	466383.6	7491613.3	2	2	0.2	0.07%			136
	Y	E	Northeast slope	466429.4	7491612.7	12	10	0.2	2.1%	Minor self-	Previously observed, no change	123, 139
Erosion		Н	Southeast slope	466427.4	7491567.0	10	5	0.1	0.86%	armouring		125, 126
Elosion		Р	Northwest slope	466373.6	7491598.7	10	2	0.2	0.35%	erosion (Acceptable)		135
		S	Northwest slope	466390.3	7491619.9	15	10	0.2	2.6%	(Ассертавіе)		138
Lateral Movement	N	-	-	-	-	-	-	-	-	-	-	-
Frost Action	N	-	-	-	-	-	-	-	-	-	-	-
Sloughing	N	-	-	-	-	-	-	-	-	-	-	-
	Υ	L	Southwest slope	466407.5	7491558.7	5	0.05	0.01	<0.01%	Minor weathered cracking (Acceptable)	Previously observed, no change	130
Cracking		R	Northwest slope	466379.7	7491601.3	5	0.01	0.01	<0.01%	Minor weathered thaw creep cracking (Acceptable)	Previously observed, not considered significant	137





Table 4-11: Visual Inspection Checklist - Station Area Non-Hazardous Waste Landfill

Checklist Item	Present (Y/N)	Feature ID (A, B, etc.)	Location Description	Easting	Northing	Length (m)	Width (m)	Depth (m)	Extent of Landfill Area (%)	Description (Severity Rating)	Comparison to Historical Observations	Photos
Animal Burrows	N	-	-	-	-	-	-	-	-	-	-	-
Vegetation	N	-	-	-	-	-	-	-	-	-	-	-
Staining	N	-	-	-	-	-	-	-	-	-	-	-
Vegetation Stress	N	-	-	-	-	-	-	-	-	-	-	-
Seepage or Ponded Water	N	-	-	-	-	-	-	-	-	-	-	-
		С	Northeast crest surface	466406.9	7491622.9	-	-	-	-	Metal debris on		121
Debris and/or	Y	J	Southeast toe	466428.1	7491547.5	-	-	-	-	surface (Acceptable)	Previously observed, not exposed waste	128
Liner Exposed		M	Southeast toe	466390.6	7491553.8	-	-	-	-	(1000)100)		131
		N	Southwest toe	466357.8	7491575.1	-	-	-	-	Steel cable and bits of metal (Acceptable)		132
Presence / Condition of Monitoring Instruments	Y	-	MW-15 to -19	-	-	-	-	-	-	Monitoring wells intact	-	140, 144, 148, 152, 156
Features of Note/Other Observations	N	G	Southeast crest surface	466426.2	7491581.9	30	20	0.1	10.4%	Tire tracks (Acceptable)	Previously observed, no change	124

Landfill Area = 5,800 m<sup>2</sup>





Table 4-12: Preliminary Stability Assessment - Station Area Non-Hazardous Waste Landfill

Feature	Severity Rating	Extent				
Settlement	Acceptable	Occasional				
Erosion	Acceptable	Occasional				
Lateral Movement	Not observed	-				
Frost Action	Not observed	-				
Sloughing	Not observed	-				
Cracking	Acceptable	Occasional				
Animal Burrows	Not observed	-				
Vegetation Establishment	Not observed	-				
Staining	Not observed	-				
Vegetation Stress	Not observed	-				
Seepage/Ponded Water	Not observed	-				
Debris and/or Liner Exposure	Acceptable	Occasional				
Other	Acceptable	Occasional				
Overall Landfill Performance	Acceptal	Acceptable				

Table 4-13: Summary Table of Photographic Log – Station Area Non-Hazardous Waste Landfill

Photo	Description (file name)	Easting	Northing	Date
110	FOX 5 – Station Area NHWL – Overview photo, southeast of landfill, facing northwest (ATT24_Photo24.jpg)	466469.3	7491464.4	6-Aug-2016
111	FOX 5 – Station Area NHWL – Crest edge, south corner, facing northeast (ATT25_Photo25.jpg)	466415.9	7491562.2	6-Aug-2016
112	FOX 5 – Station Area NHWL – Crest edge, east corner, facing northwest – previously observed settlement (Feature F) considered rough grading (ATT26_Photo26.jpg)	466442.3	7491603.7	6-Aug-2016
113	FOX 5 – Station Area NHWL – Crest edge, north corner, facing southwest (ATT27_Photo27.jpg)	466401.0	7491628.3	6-Aug-2016
114	FOX 5 – Station Area NHWL – Crest edge, west corner, facing southeast (ATT28_Photo28.jpg)	466374.4	7491588.4	6-Aug-2016
115	FOX 5 – Station Area NHWL – Northeast slope from north toe facing southeast (ATT29_Photo29.jpg)	466397.3	7491653.1	6-Aug-2016
116	FOX 5 – Station Area NHWL – Southwest slope from toe facing northeast (ATT30_Photo30.jpg)	466371.2	7491556.6	6-Aug-2016
117	FOX 5 – Station Area NHWL – Northeast slope from toe facing northwest (ATT31_Photo31.jpg)	466459.9	7491611.9	6-Aug-2016





Table 4-13: Summary Table of Photographic Log – Station Area Non-Hazardous Waste Landfill

Photo	Description (file name)	Easting	Northing	Date
118	FOX 5 – Station Area NHWL – Northwest slope facing southeast - Motorbike tracks on slope – Previously observed settlement (Feature Q) is likely rough grading and not significant (Acceptable) (ATT32_Photo32.jpg)	466363.8	7491622.9	6-Aug-2016
119	FOX 5 – Station Area NHWL – Crest surface facing southeast – Previously observed vehicle tracks (Feature G) cover most of landfill surface and are not considered significant (Acceptable) (ATT33_Photo33.jpg)	466388.9	7491608.4	6-Aug-2016
120	FOX 5 – Station Area NHWL – Crest in north corner facing northwest – Previously observed settlement (Feature A) may just be rough grading (Acceptable) (ATT86_Photo86.jpg)	466402.1	7491622.9	6-Aug-2016
121	FOX 5 – Station Area NHWL – Crest surface facing northwest – Feature C – steel bolt (Acceptable) (ATT90_Photo90.jpg)	466406.9	7491622.9	6-Aug-2016
122	FOX 5 – Station Area NHWL – Northeast crest facing north – Previously observed settlement (Feature D) is very shallow and not considered significant (Acceptable) (ATT89_Photo89.jpg)	466423.9	7491609.5	6-Aug-2016
123	FOX 5 – Station Area NHWL – Northeast slope facing northeast – Feature E – self armouring erosion (Acceptable) (ATT88_Photo88.jpg)	466429.4	7491612.7	6-Aug-2016
124	FOX 5 – Station Area NHWL – Crest surface facing south – Feature G – tire tracks (Acceptable) (ATT84_Photo84.jpg)	466426.2	7491581.9	6-Aug-2016
125	FOX 5 – Station Area NHWL – Southeast slope facing northwest – Feature H – minor self armouring erosion with fines washed down slope (Acceptable) (ATT94_Photo94.jpg)	466427.4	7491567.0	6-Aug-2016
126	FOX 5 – Station Area NHWL – Southeast slope facing northwest – Feature H – minor self armouring erosion (Acceptable) (ATT96_Photo96.jpg)	466437.2	7491586.7	6-Aug-2016
127	FOX 5 – Station Area NHWL – Southeast slope near toe facing southwest – Feature I – minor settlement (ATT95_Photo95.jpg)	466436.7	7491577.1	6-Aug-2016
128	FOX 5 – Station Area NHWL – Southeast toe facing northwest – Feature J – metal debris (Acceptable) (ATT83_Photo83.jpg)	466428.1	7491547.5	6-Aug-2016
129	FOX 5 – Station Area NHWL – Southwest crest surface facing northwest – Feature K – minor settlement (Acceptable) (ATT92_Photo92.jpg)	466402.6	7491575.4	6-Aug-2016
130	FOX 5 – Station Area NHWL – Southwest slope facing northwest – Feature L – minor weathered cracking (Acceptable) (ATT93_Photo93.jpg)	466407.5	7491558.7	6-Aug-2016





Table 4-13: Summary Table of Photographic Log – Station Area Non-Hazardous Waste Landfill

Photo	Description (file name)	Easting	Northing	Date
131	FOX 5 – Station Area NHWL – Southwest toe facing north – Feature M – bits of metal debris (Acceptable) (ATT91_Photo91.jpg)	466390.6	7491553.8	6-Aug-2016
132	FOX 5 – Station Area NHWL – Southwest toe facing northwest – Feature N – steel cable and bits of metal debris (Acceptable) (ATT102_Photo102.jpg)	466357.8	7491575.1	6-Aug-2016
133	FOX 5 – Station Area NHWL – Northwest slope northwest – Feature O – minor settlement (Acceptable) (ATT101_Photo101.jpg)	466364.1	7491587.5	6-Aug-2016
134	FOX 5 – Station Area NHWL – North crest surface facing northwest – Previously observed settlement (Feature O) area on crest are very shallow depressions and not considered significant (Acceptable) (ATT85_Photo85.jpg)	466396.0	7491598.6	6-Aug-2016
135	FOX 5 – Station Area NHWL – Northwest slope facing southeast – Feature P – minor self armouring erosion (Acceptable) (ATT100_Photo100.jpg)	466373.6	7491598.7	6-Aug-2016
136	FOX 5 – Station Area NHWL – Northwest slope facing southwest– Feature Q – minor settlement (Acceptable) (ATT98_Photo98.jpg)	466383.6	7491613.3	6-Aug-2016
137	FOX 5 – Station Area NHWL – Northwest slope facing northwest – Feature R – minor weathered cracking (Acceptable) (ATT99_Photo99.jpg)	466379.7	7491601.3	6-Aug-2016
138	FOX 5 – Station Area NHWL – Northwest slope facing southeast – Feature S – self armouring erosion channels (Acceptable) (ATT87_Photo87.jpg)	466390.3	7491619.9	6-Aug-2016
139	FOX 5 – Station Area NHWL – Northeast slope facing southeast – Feature E – self armouring erosion channels (Acceptable) (ATT97_Photo97.jpg)	466416.4	7491627.6	6-Aug-2016
140	FOX 5 – Station Area NHWL – MW-15 – monitoring well (ATT2_Photo2.jpg)	466472.3	7491556.4	6-Aug-2016
141	FOX 5 – Station Area NHWL – Soil sampling location MW- 15 before excavation (ATT3_Photo3.jpg)	466471.7	7491549.2	6-Aug-2016
142	FOX 5 – Station Area NHWL – Soil sampling location MW-15 after excavation (ATT4_Photo4.jpg)	466471.7	7491549.2	6-Aug-2016
143	FOX 5 – Station Area NHWL – Soil sampling location MW-15 after backfilling (ATT5_Photo5.jpg)	466471.7	7491549.2	6-Aug-2016
144	FOX 5 – Station Area NHWL – MW-16 – monitoring well (ATT7_Photo7.jpg)	466380.2	7491554.4	6-Aug-2016
145	FOX 5 – Station Area NHWL – Soil sampling location MW-16 before excavation (ATT6_Photo6.jpg)	466380.7	7491552.6	6-Aug-2016
146	FOX 5 – Station Area NHWL – Soil sampling location MW-16 after excavation (ATT8_Photo8.jpg)	466380.7	7491552.6	6-Aug-2016





Table 4-13: Summary Table of Photographic Log – Station Area Non-Hazardous Waste Landfill

Photo	Description (file name)	Easting	Northing	Date
147	FOX 5 – Station Area NHWL – Soil sampling location MW-16 after backfilling (ATT9_Photo9.jpg)	466380.7	7491552.6	6-Aug-2016
148	FOX 5 – Station Area NHWL – MW-17 – monitoring well (ATT10_Photo10.jpg)	466365.2	7491630.6	6-Aug-2016
149	FOX 5 – Station Area NHWL – Soil sampling location MW-17 before excavation (ATT11_Photo11.jpg)	466365.2	7491630.6	6-Aug-2016
150	FOX 5 – Station Area NHWL – Soil sampling location MW-17 after excavation (ATT12_Photo12.jpg)	466365.2	7491630.6	6-Aug-2016
151	FOX 5 – Station Area NHWL – Soil sampling location MW-17 after backfilling (ATT13_Photo13.jpg)	466365.2	7491630.6	6-Aug-2016
152	FOX 5 – Station Area NHWL – MW-18 – monitoring well (ATT15_Photo15.jpg)	466402.6	7491660.1	6-Aug-2016
153	FOX 5 – Station Area NHWL – Soil sampling location MW-18 before excavation (ATT14_Photo14.jpg)	466399.6	7491661.1	6-Aug-2016
154	FOX 5 – Station Area NHWL – Soil sampling location MW-18 after excavation (ATT16_Photo16.jpg)	466399.6	7491661.1	6-Aug-2016
155	FOX 5 – Station Area NHWL – Soil sampling location MW-18 after backfilling (ATT17_Photo17.jpg)	466399.6	7491661.1	6-Aug-2016
156	FOX 5 – Station Area NHWL – MW-19 – monitoring well (ATT19_Photo19.jpg)	466440.8	7491642.0	6-Aug-2016
157	FOX 5 – Station Area NHWL – Soil sampling location MW-19 before excavation (ATT18_Photo18.jpg)	466441.9	7491641.3	6-Aug-2016
158	FOX 5 – Station Area NHWL – Soil sampling location MW-19 after excavation (ATT20_Photo20.jpg)	466441.9	7491641.3	6-Aug-2016
159	FOX 5 – Station Area NHWL – Soil sampling location MW-19 after backfilling (ATT21_Photo21.jpg)	466441.9	7491641.3	6-Aug-2016

## 4.3.3 Summary of Sampling Deviations

The field work was conducted as per the TOR with the following exceptions:

- The deep soil sample at MW-16 could not be collected due to refusal on rock;
- PCB could not be analyzed from the groundwater sample at MW-17 due to insufficient recovery of water; and,
- The groundwater sample at MW-18 could not be collected because the well was dry.

## 4.3.4 Soil Sampling

Table 4-14 presents a summary of analytical results for soil samples collected at the Station Area Non-Hazardous Waste Landfill. MW-15 and MW-16 represent upgradient sampling locations, whereas MW-17, MW-18 and MW-19 represent downgradient sampling locations.



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Table 4-14 also lists the arithmetic mean background and baseline values for the landfill, in addition to the baseline mean plus  $3\sigma$  limits. The background arithmetic means for copper, nickel, zinc, arsenic and mercury at this landfill are greater than the baseline arithmetic means. The background arithmetic mean for mercury also exceeds the baseline mean plus  $3\sigma$  limit.

#### **MW-15**

Sampling location MW-15 is located upgradient (cross-gradient) of the landfill, approximately 46 m east of the toe. The estimated elevation of this sampling point is 571.5 masl. As shown in Photos 141 and 142, the area consists of boulders and rocks, infilled with sand and gravel and is not vegetated. The soils consisted of a brown sand, gravel and stone.

For the shallow sample at MW-15 (0-15 cm), the concentrations of all metals were less than those reported between 2009 and 2014. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep sample at MW-15 (30-40 cm), the concentrations of all metals were less than or similar to those reported between 2009 and 2014. The concentration of chromium (33.2 mg/kg) marginally exceeded the baseline mean concentration plus 3 $\sigma$  (32 mg/kg), but remained slightly less than the historical maximum concentration reported in 2009 (35 mg/kg); none of the other reported values exceeded their respective baseline mean concentrations plus 3 $\sigma$ . No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016.

#### **MW-16**

Sampling location MW-16 is located upgradient of the landfill, approximately 16 m southwest of the toe. The estimated elevation of this sampling point is 571 masl. As shown in Photos 145 and 146, the area consists of sand and gravel with some rocks and is not vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-16 (0-15 cm), the concentrations of most metals were similar to those reported in previous years, with the exception of zinc (103 mg/kg), which exceeded the baseline mean concentration plus 3 $\sigma$  (80.0 mg/kg) and represents a new historical maximum concentration. The concentration of copper (19.4 mg/kg) approached the baseline mean concentration plus 3 $\sigma$  (19.5 mg/kg), but remained less than the historical maximum concentration reported in 2009 (39 mg/kg); none of the other reported values exceeded their respective baseline mean concentrations plus 3 $\sigma$ . The modified TPH concentration of 80.5 mg/kg was similar to the range of concentrations reported in previous years (21 mg/kg to 264 mg/kg). No cadmium, arsenic, mercury, or PCB were detected at this location in 2016. It is noted that PCB concentrations of 0.03 mg/kg and 0.022 mg/kg were reported at this location in 2012 and 2014, respectively.

#### MW-17

Sampling location MW-17 is located downgradient of the landfill, approximately 14 m northwest of the toe. The estimated elevation of this sampling point is 567 masl. As shown in Photos 149 and 150, the area consists of sand and gravel with some boulders and rocks and is sparsely vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow sample at MW-17 (0-15 cm), the concentrations of all metals were within the range of concentrations reported in previous years. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .



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For the deep sample at MW-17 (30-40 cm), the average concentrations of most metals were less than or similar to those reported in previous years. No cadmium, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus 3σ.

#### **MW-18**

Sampling location MW-18 is located downgradient of the landfill, approximately 10 m north of the toe. The estimated elevation of this sampling point is 566.5 masl. As shown in Photos 153 and 154, the area consists of boulders and rocks, infilled with sand and gravel and is not vegetated. The soils consisted of brown sand with some gravel and stone.

For the shallow samples at MW-18 (0-15 cm, duplicate location), the calculated RPD values indicated the original and duplicate results differ by greater than 30% for copper, zinc and chromium and these results should therefore be interpreted with caution. The average concentrations of all metals, with the exception of arsenic were less than those reported in 2014. No cadmium, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep sample at MW-18 (40-50 cm), the concentrations of all metals, with the exception of lead, were less than those reported in 2014. All metals concentrations are less than or similar to those reported from 2007 to 2012. No cadmium, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

#### **MW-19**

Sampling location MW-19 is located downgradient of the landfill, approximately 16 m north of the toe. The estimated elevation of this sampling point is 567 masl. As shown in Photos 157 and 158, the area consists of boulders and rocks, infilled with sand and gravel and is not vegetated. The soils consisted of brown sand with some gravel.

For the shallow sample at MW-19 (0-15 cm), the concentrations of all metals, with the exception of lead, were less than or similar to those reported in previous years. The slight increase in the concentration of lead represents the maximum concentration detected at this location, but remains below the baseline concentration. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .

For the deep sample at MW-19 (40-50 cm), the concentrations of most metals were similar to those reported in 2012 and 2014 but less than those in 2009. Similar to the shallow sample, the slight increase in the concentration of lead represents the maximum concentration detected at this location, but remained below the baseline concentration. No cadmium, arsenic, mercury, PHC or PCB were detected at this location in 2016. None of the reported values exceeded their respective baseline mean concentrations plus  $3\sigma$ .





Table 4-14: Soil Chemical Analysis Results – Station Area Non-Hazardous Waste Landfill

ID	Depth (cm)	Cu (mg/kg)	Ni (mg/kg)	Co (mg/kg)	Cd (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Cr (mg/kg)	As (mg/kg)	Hg (mg/kg)	Total PCBs (mg/kg)	F1 (mg/kg)	F2 (mg/kg)	F3 (mg/kg)	F4 (mg/kg)
Background Mean		<u>10</u>	<u>5.3</u>	<u>4.0</u>	<u>1.0</u>	<u>5.0</u>	<u>46</u>	<u>19</u>	<u>1.93</u>	<u>0.5</u>	<u>0.001</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Baseline Mean		8.6	5.0	5.0	1.0	10	35	20	1.8	0.10	0.003	NA	NA	NA	NA
Baseline + 3σ		19.5	12.8	10.1	1.0	70.0	80.0	32.0	3.6	0.10	0.60	NA	NA	NA	NA
Upgradient															
MW-15b	0-15	<u>14.6</u>	<u>10.9</u>	<u>6.3</u>	<0.5	4.4	37.1	<u>30.8</u>	<1.0	<0.1	< 0.05	<7	<4	<8	<6
MW-15a	30-40	<u>17</u>	<u>12.4</u>	<u>7</u>	<0.5	<u>5.6</u>	41.1	<u>33.2</u>	<1.0	<0.1	< 0.05	<7	<4	<8	<6
MW-16a	0-15	<u>19.4</u>	<u>7.7</u>	<u>6.3</u>	<0.5	<u>19.8</u>	<u>103</u>	<u>19.7</u>	<1.0	<0.1	< 0.05	<7	18	59	33
MW-16 (deep	) 1														
Downgradient															
MW-17b	0-15	8.9	<u>7.5</u>	<u>5.2</u>	<0.5	<u>8.1</u>	<u>46.4</u>	17.1	<1.0	<0.1	< 0.05	<7	<4	<8	<6
MW-17a	30-40	7.0	<u>5.7</u>	<u>4.2</u>	<0.5	<u>6.0</u>	40.1	14.3	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-18b	0-15	5.3	4.2	3.1	<0.5	<u>5.3</u>	28.6	10.5	<1.0	<0.1	< 0.05	<7	<4	<8	<6
MW-18b dup	0-15	9	<u>6</u>	4	<0.5	<u>6</u>	45	15	<u>3</u>	<0.10	< 0.05	<5	<10	<50	<50
MW-18b (Dup Avg)	0-15	7	5.1	3.6	<0.5	<u>5.7</u>	37	13	<u>2</u>	<0.1	<0.05	<6	<7	<29	<28
MW-18a	40-50	5.5	4.3	3.3	<0.5	<u>6.8</u>	29.7	10.7	<1.0	<0.1	<0.05	<7	<4	<8	<6
MW-19b	0-15	8.7	<u>6</u>	<u>4.1</u>	<0.5	<u>7.2</u>	33.4	15.1	<1.0	<0.1	< 0.05	<7	<4	<8	<6
MW-19a	40-50	7.3	<u>5.8</u>	3.8	<0.5	<u>6</u>	33.2	14.1	<1.0	<0.1	<0.05	<7	<4	<8	<6

Notes:

NA: Not available; ID: Soil sample location ID.

<u>Underlined values</u>: Results exceed Background arithmetic mean.

**Bold Values**: Results exceed Baseline arithmetic mean.

Shaded Values: Results exceed the Baseline arithmetic mean plus 3 $\sigma$ .

1: The deep soil sample at MW-16 could not be collected due to refusal.





## 4.3.5 Groundwater Sampling

Groundwater sampling and monitoring well inspection field records are included in Appendix B. Table 4-15 presents a summary of groundwater levels and analytical results for groundwater samples collected at the Station Area Non-Hazardous Waste Landfill.

#### MW-15

The depth to groundwater measured at MW-15 in 2016 was 0.78 m below grade. No metals, PHC or PCB were detected at this location in 2016.

#### **MW-16**

The depth to groundwater measured at MW-16 in 2016 was 1.32 m below grade. The concentration of zinc, the only metal detected at MW-16, was less than those observed in previous years and was well below the baseline mean concentration plus 3σ. No PHC or PCB were detected at this location in 2016.

#### MW-17

The depth to groundwater measured at MW-17 in 2016 was 1.20 m below grade. No metals or PHC were detected at this location in 2016. PCB could not be analyzed from the groundwater sample at MW-17 due to insufficient recovery of water. It was noted on the groundwater sampling field sheets in Appendix B that a PCB sample was collected at MW-17 but no PCB sample could be collected at MW-19 due to insufficient recovery of water. Therefore the reported PCB lab result for MW-19 may be for MW-17, however it was decided to report the results as recorded on the laboratory chain of custody sheets and bottles. No PCB were detected in the MW-19 sample.

#### **MW-19**

The depth to groundwater measured at MW-19 in 2016 was 1.19 m below grade. No metals, PHC or PCB were detected at this location in 2016.





Table 4-15: Monitoring Well Groundwater Levels and Groundwater Chemical Analysis Results - Station Area Non-Hazardous Waste Landfill

ID	GW Depth BGS (m)	Cu (mg/L)	Ni (mg/L)	Co (mg/L)	Cd (mg/L)	Pb (mg/L)	Zn (mg/L)	Cr (mg/L)	As (mg/L)	Hg (mg/L)	Total PCBs (mg/L)	F1 (mg/L)	F2 (mg/L)	F3 (mg/L)	F4 (mg/L)
Baseline Mean		0.036	0.075	0.010	0.001	0.01	0.097	0.116	0.003	0.004	0.00002	NA	NA	NA	NA
Baseline + 3σ		0.093	0.186	0.040	0.001	0.01	0.322	0.368	0.009	0.004	0.00002	NA	NA	NA	NA
Upgradient															
MW-15	0.78	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
MW-16	1.32	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	0.01	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
Downgradien	t														
MW-17	1.20	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	NA <sup>1</sup>	<0.025	<0.100	<0.100	<0.100
MW-18 <sup>2</sup>															
MW-19	1.19	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.0005	<0.025	<0.100	<0.100	<0.100

Notes:

ID: Monitoring well location ID.

GW: Groundwater.

BGS: Below ground surface.

NA: Not available

**Bold Values**: Results exceed Baseline arithmetic mean.

1: PCB could not be analyzed from the groundwater sample at MW-17 due to insufficient recovery of water.

2: The groundwater sample at MW-18 could not be collected because the well was dry.



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## 4.3.6 Conclusions and Overall Performance of the Station Area Non-Hazardous Waste Landfill

The Station Area NHWL exhibited some observed minor settlement, self-armouring erosion, cracking, tire tracks and debris. No ponded water, exposed waste or indications of slope instability were observed during the 2016 visual inspection. The previously observed minor settlement and self-armouring erosion does not appear to have changed since the last inspection and is not considered to be of concern. Previously observed cracking is weathered, does not appear to have changed since the last inspection and is not considered of concern. Previously observed steel cable and metal debris are not exposed buried waste. Previously observed tire tracks on the landfill surface do not appear to have changed since the last inspection and are not considered of concern. The Station Area NHWL was assessed to have an "Acceptable" overall performance because all observed features were assessed as "Acceptable".

In 2016, soil samples were collected from 11 of the 12 scheduled locations. At upgradient location MW-16, the concentrations of most metals were similar to those reported in previous years, with the exception of zinc, which exceeded the baseline mean concentration plus 3 $\sigma$  and represents a new historical maximum concentration. The concentration of chromium at the deep upgradient (cross-gradient) MW-15 sample location also marginally exceeded the baseline mean concentration plus 3 $\sigma$ , but remained less than the historical maximum concentration reported in previous years. PHC were only detected at the MW-16 sampling location; the modified TPH concentration of 80.5 mg/kg was similar to the range of concentrations reported in previous years (21 mg/kg to 264 mg/kg). The concentrations of most metals in soil were highest overall at the deep MW-15 sampling location, located upgradient of the eastern toe and at the shallow MW-16 sampling location, located upgradient of the western toe. No detectable concentrations of cadmium, mercury or PCB were noted in any of the soil samples in 2016.

In 2016, groundwater samples were collected from four of five monitoring wells adjacent to the landfill. The concentration of zinc at MW-16, the only parameter detected at any of the four locations sampled, was less than those observed in previous years.

Comparison of groundwater elevations based on estimated grade elevation and the measured water depth in the wells indicates that groundwater in was highest at MW-15, and lowest towards the south at MW-18, which follows the topography in the area.

The historical graphs in Appendix C show concentration trends at the Main Landfill. The graphs indicate that relatively stable or slight decreasing trends are observed for most parameters at downgradient monitoring locations MW-17, MW-18 and MW-19. Slight increasing trends are observed for a number of metals (i.e. nickel, cobalt, lead, zinc and chromium) at the upgradient monitoring locations, which are largely attributed to increases at MW-16. Given that the environmental sampling results are largely the same as the previous sampling sessions, there is no evident impact of the landfill on soil quality. Similarly, there does not appear to be significant impact to groundwater quality from the landfill at the monitoring wells adjacent to the landfill.

#### 4.3.7 Recommendations for the Station Area Non-Hazardous Waste Landfill

No modifications to the ongoing monitoring program at this landfill are recommended.



# 5.0 QA/QC RESULTS

The results of the QA/QC program described in Section 3.3 are discussed herein. The results are described in terms of accuracy, reliability (blank analysis) and reproducibility (duplicate analysis).

The five DEW Line sites visited in 2016 were executed as a single field program using standard operating procedures which were consistent for all sites in the field program. The QA/QC analysis below contains both program-level (applicable to all five sites) and site-level discussions, which focus on the FOX-5 site. The laboratory reports related to the QA/QC discussion are contained in Appendix C.

# 5.1 Sample Hold Times

The generally accepted hold times for the parameters analyzed in this program are:

- Metals in soil: 180 days, metals in water: 60 days;
- Mercury in soil and water: 28 days;
- PCB in soil: 365 days, PCB in water: 14 days;
- PHC-F1 in soil: 48 hours (if unpreserved), PHC-F1 in water: 7 days; and,
- PHC F2-F4 in soil: 14 days, PHC F2-F4 in water: 7 days.

At FOX-5, the soil sampling was carried out on August 6-7, 2016. The soil samples were all received at Paracel and AGAT on August 16, 2016 and analysis commenced the following day, which was eleven days post sampling for those collected on August 6<sup>th</sup>.

Maximum hold times were exceeded for PHC-F1 (soil) due to its very short hold time of 48 hours. The very short hold time for unpreserved PHC-F1 in soil is a known issue but it has been decided to not preserve this parameter in order to maintain consistency with earlier years and data in the program. The hold times for PHC F2-F4 were all met for soil.

The groundwater sampling was carried out on August 6-7, 2016. The groundwater samples were received at Paracel and AGAT on August 16, 2016 and analysis commenced that day, which was ten days post sampling for those collected on August 6<sup>th</sup>. The maximum hold times were exceeded for PHC F1-F4 for the groundwater samples collected at FOX-5



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# 5.2 Accuracy

Accuracy is a measure of how close a measured value is to the true value. The accuracy of the laboratory data is generally evaluated by the laboratory through the use of matrix spikes or surrogate recoveries. For the FOX-5 samples, Paracel performed two spike analyses on water and one on soil. The spike recoveries for soil met the acceptable data quality objectives. The spike recoveries for groundwater were well within the acceptable range and therefore met the acceptable data quality objectives. AGAT also performed matrix spikes on the batch that included FOX-5 soil and water samples and all of their results were within their own data quality objectives.

Paracel performed lab blanks for soil and water, and all were all non-detect. AGAT also performed lab blanks in the batch that included FOX-5 soil and water samples and all of their results were non-detect. All spike recoveries for the monitoring program are within the acceptable limits and the accuracy of the results is considered acceptable on this basis.

# 5.3 Reliability

Reliability is a measure of certainty that the concentrations reported by the labs are reliable indicators of field conditions and have not been affected other sources of contamination such as ambient air or cross-contamination from other samples. The analysis of blanks provides a measure of reliability. A set of bottles of deionized water from Paracel accompanied the team on the entire 2016 monitoring program as a Trip Blank. These bottles were not opened at the sites. The analytical reports from Paracel indicate that no parameters were detected in the Trip Blank. One Field Blank was prepared on the 2016 program. Sample bottles were filled with distilled water in the field at FOX-2. No parameter was detected in the Field Blank.

Two Equipment Blanks were prepared for the 2016 program: one to test the decontamination of the groundwater probe, and the other to test the decontamination of the soil sample trowel. No parameters were detected in the Shovel Blank. Zinc was the only parameter detected in the Probe Blank, at a concentration (0.006 mg/L) marginally above the MDL of 0.005 mg/L. The Trip Blank, Field Blank and two Equipment Blank sample results are summarized in the table below.

# **Blank Samples**

	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total PCB	F1	F2	F3	F4
ID	(mg/L)								(mg/L)	_			(mg/L)	
Trip Blank	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
Field Blank	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	NA	NA	NA
Shovel Blank	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	<0.005	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100
Probe Blank	<0.0005	<0.001	<0.0005	<0.0001	<0.0001	0.006	<0.001	<0.001	<0.0001	<0.00005	<0.025	<0.100	<0.100	<0.100

Note: NA – Not analyzed.

The Trip Blank, Field Blank and two Equipment Blank sample results indicate that the laboratory results from the 2016 monitoring program were not affected by external influences associated with sampling, storage and transport.



# 5.4 Reproducibility (Duplicate Analysis)

The reproducibility of lab results was measured through the testing of field duplicate samples. Duplicate soil samples were prepared in the field by mixing up a homogeneous batch of soil in the test pit being sampled, and taking portions of soil and alternately filling the sample jars for the two labs. Duplicate groundwater samples were prepared by alternately filling bottles for each lab for each parameter type.

The labs also performed internal duplicate analysis. Paracel performed a duplicate analysis of soil, which indicated all duplicate pairs met the program's targets and a maximum RPD of 13.5% was achieved. Paracel also completed a duplicate analysis for groundwater and all duplicate pairs met the program's targets, with the exception of arsenic which had an RPD of 22.7%, however the results of both original and duplicate analysis were less than five times the MDL and RPD is less meaningful when both sets of results are less than five times the MDL. AGAT performed a duplicate analysis of parameters in soil; a maximum RPD of 11.8% was achieved. AGAT also performed a duplicate analysis of parameters in groundwater, however no parameters were detected and therefore no RPD were calculated, and thus their duplicates met the program requirements.

The total number of original soil samples collected for the 2016 program was 213, for which 21 duplicate soil samples were prepared and analyzed, providing a duplicate ratio of approximately 10%. A total of 41 groundwater samples were collected and six duplicates were analyzed, which is a duplicate ratio of greater than 10% for each site and for the program. The distribution of duplicate soil and groundwater samples over the five sites is provided in the table below.

Two soil duplicates and one groundwater duplicate were prepared at FOX-5.

#### **Soil Samples and Duplicates**

		DEW Line Site					
	DYE-M	FOX-2	FOX-3	FOX-4	FOX-5	Totals	
Soil Samples Collected	93	31	31	34	24	213	
Duplicate Soil Samples	7	4	4	4	2	21	
Percent	8%	13%	13%	12%	8%	10%	

# **Groundwater Samples and Duplicates**

		DEW L				
	DYE-M	FOX-2	FOX-3	FOX-4	FOX-5	Totals
Monitoring Well Sampled	9	9	7	7	9	41
Duplicate Groundwater Samples	2	1	1	1	1	6
Percent	22%	11%	14%	14%	11%	15%





To determine the reproducibility of the original and duplicate sample results, the RPD was calculated according to the following equation:

$$RPD = \frac{|x_2 - x_1|}{\left(\frac{x_1 + x_2}{2}\right)} \times 100\%$$

Where,  $x_1$  and  $x_2$  are the original and duplicate concentrations of a given parameter in a pair. RPD can only be calculated if concentrations of given parameters are greater than the analytical method detection limits (MDL) in both the duplicate and original samples of the pair. Additionally, the RPD calculation is less meaningful when the reported concentrations are less than five (5) times the MDL. RPD have been calculated wherever the concentrations of a parameter were five (5) times greater than the MDL in both the original and duplicate samples. Sample RPD were calculated by taking the average of the parameter RPD for a given sample-duplicate pair, and a program-level RPD was calculated by taking the average of all sample RPD to arrive at a program-wide indication of repeatability.

The TOR sets a data quality objective (DQO) for the RPD in soil and groundwater between a sample and its blind field duplicate of 30%. A discussion or the RPD for the program and at FOX-5 is provided below.

# 5.4.1 Soil Samples

# Organics and PCB

# **Program Level Interpretation**

The PCB concentrations were below the detection limit for all of the duplicate pairs of soil samples in the program.

PHC F3 was detected in five samples in the program and PHC F2 was detected in one of those five samples. In each case, it was the sample analyzed by Paracel, whereas the duplicate sample analyzed by AGAT did not. Paracel's MDL was equal to the program's requirement whereas AGAT's MDL was higher and they showed no exceedance of their MDL. None of the above are at concentrations that are greater than five times the program MDL therefore RPD were not calculated.

# Metals

# **Program Level Interpretation**

Mercury and cadmium concentrations were below detection limits for all 21 original and duplicate pairs in the program.

RPD calculations were undertaken for the seven remaining metals (copper, nickel, cobalt, lead, zinc, chromium and arsenic) for the 21 pairs of duplicate soil samples. The program-level average RPD for the soil sample duplicate analysis was 18%, which met the specified data quality objective for field duplicates for inorganics of 30%.

Two of the 21 soil sample pairs in the program had a sample average RPD of over 30%; one of which was collected at FOX-5. Fifteen parameter pairs exhibited an RPD of over 30%; three of them were at FOX-5. Overall, the most frequent metals to have an RPD over 30% were zinc, copper and nickel. The results for the samples analyzed by AGAT exhibited generally higher metals concentrations in 15 cases; Paracel's overall concentrations were higher in four cases, and in two cases it was evenly spilt. There appears to be a bias, in that results from AGAT were generally higher than those of Paracel but this does not impact interpretation of the results.





# **Site Level Interpretation**

From the two soil sample duplicates taken at FOX-5 there were 14 potential parameter pairs for RPD analysis (7 metals for a total of 2 samples). Cadmium and mercury were not detectable in any of the samples. As shown in the table below, 9 of the 14 potential metal parameter pairs exhibited concentrations greater than five times the MDL in both the original and duplicate, and therefore nine individual RPD were calculated. The individual RPD ranged from 1% to 52%. Three RPD exceeded 30% (copper, zinc and chromium at MW-18b). Copper exhibited the highest RPD, from 14% to 52% and nickel was the lowest, at 1%. The average of the nine RPD calculations from the two samples was just 20%, which was on the low side of the range of RPD in the program and met the field data quality objective of less than 30%. The table below summarizes the metals results and RPD calculations for FOX-5.

Six of the nine individual RPD at FOX-5 were below 30%, and three were over 30% (copper, zinc and chromium at MW-18b (52%, 45% and 35%, respectively). The average RPD for FOX-5 was 20%. In light of the relatively low average RPD, it concluded that the reproducibility of the soil sample results at FOX-5 was acceptable, however the affected results from MW-18b should be interpreted with caution.

# Relative Percent Difference Analysis of Soil Data at FOX-5

			Pa	arameter C	Concentrat	ions (mg/l	(g)			
Sample ID	Lab	Cu	Ni	Co	Pb	Zn	Cr	As	Sample	Any Over
MDL		<1	<1	<1	<1	<1	<1	<1	Average RPD	30%?
MW-7a	Paracel	7.8	6.9	4.6	7.4	39.3	16.1	<1.0		
MW-7a (duplicate)	AGAT	9	7	4.2	7	41	15	2	7%	no
RPD		14%	1%		6%	4%	7%		1	
MW-18b	Paracel	5.3	4.2	3.1	5.3	28.6	10.5	<1.0		
MW-18b (duplicate)	AGAT	9	6	4	6	45	15	3	36%	3 (Cu, Zn, Cr)
RPD		52%			12%	45%	35%		1	
									20%	3

**Note:** Parameters with concentrations <5 x MDL are **bold and highlighted yellow**.



# 5.4.2 Groundwater Samples

# Organics and PCB

The PHC F1-F4 results for all six of the duplicate pairs of groundwater samples in the program were below the detection limit and all PCB concentrations were below the detection limit. The reliability of these results is therefore considered acceptable.

## Metals

# **Program Level Interpretation**

Mercury was not detected in any original-duplicate groundwater pair; the reproducibility of the results is therefore considered acceptable. Six groundwater duplicate samples for a total of eight metals detected at greater than the MDL in one or more samples, resulted in 48 potential parameter pairs for duplicate analysis via RPD calculation. The metals concentrations were very low overall; in fact 33 of the possible 48 pairs exhibited one or both values less than five times the MDL and therefore, in addition to analyzing the QC by RPD analysis it is noted that of the 48 parameter pairs, there were:

- 22 pairs where both labs reported non-detect for the same metals in the parameter pair (good repeatability);
- 10 pairs where one lab reported non-detect and the other lab reported a value less than five times the MDL for the pair (good repeatability);
- 1 pair where both labs reported values that were less than five times the MDL (good repeatability);
- 10 pairs where both labs reported values that were greater than five times the MDL, so an RPD could be calculated. Of those:
  - 6 were under 30% (good repeatability)
  - 4 were over 30% (poor repeatability); and,
- 5 pairs where one lab reported a value less than five times the MDL and the other lab reported a value over five times the MDL and the RPD was over 30% (poor repeatability).

The average of the 10 RPD calculated for analysis of metals in water was 50%, which exceeds the data quality objective of 30%. This however omits the 38 other parameter pairs. A broader representation of program level RPD can be achieved by including all parameter pairs which either had values reported or were non-detect in both parameters. This leaves out only the 10 pairs where one member was non-detect. An RPD of zero has been assigned to pairs for which both members were non-detect. Using this metric, the program level RPD is 26%.

# **Site Level Interpretation**

At FOX-5, the duplicate groundwater sample was collected at MW-5, located at the Middle Site Area landfills. Copper, nickel, cobalt, cadmium, lead, chromium, arsenic and mercury were non-detect in both samples collected at this monitoring location, therefore they were excluded from the RPD calculations. As shown in the table below, there were no groundwater parameter pairs for which the concentrations in the original and duplicate were over five times the MDL. The reproducibility of the groundwater data at FOX-5 is not of concern.





# Relative Percent Difference Analysis of Groundwater Data at FOX-5

		Parameter Concentrations (mg/L)		
Sample ID	Lab	Zn	Average RPD	Any Over 30%?
MDL		<0.005		
MW-5	Paracel	<0.005		
MW-5 (Duplicate) AGAT		0.005	-	-
RPD				

**Note:** Parameters with concentrations <5 x MDL are **bold and highlighted yellow**.

# 5.4.3 Overall Lab Data Reproducibility

Based on a sample average of the field RPD for soil of 20% and considering that only three individual soil parameter pairs exhibited an RPD slightly over 30%, it is concluded that that the lab data is acceptable. For the duplicate groundwater sample taken at FOX-5, there were no groundwater parameter pairs for which the concentrations in the original and duplicate were over five times the MDL. It is noted that the concentrations of cadmium, lead, chromium, arsenic and mercury arsenic were non-detect in both samples at the two groundwater duplicate locations, which suggests the lab data is acceptable.

# 5.5 QA/QC Conclusions

The QA/QC analysis has shown that:

- Achieving maximum hold times of PHC F1 in soil and PHC F1-F4 are often not possible given the logistics of transport from the remote site location unless samples are field preserved (for PHC F1);
- With the exception of zinc detected marginally over the MDL in the Probe Blank, the concentrations of parameters in the two Equipment Blanks and one Field Blank were non-detect, as they should be to indicate that no spurious contaminates were biasing the samples while in transit;
- The duplicate analyses for soil met the program field data quality objectives; and,
- The duplicate analyses for water met the program field data quality objectives.





# **Report Signature Page**

We trust that this Monitoring Report meets the Project requirements of DND. Please direct any questions to the undersigned.

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# **APPENDIX A**

**Report Limitations** 





# REPORT LIMITATIONS

This report has been prepared as an assessment of the environmental condition and visual inspection of the subject site. The monitoring program described in this report was conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practising under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. The scope of work was carried out in accordance with the agreement between Golder Associates Ltd. and the client.

The assessment of environmental conditions at this Site has been made using the results of chemical analysis of soil and groundwater from a limited number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at sampling locations. Subsurface conditions may vary from those encountered at the sample locations. Additional study, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of study. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility that part of a Site may be contaminated and remain undetected. Visual inspection comments are based on observed conditions at the time of the inspection and may change with time.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibility of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the information contained in this report.

The content of this report is based on information collected during our monitoring program, our present understanding of the Site conditions, and our professional judgement in light of such information at the time of writing this report. This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change.

The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.





# **APPENDIX B**

# **Field Records**

Thermistor Inspection Record Sheets

Monitoring Well Sampling Logs

Soil Sampling Record Sheets



Inspector Name:	Darrin Johnson	Inspection Date:	August	7,2016
Inspector Signature	/ Prepared By:			

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-1	Inclination:	76 degrees		
Datalogger model no:		Datalogger of	cable download mod	del:	
*Install Date:	Unknown	First Date E	vent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 466017.8	E 7492251	Elev	
Length of Cable (m)		Cable Lead Above	Ground (m)		
Datalogger Serial #	2020264	Nodal Points	12		

#### **Thermistor Inspection**

	Good	Needs M	Maintenance Description
Casing	X		
Cover	X		
Data Logger	X		
Cable	X		
Beads		X	Beads 2 and 3 appear damaged
Lock condition		X	Replaced with new one
Battery Installation Date			
Battery Levels	Main	11.34	Aux <u>13.50</u>

#### **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.44	16.60
2	-	-
3	-	-
4	0.97	0.84
5	0.92	-0.88
6	0.88	-1.80
7	0.86	-2.60
8	0.84	-3.40

Bead	ohms	Degrees C
9	0.82	-4.04
10	0.80	-4.50
11	0.78	-5.20
12	0.78	-5.50

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

	Inspector Name:	Darrin Johnson	Inspection Date:	August	7,2016	
	Inspector Signature /	Prepared By:				
,						

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-2	Inclination:	77 degrees		
Datalogger model no:		Datalogger c	able download mod	del:	
*Install Date:	Unknown	First Date Ev	ent	Last Date Event	7-Aug-16
*Coordinates and Eleva	ation	N 466005.8	E 7492245	Elev	
Length of Cable (m)	5	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020228	Nodal Points	11		

#### **Thermistor Inspection**

Good	Needs M	laintenance Description
X		
Х		
Х		
X		
X		
	X	Replaced with new one
Main	11.34	Aux <u>13.67</u>
	х х х х	X

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.34	13.14
2	1.21	9.01
3	1.05	3.60
4	0.95	0.30
5	0.91	-0.82
6	0.88	-1.80
7	0.86	-2.70
8	0.84	-3.35

Bead	ohms	Degrees C
9	0.83	-3.90
10	0.81	-4.50
11	0.79	-5.20

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Darrin Johnson	Inspection Date:	August	7,2016
Inspector Signature / Prepared By:				

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-3	Inclination:	70 degrees		
Datalogger model no:	RX-16	Datalogger of	able download mod	del:	
*Install Date:	Unknown	First Date Ev	vent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 466027.8	E 7492236	Elev	
Length of Cable (m)	6.8	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020255	Nodal Points	15		

#### **Thermistor Inspection**

Good	Needs M	aintenance	Description
X			
X			_
X			
X			
X			
	Χ	Replaced with new o	ne
		· ·	
Main	11.34	Aux	13.68
	х х х х	X	X

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.44	16.70
2	1.38	14.80
3	1.44	16.60
4	1.50	18.70
5	1.44	16.70
6	1.22	8.90
7	1.06	4.10
8	0.95	0.12

Bead	ohms	Degrees C
9	0.91	-1.10
10	0.88	-2.00
11	0.86	-2.90
12	0.84	-3.60
13	0.82	-4.20
14	0.80	-4.70
15	0.79	-4.9000

		_
Battery	Informati	tion

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Darrin Johnson	Inspection Date:	August	7,2016
Inspector Signature /	Prepared By:			

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-4	Inclination:	63 degrees		
Datalogger model no:	RX-16	Datalogger c	able download mod	del:	
*Install Date:	Unknown	First Date Ev	rent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 466016.5	E 7492231	Elev	
Length of Cable (m)	6.8	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020265	Nodal Points	13		

#### **Thermistor Inspection**

	Good	Needs M	aintenance Description
Casing	X		
Cover	X		
Data Logger	X		
Cable	X		
Beads		Х	Bead 3 not working
Lock condition		Х	Replaced with new one
Battery Installation Date			
Battery Levels	Main	11.34	Aux <u>13.63</u>

#### **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.42	15.88
2	1.41	15.71
3	-	-
4	1.31	12.25
5	1.18	8.10
6	1.02	2.86
7	0.93	-0.25
8	0.90	-1.32

Bead	ohms	Degrees C
9	0.87	-2.45
10	0.73	7.02
11	0.84	-3.50
12	0.81	-4.50
13	0.78	-5.30

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# Datalogger Programming (Describe programming completed; beads and frequency)

Reprogramed to 24hr sampling rate.

Inspector Name:	Darrin Johnson	Inspection Date:	August	7,2016
Inspector Signature /	Prepared By:			

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-5	Inclination:	84 degrees		
Datalogger model no:	RX-16	Datalogger ca	able download mod	del:	
*Install Date:	Unknown	First Date Eve	ent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 465998.9	E 7492219	Elev	
Length of Cable (m)	6.8	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020265	Nodal Points	11		

#### **Thermistor Inspection**

Good	Needs M	aintenance Description
X		
X		
X		
X		
	Х	Beads 1-3 not working
	Х	Replaced with new one
Main	11.34	Aux <u>13.75</u>
	x x x	X

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	-	-
2	-	-
3	-	-
4	1.02	2.50
5	0.93	-0.30
6	0.90	-1.30
7	0.87	-2.30
8	0.85	-2.80

Bead	ohms	Degrees C
9	0.83	-3.70
10	0.80	-4.70
11	0.78	-5.20

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Darrin Johnson	Inspection Date:	August	6,2016
Inspector Signature / Prepared By:				

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-6	Inclination:	84 degrees		
Datalogger model no:	RX-16	Datalogger c	able download mod	del:	
*Install Date:	Unknown	First Date Ev	ent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 465905.2	E 7492194	Elev	
Length of Cable (m)	4.8	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020256	Nodal Points	11		

#### **Thermistor Inspection**

tor mapconon				
	Good	Needs M	aintenance	Description
Casing	X			
Cover	X			
Data Logger	X			
Cable	X			
Beads		X	Beads 1-2 not worki	ing
Lock condition		X	Replaced with new	one
Battery Installation Date	<u> </u>			
Battery Levels	Main	11.34	Aux	13.99

#### **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	-	-
2	-	-
3	1.05	3.43
4	0.95	0.06
5	0.91	-0.94
6	0.88	-2.06
7	0.85	-2.88
8	0.83	-3.87

Bead	ohms	Degrees C
9	0.80	-4.66
10	0.78	-5.36
11	0.78	-5.54

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# Datalogger Programming (Describe programming completed; beads and frequency)

Reprogramed to 24hr sampling rate.

#### **Observations and Proposed Maintenance**

Memory used 78% before reprograming

Inspector Name:	Darrin Johnson	Inspection Date:	August	6,2016
Inspector Signature / Prepared By:				

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

Site Name:	FOX-5	Landfill:	Main Landfill			
Thermistor Number:	VT-7	Inclination:	85 degrees			
Datalogger model no:	RX-16	Datalogger o	Datalogger cable download model:			
*Install Date:	Unknown	First Date Ev	vent	Last Date Event	7-Aug-16	
*Coordinates and Eleva	tion	N 465948	E 7492128	Elev		
Length of Cable (m)	4.8	Cable Lead Above	Ground (m)	3		
Datalogger Serial #	2020257	Nodal Points	11			

#### **Thermistor Inspection**

	Good	Needs M	aintenance Descrip	tion
Casing	X			
Cover	X			
Data Logger	Х			
Cable	Х			
Beads	Х			
Lock condition		Х	Replaced with new one	
Battery Installation Date				
Battery Levels	Main	11.34	Aux <u>13.38</u>	

#### **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.55	20.60
2	1.23	9.35
3	0.96	0.76
4	0.92	-0.61
5	0.90	-1.40
6	0.87	-2.30
7	0.85	-3.20
8	0.81	-4.35

Bead	ohms	Degrees C
9	0.80	-4.80
10	0.78	-5.50
11	0.77	-5.70

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Darrin Johnson	Inspection Date:	August	6,2016
Inspector Signature / Prepared By:				

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

Site Name:	FOX-5	Landfill:	Main Landfill			
Thermistor Number:	VT-8	Inclination:	87 degrees			
Datalogger model no:	RX-16	Datalogger of	Datalogger cable download model:			
*Install Date:	Unknown	First Date E	vent	Last Date Event	7-Aug-16	
*Coordinates and Elevat	tion	N 465962.2	E 7492104	Elev		
Length of Cable (m)		Cable Lead Above	Ground (m)			
Datalogger Serial #		Nodal Points	10			

#### **Thermistor Inspection**

	Good	Needs M	aintenance	Description
Casing	X			
Cover	X			
Data Logger	X			
Cable	X			_
Beads	X			_
Lock condition		Х	Replaced with new or	ne
Battery Installation Date			-	
Battery Levels	Main	11.34	Aux	13.75

#### **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.31	12.30
2	1.08	4.60
3	0.94	0.06
4	0.91	-0.94
5	0.88	-1.90
6	0.86	-2.78
7	0.83	-3.71
8	0.82	-4.85

Bead	ohms	Degrees C
9	0.74	-5.27
10	0.78	-5.53

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Kevin Rattray	Inspection Date:	August	7,2016	
Inspector Signature	Prepared By:				

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

Site Name:	FOX-5	Landfill:	Main Landfill			
Thermistor Number:	VT-9	Inclination:	86 degrees			
Datalogger model no:	RX-16	Datalogger c	Datalogger cable download model:			
*Install Date:	Unknown	First Date Ev	ent	Last Date Event	7-Aug-16	
*Coordinates and Eleva	tion	N 461848.5	E 7493615	Elev		
Length of Cable (m)	4.4	Cable Lead Above	Ground (m)	3		
Datalogger Serial #	2020261	Nodal Points	10			

#### **Thermistor Inspection**

tor mapconon				
	Good	Needs M	aintenance	Description
Casing	Х			
Cover	Х			
Data Logger	Х			
Cable	Х			
Beads		Χ	Bead 4 not working	
Lock condition		Χ	Replaced with new of	one
Battery Installation Date				
Battery Levels	Main	11.34	Aux	13.26

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.25	10.06
2	1.21	8.73
3	0.93	3.99
4	-	-
5	0.90	-0.58
6	0.86	-1.43
7	0.86	-2.78
8	0.84	-3.73

Bead	ohms	Degrees C
9	0.82	-4.14
10	0.81	-4.01

# **Battery Information**

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

Inspector Name:	Kevin Rattray	Inspection Date:	August	7,2016
Inspector Signatur	e / Prepared By:			

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-10	Inclination:	86 degrees		
Datalogger model no:	RX-16	Datalogger ca	able download mod	del:	
*Install Date:	Unknown	First Date Ev	ent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 461861.7	E 7493641	Elev	
Length of Cable (m)	4.4	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020230	Nodal Points	10		

#### **Thermistor Inspection**

	Good	Needs M	aintenance Description
Casing	Χ		
Cover	X		
Data Logger	X		
Cable	X		
Beads		Χ	Beads 2 and 5 not working
Lock condition		Χ	Replaced with new one
Battery Installation Date			
Battery Levels	Main	11.34	Aux <u>13.38</u>

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.27	10.90
2	-	-
3	1.23	9.60
4	1.18	7.70
5	-	-
6	0.95	0.14
7	0.90	-1.50
8	-2.52	0.87

Bead	ohms	Degrees C
9	0.84	-3.30
10	0.83	-3.70

Battery	Information

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# Datalogger Programming (Describe programming completed; beads and frequency)

Reprogramed to 24hr sampling rate.

Inspector Name:	Kevin Rattray	Inspection Date: August 7, 2016
Inspector Signature /	Prepared By:	
		_

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-11	Inclination:	90 degrees		
Datalogger model no:	RX-16	Datalogger of	cable download mod	del:	
*Install Date:	Unknown	First Date Ev	vent	Last Date Event	7-Aug-16
*Coordinates and Eleva	tion	N 461823.7	E 7493642	Elev	
Length of Cable (m)	3.8	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020120	Nodal Points	9		

#### **Thermistor Inspection**

	Good	Needs M	aintenance	Description	
Casing	X				
Cover	X				
Data Logger	X				
Cable	X				
Beads	X				
Lock condition		Χ	Replaced with new o	ne	
Battery Installation Date					
Battery Levels	Main	11.34	Aux	13.14	_

# **Manual Ground Temperature Readings**

Bead	ohms	Degrees C
1	1.26	10.35
2	1.23	9.57
3	1.29	11.37
4	1.25	10.16
5	1.13	6.81
6	0.96	0.63
7	0.92	-0.67
8	0.87	-2.21

Bead	ohms	Degrees C
9	0.86	-2.75

Battery	Infor	mati∧n

Batteries changed? Yes No x Monitoring Year:

Battery model number installed: ULB15

Expected battery life (years): 2019

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

inspector Name.	Reviii Railiay	inspection Date.	Augusi	7,2016
Inspector Signature / F	repared By:			
The surveion to the form of	/*C  f		I = = = \	

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

Site Name:	FOX-5	Landfill:	Main Landfill		
Thermistor Number:	VT-12	Inclination:	90 degrees		
Datalogger model no:	RX-16	Datalogger c	able download mod	del: USB	
*Install Date:	Unknown	First Date Ev	ent	Last Date Event	7-Aug-16
*Coordinates and Elevat	tion	N 461796.5	E 7493670	Elev	
Length of Cable (m)	7	Cable Lead Above	Ground (m)	3	
Datalogger Serial #	2020270	Nodal Points	not recorded		

#### **Thermistor Inspection**

	Good	Needs M	aintenance	Description
Casing	Х			
Cover	Х			
Data Logger	X			_
Cable	X			_
Beads	X			_
Lock condition		X	Replaced with new on	e
Battery Installation Date	2016			
Battery Levels	Main	11.34	Aux	13.14

#### **Manual Ground Temperature Readings**

manaar Greana remperature readinge				
Bead	ohms	Degrees C		
nc	ot recorded in field			

Bead	ohms	Degrees C

Battery	Infor	mati∧n

Batteries changed? Yes x No Monitoring Year: 2016
Battery model number installed: new ULB1 and ULB15

Expected battery life (years): 2023

# <u>Datalogger Programming (Describe programming completed; beads and frequency)</u>

Reprogramed to 24hr sampling rate.

#### **Observations and Proposed Maintenance**

VT-12 reinstalled Aug 7, 2016

	Anne	k J: ivionitoring v	Vells Sampling I	Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-5				Middle Site
Sample Number(s) inclu	ıde dups.:	All plus Dup			
Bottles filled (by parame	eter type)	All plus Dup			<u>_</u>
Date of Sampling Event	: <u>.</u>	7	August	2016	Time: 10:00
Weather	Slight wind and	fog, +5			<u> </u>
Names of Samplers	JB				
Description of well cond	dition and surrou	inding ground co	nditions (note p	onding of water):	
Good, dry ground.					
Lock (condition, presen	ce, model, manu	facturer):	Changed to cro	wn	
Pre-Measured Data (fro	m water well re	scord log)			
Depth of well installation			Diameter of we	ell (cm).	4.4
Depth to top of screen (		_		ned section (cm):	
septification of screening	_		Length of seree	med section (em).	
Field Measurements					
Measurement method	(interface probe,	tape, etc):	Interface Probe	<u>.</u>	
Well pipe height above	ground (cm) (to	top of pipe):			<del>-</del> 5:
Static water level (cm) f					147.
Static water level (cm) (	below ground su	ırface) calculated	<b>:</b>		205.
	-				
Measured well refusal o	lepth (cm) (meas	sured after samp	ling from top of	pipe):	20!
Measured well refusal on Thickness of water colu		•	•	pipe): of water in well (mL):	205 874
Thickness of water colu Free product thickness Purge Information Sum	mn (cm): (mm):	57.5	Static Volume of Evidence of Slu	of water in well (mL): dge or siltation:	
Thickness of water colu Free product thickness	mn (cm): (mm):  mary ment, sampling t	57.5 - technique and ed	Static Volume of Evidence of Slu	of water in well (mL): dge or siltation:	874
Thickness of water colu Free product thickness Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (not	mn (cm): (mm):  mary ment, sampling t	57.5 - technique and ed - ng events):	Static Volume of Slu Evidence of Slu quipment calibra	of water in well (mL): dge or siltation: ation information: Recharge Rate:	874 No 250ml / 3min
Thickness of water colurer Free product thickness of Purge Information Sum Purging/sampling equip	mn (cm): (mm): mary ment, sampling to	57.5  technique and ed  ag events):  Stablized	Static Volume of Sluguipment calibrates  Final	of water in well (mL): dge or siltation: ation information: Recharge Rate:	874 No 250ml / 3min
Thickness of water colu Free product thickness Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH	mn (cm): (mm): mary ment, sampling to the control of the control o	57.5  technique and ed  reg events):  Stablized 7.05	Static Volume of Slu Evidence of Slu quipment calibra  - Final 6.81	of water in well (mL): dge or siltation: ation information: Recharge Rate: Note: 6.5	874 No 250ml / 3min
Thickness of water colu Free product thickness Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	mn (cm): (mm): mary ment, sampling to e multiple purgin  Initial 7.14 0.037	technique and economic stablized 7.05 0.038	Static Volume of Sluguipment calibrates  Final 6.81 0.035	Recharge Rate:  Note: 6.5: 0.03:	250ml / 3min
Thickness of water colu Free product thickness Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note  Parameter pH Conductivity (mS/cm) Turbidity (NTU)	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	57.5  technique and ed  reg events):  Stablized  7.05  0.038	Static Volume of Slu Evidence of Slu quipment calibra  Final 6.81 0.035	Motes  Notes  0.03	250ml / 3min
Thickness of water colureree product thickness of Purge Information Sum Purging/sampling equip	mn (cm): (mm): mary ment, sampling to e multiple purgin  Initial 7.14 0.037 0 8.03	technique and economic stablized 7.05 0.038	Static Volume of Sluguipment calibrates  Final 6.81 0.035	Motes  Notes  0.03	250ml / 3min
Thickness of water colustree product thickness of Purge Information Sum Purging/sampling equip -  Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC)  Visual/olfactory observations	mn (cm): (mm):  mary ment, sampling to the control of the control	57.5  technique and ed  gevents):  Stablized  7.05  0.038  0  6.89	Static Volume of Slu Evidence of Slu quipment calibra  Final 6.81 0.035	Motes  Notes  0.03	250ml / 3min
Purge Information Sum Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observations	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	57.5  technique and ed  gevents):  Stablized  7.05  0.038  0  6.89	Static Volume of Slu Evidence of Slu quipment calibra  - Final 6.81 0.035 0 6.26	Recharge Rate:  Note:  0.03	250ml / 3min
Thickness of water colustree product thickness of Purge Information Sum Purging/sampling equip -  Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC)  Visual/olfactory observations	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	57.5  technique and ed  gevents):  Stablized  7.05  0.038  0  6.89	Static Volume of Slu Evidence of Slu quipment calibra  - Final 6.81 0.035 0 6.26	Recharge Rate:  Note:  0.03	250ml / 3min

	Anne	x J: Monitoring	Wells Samplir	ng Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-6		<u> </u>		Middle Site
Sample Number(s) inclu	de dups.:	-			
Bottles filled (by parame	eter type)	Partial			_
Date of Sampling Event:			7 August	2016	Time: 11:30
Weather	Cloud over, fog	, breeze from r	orth, +5		<u> </u>
	JB				_
Description of well cond	lition and surro	unding ground	conditions (not	e ponding of water):	
Good, dry ground and lo					
Lock (condition, present	ce, model, man	ufacturer):	Changed to	crown (broke)	
Pre-Measured Data (fro	m water well r	ecord log)			
Depth of well installatio		-	Diameter of	well (cm):	4.4
Depth to top of screen (		_		reened section (cm):	-
Depth to top of screen (	ciii).			reened section (em).	
Field Measurements					
Measurement method (	interface probe	e, tape, etc):	Interface Pro	obe	
Well pipe height above	ground (cm) (to	top of pipe):			<del>_</del>
Static water level (cm) f	rom top of pipe	::			191.5
Static water level (cm) (	below ground s	urface) calculat	ed:		199
Measured well refusal d	lepth (cm) (mea	sured after san	npling from top	of pipe):	199
Thickness of water colu	mn (cm):	7	.5 Static Volum	e of water in well (mL):	114
Free product thickness (	mm):	-	Evidence of	Sludge or siltation:	-
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	ment, sampling	<u>-</u>	equipment cali	Bration information: Recharge Rate:	250ml / 4min
voidine i diged (2) (note	s manapie parbi	ing events).			
Parameter	Initial	Stablized	Final	Note	S
рН	6.51		-		
Conductivity (mS/cm)	0.043	-	-		
Turbidity (NTU)	0	-	-		
Temperature (degC)	8.83	-	-		
Visual/olfactory observa -	ations:				
Decontamination of sar					
Type of decontaminatio	n fluid(s):	Soap and water	er, decon interfa		
Number of washes:	1			Number of rinses:	1
Other relevant commen	ts:	Not recharging	g, not able to fil	l all bottles.	

	An	nex J: Monitoring	g Wells Sampli	ng Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-7				Middle Site
Sample Number(s) inclu	ide dups.:	_			
Bottles filled (by param	eter type)	-			
Date of Sampling Event	:		7 August	2016	Time: 12:00
Weather	North wind, o	loudy, +5			
Names of Samplers	JB				_
Description of well cond	dition and suri	ounding ground	conditions (no	te ponding of water):	_
Good, dry ground.					
Lock (condition, presen	ce, model, ma	nufacturer):	Needs to be	e changed (crown lock in	nstalled)
Pre-Measured Data (fro	om water wel	record log)			
Depth of well installation		-	Diameter o	f well (cm):	4.4
Depth to top of screen		-		creened section (cm):	_
	v - ··/·				
Field Measurements	<i>,</i> , , , , , , , , , , , , , , , , , , ,				
Measurement method	•	• •	Interface Pr	obe	<u> </u>
Well pipe height above	•				70
Static water level (cm) f					-
Static water level (cm) (	_	· ·			
Measured well refusal of		easured after san			111 dry
Thickness of water colu		-	Static Volume of water in well (mL):		-
Free product thickness	(mm):	_	Evidence of	Sludge or siltation:	-
Purge Information Sum Purging/sampling equip	-	ng technique and	equipment ca	libration information:	
Well purged (Y/N):		-		Recharge Rate:	
Volume Purged (L) (not	e multiple pur	ging events):			
Parameter	Initial	Stablized	Final	Note	2S
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	-	-	-		
	-	-	-		
Temperature (degC)  Visual/olfactory observ	- ations:	-	-		
<u>-</u>	1				
<b>Decontamination of sa</b> Type of decontamination		nent Soap and wate	or decon inter	face	
Number of washes:	m naia(s).	<u>-</u>	i, decon inter	Number of rinses:	
number of wasnes:		1		number of finses:	1
Other relevant commer	nts:	Dry well, sand	on end of pro	be.	

			/ells Sampling	0	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-8				Middle Site
Sample Number(s) inclu	de dups.:	-			
Bottles filled (by parame	eter type)	All			
Date of Sampling Event:	_	7 .	August	2016	Time: 12:40
Weather	North wind, clou	ıdy, +5			_
Names of Samplers	JB				
Description of well cond	lition and surrou	nding ground cor	nditions (note ¡	oonding of water):	
Good, dry ground.					
Lock (condition, presend	ce, model, manut	facturer):	Replaced with	crown	
Pre-Measured Data (fro	m water well re	cord log)			
Depth of well installatio			Diameter of w	ell (cm):	4.4
Depth of well illistaliation  Depth to top of screen (	_ · · · · _			ened section (cm):	
Depth to top of screen (			Length of Scien	eneu section (cm).	
Field Measurements					
Measurement method (	interface probe,	tape, etc):	Interface Prob	e	
Well pipe height above a	ground (cm) (to t	op of pipe):			<del></del>
Static water level (cm) for	rom top of pipe:				137
Static water lever (Cili) ii					
• •	below ground su	rface) calculated	:		206
Static water level (cm) (l Static water level (cm) (l Measured well refusal d	_			f pipe):	
Static water level (cm) (l	epth (cm) (meas	ured after sampl	ing from top o	f pipe): of water in well (mL):	206 206 1049
Static water level (cm) (l Measured well refusal d	epth (cm) (meas mn (cm): mm):	ured after sampl	ing from top o Static Volume		206
Static water level (cm) (l Measured well refusal d Thickness of water colu Free product thickness (	epth (cm) (meas mn (cm): mm): mary ment, sampling t	ured after sampl 69 - echnique and eq	ing from top o Static Volume Evidence of Slu	of water in well (mL): udge or siltation:	206 1049 -
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness ( Purge Information Sum Purging/sampling equip	epth (cm) (meas mn (cm): mm): mary ment, sampling t	ured after sampl 69 - echnique and eq	ing from top o Static Volume Evidence of Slu	of water in well (mL): udge or siltation: ration information:	206 1049 - 250ml / 3min
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness ( Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	epth (cm) (meas mn (cm): mm): mary ment, sampling t	echnique and eq	ing from top o Static Volume Evidence of Slu uipment calibr	of water in well (mL): udge or siltation: ration information: Recharge Rate: Note	206 1049 - 250ml / 3min
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness ( Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	epth (cm) (meas mn (cm): mm): mary ment, sampling to the multiple purgin	echnique and eques g events):  Stablized	ing from top o Static Volume Evidence of Slu uipment calibr	of water in well (mL): udge or siltation: ration information: Recharge Rate: Note	206 1049 - 250ml / 3min
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness ( Purge Information Sum Purging/sampling equip  - Well purged (Y/N): Volume Purged (L) (note Parameter pH	epth (cm) (meas mn (cm): mm): mary ment, sampling t e multiple purgin Initial 6.51	echnique and eq g events): Stablized 6.45	ing from top o Static Volume Evidence of Slu uipment calibr - Final 6.41	of water in well (mL): udge or siltation: ration information: Recharge Rate: Note	206 1049 - 250ml / 3min
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness (  Purge Information Sum Purging/sampling equip  - Well purged (Y/N): Volume Purged (L) (note  Parameter pH Conductivity (mS/cm)	epth (cm) (meas mn (cm): mm): mary ment, sampling t e multiple purgin Initial 6.51 0.033	echnique and eques sevents):  Stablized 6.45 0.033	ing from top o Static Volume Evidence of Slu uipment calibr  - Final 6.41 0.032	of water in well (mL): udge or siltation: ration information: Recharge Rate: Note	206 1049 - 250ml / 3min
Static water level (cm) (I Measured well refusal d Thickness of water colur Free product thickness ( Purge Information Sum Purging/sampling equip  - Well purged (Y/N): Volume Purged (L) (note  Parameter pH Conductivity (mS/cm) Turbidity (NTU)	epth (cm) (measmn (cm): mm (cm): mmn): mary ment, sampling t e multiple purgin linitial 6.51 0.033 0 6.94 etions:	echnique and eques stablized 6.45 0.033 0 5.76	ing from top o Static Volume Evidence of Slu uipment calibr  - Final 6.41 0.032 0 5.18	of water in well (mL): udge or siltation: ration information: Recharge Rate: Note	206 1049 - 250ml / 3min

	, , , , , ,	k J: Monitoring \	vvciis sampiii	ig Lug	
Site Name:	FOX5		_	Landfill Name:	
Monitoring Well ID:	MW-9		_		Middle Site
Sample Number(s) inclu	ude dups.:	-			
Bottles filled (by parame	eter type)	All and half PBC	bottle		
Date of Sampling Event	:	7	' August	2016	Time: 1:05
Weather	North wind, clou	udy, +5			
Names of Samplers	JB				_
Description of well cond	dition and surrou	nding ground co	onditions (not	e ponding of water):	_
Water ponded in well ca	asing, dry ground	l.			
ock (condition, presen	ce, model, manu	facturer):	Replaced wi	th crown	
Pre-Measured Data (fro	om water well re	cord log)			
Depth of well installation		-	Diameter of	well (cm):	4.4
Depth to top of screen (	- · · · · · -	_	_	reened section (cm):	_
	_		0	(, ,	
Field Measurements					
Measurement method	•	• •	Interface Pro	obe	_
Well pipe height above					6
Static water level (cm) f					169.
Static water level (cm) (		•			197.
Measured well refusal o		•	•		197.
Thickness of water colu	ımn (cm)·	28	C+a+ia Value		42
		20	_	ne of water in well (mL):	420
Free product thickness  Purge Information Sum	(mm):	-	Evidence of	Sludge or siltation:	Siltation yes
Free product thickness	(mm): nmary oment, sampling t	- technique and e -	Evidence of	Sludge or siltation:	
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (not	(mm):	technique and e	Evidence of quipment cal	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	(mm):  nmary nment, sampling to e multiple purgin	technique and e  - ng events): Stablized	Evidence of quipment cal	Sludge or siltation: ibration information:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH	e multiple purgin	technique and e  g events):  Stablized 6.38	Evidence of quipment cal	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	e multiple purgin	technique and e  g events):  Stablized  6.38	Evidence of quipment cal	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU)	e multiple purgin  Initial  6.55  0.021	technique and e  g events):  Stablized 6.38 0.021	Evidence of quipment cal  Final	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC)	e multiple purgin  Initial  6.55  0.021  0  6.1	technique and e  g events):  Stablized  6.38	Evidence of quipment cal  Final	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observa	e multiple purgin  Initial  6.55  0.021  0  6.1	technique and e  Stablized 6.38 0.021	Evidence of quipment cal  Final	Sludge or siltation: ibration information: Recharge Rate:	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observations	e multiple purgin  Initial  6.55  0.021  0  6.1  ations:	technique and e  Stablized 6.38 0.021 0 5.44	Evidence of quipment cal	Sludge or siltation: ibration information: Recharge Rate: Notes	Siltation yes
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observa	e multiple purgin  Initial  6.55  0.021  0  6.1  ations:	technique and e  Stablized 6.38 0.021	Evidence of quipment cal	Sludge or siltation: ibration information: Recharge Rate: Notes	Siltation yes

	An	nex J: Monitoring	g Wells Sampl	ing Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-10				Main
Sample Number(s) inclu	ıde dups.:	-			
Bottles filled (by param	eter type)	-			
Date of Sampling Event	:		6 August	2016	Time: 15:00
Weather	_				
Names of Samplers	JB				
Description of well con-	dition and sur	rounding ground	conditions (no	te ponding of water):	<del></del>
Dry ground, well in goo		00	`	,	
Lock (condition, presen		anufacturer):	Changed lo	ck to crown	
Pre-Measured Data (fro	om water wel	l record log)			
Depth of well installation		-	Diameter o	f well (cm):	4.4
Depth to top of screen	· ·	_		creened section (cm):	_
	(- /			( ,	
Field Measurements					
Measurement method	(interface pro	be, tape, etc):	Interface P	robe	
Well pipe height above					<del>_</del> _
Static water level (cm) f					_
Static water level (cm) (		•	ted:		_
Measured well refusal of				p of pipe):	154 dry wel
Thickness of water colu		-		me of water in well (mL):	
Free product thickness		_		f Sludge or siltation:	No
Purge Information Sum Purging/sampling equip	-	ng technique and	equipment ca	libration information:	
-					
Well purged (Y/N):		-		Recharge Rate:	-
Volume Purged (L) (not	e multiple pur	ging events):	_		
0-1 (7( -1		0 0,			
Parameter	Initial	Stablized	Final	Note	es
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	_	_	-		
Temperature (degC)	-	_	-		
Temperature (dege)	<u> </u>				
Visual/olfactory observ	ations:				
Decontamination of sa	mpling equipr	ment			
Type of decontamination	on fluid(s):	Water and so	ap, decon inter	face probe	
Number of washes:		1		Number of rinses:	1
Other relevant commer	nts:	Dry well.			_

	Anı	nex J: Monitoring	g Wells Sampli	ng Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-11		<u></u>		Main
Sample Number(s) inclu	ıde dups.:	-			
Bottles filled (by param	eter type)	-			<u> </u>
Date of Sampling Event	:		6 August	2016	Time: 13:50
Weather	Sunny, +20				_
Names of Samplers	JB				_
Description of well con	dition and surr	ounding ground	conditions (no	te ponding of water):	
Good, dry land.					_
Lock (condition, presen	ce, model, ma	nufacturer):	Crown lock	installed	
Pre-Measured Data (fr	om water well	record log)			
Depth of well installation		-	Diameter o	f well (cm):	4.4
Depth to top of screen		_		creened section (cm):	_
	(511)				
Field Measurements					
Measurement method	(interface prob	oe, tape, etc):	Interface Pr	robe	
Well pipe height above	ground (cm) (t	to top of pipe):			103
Static water level (cm)	from top of pip	e:			-
Static water level (cm)	(below ground	surface) calculat	ed:		-
Measured well refusal	depth (cm) (me	easured after san	npling from to	p of pipe):	230.5 dry
Thickness of water colu	ımn (cm):	_	Static Volur	me of water in well (mL):	-
Free product thickness	(mm):	_	Evidence of	Sludge or siltation:	-
Purge Information Sum Purging/sampling equip	•	ng technique and	equipment ca		
Well purged (Y/N):		-		Recharge Rate:	
Volume Purged (L) (not	e multiple pur	ging events):			
Parameter	Initial	Stablized	Final	Note	S
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	-	-	-		
Temperature (degC)	-	-	-		
Visual/olfactory observ	ations:				
Decontamination of sa	mpling equipn	nent			
Type of decontamination	on fluid(s):	Water and soa	ip, decon inter		
Number of washes:		1		Number of rinses:	1
Other relevant comme	nts:	Water 1cm at	bottom, not a	ble to sample.	

	Anr	nex J: Monitoring	Wells Sampli	ng Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-12				Main
Sample Number(s) inclu	ıde dups.:	-			
Bottles filled (by param	eter type)	_			
Date of Sampling Event	:		6 August	2016	Time: 13:50
Weather	Sunny, +20				
Names of Samplers	JB				<u> </u>
Description of well cond	dition and surr	ounding ground	conditions (no	te ponding of water):	<del>_</del>
Well slightly inclined to	wards the east	Some ponding o	of water in cas	ing.	
Lock (condition, presen	ce, model, ma	nufacturer):	Changed loo	ck (crown)	_
Pre-Measured Data (fro	om water well	record log)			
Depth of well installation		-	Diameter of	well (cm):	4.4
Depth to top of screen		_		creened section (cm):	-
- apt. 10 top 01 3010011	(=).			22.124 3231011 (0111).	
Field Measurements					
Measurement method	•		Interface Pr	obe	
Well pipe height above					_
Static water level (cm) f	from top of pip	e:			_
Static water level (cm) (	below ground	surface) calculat	ed:		_
Measured well refusal o	depth (cm) (me	easured after sam	npling from top	o of pipe):	136.5 dry we
Thickness of water colu	mn (cm):	_	Static Volun	ne of water in well (mL):	-
Free product thickness	(mm):	-	Evidence of	Sludge or siltation:	No
Purge Information Sum Purging/sampling equip -	-	ng technique and	equipment ca		
Well purged (Y/N):		<del>-</del>		Recharge Rate:	-
Volume Purged (L) (not	e multiple pur	ging events):	-	<u></u>	
Parameter	Initial	Stablized	Final	Note	25
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	-	-	-		
Temperature (degC)	-	-	-		
Visual/olfactory observerserverserverserverserverserverserverserverserverserverserverserverserverserverserverse		nent			
Type of decontamination			n methyl dec	on interface probe	
Number of washes:	· ·	1	p meany, acc	Number of rinses:	
ivuilibel UI Wasiles.		<u> </u>		INGITIDEL OF HIISES:	

		U	<b>Nells Sampl</b>	0 0	
Site Name:	FOX5		_	Landfill Name:	
Monitoring Well ID:	MW-13		_		Main
Sample Number(s) inclu	-	-			
Bottles filled (by parame	eter type)	Partial			
Date of Sampling Event:	<u>-</u>	6	August	2016	Time: 13:45
Weather	Sunny, +20				
Names of Samplers	JB				
Description of well cond	lition and surrou	ınding ground co	onditions (no	te ponding of water):	
Good, dry ground, some	ponding water	in casing.			
Lock (condition, present	ce, model, manu	ifacturer):	Changed lo	ck to crown	
Pre-Measured Data (fro	ım water well re	ecord log)			
Depth of well installatio		-	Diameter o	of well (cm):	4.4
Depth to top of screen (	- ·	_	-	creened section (cm):	
bepth to top of screen (	-		_ Length of 3	creened section (em).	
Field Measurements					
Measurement method (	interface probe,	, tape, etc):	Interface P	robe	
Well pipe height above	ground (cm) (to	top of pipe):			
Static water level (cm) f	rom top of pipe:				151.
					·
Static water level (cm) (	below ground รเ	irface) calculated	d:		
Static water level (cm) ( Measured well refusal d	_	•		p of pipe):	16
	lepth (cm) (meas	•	oling from to	op of pipe): me of water in well (mL)	
Measured well refusal d Thickness of water colu Free product thickness ( Purge Information Sum	lepth (cm) (meas mn (cm): (mm):	sured after samp - -	oling from to Static Volu Evidence o	me of water in well (mL) f Sludge or siltation:	
Measured well refusal description of the color of the col	mn (cm) (measemn (cm): mm): mary ment, sampling	sured after samp technique and e	oling from to Static Volu Evidence o	me of water in well (mL) f Sludge or siltation:	: -
Measured well refusal de l'hickness of water coluitree product thickness (  Purge Information Sum Purging/sampling equip -  Well purged (Y/N):  Volume Purged (L) (note	lepth (cm) (measimn (cm):  mm):  mary ment, sampling	sured after samp technique and e - ng events):	oling from to Static Volu Evidence of quipment ca	me of water in well (mL) f Sludge or siltation: alibration information: Recharge Rate:	- No
Measured well refusal description of the product thickness of water column of the product thickness (Purge Information Sum Purging/sampling equip	lepth (cm) (measimn (cm): mm): mary ment, sampling	sured after samp technique and e - ng events): Stablized	oling from to Static Volut Evidence o  quipment ca	me of water in well (mL) f Sludge or siltation:	No
Measured well refusal de Thickness of water coluit Free product thickness (  Purge Information Sum Purging/sampling equip	lepth (cm) (measimn (cm): mm (cm): mary ment, sampling the multiple purgin Initial 6.85	sured after samp technique and e - ng events): Stablized 6.74	Static Volument control of the	me of water in well (mL) f Sludge or siltation: alibration information: Recharge Rate:	- No
Measured well refusal description of the column of the col	mn (cm) (measumn (cm): mm): mary ment, sampling e multiple purgin  Initial 6.85 0.026	technique and e  - ng events):  Stablized 6.74 0.025	Static Volument carrier Final	me of water in well (mL) f Sludge or siltation: alibration information: Recharge Rate:	- No
Measured well refusal de Thickness of water coluit Free product thickness (Purge Information Sum Purging/sampling equip	lepth (cm) (measimn (cm): mm (cm): mary ment, sampling the multiple purgin Initial 6.85	sured after samp technique and e - ng events): Stablized 6.74	Static Volument carrier Final	me of water in well (mL) f Sludge or siltation: alibration information: Recharge Rate:	- No
Measured well refusal description of the color of the col	lepth (cm) (measure (cm): mm (cm): mmm): mary ment, sampling e multiple purgin  Initial 6.85 0.026 28.8 14.29  ations: r mpling equipme	sured after samp  -  technique and e  - ng events):  Stablized 6.74 0.025 7.8 10.99	Static Volument carrier Final	me of water in well (mL) f Sludge or siltation: alibration information: Recharge Rate: Note	- No

	An	nex J: Monitoring	Wells Sampl	ing Log	
Site Name:	FOX5			Landfill Name:	
Monitoring Well ID:	MW-14				Main
Sample Number(s) inclu	ıde dups.:				
Bottles filled (by param	eter type)	No			<u></u>
Date of Sampling Event	:		6 August	2016	Time: 15:30
Weather	Sunny, +20				<u></u>
Names of Samplers	JB				<u></u>
Description of well con-	dition and sur	rounding ground	conditions (no	te ponding of water):	
Good, dry ground.					
Lock (condition, presen	ce, model, ma	anufacturer):	Added new	lock (crown)	
Pre-Measured Data (fro	om water wel	l record log)			
Depth of well installation	on (cm):	-	Diameter o	f well (cm):	4.4
Depth to top of screen	(cm):	-	 Length of s	creened section (cm):	-
•		-	_	, ,	
Field Measurements					
Measurement method	(interface pro	be, tape, etc):	Interface P	robe	
Well pipe height above	ground (cm) (	to top of pipe):			46
Static water level (cm)	rom top of pi	pe:			-
Static water level (cm)	_	<u>=</u>			<u>-</u>
Measured well refusal of	depth (cm) (m	easured after san		p of pipe): 154 dry (ice	
Thickness of water colu	mn (cm):	-	Static Volui	me of water in well (mL)	: <u>-</u>
Free product thickness	(mm):		Evidence o	f Sludge or siltation:	No
Purge Information Sum Purging/sampling equip -	•	ng technique and	equipment ca	llibration information:	
Well purged (Y/N):		-		Recharge Rate:	-
Volume Purged (L) (not	e multiple pur	ging events):	-	<u> </u>	
		_			
Parameter	Initial	Stablized	Final	Not	es
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	-	-	-		
Temperature (degC)	-	-	-		
Visual/olfactory observ Slightly cloudy, no odou					
Decontamination of sa	mpling equip	ment			
Type of decontamination	on fluid(s):				
Number of washes:	-	-		Number of rinses:	
Other relevant comme	nts:	Dry well.			_
Street relevant comme		Dry WCII.			

	Ailica	J: Monitoring W	ens sampling	_og	
Site Name:	FOX5			Landfill Name:	Non
Monitoring Well ID:	MW-15				Hazardous
Sample Number(s) inclu	ide dups.:	-			
Bottles filled (by parame	eter type) <u>/</u>	All			_
Date of Sampling Event:	: <u> </u>	6 <i>A</i>	August	2016	Time: 11:50
Weather	Sunny, +20				<u> </u>
Names of Samplers	JB				_
Description of well cond			ditions (note p	onding of water):	
Well in good condition,					
Lock (condition, present	ce, model, manuf	facturer): <u>(</u>	Good condition	1	
Pre-Measured Data (fro	om water well red	cord log)			
Depth of well installatio			Diameter of we	ell (cm):	4.4
Depth to top of screen (				ned section (cm):	
septification of selecting	_		zengan or seree	inca section (citi).	
Field Measurements					
Measurement method (	interface probe,	tape, etc): <u> </u>	nterface Probe	1	_
Well pipe height above	ground (cm) (to t	op of pipe):			5
Static water level (cm) f	rom top of pipe:				128.3
Static water level (cm) (	below ground sur	rface) calculated:			78.3
, , ,	•				
Measured well refusal d	-	ured after sampli	ng from top of	pipe):	223
	lepth (cm) (meas	•	•	pipe): of water in well (mL):	
Measured well refusal d	depth (cm) (meas mn (cm): (mm):	94.7	Static Volume	• • •	1440 No
Measured well refusal of the column of the c	depth (cm) (measomn (cm): (mm):  mary ment, sampling t	94.7 S - E echnique and equ	Static Volume of Slu	of water in well (mL): dge or siltation:	1440
Measured well refusal of Thickness of water columnia product thickness (Purge Information Sum Purging/sampling equipated (Y/N):	depth (cm) (measomn (cm): (mm):  mary ment, sampling t	94.7 S - E echnique and equ	Static Volume of Sluuipment calibration	of water in well (mL): dge or siltation: ation information: Recharge Rate: Notes	1440 No
Measured well refusal of Thickness of water columneree product thickness (Purge Information Sum Purging/sampling equip	lepth (cm) (measomn (cm): (mm): mary ment, sampling t e multiple purging Initial 7.98	94.7 Second equal	Static Volume of Sluuipment calibration	of water in well (mL): dge or siltation: ation information: Recharge Rate: Notes	
Measured well refusal of Thickness of water columneree product thickness (Purge Information Sum Purging/sampling equipation)  Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	depth (cm) (measomn (cm): (mm):  mary ment, sampling t e multiple purging	94.7 Second equal	Static Volume of Sluuipment calibration	of water in well (mL): dge or siltation: ation information:  Recharge Rate: Notes 7.35	
Measured well refusal of Thickness of water columneree product thickness (Purge Information Sum Purging/sampling equip	lepth (cm) (measomn (cm): (mm): mary ment, sampling t e multiple purging Initial 7.98 0.036	94.7 Second equal	Static Volume of Sluuipment calibration Final 7.69	Motes  Notes  7.35  0.022	
Measured well refusal of Thickness of water columneree product thickness (Purge Information Sum Purging/sampling equipation)  Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	mary ment, sampling t multiple purging Initial 7.98 0.036	echnique and equestrates and equestrates are secured as a secure and equestrates are secured as a secure are secure as a secure are secured as a secur	Static Volume of Sluuipment calibrations  Final  7.69	Motes  Notes  7.35  0.022	
Measured well refusal of Thickness of water columneree product thickness (Purge Information Sumpurging/sampling equipation)  Well purged (Y/N): Volume Purged (L) (note the phase of the ph	lepth (cm) (measomn (cm): (mm): (mm): mary ment, sampling t e multiple purging Initial 7.98 0.036 0 10.45 eations:	94.7 Second equal	Final 7.69 0.028	Recharge Rate:  Notes  7.35  0.027	

	Anne	x J: Monitoring \	<b>Nells Sampl</b>	ing Log	
Site Name:	FOX5		_	Landfill Name:	Non
Monitoring Well ID:	MW-16		_		Hazardous
Sample Number(s) inclu	de dups.:	-			
Bottles filled (by parame	eter type)	All			
Date of Sampling Event		6	August	2016	Time: 12:15
Weather	Light breeze, +2	.0			<u></u>
Names of Samplers	JB				
Description of well cond	dition and surrou	ınding ground co	nditions (no	te ponding of water):	_
Dry ground with loose b	olders, ponded	water in casing.			
Lock (condition, presen	ce, model, manu	ıfacturer):	No lock, pla	aced a new lock	
Pre-Measured Data (fro	om water well re	ecord log)			
Depth of well installation		-	Diameter o	f well (cm):	4.4
Depth to top of screen (	· · · · · · · · · · · · · · · · · · ·	_		creened section (cm):	
Depth to top of screen			_ Length of 3	erectica section (em).	
Field Measurements					
Measurement method	interface probe	tane etc).	Interface P	rohe	
Well pipe height above	•	•	miterrace r		<del>-</del>
Static water level (cm) f					131.5
Static water level (cm) (			٠.		155.4
Measured well refusal of	_			n of nine).	155.4
Thickness of water colu		•	_	me of water in well (mL):	
Free product thickness			_	f Sludge or siltation:	
Purge Information Sum Purging/sampling equip -	•	technique and e	quipment ca	libration information:	
Well purged (Y/N):		-		Recharge Rate:	250ml / 5min
Volume Purged (L) (note	e multinle nurgir	ng events).		Recharge nate.	23011117 3111111
volume rangea (2) (not	e manipie pargii	is events).			
Parameter	Initial	Stablized	Final	Note	es
рН	6.58	6.57	-		
Conductivity (mS/cm)	0.077	0.076	-		
Turbidity (NTU)	0	0	-		
Temperature (degC)	12.34	10.58	-		
Visual/olfactory observe					
Decontamination of sai			_		
Type of decontamination	•	Interface decon,	soap and w		
Number of washes:	1			Number of rinses:	1
Other relevant commer	nts:				

Site Name: FOX5   Landfill Name: Non Monitoring Well ID: MW-17   MW-17
Sample Number(s) include dups.:  Bottles filled (by parameter type) All  Date of Sampling Event:  Weather Sunny, +20  Names of Samplers JB  Description of well condition and surrounding ground conditions (note ponding of water): Good condition, dry ground.  Lock (condition, presence, model, manufacturer):  In good condition  Pre-Measured Data (from water well record log)  Depth of well installation (cm): Depth to top of screen (cm):  - Diameter of well (cm): Length of screened section (cm): -  Field Measurements  Measurement method (interface probe, tape, etc): Mel pipe height above ground (cm) (to top of pipe): Static water level (cm) from top of pipe: Static water level (cm) (below ground surface) calculated: Measured well refusal depth (cm) (measured after sampling from top of pipe): Thickness of water column (cm): 14 Static Volume of water in well (mL): Free product thickness (mm):  - Purge Information Summary
Bottles filled (by parameter type) Date of Sampling Event:  Weather Sunny, +20  Names of Samplers Description of well condition and surrounding ground conditions (note ponding of water): Good condition, dry ground. Lock (condition, presence, model, manufacturer): Depth of well installation (cm): Depth to top of screen (cm):  Diameter of well (cm): Depth to top of screen (cm):  Diameter of well (cm): Depth deasurements Measurement method (interface probe, tape, etc): Measurement method (interface probe): Static water level (cm) from top of pipe: Static water level (cm) (below ground surface) calculated: Measured well refusal depth (cm) (measured after sampling from top of pipe): Thickness of water column (cm):  14 Static Volume of water in well (mL): Free product thickness (mm):  Purge Information Summary
Date of Sampling Event:  Weather  Sunny, +20  Names of Samplers  Description of well condition and surrounding ground conditions (note ponding of water):  Good condition, dry ground.  Lock (condition, presence, model, manufacturer):  Depth of well installation (cm):  Depth to top of screen (cm):  Depth to top of screen (cm):  Depth deasurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  Purge Information Summary  A Static Volume of Sludge or siltation:  - Sunny, +20  Time: 13:0  Ti
Names of Samplers  JB  Description of well condition and surrounding ground conditions (note ponding of water):  Good condition, dry ground.  Lock (condition, presence, model, manufacturer):  In good condition  Pre-Measured Data (from water well record log)  Depth of well installation (cm):  Depth to top of screen (cm):  Depth to top of screen (cm):  Field Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  Purge Information Summary
Names of Samplers JB Description of well condition and surrounding ground conditions (note ponding of water): Good condition, dry ground. Lock (condition, presence, model, manufacturer): In good condition  Pre-Measured Data (from water well record log) Depth of well installation (cm): - Diameter of well (cm): Depth to top of screen (cm): - Length of screened section (cm): -  Field Measurements  Measurement method (interface probe, tape, etc): Interface Probe  Well pipe height above ground (cm) (to top of pipe): Static water level (cm) from top of pipe: Static water level (cm) (below ground surface) calculated: Measured well refusal depth (cm) (measured after sampling from top of pipe): Thickness of water column (cm): 14 Static Volume of water in well (mL): Free product thickness (mm): - Evidence of Sludge or siltation: -
Description of well condition and surrounding ground conditions (note ponding of water):  Good condition, dry ground.  Lock (condition, presence, model, manufacturer):  Pre-Measured Data (from water well record log)  Depth of well installation (cm):  Depth to top of screen (cm):  Depth to top of screen (cm):  Field Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  - Evidence of Sludge or siltation:  Purge Information Summary
Good condition, dry ground.  Lock (condition, presence, model, manufacturer): In good condition  Pre-Measured Data (from water well record log)  Depth of well installation (cm): - Diameter of well (cm): - Length of screened section (cm): -  Field Measurements  Measurement method (interface probe, tape, etc): Interface Probe  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm): 14 Static Volume of water in well (mL):  Free product thickness (mm): - Evidence of Sludge or siltation: -
Lock (condition, presence, model, manufacturer):  Pre-Measured Data (from water well record log)  Depth of well installation (cm):  Depth to top of screen (cm):  Depth to top of screen (cm):  Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  Purge Information Summary
Pre-Measured Data (from water well record log)  Depth of well installation (cm): - Diameter of well (cm): - Length of screened section (cm): -    Field Measurements  Measurement method (interface probe, tape, etc): Interface Probe  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm): 14 Static Volume of water in well (mL):  Free product thickness (mm): - Evidence of Sludge or siltation: -
Depth of well installation (cm):  Depth to top of screen (cm):  Field Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  Purge Information Summary
Depth of well installation (cm):  Depth to top of screen (cm):  Field Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  Free product thickness (mm):  Diameter of well (cm):  Length of screened section (cm):  Interface Probe  Interface Probe  Static Probe  Static Probe  Static Volume of pipe):  Evidence of Sludge or siltation:  Purge Information Summary
Depth to top of screen (cm):  - Length of screened section (cm):  - Field Measurements  Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  - Evidence of Sludge or siltation:  Purge Information Summary
Field Measurements  Measurement method (interface probe, tape, etc): Interface Probe  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm): 14 Static Volume of water in well (mL):  Free product thickness (mm): - Evidence of Sludge or siltation: -
Measurement method (interface probe, tape, etc):  Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  Purge Information Summary
Well pipe height above ground (cm) (to top of pipe):  Static water level (cm) from top of pipe:  Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  - Evidence of Sludge or siltation:  Purge Information Summary
Static water level (cm) from top of pipe: Static water level (cm) (below ground surface) calculated: Measured well refusal depth (cm) (measured after sampling from top of pipe): Thickness of water column (cm):  14 Static Volume of water in well (mL): Free product thickness (mm):  - Evidence of Sludge or siltation: Purge Information Summary
Static water level (cm) (below ground surface) calculated:  Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Free product thickness (mm):  - Evidence of Sludge or siltation:  Purge Information Summary
Measured well refusal depth (cm) (measured after sampling from top of pipe):  Thickness of water column (cm):  14 Static Volume of water in well (mL):  Eree product thickness (mm):  - Evidence of Sludge or siltation:  Purge Information Summary
Thickness of water column (cm):  14 Static Volume of water in well (mL):  Evidence of Sludge or siltation:  Purge Information Summary
Free product thickness (mm):  - Evidence of Sludge or siltation: Purge Information Summary
Purge Information Summary
-
Well purged (Y/N):  - Recharge Rate: Volume Purged (L) (note multiple purging events): -
Parameter Initial Stablized Final Notes
pH 6.83 6.58 -
Conductivity (mS/cm) 0.034 0.035 -
Turbidity (NTU) 0 0 -
Turbidity (NTU)       0       0       -         Temperature (degC)       12.96       12.9       -

	Anr	ex J: Monitoring	Wells Sampli	ing Log	
Site Name:	FOX5			Landfill Name:	Station Site
Monitoring Well ID:	MW-18				Area
Sample Number(s) inclu	ude dups.:	-			
Bottles filled (by param	eter type)		0		
Date of Sampling Event	:		6 August	2016	Time: 13:30
Weather	Sunny, +20				
Names of Samplers	JB				
Description of well con-	dition and surr	ounding ground o	conditions (no	te ponding of water):	
Good condition, dry gro	ound.				
Lock (condition, presen	ce, model, mai	nufacturer):	Changed lo	ck to crown	
Pre-Measured Data (fro	om water well	record log)			
Depth of well installation		-	Diameter o	f well (cm):	4.4
Depth to top of screen		_		creened section (cm):	-
	()-				
Field Measurements					
Measurement method	(interface prob	e, tape, etc):	Interface Pi	robe	
Well pipe height above	ground (cm) (t	o top of pipe):			34
Static water level (cm)	from top of pip	e:			-
Static water level (cm)	(below ground	surface) calculat	ed:		-
Measured well refusal of	depth (cm) (me	asured after sam	pling from to	p of pipe): 15	64.5 ice / dry well
Thickness of water colu	ımn (cm):	_	Static Volur	me of water in well (mL)	: -
Free product thickness	(mm):	-	Evidence of	Sludge or siltation:	No
Purge Information Sum Purging/sampling equip	-	g technique and	equipment ca	libration information:	
Well purged (Y/N):		_		Recharge Rate:	-
Volume Purged (L) (not	e multiple pur	ging events):	-		
Parameter	Initial	Stablized	Final	Note	es
рН	-	-	-		
Conductivity (mS/cm)	-	-	-		
Turbidity (NTU)	-	-	-		
Temperature (degC)	-	-	-		
Visual/olfactory observ					
Decontamination of sa		nent			
Type of decontamination	on fluid(s):	-		NI with Con-	
Number of washes:				Number of rinses:	
Other relevant comme	nts:	Dry, moisture	at bottom of v	vell.	

	Annex	k J: Monitoring V	Vells Sampling	Log	
Site Name:	FOX5			Landfill Name:	Non
Monitoring Well ID:	MW-19				Hazardous
Sample Number(s) inclu	· -	-			
Bottles filled (by parame	eter type)	Partial, no PCB			_
Date of Sampling Event:	: _	6	August	2016	Time: 14:30
Weather	Sunny, +20				_
Names of Samplers	JB				_
Description of well cond	dition and surrou	nding ground co	nditions (note	ponding of water):	
Good condition, dry gro	und.				
Lock (condition, presen	ce, model, manu	facturer):	Good		
Pre-Measured Data (fro	om water well re	cord log)			
Depth of well installatio		-	Diameter of v	vell (cm):	4.4
Depth to top of screen (	- · · · · · · - · ·	-		ened section (cm):	
zepin to top or soreen (	_			ienea section (em).	
Field Measurements					
Measurement method (	(interface probe,	tape, etc):	Interface Prob	oe .	_
Well pipe height above	ground (cm) (to	top of pipe):			34
Static water level (cm) f	rom top of pipe:				152.5
Static water level (cm) (	below ground su	ırface) calculated	l:		118.5
Measured well refusal o	lepth (cm) (meas	sured after samn	ling from ton	£!	161
		dica ditei samp	iilig iroiii top t	or pipe):	102
Thickness of water colu	• • •	•		of water in well (mL):	
Thickness of water colu Free product thickness ( Purge Information Sum	mn (cm): (mm):	•	Static Volume		162 144 No
Free product thickness	mn (cm): (mm):  mary ment, sampling	9.5 - technique and ed	Static Volume Evidence of Sl	of water in well (mL): udge or siltation:	144
Free product thickness ( Purge Information Sum Purging/sampling equip - Well purged (Y/N):	mn (cm): (mm):  mary ment, sampling to the control of the control	9.5  technique and ed  g events):	Static Volume Evidence of Sl	of water in well (mL): udge or siltation: ration information:	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	mn (cm): (mm):  mary ment, sampling e multiple purgin  Initial 6.81	9.5  technique and ed  g events):  Stablized 6.99	Static Volume Evidence of Sl quipment calib	of water in well (mL): udge or siltation: ration information: Recharge Rate: Notes	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	mn (cm): (mm):  mary ment, sampling to the control of the control	9.5  technique and ed  g events):	Static Volume Evidence of Sl quipment calib	of water in well (mL): udge or siltation: ration information: Recharge Rate: Notes	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note	mn (cm): (mm):  mary ment, sampling e multiple purgin  Initial 6.81	9.5  technique and ed  g events):  Stablized 6.99	Static Volume Evidence of Sl quipment calib  - Final 0.03	of water in well (mL): udge or siltation: ration information: Recharge Rate: Notes	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm)	mn (cm): (mm): mary ment, sampling to the control of the control o	9.5  technique and ed  g events):  Stablized  6.99  0.033	Static Volume Evidence of Sl quipment calib  - Final 0.03	of water in well (mL): udge or siltation: ration information: Recharge Rate:	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observa	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	9.5  technique and ed  g events):  Stablized  6.99  0.033  0  10.11	Static Volume Evidence of Sl quipment calib  - Final 0.03	of water in well (mL): udge or siltation: ration information: Recharge Rate:	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC)  Visual/olfactory observations Clear, no odour  Decontamination of sai	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	9.5  technique and ed  g events):  Stablized  6.99  0.033  0  10.11	Static Volume Evidence of Sl quipment calib  - Final 0.03	of water in well (mL): udge or siltation: ration information: Recharge Rate:	144 No
Purge Information Sum Purging/sampling equip - Well purged (Y/N): Volume Purged (L) (note Parameter pH Conductivity (mS/cm) Turbidity (NTU) Temperature (degC) Visual/olfactory observa	mn (cm): (mm): mary ment, sampling to the multiple purging to the multiple pur	9.5  technique and ed  g events):  Stablized  6.99  0.033  0  10.11	Static Volume Evidence of Sl quipment calib  - Final 0.03	of water in well (mL): udge or siltation: ration information: Recharge Rate:	144 No

Inspection Name: DAPUN TO WIGO Inspection Date: AUV. 77201 Inspection Signature / Prepared By: Thermistor Information ("Some Information can be pre-populated from thermistor logs)  It was a construct of the Name: Pox 5	ANNEX M: T	hermistor Inspe	ction Template	
Intermistor Information ("Some Information can be pre-populated from thermistor logs)  It Name:				7/2010
Thermistor Information (*Some Information can be pre-populated from thermistor logs)  Itile Name:			7.000	1
Landfill:   ANN LANDFILM				
Inclination: 3-60  Datalogger model not kennstall Date:  First Date Event  Coordinates and Elevation  N E Elev  Elev  Inclination: 3-60  Datalogger cable download model: 1,150  Install Date:  First Date Event  Coordinates and Elevation  N E Elev  Elev  Inclination: 3-60  Datalogger cable download model: 1,150  Inclination: 3-60  Data Date:  First Date Event  Last Date Event  Last Date Event  Last Date Event  Elev  Description  Casing  Cover  Data Logger  Cable  Data Logger  Data Logger  Cable  Data Logger  Data Logger  Data Logger  Cable  Data Logger  Data				
Datalogger cable download model: \( \int \)   Datalogger cable (with the control of the cable (with				
Install Date:    First Date Event   Last Date Event				
Coordinates and Elevation Inglified Cable (m) Cable Lead Above Ground (m) Cable Lead Above Ground (m) Catalogger Serial # 0202000 Nodal Points  Casing Cover Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Inglified Operature Readings  Gead Operature Readings  Bead Operature Readings  Bead Operature Readings  Inglified Operatu				
Cable Lead Above Ground (m)   Cable Lead Above Ground (m)   Atalogger Serial # D2020264   Nodal Points   Description				
Actalogger Serial # 02172124   Nodal Points   16   Needs Maintenance   Description    Casing				LICA
Casing Cover Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Degrees C  1.44   1.40    0.0005 -   0    0.968 0.87    0.968 - 2.6				
Casing Cover Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Degrees C  1.44   1.40    0.0005 -   0    0.968 0.87    0.968 - 2.6				
Casing Cover Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Ma				
Cover Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Mai			aintenance	Description
Data Logger Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Mai	•	_		
Cable Beads Lock condition Battery Installation Date Battery Levels  Main  Mai				
Beads Lock condition Battery Installation Date Battery Levels  Main  Mai			2.2	
Lock condition Battery Installation Date Battery Levels  Main  Mai		_		A.Que a / the
Battery Installation Date Battery Levels  Main			4.070	
Battery Levels   Main			out I faction	400
	•	Main 11 4	V	12 F.
	battery Levers	wain 11.5	4 Aux -	1-515 4
1.44	aal Ground Temperature Readings			
0.0005 -   0     0.80 - 4.0     0.70 - 5.0     0.	ad obms V Degrees C		Bead ohms	Degrees C
0.0005 -   0     0.80 - 4.9     0.78 - 5.9     0.78 - 5.9     0.78 - 5.9     0.78 - 5.9     0.78 - 5.9     0.78 - 5.9     0.70 - 1.8     0.86 - 1.8     0.86 - 2.6     15   17   17   19   0	1.44 16.6		9 0.82	-4.14
0.005 -/01  0.968 0.87  0.968 0.89  0.97 -0.86  0.86 -1.8  0.86 -2.6  0.87 -1.8  13 0.005 -10  14 10 -10  15 11 -10  16 11 -10  17 11 -10  18 11 -10  18 11 -10  19 11 -10  19 11 -10  10 1	0.0005 -101	1		
0.968 0.87  0.978 -5,  0.978 -5,  13 0.005 -10  15 17 -10  15 17 -10  16 11 -10  16 11 -10  17 11 -10  18 11 -10  18 11 -10  19 11 -10  19 11 -10  10 11 -		1	,	2.07
0.97 -0.86   13 0.005 -10   14				
D.86 -1.6  O.86 -2.6  D.67 -3.4   tery Information eries changed? ery model number installed: ected battery life (years):  Monitoring Year:	0.768 0.89		0.40	-5.5
O.86 -1.8  O.86 -2.6  D.67 -3.4   tery Information eries changed? ery model number installed: ected battery life (years):	0.97 -0.88		13 0.00	5 -/01
tery Information eries changed? ery model number installed: ected battery life (years):	0.88 -18		44.6	-/01
tery Information eries changed? Yes No Monitoring Year: ery model number installed: ected battery life (years):			//	10"
tery Information eries changed? Yes No Monitoring Year: ery model number installed: ected battery life (years):	4 /		11	=/0/
eries changed? Yes Monitoring Year: ery model number installed: ected battery life (years):  Monitoring Year:	0.89 -3,9		16 11	101
eries changed? Yes Monitoring Year: ery model number installed: ected battery life (years):  Monitoring Year:	. Information			
ery model number installed:  acted battery life (years):		No L	Monitoring Voor	
ected battery life (years):		LBIX	-	
alogger Programming (Describe programming completed; beads and frequency)	gger Programming (Describe programm	ing completed; beac	s and frequency)	
(a)			47	
prystions and Proposed Maintenance				

Observations and Proposed Maintenance
- DATE 4 TIME 08/07/16 10:56 @ 11:45 AM
- REPROGRAMMED TO 24 HA CAMPUNE

	ANN			tor insp	ection Ten	nplate	
Inspector Name:	DARRIN	JOHNSON	J		nspection Dat	e: AU 6. =	-/201b
Inspector Signature	/ Prepared By:	2-9					1
Thermistor Informa	ation (*Some Ir	formation car	be pre	-populated	from thermis	tor logs)	
Site Name: Fox-		120	Landfil				
Thermistor Number:			Inclina	7 . 7			
Datalogger model no	THE RESERVE THE PARTY OF THE PA				download mo	del: 115B	والمرابع المرابعة المستوا
*Install Date:				ate Event		Last Date Eve	ent
*Coordinates and Ele	evation	N		Е		Ele	
Length of Cable (m)		Cable	Lead A	bove Grou	ind (m) 3 m		
Datalogger Serial #	0202027	8 Noda	Points	16			
Thermistor Inspect	<u>on</u>						
		Good			Maintenance	De	scription
Casing							
Cover							
Data Logg	er						
Cable			A.				
Beads				1	BOA05	12-16	bAMAG DO
Lock condi	tion					2 REPLACE	M
Battery Ins	tallation Date			_		a 1- 01 001 C	. D
Battery Lev		7	Main	11 -	3 4	4 1."	3167
Datiery Lev	-010	1	VICALII I		2 7	_Aux _/	3107
Manual Ground Tem		lings Degrees C			Bead	ohms V	D
/ '3	2 1/	4,500				ODIAS C	Degrees C
	7/	13.14			9	0.73	-3.9
1.	21	7.01			10	0,81	-4.5
3	15	3.6			11	2.30	-52
3 1.1		07				11111	-5,6
25	95	0.3			12	0.0	
5 0.	91 -	0.82			1.3	a	
	18 -	-10			15.4		
		7. 0			14		
Ch	6 -	-Z.7			15	0	
8.0	4 -	3,35			16	0	
						<u> </u>	
attery Information atteries changed ? attery model number spected battery life (y			No ACE		Monitoring Y	ear:	
ANY AS 614	ing (Describe	programmin To	g com	ZY H	ds and frequ	ency) MPLIN B	
DATE Trans		1ance 07//					

ANNEX	M: Thern	nistor Inspec	tion Temn	ilate	
Inspector Name: Value To	HWION		pection Date:		2.16
Inspector Signature / Prepared By:	VIII V	Ins	pection Date:	40.01	2016
Inspector digristare? Prepared by.	-				
Thermistor Information (*Some Inform	ation can be	pre-populated fro	om thermistor	logs)	
Site Name: FOY-5		dfill: MAIN		-	
Thermistor Number: 173	inc	ination:	100		
Datalogger model no: PX-	Dat	alogger cable do	wnload mode	: UGR	JEIENS UP N
*Install Date:		t Date Event		Last Date Eve	nt
*Coordinates and Elevation	N	E		Ele	v
Length of Cable (m) ( , 6)	Cable Lea	d Above Ground	(m) 3m		
Datalogger Serial # 02020255	Nodal Poi	nts /6			
Thermistor Inspection	Good	Needs Ma	intenance	Des	cription
Casing	Ø				oription
Cover					·
Data Logger	10/	, –			
Cable					<del></del>
Beads			04/40	. 100 sa 0.6	NAIC CARE
Lock condition	_	, D	12540 17	ON CONTRACT	rew
1			47 4	MALACE	<u>v</u>
Battery Installation Date					
Battery Levels	Main	11.39	/	Aux	80
Manual Ground Temperature Readings				, ,	
Bead ohme Deg	rees C	[	Bead	ohms V	Degrees C
1 1.44 16.	71		O	0.91	-11
2 1.38 14.	V9	ŀ	14	1000	-7.1
- 11	,5	}	10	0.48	-2,0
3 1.44 16.6			Щ	0.86	- 2.9
4 1.50 18.	+	1	12	1.84	- 3,6
5 1.44 16.	7	L	13	0.82	-4.2
6 1.22 8.9			14	O. SA	-4.7
7 1.06 4.1		- 1	15	C 29	LI a
	2		! >	0, 7/	77.7
8 0.95 0.1		Ĺ	1 4	0.1117	- Y5,1
Battery Information Batteries changed ? Yes Battery model number installed: Expected battery life (years):	- 1010 NO	N N	fonitoring Yea	r:	

Datalogger Programming (Describe programming completed; beads and frequency)

Observations and Proposed Maintenance

- REPROGRAMMY TO 24HR SARPLING

ANNEX N	/: The	ermistor Ins	spectio	on Temp	late	1
Inspector Name: DAWW		7	Inspe	ction Date:	Aub 7	12016
Inspector Signature / Prepared By:	-6	w			-10-12	1
Thermistor Information (*Some Informa	tion car		ted from	thermistor	logs)	
Site Name: Fox-5	7	Landfill: ^	<b>VAIN</b>	LF.		
Thermistor Number: VT-4		Inclination:	630		4	
Datalogger model no: RY-	i i	Datalogger cal		load mode	LUES I	No.
*Install Date:		First Date Ever	nt		Last Date Eve	ent
*Coordinates and Elevation	N		E		Ele	V
Length of Cable (m)		Lead Aboye G	round (n	1)		
Datalogger Serial # り 2 う20 ~ 6 ら	Nodal	Points (b				
Thermistor Inspection	Good	Non	al- B <i>d</i> -5-4			
Casing	_	Need	ds Maint	enance	De	scription
Cover		_			·	
Data Logger					_	
Cable						
Beads				MANS	3.14-	4 BAMAGU
Lock condition	1			4.5	CHAN	6154
Battery Installation Date				- 60		QU II
Battery Levels	-	Main I	1 24			13
Dationy Lovello			1.7-		\ux	1.63
Manual Ground Temperature Readings						
Bead ohms Degre	ees C			Bead	ohms-V	Degrees C
1 1.42 15.8	312			9	0.87	-2,45
1			<u> </u>			- 6, 1)
	7'			0	0.73	-7.02
3 6 -	-		1 1	)	0,84	-3.5
4 1.31 12.2	25			2	0.81	11.
(10)			_	2	U. 01	-4.5
5 1.18 8.				3	0.78	-5.3
6 1.02 2.8	36		75	/	0	
9 0.93 -0.	25		-			
	_		13		0	
8 0.90 -1.3	2		- 176	2	0	
tattery Information atteries changed ? Yes attery model number installed: expected battery life (years):		No 11915		itoring Yea		
atalogger Programming (Describe programming)	ammin ()	a completed: I	N SA	MPLIM	<u>cv)</u>	
bservations and Proposed Maintenance  bary 0 \$ / 0;  7 / M.S. N:0	7/1	b @ 1:	05			

ANNEX			r Inspe	ction Tem	plate ,	
Inspector Name: DARNIN TO	HNJOI	V	In	spection Date	: A16, 11	2016
Inspector Signature / Prepared By:	-0	han			1	- 0,0
Thermistor Information (*Some Information	ation car	be pre-p	opulated	from thermisto	r logs)	
Site Name: Fox-5		Landfill:	MA	W LF		
Thermistor Number: VI-5	71	Inclinatio				
Datalogger model no: (LV-1)				download mode	el·	make to the same
*Install Date:		First Date		TOWN THOUSE	Last Date Eve	and
*Coordinates and Elevation	N		E		Ele	
Length of Cable (m) 5	Cable	Lead Abo	ove Groun	nd (m) -3		
Datalogger Serial # 02020252		Points	16			
Thermistor Inspection						
	Good		Needs N	/laintenance	Des	cription
Casing						
Cover						
Data Logger						
Cable						
Beads			_	BEXAUS	1-3.12-	6 DAMABER
Lock condition					<del>/ - / / /</del>	
	,	Ш		CM /	IND CHA	NOCO
Battery Installation Date	-					
Battery Levels		Vlain	- 11.	34	Aux	3,75
Manual Ground Temperature Readings	-W					
Bead ohms√ Degi	rees C			Bead	ohms	Degrees C
1 0 -				2	a 62	2 T
	_			7	0.03	-),4
~ 0 -				Jo	0.80	-47
7 0 -	~ 7			11	0.78	-43
	=			//		
4 1.02 2.5	2			12	0.0	-
5 0.93 -0.3	3			13	0	-
	7			<del></del>		
6 0.90 -1.	_			[7]	U	
7 0.87 -2.	3			15	0	
0.95 -2	8			11	0	
0.143				4		
attery Information atteries changed ? Yes		No F	$\prec$	Monitoring Ye	ar:	
attery model number installed: opected battery life (years):	7	219				
atalogger Programming (Describe prog				ds and freque	ency	
- Karmele -	To	24	HRS			
pservations and Proposed Maintenance	<b>.</b>					
DATE 08/07	- /	(				
12.7	2	0	1.	7 - 000		

# GOLDER PROJECT #1530908 PHASE \$1000

ANNEA	M: Thermistor In	spection lemi	plate	
	MOINE	Inspection Date		2011
Inspector Signature / Prepared By:	An	inopositori Dato	7.0031 01	
Thermistor Information (*Some Information	ation can be pre-popul	ated from thermisto	r logs)	_
Site Name: COX	Landfill:	MIN LF		
Thermistor Number: V7-1		Ryodeacets	Inchine	
Datalogger model no:		ble download mode	el: USB	
*Install Date:	First Date Eve		Last Date Event	
*Coordinates and Elevation  Length of Cable (m)	N Coble Lead Abases	E	Elev	
Length of Cable (m) 4 m STRW(Datalogger Serial # 122 1/2 a 2 5 1			- CVAO	
Dataioggar Certai # 1720 700	Nodal Points   1/6	(II WORL	<u> </u>	
Thermistor Inspection	•		)	
	Good Ne	eds Maintenance	Descrip	otion
Casing				
Cover			11	
Data Logger			,	
Cable				
Beads		NO BORDE	2.12-16	NOT WORKIN
Lock condition		NO CMT 4	- RIPELACE	n)
Battery Installation Date		110	7-0-090	
Battery Levels	Main /	1.341/	Aux 3,	gari
<b>%</b>			1.00	110
Manual Ground Temperature Readings				
. /	rees C	Bead	ohms	Degrees C
L 0		e Deut	- 1A	. 1 1 4
7		168	0,80	-7.66
0 -			7 40	-5.36
104 2	17	10	<u> </u>	<u>→ → → → → → → → → → → → → → → → → → → </u>
3 1.05 31	13	11	0.78	-5,54
3 1.05 31 4 0.95 0.	13	10	0, 78	-5,54
y 0.95 0. 5 0.9 -0,	12 06 94	12	0.78	-5,54 ===================================
Y     0.95     0.       S     0.91     -0.       6     0.18     -2	13 96 94	14	0.78	-5,54 -
Y     0.95     0.       S     0.91     -0.       6     0.88     -2       7     0.85     -2	12 06 94 06 88	10 11 13 13 14 15	0.78	-5,54 
Y     0.95     0.       S     0.91     -0.       6     0.18     -2		14	0	-5,54 
Y     0.95     0.95       S     0.91     -0.95       6     0.88     -2       7     0.85     -7       8     0.83     -3.8		14	0	-5,54 
9 0.95 0. 5 0.91 -0. 6 0.88 -2 7 0.85 -2 8 0.83 -3. Battery Information	87	14 (8	0	-5,54 
Y     0.95     0.95       S     0.91     -0.95       6     0.88     -2       7     0.85     -7       8     0.83     -3.8		14	0	-5,54 
9 0.95 0. 5 0.91 -0. 6 0.88 -2 7 0.85 -2 0.83 -3.  3attery Information Batteries changed? Yes	87	14 (8	0	-5,54 
O.95 O.95 O.95 O.95 O.88 -2 O.85 O.83 O.83 O.83 O.83 O.83 O.83 O.83 O.83	No 12	Monitoring Ye	O O O oar:	-5,54 
O.95 O.95 O.95 O.85 O.85 O.85 O.83 O.83 O.83 O.83 O.83 O.83 O.83 O.83	No F	Monitoring Ye	O O O oar:	-5,54 
O.95 O.95 O.95 O.95 O.88 -2 O.85 O.83 O.83 O.83 O.83 O.83 O.83 O.83 O.83	No F	Monitoring Ye	oar:	-5,54 
O.95 O.95 O.95 O.85 O.85 O.85 O.83 O.83 O.83 O.83 O.83 O.83 O.83 O.83	No F	Monitoring Ye	O O O oar:	-5,54 
O.95 O.95 O.95 O.85 O.85 O.85 O.83 O.83 O.83 O.83 O.83 O.83 O.83 O.83	No F	Monitoring Ye	oar:	-5,54 

MANON 78° LOBERON RUPROGRAMMING

# GOLDER PROJECT #1530908 PHASE 2000

ANNEX M	l: Thermist	or Inspection	Template	1
Inspector Name: DALRIN JO	HUREN	Inspection	Date: Abbust 6	12016
Inspector Signature / Prepared By:	B			1 2/9
Thermistor Information (*Some Information	ion can be pre-	populated from the	rmistor logs)	
Site Name: COX	Landfill			
Thermistor Number: / [-]	Inclinati			
Datalogger model no: XX	Datalog	ger cable download	model: WB	
*Install Date:		te Event	Last Ďate Eve	ent
*Coordinates and Elevation	N	E	Ele	V
Length of Cable (m)		bove Ground (m)	3m	
Datalogger Serial # (2020257	Nodal Points	16 / 11 MD	HCING)	
Thermistor Inspection		C		
	Good /	Needs Maintena	nce Des	scription
Casing	T T			
Cover			2	
Data Logger				
Cable				
Beads		IN BU	CAOS 12-16	Plama6100
Lock condition		NO Chi	T & RIPLACE	p
Battery Installation Date				
Battery Levels	Main	- 11.3U V	Aux	2 301/
<b>%</b>		111111111111111111111111111111111111111	- 10/	<del>)                                    </del>
Manual Ground Temperature Readings		•		
Bead ohms Degre	ees C	Be	ad ohms	Degrees C
1 15 70	. [	4	0.80	-U0
1 173 9.	75	1.	0.00	710
3 1296 50	31	1.0	0.78	77
4 9.97 -1).	6 j	17	0.74	J.4
5 0.90 -11	1	17	0	
6 0,87 -2,	3	14	0	_
7 0.85 -3.2		15	0	
- 4.3	5	16	0	
Detter Information		4		
Battery Information Batteries changed ? Yes	No	Manita	ing Voor	
Battery model number installed:	NO	IVIOTILO	ring Year:	
Expected battery life (years):	7000	)		<del></del>
-			-	
Datalogger Programming (Describe programming)				
NOPRO (RAINIMO)	yo 2	-4 HR Su	smplinb	

Observations and Proposed Maintenance

DATY D8/06/16 TIME 15:45 @ 4:35Pm

# GOLDER PROJECT #1530908 PHASE 2000

ANNEX	1: Thermist	or Inspection Ten	nplate	
Inspector Name: DALKIN JOH		Inspection Dat		1016
Inspector Signature / Prepared By: Do	- Par			)
Thermistor Information (*Some Informa	tion can be pre-	populated from thermis	tor logs)	
Site Name: 100V~5	Landfill	MAIN LANDS	ill	
Thermistor Number 7-4	Inclinati	on: Ba		
Datalogger model no: Qv	Datalog	ger cable download mo	del: WIB	
*Install Date:		te Event	Last Date Eve	nt
*Coordinates and Elevation	N	Е	Ele	/
Length of Cable (m)		bove Ground (m)		
Datalogger Serial #	Nodal Points	16/10 WO	AKING)	
Thermistor Inspection				
Ocales	Good	Needs Maintenance	Des	cription
Casing				
Cover				
Data Logger				_
Cable			-	
Beads		IN BEAR	i 11-16.	DAMA600
Lock condition		ME CONT 4	RUPLACION	7
Battery Installation Date				
Battery Levels	Main	11.34	Aux	251/
fig.				<del>4 7 3 V</del>
Manual Ground Temperature Readings				
1 00 00	ees C	Bead	ohms	Degrees C
[ 1.3] [2,3		7	0.79	-5.27
1.08 4.6		10	0.78	-5.53
3 D.94 0.06		11	0	
7 0.91 -0.92	1	17	10	
5 0.8R -1.90		13	0	
b 0,86 -7.7	R	14	0	
7 12.83 -3.5	7	15	0	
B 0.80 -4.8	5	16	٥	
Battery Information	<del></del>			
Batteries changed ? Yes	No	Monitoring 1	Year:	
Battery model number installed:	ULRIT	- mornioring		
Expected battery life (years):	2019			
Datalogger Programming (Describe prog	ramming com	pleted; beads and freq	uency)	

**Observations and Proposed Maintenance** 

REPROGRAMMED TO 34 HR JAMPLING

ANNE	X M: The	<u>ermist</u>				late	27	
	BULL	2	1	nspection	Date:	A	7	12016
Inspector Signature / Prepared By:	1 Com	1	-5 f f	-			63	
Thermistor Information (*Some Infor	mation on	. h		frame Alexan		( ) \		
	mation car				mistor	logs)	_	
Site Name: Fox 5		Landfill: Inclination		110-				
Datalogger model no: 2			on: 《( ger cable		madal	. 4. 60	B. France	Spring and Street Commencer
Install Date:		First Dat		dowinoad		Last Dat		
Coordinates and Elevation	N	1 NOT DO	E			Last Dat	Elev	
ength of Cable (m) 8 4,4	Cable	Lead Ab	ove Grou		3		LIOT	
Datalogger Serial # 12020261		Points		10				
Thermistor Inspection	_							
0	Good			<u> Maintenar</u>	nce		Desc	cription
Casing	,	<b>D</b>						
Cover		Ø						
Data Logger		Ø						
Cable		Ø						
Beads				Dre 1	pad	ad	14.05	he of
Lock condition				Rep	lacer	ري	1 0	roun
Battery Installation Date	_							
Battery Levels (V)	1	<i>l</i> lain		34	A	ux	12	. 26
1 1.25 11 2 1 3 0.93 3	173			10		0.81		-4.6
4 9.43	0 3							
6 0.90 -	0.58							
6 0.86 -	1,43							
7 9.86 -	236							
. 1	0.22			<b>—</b> —				
8 9.84 -	3.13							
ttery Information teries changed ? Yes tery model number installed: pected battery life (years):		No [	X 15 1711	Monitorir	ng Year	: . =		
Programming (Describe pro	ogrammin 24	g comple	eted; bea	ds and fr	equen	CV)	_	
paralogy dell 37	ce lib	L 40	1	3/3/	16	13	: 12	,

Inspector Signature / Prepared B Thermistor Information (*Some Site Name:  Thermistor Number:  Datalogger model no:  Coordinates and Elevation	e Information can be				12016.
Site Name: L	La In			logs)	
Cite Name:	La In			logs)	
Datalogger model no:	ln.	nanıı; 🥻	4 . 6		
Datalogger model no: (C)		lination:	40		
instali Date:	ID:	talogger cable de		4.49	
		st Date Event		Last Date Ever	
	N N	F		Elev	
ength of Cable (m) 4, 4	Cable Le	ad Above Ground	d (m) 3		
atalogger Serial # 02-2-	230 Nodal Po		10	<del></del>	
hermistor Inspection	01			_	
Casing	Good		aintenance	Desi	cription
Cover				<del>"</del>	
Data Logger	Z G			·	
Cable					
Beads			#5 1.+ ·	مراعامون	and # 2
Lock condition			Replace	1 27.	power.
Battery Installation Date	e		Ŭ.		
Battery Levels	Mai	n 11,3	<u>4</u> A	ux 13	.380
2 3 1,23 4 1,18 5 6 0.95 7 0.90 8 -2.52	9,6 7,7 0.H' -1.5		10	0.33	-3.7
tery Information teries changed? Yetery model number installed: ected battery life (years): alogger Programming (Descri	y /19	ompleted; bead			

Inspector Name: Kevin Putter	<u> </u>	or Inspection Temp	Au 7/2016,
Inspector Signature / Prepared By:	ett	Inches of Park	0 7/ 601
Thermistor Information (*Some Information)			logs)
Site Name: Fox 5	Landfill:		
Thermistor Number: VT-II	Inclinati		
Datalogger model no: Rx	Datalog	ger cable download mode	The state of the s
*Install Date:		te Event	Last Date Event
*Coordinates and Elevation Length of Cable (m) 3 2	N IC-Notes de	E	Elev
Datalogger Serial # 0 2020 1 70	Nodal Points	pove Ground (m) 3	
Damoggo Cona # 5 20 20 1 00	I TOUGH FOIRIS		
Thermistor Inspection			
	Good	Needs Maintenance	Description
Casing	<b>Z</b>		
Cover	15		
Data Logger	<b>Z</b>		
Cable	Z		
Beads	.⊒		
Lock condition		- Replace	1 / 12:
Battery Installation Date	_	The section	sul crown
Battery Levels	Main	11 211	12
Dattery Levels	wain	11.34	lux 13.14
anual Ground Temperature Readings			
Bead ohnse V Degre	es C	Bead	obms U Degrees C
1 1.26 10.3	5	a	0.86 2.75
		1	W 0 W 15
1.0			
3 1.29 11.3	7	i	
4 1.25 10.1	6		
J (*17)	<u></u>		
6 0.96 0.	63		
7 .92 -0	12		
8 0.8+ -2.	3.		
0 0.07 -2.	4		
ittery Information			
tteries changed ? Yes	No. 1	V	
ttery model number installed:	No [	Monitoring Year	
pected battery life (years):	y19	OZM ·	
	7.1	V / / /	
	amming compl	eted: beads and frequen	cy)
talogger Programming (Describe progra			<del></del>
regrand to 24 hr	inter	4.	
	inter	4.	

datalosser clock: 08/07/16 11:54 et 08/07/16 12:57.

ANNEX N	l: The	rmistor Inspec	tion Template	
Inspector Name: Kovis	Jun.	Ins	spection Date: 4	7/2016
Inspector Signature / Prepared By:	-	25 74	The state of the s	0
		6		
Thermistor Information (*Some Information)			om thermistor logs)	
Site Name: YOX S		andfill: Midle		
Thermistor Number: VT- 2		nclination: ९0°		
Datalogger model no: R-		Datalogger cable do	wnload model: L.S.	R
*Install Date: Any 7 /2016		irst Date Event	Last Dat	
*Coordinates and Elevation	N	E		Elev
Length of Cable (m) 7	Nodal F	ead Above Ground	d (m) 3	
Datalogger Serial # 02020270	NOGAI P	oints		
Thermistor Inspection				
THEIRIBIOI INSPECTION	Good	Noode Me	aintenance	D
Casing	Z		airitenarice	Description
Cover	7			
<del></del>		_		
Data Logger	2	_		
Cable	Ø			
Beads				
Lock condition	ō		Replaced w/	Crown
Battery Installation Date = 201	6	123 07	M EXOUTTIN	( CYPIRM
Battery Levels	1.	ain _11.34	Aux	13.14
				.0
Manual Crawal Tampayatura Bandings				
Manual Ground Temperature Readings				
Bead ohms Degre	es C		Bead ohms	Degrees C
	$\neg$			
		Į.		
		}		
				i
		ſ		
	_	ŀ		
	_			
		ľ		
		_		
Battery Information				
Batteries changed? Yes		No No	/lonitoring Year:	2016
Battery model number installed:	acs	-12 /		
Expected battery life (years):	10	19 /7	-B YLDARLS	
	a1022	3 <b>7</b> ('		
Datalogger Programming (Describe progra			s and frequency)	
Programed to 4th	Lari	unte.		
Acad mice. Is holy	1410	A 4/(3 )		
24 hr				
Observations and Proposed Maintenance				
	21	2016.		
VI-12Peinstalled Am	5 1	Tolo.		
VT-1278 installed Am Dale/Time synced in	14	tu		
vale/ lime synted w.	The	comp		
/				

ANNEX J: Moi	nitoring Well S	ampling Log	(Complete All	Fields)
Site Name:			Middle	
Monitoring Well ID:	MW-5			
Sample Number(s) include dups		<u>—</u> Р		
Bottles filled (by parameter type)				
Date of Sampling Event:	Aug 7		Т	ime: 10:00
Weather:		twind For	,	
Names of Samplers:	JB	,		
Description of Well Condition and	d Surrounding grou	and conditions (no	ote ponding of water	er):
good, dry		****	, p	5
Lock (condition, presence, mode		-900 d-	changed to	crows
Pre-Measured Data (From Wate	er Well Becord I o		- Company	
*Depth of well installation (cm)=	. Well Recolu Eo	Diameter of we	(cm)=	
*Depth to top of screen (cm)=		_	d section (cm)=	
note: *depths are from ground surface			a section (cm)=	
Field Measurements				
Measurement method (interface բ	probe, tape, etc):			
Well pipe height above ground (cr		=	_ Slem	
Static water level (cm) from top of			147.5	
Static water level (cm) (below ground		ated =	205.5	<del></del> .
Measured well refusal depth (cm)	•		205 cm	<del></del>
Thickness of water column (cm)=	•	,	of water in well (ml	
Free product thickness (mm)=		-	of sludge or siltation	
Demain a laformation Comment		•	•	
Purging Information Summary* Purging/sampling equipment, sam	plina technique			
and equipment calibration informat				
Well purged (Y/N):		Recharge Rate	: 250m1/3m	12
Volume Purged (L) (note multiple				
purging events if applicable):				
Parameter	Initial	Stabilized	Final	Notes (If not
				stabilize(i)
pH  Conductivity (u-6/cm) m S	7.14	7.05	6.81	6.56
Turbidity (NTU)	.037	.038	.035	.035
Temperature (degC)	8.03	00	00	00
		6.69	6.26	5.38
Visual/olfactory observations (incl. opresence of free product/sheen/glol		1.	- 1	
siltation):	Jules,	clear, n	0 00000	
Decontamination of sampling equ	•	, ,	$\Gamma$	
Type of decontamination fluid (s):	SOAPLWATER	. decon ant	ertace	·
Number washes:			Number rinses	:
Other Relevant Comments:				
* Complete field notes including full suite of v should be apended to this summary.	vater quality indicator p	arameters VS time as	s per EPA low flow sam	pling procedures

ANNEX J: Mon	itoring Well Sa	ampling Log (	Complete All F	ields)
Site Name:		_Landfill Name:	Middle sit	
Monitoring Well ID:	nwb	_		2
Sample Number(s) include dups.				
Bottles filled (by parameter type):	Partial	<i></i>		
Date of Sampling Event:	SB Aug	. 7	Tim	ne: 11:30
Weather:	. /	ver, fog.		
Names of Samplers:	JB_			
Description of Well Condition and			ponding of water)	):
good dry ground	Loose bol	lders-		
Lock (condition, presence, model,	, manufacturer):	change to	to crown.	(broke)
Pre-Measured Data (From Water		7		
*Depth of well installation (cm)=	11011 110001	l) Diameter of well (	/om\=	
*Depth to top of screen (cm)=		Length screened	•	
note: *depths are from ground surface		Lengar corconou.	Section (onl)—	
Field Measurements				
Measurement method (interface pr	robe, tape, etc):	interface	anho	
Well pipe height above ground (cm			65cm	
Static water level (cm) from top of	1 1 1 7	•	191.5cm	_
Static water level (cm) (below ground		ated =	199.cm	_
Measured well refusal depth (cm) (		-	199cm	_
Thickness of water column (cm)=			water in well (mL)=	<del>-</del>
Free product thickness (mm)=	<del></del>		sludge or siltation	
		<del></del>	oldage t. t	
Purging Information Summary* Purging/sampling equipment, samp	-line technique			
and equipment calibration information				
Well purged (Y/N):	_	Pecharge Rate:	250ml /4mi	
Volume Purged (L) (note multiple		Recialge Nato.	250m L 14mi	2
purging events if applicable):				
Parameter	Inibal	No. of the last		Notes (# nat
transfer of the second		Stabilized	Final	stabiliz
pH	6.51			
Conductivity (#S/cm) MS	.043			
Turbidity (NTU)	00			
Temperature (degC)	8.83°C			
Visual/olfactory observations (incl. co	, ,			<del></del>
presence of free product/sheen/globs siltation):	ules,			
Shanonj.	-			
Decontamination of sampling equi			-	
Type of decontamination fluid (s):	30+p. water	decon intert	Cace	
Type of decontamination fluid (s):  Number washes:  Other Relevant Comments:			Number rinses:	/
Other Relevant Comments:	not richargina	. not able to	E.II all hat	11
* Complete field notes including full suite of washould be apended to this summary.	ater quality indicator par	rameters VS time as po	er EPA low flow sampli	ng procedures

	ANNEX J: Monit	toring Well \$	ampling Log (C	Complete All	Fields)
	Site Name:	Fox 5	Landfill Name:		•
	Monitoring Well ID:	MW-7			
	Sample Number(s) include dups.:	0			
	Bottles filled (by parameter type):	Ø			
	Date of Sampling Event:	Aug 7		Ti	me: /2:00
	Weather:	+5 Navi	nd cloudy		
	Names of Samplers:	73	/		
	Description of Well Condition and S	Surrounding gro	und conditions (note	ponding of water	r):
	- good, dry grow				
	Lock (condition, presence, model, r	manufacturer):	Needs to be a	langed (Cr.	own Lock)
	Pre-Measured Data (From Water )	Wall Record I		( )	1 stalled
	*Depth of well installation (cm)=	Well Kecold Fo	0,	\-	
	*Depth to top of screen (cm)=		_ Diameter of well (d	•	
	note: *depths are from ground surface		_Length screened s	section (cm)=	
	Field Measurements				
	Measurement method (interface pro	be, tape, etc):			
	Well pipe height above ground (cm)		=	71	
	Static water level (cm) from top of pi		-	70	
	Static water level (cm) (below ground	•	 lated =		_
	Measured well refusal depth (cm) (m	•		idland	<del>-</del> ,
	Thickness of water column (cm)=	104041 - 415-1	Static volume of v	IdlcM	dy
	Free product thickness (mm)=		_	water in weil (mL) sludge or siltation	·
	_		_ LVIGOTIOG O,	Sidage or Siliation	n:
	Purging Information Summary*				
	Purging/sampling equipment, sampling and equipment calibration information				
	Well purged (Y/N):		Panharan Data:		
	Volume Purged (L) (note multiple		Recharge Rate:		
	purging events if applicable):				
		1			Notes di noi
	Parameter.	initial	Stabilized	Final	stabilized)
	рН				
L	Conductivity (uS/cm)				
L	Turbidity (NTU)				
L	Temperature (degC)				
	/isual/olfactory observations (incl. cold				-
p	resence of free product/sheen/globule				
5	iltation):	_			
D	econtamination of sampling equip	ment			
			Lecan inter	1.	
	umber wash <b>es</b> :	1	THE THE	Number ringes:	4
0	ther Relevant Comments:	1 11	SAND OR end of	Number mises.	
	Her Relevant Comments.	17 Well	SAND OR end of	+ prope	
* C	Complete field notes including full suite of wate ould be apended to this summary.	er quality indicator pe	arameters VS time as per	r EPA low flow sample	ling procedures

ANNEX J: Moni	toring Well S	ampling Log	(Complete All F	ields)
Site Name:			middle s	
Monitoring Well ID:	MW-8	<del></del>		
Sample Number(s) include dups.:		_		
Bottles filled (by parameter type):	AII			
Date of Sampling Event:	Aug 7		Tim	ne: /2:40
Weather:	+5 NW11	d cloudy		
Names of Samplers:	JB			· · · · · · · · · · · · · · · · · · ·
Description of Well Condition and	Surrounding grou	ınd conditions (no	te ponding of water)	good
dryget groun			,	7
Lock (condition, presence, model,	manufacturer):	Replace	J Crown	*
Pre-Measured Data (From Water	Wall Record I o	m)		
*Depth of well installation (cm)=	Well Record Lo	Diameter of well	II (ana)=	
*Depth to top of screen (cm)=		Length screene	, ,	
note: *depths are from ground surface		_ Length screene	a section (cm)-	
Field Measurements				
Measurement method (interface pro	obe tape, etc):			
Well pipe height above ground (cm)		-	62cm	
Static water level (cm) from top of p			137 cm	
Static water level (cm) (below groun	•	ated =	206 cm	
Measured well refusal depth (cm) (n	•		206cm	_
Thickness of water column (cm)=		. 0,	of water in well (mL)=	-
Free product thickness (mm)=		-	of sludge or siltation	
Barrier Information Comment				
Purging Information Summary* Purging/sampling equipment, sampl	ina technique			
and equipment calibration information				
Well purged (Y/N):	,	Recharge Rate	: 150ml/3	n/1
Volume Purged (L) (note multiple				
purging events if applicable):				
Parsmeter	Initial	Stabilized	Final	Notes (Fnot
				stabilized)
pH Conductivity (ಚ≶/cm) M ⊆	6.51	6.45	6.41	
Turbidity (NTU)	,033	033	1032	
Temperature (degC)	6.94	5.76	00	
		3.10	5.48	
Visual/olfactory observations (incl. co presence of free product/sheen/globu		clear no	odour	
siltation):	_	cear no	9 00001	
	_	<del></del>		
Decontamination of sampling equi		1	, (	
Type of decontamination fluid (s):	WATCHSU	DAP decon		
Number washes:	1		Number rinses:	
Other Relevant Comments:				
* Complete field notes including full suite of wa should be apended to this summary.	ter quality indicator p	arameters VS time as	per EPA low flow sampli	ng procedures

ANNEX J: Mon	itoring Well S	ampling Log (	Complete All Fi	elds)
Site Name:	_		Middle s	
Monitoring Well ID:	MW-9	_	- 1,	
Sample Number(s) include dups.		<b>-</b>		
Bottles filled (by parameter type):	A11 1/2	PBC Bottle		
Date of Sampling Event:			Time	e: 1:05
Weather:	+5 NWI	ed cloudy		
Names of Samplers:	3B	-		
Description of Well Condition and	Surrounding grou	nd conditions (note	ponding of water):	water
ponded in well casi	ng, dry gr.	ound		D
Lock (condition, presence, model	, manufacturer):	replaced i	T Crown	
Pre-Measured Data (From Wate	r Well Record Lo			
*Depth of well installation (cm)=		9 <i>I</i> Diameter of well (	(om)=	
*Depth to top of screen (cm)=		Length screened	. ,	
note: *depths are from ground surface		_ Leligiii soloolla	Section (only-	
Field Measurements		_		
Measurement method (interface p	robe. tape, etc):	interface	Probe	
Well pipe height above ground (cn			62 Cm	
Static water level (cm) from top of	, , , , , , ,	•	169.3	-
Static water level (cm) (below grou		ated =	197.3	-
Measured well refusal depth (cm)	•		197-3	-
Thickness of water column (cm)=		,	water in well (mL)=	- M
Free product thickness (mm)=		•	f sludge or <u>siltation</u> :	
		<del></del>	one age of	703
Purging Information Summary* Purging/sampling equipment, samp	-lima taahaisi ja			
and equipment calibration informat				
Well purged (Y/N):	-	Recharge Rate:		
Volume Purged (L) (note multiple		Treories go , tate.		<del></del>
purging events if applicable):				
Para meter	Mital	Otabilizad		Notes (if not
		Stabilized	Final	stabilized)
pH		6.38		
Conductivity (uS/cm) MS	.021	.021		
Turbidity (NTU)	00	00		
Temperature (degC)	6.10	5.44		
Visual/olfactory observations (incl. c		,		
presence of free product/sheen/glob siltation):	oules, _	clear, No	odovr	
Shrationj.	_			
Decontamination of sampling equ	ıipment			
Type of decontamination fluid (s):	water nel	that sopp dec	in inhertace	
Number washes:	A.		Number rinses:	(
Other Relevant Comments:	well dry a	+ Lareo DCB	bottle only	half full.
_	Floating Sitt	htebn	,	
* Complete field notes including full suite of w should be apended to this summary.	ater quality indicator pa	arameters VS time as p	er EPA low flow samplin	g procedures

ANNEX J: Monit	toring Well Sa	mpling Log ((	Complete All F	-ields)
Site Name:		_Landfill Name:		,
Monitoring Well ID:	MWIO	-		
Sample Number(s) include dups.:				
Bottles filled (by parameter type):	Ø			
Date of Sampling Event:	Aug6		Tin	me: 15:00
Weather:				
Names of Samplers:	JB			
Description of Well Condition and S	Surrounding grour	nd conditions (note	ponding of water	·):
dry ground, u	sellin 900	d condit.	101	
Lock (condition, presence, model, r	manufacturer):	changed	Lock to	erown
Pre-Measured Data (From Water		*		
*Depth of well installation (cm)=	_	Diameter of well (	/nm)=	
*Depth to top of screen (cm)=		Length screened s	` '	
note: *depths are from ground surface		Lengur out of	Section (only	
Field Measurements				
Measurement method (interface pro	obe; tape, etc):			
Well pipe height above ground (cm)	_			
Static water level (cm) from top of p		-		_
Static water level (cm) (below groun	•	ated =		_
Measured well refusal depth (cm) (n	•	_	154cm di	~ well
Thickness of water column (cm)=			water in well (mL)	
Free product thickness (mm)=			f sludge or siltation	
Purging Information Summary* Purging/sampling equipment, sampli and equipment calibration informatio				
Well purged (Y/N): Volume Purged (L) (note multiple purging events if applicable):		Recharge Rate:		
Parameter	inihal	Otabilized		Notes (final
	litipar	Stabilized	Final	stabilized
pH				
Conductivity (uS/cm)				
Turbidity (NTU)			- 2	
Temperature (degC)				
Visual/olfactory observations (incl. co presence of free product/sheen/globu siltation):				
Decontamination of sampling equipment	pment		^ 4	
Type of decontamination fluid (s):  Number washes:	INATER SUA	ip, decon is	ndertace fr	obe
Number washes:	1		Number rinses:	/
Other Relevant Comments:	Dry well		-	
	81			
* Complete field notes including full suite of war should be apended to this summary.	ter quality Indicator pa	rameters VS time as p	er EPA low flow samp!	ling procedures

ANNEX J: Monit	oring Well Sa	ampling Log	(Complete All I	Fields)
Site Name:	FOX5	Landfill Name	: MAIN	-
Monitoring Well ID:	Mw-11			
Sample Number(s) include dups.:			·	
Bottles filled (by parameter type):	Ø			
Date of Sampling Event:	Aug6		Tir	me: 13:50
Weather:	+20 Sun			
Names of Samplers:	JB			
Description of Well Condition and S	Surrounding grou	nd conditions (ne	ote ponding of water	r):
goods dry Land				
Lock (condition, presence, model, r	nanufacturer):	Crown	Lock insta	Med
Pre-Measured Data (From Water	Well Record Loc	•	•	
*Depth of well installation (cm)=		Diameter of we	الام)=	
*Depth to top of screen (cm)=		_	ed section (cm)=	
note: *depths are from ground surface		Tou Bar agree	ocouon (om)	
Field Measurements				
Measurement method (interface pro	be, tape, etc):			
Well pipe height above ground (cm)	( to top of pipe)=		103	
Static water level (cm) from top of pi	pe =		U	
Static water level (cm) (below ground	d surface) calcula	ated =		_
Measured well refusal depth (cm) (m	easure after san	npling)=	230.5cm	dry
Thickness of water column (cm)=		Static volume	of water in well (mL)	
Free product thickness (mm)=			of sludge or siltation	
Purging Information Summary*				
Purging/sampling equipment, sampli				
and equipment calibration information		<u>-</u>		
Well purged (Y/N):		Recharge Rate	9:	
Volume Purged (L) (note multiple purging events if applicable):				
pulging events ii apprioable).	b			
Parameter	Initial	Stabilized	Final	Notes (Frict
pH	Name of the Party			stabilized)
Conductivity (uS/cm)				125
Turbidity (NTU)				-
Temperature (degC)			+	+
Visual/olfactory observations (incl. col	our adour			
presence of free product/sheen/globu	•			
siltation):				
m	-			
Decontamination of sampling equip	ment y	(		
Type of decontamination fluid (s):	decon into	irtace probe	its vorum, s	Soul P
Number wasnes.	<del></del> ,	, 3	Number rinses:	
Type of decontamination fluid (s):  Number washes:  Other Relevant Comments: NAMER	cm at bot	ton. no	table to sa	J.1.118
* Complete field notes including full suite of wat should be apended to this summary.				

ANNEX J: Monit	oring Well Sa	ampling Log	(Complete All Fi	elds)
Site Name:	FOX 5	_Landfill Name:	MAIN	
Monitoring Well ID:	MW-12			
Sample Number(s) include dups.:				
Bottles filled (by parameter type):				
Date of Sampling Event:	Aug. 6		Time	e: 13:50
Weather:	+20 5	2114		
Names of Samplers:	23			
Description of Well Condition and S	urrounding grou	nd conditions (no	te ponding of water):	
well slightly inclinde	d Towards	the Brest. 5	one ponding	ofwater in case
Lock (condition, presence, model, r	nanufacturer):	changed	LOCK (COO	(nu
Pre-Measured Data (From Water )		•		
*Depth of well installation (cm)=		Diameter of well	(cm)=	
*Depth to top of screen (cm)=		Length screened	` '	
note; *depths are from ground surface		_Longar dorectica	2 900tion (Citi)=	
Field Measurements				
Measurement method (interface pro	be) tape, etc):			
Well pipe height above ground (cm)				
Static water level (cm) from top of pi				-
Static water level (cm) (below ground	d surface) calcula	ated =		-
Measured well refusal depth (cm) (m	•		136-5cm	drewell
Thickness of water column (cm)=		Static volume of	of water in well (mL)=	
Free product thickness (mm)=		Evidence	/ ろらっらっか f water in well (mL)= of sludge or siltation:	8
Purging Information Summary* Purging/sampling equipment, sampli and equipment calibration information				
Well purged (Y/N):	-	Recharge Rate:		
Volume Purged (L) (note multiple purging events if applicable):		Necharge Nate.		
Paraaetri	Initial	Stabilized	resident of the second	Notes (f not
	Bullal	Stabilized	Final	stabiliz <b>a</b> d)
рН				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				
Visual/olfactory observations (incl. col presence of free product/sheen/globul siltation):		<u> </u>		
Decontamination of sampling equip	ment	<u></u> :		
		mall d	lesso intent.	
Type of decontamination fluid (s):  Number washes:  Other Relevant Comments:	1	TETAYLA C	Number rineas	·
Other Relevant Comments:	day 1.12 11		11011106 1111969.	
	gry WELL			
* Complete field notes including full suite of wat should be apended to this summary.	er quality indicator pa	rameters VS time as	per EPA low flow sampling	ng procedures

ANNEX J: Monit	oring Well Sa	ampling Log (C	omplete All F	ields)
Site Name:		Landfill Name:		
Monitoring Well ID:	MW-13	_		
Sample Number(s) include dups.:				
Bottles filled (by parameter type):	Partio	ul		
Date of Sampling Event:			Tin	ne: /3:45
Weather:		9		
Names of Samplers:	JB			
Description of Well Condition and S	urrounding grou	nd conditions (note	ponding of water)	:
good, dry ground		some ponding	wedering.	25.19
Lock (condition, presence, model, m	nanufacturer):	change L	lock to es	own
Pre-Measured Data (From Water V				
*Depth of well installation (cm)=	1011110014 208	Diameter of well (c	-m/=	
*Depth to top of screen (cm)=		Length screened s	,	
note: *depths are from ground surface			ection (citt)=	
Field Measurements				
Measurement method (interface pro	be tape, etc):			
Well pipe height above ground (cm)				
Static water level (cm) from top of pig		_	151.5cm	-
Static water level (cm) (below ground	l surface) calcula		162Em	
Measured well refusal depth (cm) (m	•	_	100.6	-
Thickness of water column (cm)=		Static volume of v	vater in well (mL)	<del>-</del> =
Free product thickness (mm)=			sludge or siltation	
Durging Information Cummon &			-	
Purging Information Summary*  Purging/sampling equipment, sampling	ra technique			
and equipment calibration information	-,			
Well purged (Y/N):	_	Recharge Rate:		
Volume Purged (L) (note multiple		_		
purging events if applicable):				
Paremeter	Initial	Stabilized	Final	Notes (if not
pH	. 05		17 13018	stabilized)
Conductivity ( <del>uS</del> /cm) nS	6.85	6.74		
Turbidity (NTU)	28.8	025		
Temperature (degC)	22/4.290	10.99		
		10,49		
Visual/olfactory observations (incl. cold presence of free product/sheen/globule		41-1411	1	
siltation):		slightly clo.	Jay - NO 000	
December 1 and 1 and 1	_			
Decontamination of sampling equip		/	, (	
	WAter Sc	DAP, decon		
Number washes:			Number rinses:	)
Other Relevant Comments:				
* Complete field notes including full suite of wate should be apended to this summary.	r quality indicator pa	rameters VS time as per	r EPA low flow sampli	ng procedures

	g	ba —- 3	(Complete All Fig	eius)
Site Name:	Fox 5	_Landfill Name:	MAIN	-
Monitoring Well ID:	MW 14	_		
Sample Number(s) include dups.:				
Bottles filled (by parameter type):	NO			
Date of Sampling Event:	A496		Time	: /5:30
Weather:	+20 800			
Names of Samplers:	JB			
Description of Well Condition and S	urrounding groun	nd conditions (no	te ponding of water):	
Lock (condition, presence, model, m	nanufacturer):	add new	Lock (crown	)
Pre-Measured Data (From Water \	Nell Record Log	1)	_	
*Depth of well installation (cm)=	<u></u>	Diameter of well	i (cm)=	
*Depth to top of screen (cm)= note: *depths are from ground surface		Length screened	. ,	
Field Measurements				
Measurement method (interface pro	be. tape, etc):			
Well pipe height above ground (cm)			46cm	
Static water level (cm) from top of pi				•
Static water level (cm) (below ground	-			•
Measured well refusal depth (cm) (m	•		154cm dry	(ice)ornois
Thickness of water column (cm)=		Static volume of	154cm dry of water in well (mL)=	only
Free product thickness (mm)=			of sludge or siltation:	
Purging Information Summary* Purging/sampling equipment, sampling and equipment calibration information Well purged (V/N):	_			
Well purged (Y/N): Volume Purged (L) (note multiple purging events if applicable):		Recharge Rate:		
Paremeter	Initial	Stabilized	Final	Notes (If not stabilized)
pH				
Conductivity (uS/cm)				
Turbidity (NTU)				
Temperature (degC)				
Visual/olfactory observations (incl. colopresence of free product/sheen/globul siltation):				
Decontamination of sampling equip	ment			
Type of decontamination fluid (s):				
Type of decontamination fluid (s): Number washes:	dry well		Number rinses:	

ANNEX J: Monitoring Well Sampling Log (Complete All Fields)								
Site Name:	~	Landfill Name:		2 site area				
Monitoring Well ID:	MW-15							
Sample Number(s) include dups.:		_						
Bottles filled (by parameter type):	A 11							
Date of Sampling Event:	Ava-6		Tir	ne: //:50				
Weather:	+20° Su.	? N 4						
Names of Samplers:	7B,	,	-					
Description of Well Condition and	Surrounding grou	nd conditions (no	te ponding of water	):				
Well inguod conditi	on dry 9	Looved I T	cose bolders					
Lock (condition, presence, model,	manufacturer):	good co	dition					
Pre-Measured Data (From Water				· · · · · · · · · · · · · · · · · · ·				
*Depth of well installation (cm)=	17011 1100014 20	Biameter of wel	l (cm)=					
*Depth to top of screen (cm)=		Length screene	• •					
note: *depths are from ground surface			a 6000011 (0111)-					
Field Measurements								
Measurement method (interface pr	obe, tape, etc):		ű.					
Well pipe height above ground (cm	) ( to top of pipe)=		50 cm					
Static water level (cm) from top of	oipe =		128.3c~	_				
Static water level (cm) (below ground	nd surface) calcul	ated =	223.cm					
Measured well refusal depth (cm) (	measure after sar	mpling)=		_				
Thickness of water column (cm)=		Static volume of	of water in well (mL)	=				
Free product thickness (mm)=		Evidence	of sludge or siltation	n: NO				
Purging Information Summary*								
Purging/sampling equipment, samp			22					
and equipment calibration information	on:							
Well purged (Y/N):		Recharge Rate						
Volume Purged (L) (note multiple purging events if applicable):								
Parameter	Initial	Stabilized	Puial	Notes (if not )				
Hq	7.90	7.92	7.69	7.35				
Conductivity (#\$/cm) # S	0.036	.028	.028	.027				
Turbidity (NTU)	00	00	00	06				
Temperature (degC)	10.45	9.07	7.69	7.78				
Visual/olfactory observations (incl. co	olour, odour.							
presence of free product/sheen/glob	ules,	clear, no	odour					
siltation):								
Decontamination of sampling equ	ipment							
Type of decontamination fluid (s):		decar sin	2 WHET					
Number washes:	1	2003	Number rinses:	ì				
Other Relevant Comments:	<del></del>							
			<del></del> -					
* Complete field notes including full suite of washould be apended to this summary.	ater quality indicator p	arameters VS time as	per EPA low flow samp	ling procedures				

ANNEX J: Moni	toring Well Sa	ampling Log (C	Complete All Fi	ields)
Site Name:	Fox 5	Landfill Name:	St. Area	,
Monitoring Well ID:	MW-16.			
Sample Number(s) include dups.:				
Bottles filled (by parameter type):	All			
Date of Sampling Event:	Aug 6		Tim	e: 12:15
Weather:	20°C 150	at breeze		
Names of Samplers:	28	· ·		-
Description of Well Condition and	Surrounding groun	nd conditions (note	ponding of water):	dr. 222
rasinge Ponded	rater in	esta. di	V STOUND IS 10	ase holders
Lock (condition, presence, model,	manufacturer):	no lock:	ole sed a	and lack
Pre-Measured Data (From Water	Wall Pagerd Lag		4	TOCK.
*Depth of well installation (cm)=	Meli Kecold Fo			
*Depth to top of screen (cm)=		Diameter of well (	•	
note: *depths are from ground surface		Length screened	section (cm)=	
Field Measurements				
Measurement method (interface pro	obe, tape, etc):			
Well pipe height above ground (cm	,		40cm.	
Static water level (cm) from top of p		-	1345	_
Static water level (cm) (below grour	•	ated =	155.4	-
Measured well refusal depth (cm) (r	•	-	155 4 155	<b>-</b>
Thickness of water column (cm)=		. 07	water in well (mL)=	_ /
Free product thickness (mm)=			sludge or siltation:	
			0	
Purging Information Summary* Purging/sampling equipment, sampl	ina technique			
and equipment calibration information				
Well purged (Y/N):	_	Recharge Rate:	250 ml per 3	Smile
Volume Purged (L) (note multiple		_		
purging events if applicable):				
Raremeter	Initial	Stabilized	Final	Notes (Froit
				stabili (ed)
pH Conductivity (uS/cm) HS	6.58	6.53		
Turbidity (NTU)	0077	.076		
Temperature (degC)	12.34	10.58		
		10:30		
Visual/olfactory observations (incl. co presence of free product/sheen/globu		clear, 10		
siltation):		Clear, 10	DOOUF	
	_	<del></del>		
Decontamination of sampling equi	•			
Type of decontamination fluid (s):	doran pro	be a Supper		
Number washes:			Number rinses:	/
Other Relevant Comments:				<del></del>
* Complete field notes including full suite of wa should be apended to this summary.	ter quality indicator pa	rameters VS time as pe	er EPA low flow sampling	ng procedures

ANNEX J: Mon	itoring Well S	Sampling Log (	Complete All	Fields)
Site Name:	For 5	Landfill Name:	NON hAZ	site area
Monitoring Well ID:	110017	<del></del>		Station
Sample Number(s) include dups.:	,			
Bottles filled (by parameter type):	B11			
Date of Sampling Event:	Auglo		Ti	me: /3:00
Weather:	+20 000	104		
Names of Samplers:	JB	· · · · · · · · · · · · · · · · · · ·		
Description of Well Condition and	Surrounding grou	und conditions (note	ponding of water	-}-
Good condition, dry			perianing of mator	/-
Lock (condition, presence, model,		in good co	211	
	,	e .	THE WORLD	
Pre-Measured Data (From Water	Well Record Lo	•		
*Depth of well installation (cm)=		_Diameter of well	` '	
*Depth to top of screen (cm)= note: *depths are from ground surface		_Length screened	section (cm)=	
Field Measurements				
Measurement method (interface pro	obel tano oto):			
Well pipe height above ground (cm			35cm	
Static water level (cm) from top of p		-		_
Static water level (cm) (below groun	•	lata d	155@M	_
Measured well refusal depth (cm) (r	•		169cm	_
Thickness of water column (cm)=	neasure alter sal			-
Free product thickness (mm)=		-	water in well (mL)	
Tiee product unoxiless (mm)=		_ Evidence of	sludge or siltation	n:
Purging Information Summary*				
Purging/sampling equipment, sampl				
and equipment calibration information	in:			
Well purged (Y/N): Volume Purged (L) (note multiple		Recharge Rate:		
purging events if applicable):				
Parameter	Inihal	Stabilized	Final	Notes (Friol )
рН	6-83	6.58		J. J
Conductivity (uS/cm)	0.034	0.035		
Turbidity (NTU)	00	00		
Temperature (degC)	12-96	12.90		
Visual/olfactory observations (incl. co	lour, odour,			
presence of free product/sheen/globu		clear, no	odour	
siltation):				
Decontamination of sampling equi	nment			
Type of decontamination fluid (s):	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Number washes:		-	Manaharata	
	1		Number rinses:	le es mor i
Other Relevant Comments:	NOW KOWJERG	1 - set upat o	ment well . u	nable to F.W
* Complete field notes including full suite of wat should be apended to this summary.	er quality indicator pa	arameters VS time as pe	er EPA low flow sampl	ing procedures

ANNEX J: Mon			(Complete All I	Fields)
Site Name:		Landfill Name:	STATION SITE	area
Monitoring Well ID:	MW-18			
Sample Number(s) include dups				
Bottles filled (by parameter type):	0			
Date of Sampling Event:	Aug.6		Ti	me: 13:30
Weather:	+20 5U			
Names of Samplers:	JB			
Description of Well Condition and		ound conditions (no	ote ponding of water	r);
in good Condi	1 10 -	ry ground		
Lock (condition, presence, model		7 7	Lock to cro	WA
Pre-Measured Data (From Wate	r Well Record L	og)		
*Depth of well installation (cm)=		Diameter of well	ll (cm)=	
*Depth to top of screen (cm)= note: *depths are from ground surface		_	ed section (cm)=	
Field Measurements				
Measurement method (interface p	robe, tape, etc):			
Well pipe height above ground (cn	n) ( to top of pipe	)=	34cm	<del></del>
Static water level (cm) from top of	pipe =	•		
Static water level (cm) (below grou	und surface) calc	ulated =		
Measured well refusal depth (cm)	(measure after sa	ampling)=	154.5cm	ice /dry well
Thickness of water column (cm)=		Static volume	of water in well (mL)	)=
Free product thickness (mm)=			of sludge or siltation	
Purging Information Summary* Purging/sampling equipment, sample and equipment calibration informat			-	
Well purged (Y/N): Volume Purged (L) (note multiple purging events if applicable):		_ Recharge Rate	:	
Paremeter	initial	Stabilized	Final	Notes (if not stabilized)
рН				W. Salama Day
Conductivity (uS/cm)		İ	İ	
Turbidity (NTU)				
Temperature (degC)				
Visual/olfactory observations (incl. c presence of free product/sheen/glob siltation):				
Decontamination of sampling equ	ipment			
Type of decontamination fluid (s):				
Number washes:			Number rinses:	
Other Relevant Comments:	Dry, mo	isture at	bottom of u	
* Complete field notes including full suite of w should be apended to this summary.	ater quality indicator	parameters VS time as	s per EPA low flow samp	ling procedures

ANNEX J: Moni	toring Well Sa	ampling Log (	Complete All F	ields)
Site Name:			Nowhaz Law	
Monitoring Well ID:	MW-18	_		.,
Sample Number(s) include dups.:		<del></del>		
Bottles filled (by parameter type):	PARTIALNO	PCB		
Date of Sampling Event:	Aug 6		Tin	ne: 14:30
Weather:	420 SU	274		
Names of Samplers:	J.B			
Description of Well Condition and	Surrounding grou	nd conditions (note	e ponding of water)	:
good condition, d		•	,	
Lock (condition, presence, model,		9000		
Pre-Measured Data (From Water	Wall Dagged La			
*Depth of well installation (cm)=	Men vecola Foi			
*Depth to top of screen (cm)=		Diameter of well	• •	
note: *depths are from ground surface		Length screened	section (cm)=	
Field Measurements				
Measurement method (interface pro	tane etc):			
Well pipe height above ground (cm)			711.	
Static water level (cm) from top of p			34cm 152.5cm 162.cm	
Static water level (cm) (below groun	•	ated =	1/2	_
Measured well refusal depth (cm) (n	*		16d.cm	_
Thickness of water column (cm)=	nododie ditel SEI	,	water in well (mL)=	<del>-</del>
Free product thickness (mm)=			f sludge or siltation	
			r oracigo or singhor	:N0
Purging Information Summary*  Purging/sampling equipment, sampli	ing toohnisus			
and equipment calibration information				
Well purged (Y/N):	-	Recharge Rate:		
Volume Purged (L) (note multiple		reoriarge rate.		
purging events if applicable):				
Parameter	Initial	out mois		Notes (final
N.T.	the second second	Stabilized	Final	stabilized
рН	6-81	6.99	7.00	
Conductivity (#8/cm) mS	.038	033	. 6 3 3	
Turbidity (NTU)	4.8	00	00	
Temperature (degC)	13.62	10.11	9.46	
Visual/olfactory observations (incl. co				
presence of free product/sheen/globu siltation):	les,	clear no od	001	
Sination).	-			
Decontamination of sampling equip	oment			
Type of decontamination fluid (s):				
Number washes:			Number rinses:	
Other Relevant Comments: //	rada to fil	1 Large hall	le well day	
<u>/</u>	110000 110 879 8	71 200	- , or ell (2.77)	
* Complete field notes including full suite of wat should be apended to this summary.	er quality indicator pa	rameters VS time as p	er EPA low flow sampling	ng procedures

rox >

RECORD OF L SAMPLING

LANDFILL NAME	SOIL SAMPLE ID	DEPTH (m)	SOIL DESCRIPTION		U			
Sta Area	MW15a		SOIL DESCRIPTION	GPS Northing	GPS Easting	GPS Elevation	Photographs	Backfilled (Y/
		40	and gravel				3	4
	MWISB	30	Bon for refusa				3	4
Sth Area	MW/6a	230	Sand w/cos		, ,		No.	
	A / 1		Boulder refusat	at 30			2 2	J
	1601615		locse poulders				3	0
She Amer	MWITa	3.40	Some obler present.	-			with monthly to	0
							5	9
	MW178.	30					3	4
Sh Az	MW18a	50	Some some				3	y
	111 1 22		·	ĵ.				
	MW188	36		dupl.	ate.	·	3	5
sh Area	MW 19a	50	loose sand				3	2/
	MWIGB	30	100 se sond					1
				. +		t	3	A STATE OF THE STA

SITE NAME: POXS Aug 6

#### **RECORD OF SOIL SAMPLING**

SAMPLER NAME:

LANDFILL NAME	SOIL SAMPLE ID	DEPTH (m)	SOIL DESCRIPTION	GPS Northing	GPS Easting	GPS Elevation	Photographs	Backfilled (Y/N)
MAIN	MW-10 A	50 cm	MOISTSAND					
AND FILL			with cobbles				3	1/
<i>(</i>	MW-1013	30 cm	((				3	Y
Main.	MW-14A	430	Rocks refusal				7	
(500)	1100 11A		cobbles w/ sand				3	7
Main	14W-13A	30	Rocky Refrant at 30				3	4
			Cobbles w/ 5-d					
Maln	MW-12A	~ 30	sout raponel with some cobble rock celes a	30			3	4
Main	MW-11A	~30	Sand - gravel  w/cobblet	o de do	rocks.		3	7
		The state of the s						
					The state of the s	And the second s	and the same of th	

Golder Project #1530908 /

Tox 5 Aug 7

RECORD OF 5

SAMPLING

SAMPLER NAME: U38

LANDFILL NAME	SOIL SAMPLE ID	DEPTH (m)	SOIL DESCRIPTION	GPS Northing	GPS Easting	GPS Elevation	Photossah	Davids and
Middle.	MW-5a	Goca	dry sity and w/ cobbles.			o, o chevation	Photographs	Backfilled (Y/N
	MW-5B	30 cm	at your				3	У
Middle	MW-6a	Soun	sad with colubber dry.				3	4
1	Mw-6B	30 cm	11				3	4
1idde	MW-7a	50 cm	sand w/ cobbles	duplica	de		3	Y
1	MW-78	30ch	// _				3	7
Middle	MW-Ba	30 cm	Sand in Cobbles				3	y
	MW-8B	50cm	Sand in Cobbles		·	,		
Midle	Mh -9a	<306n	Sand in cobbles refusalat Rock				3	7
	MW-93	**	7					





### **APPENDIX C**

**Laboratory Certificates of Analysis and QA/QC Reports Historical Monitoring Results** 



### **Appendix C1**

Certificate Of Analysis –
Paracel Laboratories Ltd.,
Aug. 19, 2016; Order #1634132



300 - 2319 St. Laurent Blvd Ottawa, ON, K1G 4J8 1-800-749-1947 www.paracellabs.com

#### Certificate of Analysis

#### Golder Associates Ltd. (Ottawa)

1931 Robertson Rd. Ottawa, ON K2H 5B7 Attn: Alyssa Troke

Client PO:

Project: 1530908-2000

Custody: 107623/79624/7625

Report Date: 19-Aug-2016 Order Date: 15-Aug-2016

Order #: 1634132

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634132-01	MW15-A
1634132-02	MW-15B
1634132-03	MW-16A
1634132-04	MW-17A
1634132-05	MW-17B
1634132-06	MW-18A
1634132-07	MW-18B
1634132-08	MW-19A
1634132-09	MW-19B
1634132-10	MW-10A
1634132-11	MW-10B
1634132-12	MW-11A
1634132-13	MW-12A
1634132-14	MW-13A
1634132-15	MW-14A
1634132-16	MW-5A
1634132-17	MW-5B
1634132-18	MW-6A
1634132-19	MW-6B
1634132-20	MW-7A
1634132-21	MW-7B
1634132-22	MW-8A
1634132-23	MW-8B
1634132-24	MW-9A

Approved By:

Mark Froto

Mark Foto, M.Sc. Lab Supervisor



Order #: 1634132

Report Date: 19-Aug-2016 Certificate of Analysis Order Date: 15-Aug-2016 Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

#### **Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME-SQG: Metals by ICP-OES	based on MOE E3470, ICP-OES	18-Aug-16	18-Aug-16
Mercury by CVAA	EPA 7471B - CVAA, digestion	19-Aug-16	19-Aug-16
PCBs, total	SW846 8082A - GC-ECD	17-Aug-16	17-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	18-Aug-16	18-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Aug-16	19-Aug-16
Solids, %	Gravimetric, calculation	18-Aug-16	18-Aug-16



Certificate of Analysis Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016 Client PO: Project Description: 1530908-2000

	Client ID: Sample Date: Sample ID: MDL/Units	MW15-A 06-Aug-16 1634132-01 Soil	MW-15B 06-Aug-16 1634132-02 Soil	MW-16A 06-Aug-16 1634132-03 Soil	MW-17A 06-Aug-16 1634132-04 Soil
Physical Characteristics	MDLJOING				1
% Solids	0.1 % by Wt.	96.2	95.3	91.8	93.0
Metals	•			•	•
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Barium	1.0 ug/g dry	148	136	106	97.3
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	<1.0	<1.0	3.6	<1.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	33.2	30.8	19.7	14.3
Cobalt	1.0 ug/g dry	7.0	6.3	6.3	4.2
Copper	1.0 ug/g dry	17.0	14.6	19.4	7.0
Lead	1.0 ug/g dry	5.6	4.4	19.8	6.0
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	12.4	10.9	7.7	5.7
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Tin	5.0 ug/g dry	<5.0	<5.0	6.0	<5.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	50.9	46.5	31.5	27.2
Zinc	1.0 ug/g dry	41.1	37.1	103	40.1
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	18	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	59	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	33	<6
PCBs					
PCBs, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Decachlorobiphenyl	Surrogate	96.2%	101%	111%	105%

Report Date: 19-Aug-2016



Certificate of Analysis
Client: Golder Associates Ltd. (Ottawa)

Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016

Client PO:

Project Description: 1530908-2000

	Client ID: Sample Date: Sample ID: MDL/Units	MW-17B 06-Aug-16 1634132-05 Soil	MW-18A 06-Aug-16 1634132-06 Soil	MW-18B 06-Aug-16 1634132-07 Soil	MW-19A 06-Aug-16 1634132-08 Soil
Physical Characteristics	WIDE/OTHES		00.1	Con	0011
% Solids	0.1 % by Wt.	89.7	94.3	93.8	94.6
Metals	1		ı	J	
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Barium	1.0 ug/g dry	110	68.2	67.7	86.1
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	1.0	<1.0	<1.0	<1.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	17.1	10.7	10.5	14.1
Cobalt	1.0 ug/g dry	5.2	3.3	3.1	3.8
Copper	1.0 ug/g dry	8.9	5.5	5.3	7.3
Lead	1.0 ug/g dry	8.1	6.8	5.3	6.0
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	7.5	4.3	4.2	5.8
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Tin	5.0 ug/g dry	<5.0	<5.0	<5.0	<5.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	31.7	19.7	19.3	24.9
Zinc	1.0 ug/g dry	46.4	29.7	28.6	33.2
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
PCBs			·	•	•
PCBs, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Decachlorobiphenyl	Surrogate	89.5%	102%	101%	107%

Report Date: 19-Aug-2016



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016

Client PO:

Project Description: 1530908-2000

MW-10A MW-19B MW-10B MW-11A Client ID: Sample Date: 06-Aug-16 06-Aug-16 06-Aug-16 06-Aug-16 1634132-09 1634132-10 1634132-11 1634132-12 Sample ID: Soil Soil Soil Soil MDL/Units **Physical Characteristics** 0.1 % by Wt. % Solids 94.2 95.1 95.0 94.8 Metals 1.0 ug/g dry Antimony <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Arsenic <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Barium 93.1 86.0 85.3 8.08 1.0 ug/g dry Beryllium <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry <1.0 Boron <1.0 <1.0 <1.0 0.5 ug/g dry Cadmium < 0.5 < 0.5 < 0.5 < 0.5 1.0 ug/g dry 12.6 11.7 13.3 Chromium 15.1 1.0 ug/g dry 4.1 3.6 3.7 Cobalt 3.6 1.0 ug/g dry Copper 8.7 6.3 6.3 6.8 1.0 ug/g dry Lead 7.2 7.9 7.0 13.0 0.1 ug/g dry < 0.1 < 0.1 < 0.1 Mercury < 0.1 1.0 ug/g dry Molybdenum <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Nickel 6.0 5.5 5.2 5.4 Selenium 1.0 ug/g dry <1.0 <1.0 <1.0 <1.0 0.5 ug/g dry Silver < 0.5 < 0.5 < 0.5 < 0.5 1.0 ug/g dry Thallium <1.0 <1.0 <1.0 <1.0 5.0 ug/g dry Tin < 5.0 < 5.0 < 5.0 < 5.0 1.0 ug/g dry Uranium <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Vanadium 26.1 22.4 21.7 22.6 Zinc 1.0 ug/g dry 33.4 32.3 31.7 29.8 **Hydrocarbons** 7 ug/g dry F1 PHCs (C6-C10) <7 <7 <7 <7 4 ug/g dry F2 PHCs (C10-C16) <4 <4 <4 <4 8 ug/g dry F3 PHCs (C16-C34) <8 <8 <8 <8 6 ug/g dry F4 PHCs (C34-C50) <6 <6 <6 <6 PCBs 0.05 ug/g dry PCBs, total < 0.05 < 0.05 < 0.05 < 0.05 Decachlorobiphenyl Surrogate 100% 90.9% 92.0% 92.6%

Report Date: 19-Aug-2016



LABORATORIES LTD.

Certificate of Analysis
Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

Order #: 1634132

Report Date: 19-Aug-2016 Order Date: 15-Aug-2016

	Client ID: Sample Date: Sample ID: MDL/Units	MW-12A 06-Aug-16 1634132-13 Soil	MW-13A 06-Aug-16 1634132-14 Soil	MW-14A 06-Aug-16 1634132-15 Soil	MW-5A 07-Aug-16 1634132-16 Soil
Physical Characteristics	WIDL/Units	3011	3011	3011	3011
% Solids	0.1 % by Wt.	97.5	95.7	94.9	92.6
Metals	L		I	I	
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Barium	1.0 ug/g dry	54.1	62.8	55.7	59.0
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	<1.0	<1.0	<1.0	1.3
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	8.5	9.0	7.3	14.1
Cobalt	1.0 ug/g dry	2.7	2.9	2.8	4.1
Copper	1.0 ug/g dry	5.5	5.7	4.2	6.9
Lead	1.0 ug/g dry	9.6	9.2	8.7	6.9
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	3.8	3.9	3.5	6.2
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Tin	5.0 ug/g dry	<5.0	<5.0	<5.0	<5.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	15.1	16.8	14.1	25.6
Zinc	1.0 ug/g dry	40.6	30.8	25.5	33.0
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	35	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	18	<6	<6	<6
PCBs	<del> </del>		T	T	
PCBs, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Decachlorobiphenyl	Surrogate	85.7%	86.1%	87.7%	86.4%



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

Order #: 1634132

Report Date: 19-Aug-2016 Order Date: 15-Aug-2016

Page 7 of 12

	Client ID: Sample Date: Sample ID:	MW-5B 07-Aug-16 1634132-17	MW-6A 07-Aug-16 1634132-18	MW-6B 07-Aug-16 1634132-19	MW-7A 07-Aug-16 1634132-20
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	88.5	91.2	90.3	95.8
Metals			T	T	
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Barium	1.0 ug/g dry	60.3	42.4	44.4	45.3
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	1.2	1.5	1.4	2.1
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	14.3	12.1	12.2	16.1
Cobalt	1.0 ug/g dry	4.0	3.5	3.5	4.6
Copper	1.0 ug/g dry	6.8	5.5	5.5	7.8
Lead	1.0 ug/g dry	7.6	6.4	6.6	7.4
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	6.2	5.3	4.9	6.9
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Tin	5.0 ug/g dry	<5.0	<5.0	<5.0	<5.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	26.1	22.7	22.7	28.6
Zinc	1.0 ug/g dry	32.8	27.4	27.6	39.3
Hydrocarbons	<u>,                                      </u>		ı	r	
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6
PCBs	T T		Г	T	
PCBs, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Decachlorobiphenyl	Surrogate	64.6%	92.7%	89.1%	79.4%



Report Date: 19-Aug-2016

Certificate of Analysis Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016 Client PO: Project Description: 1530908-2000

MW-8A MW-7B MW-8B MW-9A Client ID: Sample Date: 07-Aug-16 07-Aug-16 07-Aug-16 07-Aug-16 1634132-21 1634132-22 1634132-23 1634132-24 Sample ID: Soil Soil Soil Soil MDL/Units **Physical Characteristics** 0.1 % by Wt. % Solids 95.2 87.8 90.3 89.9 Metals 1.0 ug/g dry Antimony <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Arsenic <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Barium 37.3 49.3 47.0 44.5 Beryllium 1.0 ug/g dry <1.0 <1.0 <1.0 <1.0 Boron 1.0 ug/g dry 1.2 1.2 1.9 1.1 0.5 ug/g dry Cadmium < 0.5 < 0.5 < 0.5 < 0.5 1.0 ug/g dry Chromium 13.4 12.6 12.4 11.3 1.0 ug/g dry Cobalt 3.9 3.4 3.4 3.3 1.0 ug/g dry Copper 6.7 5.9 5.5 7.2 1.0 ug/g dry Lead 7.2 5.8 6.0 6.6 0.1 ug/g dry <0.1 < 0.1 <0.1 < 0.1 Mercury 1.0 ug/g dry <1.0 <1.0 <1.0 Molybdenum <1.0 1.0 ug/g dry Nickel 5.6 5.6 5.2 5.0 1.0 ug/g dry Selenium <1.0 <1.0 <1.0 <1.0 0.5 ug/g dry Silver < 0.5 < 0.5 < 0.5 < 0.5 1.0 ug/g dry Thallium <1.0 <1.0 <1.0 <1.0 5.0 ug/g dry <5.0 Tin <5.0 <5.0 <5.0 1.0 ug/g dry Uranium <1.0 <1.0 <1.0 <1.0 1.0 ug/g dry Vanadium 23.8 23.5 23.1 21.3 1.0 ug/g dry Zinc 32.4 27.0 26.4 25.8 **Hydrocarbons** 7 ug/g dry F1 PHCs (C6-C10) <7 <7 <7 <7 4 ug/g dry F2 PHCs (C10-C16) <4 <4 <4 <4 8 ug/g dry <8 F3 PHCs (C16-C34) <8 <8 <8 6 ug/g dry F4 PHCs (C34-C50) <6 <6 <6 <6 **PCBs** 0.05 ug/g dry PCBs, total < 0.05 < 0.05 < 0.05 < 0.05 Decachlorobiphenyl Surrogate 97.4% 93.0% 76.7% 89.1%



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 19-Aug-2016

Order Date: 15-Aug-2016

Client PO: Project Description: 1530908-2000

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Tin	ND	5.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
PCBs									
PCBs, total	ND	0.05	ug/g						
Surrogate: Decachlorobiphenyl	0.0792		ug/g		79.2	60-140			



Report Date: 19-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016 Client PO: Project Description: 1530908-2000

Method Quality Control: Duplicate

		Reporting		Source		%REC		RPD	
Analyte	Result	Limit	Units	Result	%REC	Limit	RPD	Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Metals		-	-9.9)						
Antimony	ND	1.0	ug/g dry	ND				30	
Arsenic	ND	1.0	ug/g dry	ND				30	
Barium	137	1.0	ug/g dry	148			8.1	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	ND	1.0	ug/g dry	ND			0.0	30	
Cadmium	ND	0.5	ug/g dry	ND				30	
Chromium	31.9	10.0	ug/g dry	33.2			4.0	30	
Cobalt	6.53	1.0	ug/g dry	6.99			6.8	30	
Copper	16.0	1.0	ug/g dry	17.0			6.1	30	
Lead	4.86	1.0	ug/g dry	5.57			13.5	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	11.8	1.0	ug/g dry	12.4			4.9	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Tin	ND	5.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	46.8	1.0	ug/g dry	50.9			8.6	30	
Zinc	39.1	1.0	ug/g dry	41.1			5.0	30	
PCBs									
PCBs, total	ND	0.05	ug/g dry	ND				40	
Surrogate: Decachlorobiphenyl	0.102		ug/g dry		97.8	60-140			
Physical Characteristics									
% Solids	84.9	0.1	% by Wt.	84.5			0.4	25	



Report Date: 19-Aug-2016 Order Date: 15-Aug-2016

Project Description: 1530908-2000

Certificate of Analysis
Client: Golder Associates Ltd. (Ottawa)

Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	186	7	ug/g		93.0	80-120			
F2 PHCs (C10-C16)	98	4	ug/g	ND	100	60-140			
F3 PHCs (C16-C34)	181	8	ug/g	ND	89.2	60-140			
F4 PHCs (C34-C50)	148	6	ug/g	ND	110	60-140			
Metals									
Antimony	246		ug/L	ND	98.3	70-130			
Arsenic	253		ug/L	ND	101	70-130			
Barium	215		ug/L		86.0	70-130			
Beryllium	217		ug/L	ND	86.7	70-130			
Boron	248		ug/L	11.2	94.9	70-130			
Cadmium	297		ug/L	ND	119	70-130			
Chromium	209		ug/L		83.7	70-130			
Cobalt	354		ug/L	140	85.6	70-130			
Copper	555		ug/L	340	86.0	70-130			
Lead	301		ug/L	111	75.8	70-130			
Mercury	1.23	0.1	ug/g	ND	82.0	70-130			
Molybdenum	231		ug/L	18.3	85.2	70-130			
Nickel	449		ug/L	247	80.7	70-130			
Selenium	185		ug/L	ND	74.1	70-130			
Silver	184		ug/L	ND	73.5	70-130			
Thallium	195		ug/L	16.6	71.2	70-130			
Tin	229		ug/L	13.0	86.4	70-130			
Uranium	281		ug/L	ND	112	70-130			
Vanadium	1210		ug/L	1020	77.0	70-130			
Zinc	997		ug/L	821	70.4	70-130			
PCBs									
PCBs, total	0.523	0.05	ug/g	ND	126	60-140			
Surrogate: Decachlorobiphenyl	0.106		ug/g		102	60-140			



Certificate of Analysis

Order #: 1634132

Report Date: 19-Aug-2016 Order Date: 15-Aug-2016

Client PO: Project Description: 1530908-2000

#### **Qualifier Notes:**

None

#### **Sample Data Revisions**

None

#### **Work Order Revisions / Comments:**

Client: Golder Associates Ltd. (Ottawa)

None

#### **Other Report Notes:**

n/a: not applicable ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'. Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

#### CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.



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www.paracellabs.com

(Lab Use Only)

Chain of Custody

Nº 107623

Page \_ of 4

Client Name: Golder Associates	1		Į.	Project Reference:	1530	90	8	-	20	0	0	4	4	TAT:	Régula	r [1	3 Day	-
Contact Name: Alyssa Troke			1100	Quote#	8-30K	1				nes				1	,		******	
Address: 1931 Robertson Road, Ottai	υα			PO#	6-011	5.								l	[] 2 Day	Į.	] 1 Day	
K2H 5B7				Email Address:	alyssa_	tro	re	0	90	de	r. (c	m		Date Rec	quired:			
Telephone: 613 592 9600				Email Address: d	enderl	eit	46	9	20	de	1.C	our					1	
Criteria: [ ] O. Reg. 153/04 (As Amended) Table _ [ ] RSC Filin	ng [ ] O. R	eg. 558/	/00 []P	WQO MCCME	[ ] SUB (Stor	m) [	] SU	B (Sa	nitary	) Mu	nicipalit	y:		_[]0	ther:			
Matrix Type S (Soil/Sed.) GW (Ground Water) SW (Surface Water)	SS (Storm/S	anitary S	ewer) P (	Paint) A (Air) O (C	Other)	Re	quir	ed A	naly	ses	N 97						1367	
Paracel Order Number: 1634132-5011. 1634136-water	ix	Air Volume	of Containers	Sample	Taken	FI-F4+BTEX	s		Is by ICP		ws)	e Rote						
Sample ID/Location Name	Matrix	Air 1	# of	Date	Time	PHCs	VOCs	PAHs	Metals	Hg	CrVI B (HWS)	see		-6	Oml	+9	50 m	(-
1 MASSA MW15-A	5		2	Aug-6			1					X	8	Hy.	ESE	Smil	12	1)
2 MW-15B	5		2	Aug 6								X		• /	/ -		0	
3 MW-16 A	S		2	Aug-6								X						
4 MW-17A	9		2	Aug-6								X						1
5 MW-17B	S		2	Avg-6								X						
6 MIN - 10 A	S		2	Aug 6								X						
7 MILI-18 13	5	-	2	Aug 6			T		Ī	П		K						
8 MILI - 19 A	9	12 1	2	Avg 6		1				П		X						
9 MI17-19B	18		2	Ava 6		1				П		X						
10 MIN - 10 A	S		2	Aleca	1850							X						V,
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Chain of Custody

(Lab Use Only)

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Sample ID/Location Name	Matrix	Air 7	Jo #	Date	Time	PHCs	VOCs	PAHs	Metals	Hg	B (HWS)	See						
1 NW-10B	3		2	Aug Ce						11		X	-	bom	4	150	ml	- /
2 MW - 12A	S		2	Aug 6								X				1		1
3 MW - 13A	5		2	Aug 6								X						,
4 MW - 14A	S		2	Aug 6								X						1
5 MW - 5A	5		2	Aug 7								χ						1
6 MW - 5B	8		2	1								X						
7 MW-6A	3		2									X						
8 MW-6B	S		2			T						X						
9 MW-7A	8		2									X						1
10 MIN-7B	S		12	1		3,4						X	-			V		1
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Nº 107625

Page 3 of 4

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Sample ID/Location Name	Matrix	Air	Jo#	Date	Time	PHCs	VOCs	PAHs	Metals	H	CrVI B (HWS)	See						
1 UW-8A	S		2	Aug 7/16	EN 187	1						X		60	ML	+0	501	nl-1
2 W-8B	1		2	7								X						1
3 NW-QA	-		2									4		V.		V		1
4 MW-5	W		6	Aug 7	10:10							X						1
5 MW-6	W		4	Aug 7	11:35							X	Nx.	BP	CB:0	F PI	C b	He
6 HW - 8	iN		6	Aug 7	1240							X					/2	
7 MW 9	M		6	Aug 7	1315							X						1
8 UU - 13	IN		4	Augle	1330	-						X	0	080	Bac	PHC	MH	10.1
9 UW -15	W		6	Aug 6	1150							X						
10 MI) - VO	W		6	Avab	1225										- 10	1.4	e a	
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Parac	el Order Number: 1634132 - Soil. 1634136 - Water.	×i	Air Volume	# of Containers	Sampl	e Taken	S F1-F4+BTEX	S	S	Metals by ICP		CrVI B (HWS)	se vote	2					8 8
	Sample ID/Location Name	Matrix	Air	Jo#	Date	Time	PHCs	VOCs	PAHs	Meta	Hg	CrVI B (H)	NB						
1	MW-19	W		5	Aug 6	1400							X	1	20 F	CB	bottl	e	
2	410-17	W		5	Aug 6	1300						_	X			11			
3												1							
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# **Appendix C2**

Certificate Of Analysis –
Paracel Laboratories Ltd.,
Sept. 2, 2016; Order #1634136



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## Certificate of Analysis

#### Golder Associates Ltd. (Ottawa)

1931 Robertson Rd. Ottawa, ON K2H 5B7 Attn: Alyssa Troke

Client PO:

Project: 1530908-2000 Custody: 107625/107626 Report Date: 2-Sep-2016 Order Date: 15-Aug-2016

Revised Report

Order #: 1634136

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634136-01	MW-5
1634136-02	MW-6
1634136-03	MW-8
1634136-04	MW-9
1634136-05	MW-13
1634136-06	MW-15
1634136-07	MW-16
1634136-08	MW-19
1634136-09	MW-17

Approved By:

2 mgc

Tim McCooeye Senior Advisor



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 15-Aug-2016

Client PO: Project Description: 1530908-2000

### **Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date Analysis Date
Mercury by CVAA	EPA 245.1 - Cold Vapour AA	17-Aug-16 17-Aug-16
Metals, ICP-MS	EPA 200.8 - ICP-MS	18-Aug-16 18-Aug-16
PCBs, total	EPA 608 - GC-ECD	18-Aug-16 18-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	16-Aug-16 18-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Aug-16 18-Aug-16



Report Date: 02-Sep-2016

Order Date: 15-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

	Client ID:	MW-5	MW-6	MW-8	MW-9
	Sample Date:	07-Aug-16	07-Aug-16	07-Aug-16	07-Aug-16
	Sample ID:	1634136-01	1634136-02	1634136-03	1634136-04
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt	0.0005 mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Copper	0.0005 mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Lead	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Zinc	0.005 mg/L	<0.005	<0.005	0.006	<0.005
Hydrocarbons					
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [1]	<0.025 [1]	<0.025 [1]	<0.025 [1]
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [1]	-	<0.100 [1]	<0.100 [1]
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [1]	-	<0.100 [1]	<0.100 [1]
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [1]	-	<0.100 [1]	<0.100 [1]
PCBs	-				
PCBs, total	0.00005 mg/L	<0.00005	-	<0.00005	<0.00005
Decachlorobiphenyl	Surrogate	72.5%	-	76.0%	84.6%



Certificate of Analysis Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016 Client PO: Project Description: 1530908-2000

	Client ID: Sample Date: Sample ID: MDL/Units	MW-13 06-Aug-16 1634136-05 Water	MW-15 06-Aug-16 1634136-06 Water	MW-16 06-Aug-16 1634136-07 Water	MW-19 06-Aug-16 1634136-08 Water
Metals					
Mercury	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt	0.0005 mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Copper	0.0005 mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Lead	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Zinc	0.005 mg/L	<0.005	<0.005	0.010	<0.005
Hydrocarbons	1		<b>-</b>	<b>.</b>	,
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [1]	<0.025 [1]	<0.025 [1]	<0.025 [1]
F2 PHCs (C10-C16)	0.100 mg/L	-	<0.100 [1]	<0.100 [1]	<0.100 [1]
F3 PHCs (C16-C34)	0.100 mg/L	-	<0.100 [1]	<0.100 [1]	<0.100 [1]
F4 PHCs (C34-C50)	0.100 mg/L	-	<0.100 [1]	<0.100 [1]	<0.100 [1]
PCBs			•		
PCBs, total	0.00005 mg/L	-	<0.00005	<0.00005	-
Decachlorobiphenyl	Surrogate	-	88.6%	77.5%	-
	Client ID: Sample Date: Sample ID:	MW-17 06-Aug-16 1634136-09	- - -	- - -	- - -
Metals	MDL/Units	Water	-	-	-
Mercury	0.0001 mg/L	<0.0001	_	_	_
Arsenic	0.001 mg/L	<0.001	_	_	_
Cadmium	0.0001 mg/L	<0.0001	_	_	_
Chromium	0.001 mg/L	<0.001	_	-	_
Cobalt	0.0005 mg/L	<0.0005	-	-	-
Copper	0.0005 mg/L	<0.0005	-	_	-
Lead	0.0001 mg/L	<0.0001	-	-	-
Nickel	0.001 mg/L	<0.001	-	_	-
Zinc	0.005 mg/L	<0.005	-	-	-
Hydrocarbons	1 - 1		1	1	1
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [1]	-	-	-
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [1]	-	-	-
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [1]	-	-	-
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [1]	-	-	-
	•		-	-	-

Report Date: 02-Sep-2016



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 15-Aug-2016

Client PO: Project Description: 1530908-2000

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L						
F2 PHCs (C10-C16)	ND	0.100	mg/L						
F3 PHCs (C16-C34)	ND	0.100	mg/L						
F4 PHCs (C34-C50)	ND	0.100	mg/L						
Metals									
Mercury	ND	0.0001	mg/L						
Arsenic	ND	0.001	mg/L						
Cadmium	ND	0.0001	mg/L						
Chromium	ND	0.001	mg/L						
Cobalt	ND	0.0005	mg/L						
Copper	ND	0.0005	mg/L						
Lead	ND	0.0001	mg/L						
Nickel	ND	0.001	mg/L						
Zinc	ND	0.005	mg/L						
PCBs									
PCBs, total	ND	0.00005	mg/L						
Surrogate: Decachlorobiphenyl	0.00020		mg/L		80.6	60-140			



Report Date: 02-Sep-2016

Page 6 of 8

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016 Client PO: Project Description: 1530908-2000

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons F1 PHCs (C6-C10)	ND	0.025	mg/L	ND				30	
Metals			· ·						
Mercury	ND	0.0001	mg/L	ND				20	
Arsenic	0.0046	0.001	mg/L	0.0036			22.7	20	QR-01
Cadmium	ND	0.0001	mg/L	ND			0.0	20	
Chromium	ND	0.001	mg/L	ND			0.0	20	
Cobalt	0.00625	0.0005	mg/L	0.00630			0.7	20	
Copper	ND	0.0005	mg/L	ND			0.0	20	
Lead	ND	0.0001	mg/L	ND			0.0	20	
Nickel	0.0133	0.001	mg/L	0.0133			0.0	20	
Zinc	0.009	0.005	mg/L	0.008			0.6	20	



Report Date: 02-Sep-2016 Order Date: 15-Aug-2016

Project Description: 1530908-2000

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa) Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1.99	0.025	mg/L		99.4	68-117			
F2 PHCs (C10-C16)	1.22	0.100	mg/L		68.0	60-140			
F3 PHCs (C16-C34)	3.24	0.100	mg/L		87.2	60-140			
F4 PHCs (C34-C50)	2.11	0.100	mg/L		85.2	60-140			
Metals									
Mercury	0.00309	0.0001	mg/L	ND	103	70-130			
Arsenic	46.1		ug/L		92.2	80-120			
Cadmium	46.9		ug/L		93.9	80-120			
Chromium	46.8		ug/L		93.6	80-120			
Cobalt	46.5		ug/L		93.0	80-120			
Copper	46.1		ug/L		92.1	80-120			
Lead	43.1		ug/L		86.1	80-120			
Nickel	46.2		ug/L		92.3	80-120			
Zinc	48		ug/L		95.9	80-120			
PCBs									
PCBs, total	0.00110	0.00005	mg/L		110	60-140			
Surrogate: Decachlorobiphenyl	0.00021		mg/L		87.2	60-140			



Report Date: 02-Sep-2016

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Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client: Golder Associates Ltd. (Ottawa)

Order Date: 15-Aug-2016

Client PO:

Project Description: 1530908-2000

#### **Qualifier Notes:**

**Login Qualifiers:** 

Sample - One or more parameter received past hold time -

Applies to samples: MW-5, MW-6, MW-8, MW-9, MW-13, MW-15, MW-16, MW-19, MW-17

Sample - Insufficient volume - Applies to samples: MW-9

Sample Qualifiers:

1: Holding time had been exceeded upon receipt of the sample at the laboratory.

QC Qualifiers:

QR-01: Duplicate RPD is high, however, the sample result is less than 10x the MDL.

#### **Sample Data Revisions**

None

#### **Work Order Revisions / Comments:**

Revision 1, all results reported as mg/L.

#### **Other Report Notes:**

n/a: not applicable ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

#### CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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1634136-water	xiri	Volume	of Containers	Sample	e Taken	E	s		ls by ICP		VS)	34						
Sample ID/Location Name	Matrix	Air	# of	Date	Time	PHCs	VOC	PAHs	Metals	Hg	B (HWS)	See						
1 MW-8A	S		2	Aug 7/16		- 1					+	X		11	mi	+0	NEW /	yn/
2 MW - 8B	1		2	J, 1/10						+	$^{\dagger}$	X		00	1111	10	1501	11/~
3 MW-9A	-		2					П	+	+	+	4				+	-	-
4 MW-5	W		6	Aug 7	10:10			$\vdash$	$\dashv$	+	+	V				V	_	-
5 MW-6	W		11	103	11:35				+	+	+						_	
6 MW-8	IN		6	Aug t				-	+	+	+	1	M	多月	CB.O.	P	C p	He
1 MW-9 X Proceed	JAK		0	Aug 7	1240			-		+	+						9	/
8 1111-13 PC	2 111	Acd	0	Aug T	1315		1 1			+	+	X						
9 UW -15	SAU		4	Augle	1330	-		-	+	+	+	X	0	0 PC	Bor	PHC	Hod	e -
10 MW - 16	W		6	Augb	1150				-	-	-	X						
Comments:	W		6	Augb	1225					25.0		X						,
Cancel POB+PNC ES	A	1 +	10	MW	e + M	11	2	(	0	21	11	D.			Method	of Deliv	ery:	1
Celinquished By (Sign):		by Driv	er/Depot	1	Receive	d at L	ah:				M)		Verified		\ \	<u> 1411</u>	<u>ر ب</u>	
tellinquished By (Print): Janua Woodhouse	Date/Tin	ne:	RX	112 50	Date/Ti				Q n	VV)	VIV	4 (14)	Doto (T)	Kad	nel .	Sil	Sect	
Date/Time: Aug 15/16 430 pm	Tempera		0(	2.00	Temper				COOL	15		10.09	oH Verit	ie: A	19 /	2/16	2 2	:49
0							-					1		[-] 1	7.	_		



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Head Office 300-2319 St. Laurent Blvd. Ottawa, Ontario K1G 4J8 p: 1-800-749-1947 e: paracel@paracellabs.com

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Chain of Custody (Lab Use Only)

№ 107626

Client Name: GAL	)			Desired D. C.	20.0								i.		Pag	ge 4 o	f_4	
Contact Name:			77	Project Referen	100	00	10	8	- 0	20	00	) -		TAT:	Regu	lar [	] 3 Day	
Address: See page	-		_	PO#	15-30	94		18	<b>&gt;</b> ~	0	10	•		/	[] 2 Da		] 1 Day	
- W 9				Email Address:	aluce	+00	40	(2)	00	10	2 400					, i	ј г Бау	-, -
Telephone:				1	alyss-	1 -	10	1/	J	3 0	ي. ر ال	on		Date Re	equired:			_
Criteria: [ ] O. Reg. 153/04 (As Amended) Table [ ] RSC Filin	g [] O.	Reg. 558	/00 [ ]	PWQO IXCCN	IE I I SUB (Stor	m) 1	1SUI	/ <b>7</b> /	7 @	Mill	0/OL	<u>er.co</u>	М	( )	Other:			
Matrix Type: S (Soil/Sed.) GW Ground Water) SW (Surface Water)	SS (Storm/	Sanitary S	Sewer) P	(Paint) A (Air) O	(Other)	T	uire				nerbati	) k		1.11	Aner;			
Paracel Order Number:	T		S			1.2	П		T	Т	$\top$			T -				
1634132-5011.	2)	ne	aine	Samn	le Taken	+BTE			Д									
1634136-water.	rix	Air Volume	# of Containers	Samp	e raken	F1-F4+BTEX			s by 1CP		(S)	ofe						
Sample ID/Location Name	Matrix	Air	# of	Date	Time	PHCs	VOCs	PAHs	Metals	H g	B (HWS)	See						
1 MW - 19	W		5	Aug 6	1400	-			-		7 1 1 1	V		2.	-	111		
2 MW-17	W		5	1 . 1 .	1300	-			$\forall$	+	+	1		001		1004	e	-1
3				Aug 6	1300	$\vdash$	$\vdash$	$\dashv$	+	+	+	/\			//			-1
4							Н		+	+	+							
5						$\vdash$	Н	-	+	+	+							
6							H	-	+	+	+							
7						-		$\dashv$	+	+	+							
8						$\vdash$	$\dashv$	$\dashv$	+	+	+							
9							-	-	+	+	+							
10	1	- 1				-	-	-	+	+	-							
Comments:														<u></u>	Post source of the source of t			
Carrel Pie Cal	N N	. \						7 22					ee 100gm	_	Method	of Deliver	y: /	
Relinquished By (Sign): Which se Relinquished By (Print): Too note Who does se	Received	by Drive	er/Depot:	11	Receive	d at L	2< h:	20	70	A	Jul.	). (	Verified	By:	L M	JOK	-11	)
celinquished By (Print): Toanve Woodhouse	Date/Tim	e: 08	515	16 80	Y WAO Date/Ti	(M)	YU	KN	04	10	KM	A1 2.02	D	Rac	hel.	Subi	ect	
Date/Time: Aug 15/16 430	Temperat	ure:	°C	, , , ,	Date/Til	ature:	19.	20	GAN	V	1	d/Vd	pH Veri	ne: Au	9 16 3y: 1/2	16	2!1	19

# **Appendix C3**

Certificate Of Analysis –
Paracel Laboratories Ltd.,
Sept. 2, 2016; Order #1634161



300 - 2319 St. Laurent Blvd Ottawa, ON, K1G 4J8 1-800-749-1947 www.paracellabs.com

## Certificate of Analysis

Golder Associates Ltd. (Ottawa)

1931 Robertson Rd. Ottawa, ON K2H 5B7 Attn: Alyssa Troke

Client PO:

Project: 1530908-2000 Custody: 107627 Report Date: 2-Sep-2016 Order Date: 16-Aug-2016

Revised Report

Order #: 1634161

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID Client ID 1634161-01 MW-19

Approved By:

2 mgc

Tim McCooeye Senior Advisor



Report Date: 02-Sep-2016

Certificate of Analysis Client: Golder Associates Ltd. (Ottawa)

Order Date: 16-Aug-2016 Client PO:

Project Description: 1530908-2000

### **Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PCBs, total	EPA 608 - GC-ECD	18-Aug-16	18-Aug-16



Client PO:

Order #: 1634161

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016 Order Date: 16-Aug-2016

Page 3 of 6

Project Description: 1530908-2000

	Client ID:	MW-19	-	-	-
	Sample Date:	06-Aug-16	-	-	-
	Sample ID:	1634161-01	-	-	-
	MDL/Units	Water	-	-	-
PCBs					
PCBs, total	0.00005 mg/L	<0.00005	-	-	-
Decachlorobiphenyl	Surrogate	94.3%	-	-	-

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Report Date: 02-Sep-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Order Date: 16-Aug-2016 Client PO: Project Description: 1530908-2000

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
PCBs PCBs, total Surrogate: Decachlorobiphenyl	ND ).00020.	0.00005	mg/L <i>mg/</i> L		80.6	60-140			



Report Date: 02-Sep-2016

Order Date: 16-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
PCBs PCBs, total	0.00110	0.00005	mg/L		110	60-140			
Surrogate: Decachlorobiphenyl	0.00021		mg/L		87.2	60-140			



Report Date: 02-Sep-2016 Order Date: 16-Aug-2016

Page 6 of 6

Project Description: 1530908-2000

## Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa) Client PO:

### **Qualifier Notes:**

**Login Qualifiers:** 

Sample - Insufficient volume - Bottle half full Applies to samples: MW-19

#### **Sample Data Revisions**

None

#### **Work Order Revisions / Comments:**

Revision 1, all results reported as mg/L.

#### **Other Report Notes:**

n/a: not applicable ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.



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www.paracellabs.com

Chain of Custody (Lab Use Only)

Nº 107627

Ol: 13					Delices:					- 1				200	Pag	e lo	f $\perp$	4
Client Name: Golder Associates						Project Reference: 15 3 0 9 0 8 - 20 0 0								TAT. Mpinka 130 P				
Alussa Iroke						Quote# 15=301 Golde Dew Lines Monitorin												
Address	1931 Robertson Road	Ottan	19		PO#	3010	ya		reu	1	INE S	/ CON!	Orivo	1	[] 2 Day	[	] 1 Day	î
	K2H 587		3 15		Email Address:	alunco +	calle	6	pole	101		ъ		Date Re	auired:			
Telepho	ne: 613 592 9600	=			1	alyssa-t	201	0 141	0	A.	12	2000	1			11 11 11		-
Criteria	t: [ ] O. Reg. 153/04 (As Amended) Table [ ] RSC Fi	ling [] O.1	Reg. 558	/00 []	PWQO KICCH	AE [ ] SUB (Stor	m) [ ]	SUB (S	Sanitar	W M	unicipal	ity:	<u>n</u>	(10	Other:			
	Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water						T	uired							-			
Parac	el Order Number:	T		ys		1	X	Т	T			T d	1	1	0.7		· plpt is	
	1634161	ίχ	Air Volume	of Containers	Samp	le Taken	F1-F4+BTEX		Metals by ICP		(9)	ste (PCB						
	Sample ID/Location Name	Matrix	Air 1	# of	Date	Time	PHCs	VOCS	detals	Hg	CrVI	See				M No.		4
1	MW-19	W		1	Avg 6	1400			-	_	0 0	X		2	Da	172		
2					1		$\forall$	$\top$	T	1					70	0/1		
3			1				$\dagger$	$\top$	t									
4							$\forall$	$\top$	T		$\dagger$							
5											$\top$	,						-
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Comm	Rec	Qarl	Λ(	CG	cd les	Receiv	2	In				1 10	101	Λ 0	Method	of Delive	ry: , (-+)	$\cap$
	shed By (Sign):	Received	l by Driv	rer/Dopot		Receiv	Sd-ài Le	ELPO	RN	```		IMAL	Verified	By:	hel	Silv	- (1	-
Relinqui	shed By (Print): Janue Woodhouse	Date/Tin		81	MOI	1201/ Date/T			201	0			Date/Ti	MINNSHIP WAR	ua li	6/16	7 7	.5/
Date/Tin	ne: Aug 16, 2016 10 am	Tempera	ture:	180	C '	Tempe	rature:	8.8	_°C				pH Veri	fied [X]	By: 10/	A .		

# **Appendix C4**

Certificate Of Analysis –
AGAT Laboratories Ltd.,
Sept. 15, 2016; Order #16Z126843



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1530908-2000

AGAT WORK ORDER: 16Z126843

SOIL ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Sep 15, 2016

PAGES (INCLUDING COVER): 9

VERSION\*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 9

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

### Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CCME	Metale	Scan	(Soil)	(incl. Hg)	
CCIVIE	IVICIAIS	Scarr	(3011)	(IIICI, FIG)	

				CCIVIE IV	ietais Scail (	Soll) (ilici. rig)
DATE RECEIVED: 2016-08-16	6					DATE REPORTED: 2016-09-15
		SAMPLE DES	CRIPTION:	MW-18B dup	MW-7A dup	
		SAMPLE TYPE:		Soil	Soil	
		DATE SAMPLED:		8/6/2016	8/6/2016	
Parameter	Unit	G/S	RDL	7777704	7777711	
Arsenic	mg/kg		1	3	2	
Cadmium	mg/kg		0.5	<0.5	<0.5	
Cobalt	mg/kg		0.5	4.0	4.2	
Chromium	mg/kg		1	15	15	
Copper	mg/kg		1	9	9	
Lead	mg/kg		1	6	7	
Mercury	mg/kg		0.10	<0.10	<0.10	
Nickel	mg/kg		1	6	7	
Zinc	mg/kg		1	45	41	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Mile Munemen



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

## Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

SAMPLING SITE. DEW LINE						SAMPLED BY.
					PCBs (Total)	al) - Soil
DATE RECEIVED: 2016-08-16						DATE REPORTED: 2016-09-15
	;	SAMPLE DESC	RIPTION:	MW-18B dup	MW-7A dup	
		SAMP	LE TYPE:	Soil	Soil	
		DATE S	AMPLED:	8/6/2016	8/6/2016	
Parameter	Unit	G/S	RDL	7777704	7777711	
PCBs	mg/kg		0.05	<0.05	<0.05	
Surrogate	Unit	Acceptable	e Limits			
Decachlorobiphenyl	%	60-13	30	116	120	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7777704-7777711 Results are based on the dry weight of soil extracted.





Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

Petroleum Hydrocarbons F1 - F4 (C6 - C50) in Soil

				<b>,</b>		(,
DATE RECEIVED: 2016-08-16						DATE REPORTED: 2016-09-15
		SAMPLE DES	CRIPTION:	MW-18B dup	MW-7A dup	
		SAM	PLE TYPE:	Soil	Soil	
		DATE	SAMPLED:	8/6/2016	8/6/2016	
Parameter	Unit	G/S	RDL	7777704	7777711	
C6 - C10 (F1)	mg/kg		5	<5	<5	
C>10 - C16 (F2)	mg/kg		10	<10	<10	
C>16 - C34 (F3)	mg/kg		50	<50	<50	
C>34 - C50 (F4)	mg/kg		50	<50	<50	
Gravimetric Heavy Hydrocarbons	mg/kg		50	NA	NA	
Moisture Content	%		0.1	5.8	4.9	

Comments:

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

RDL - Reported Detection Limit; G / S - Guideline / Standard

7777704-777711 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Quality Control Data is available upon request.



### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843 PROJECT: 1530908-2000 ATTENTION TO: Alyssa Troke

SAMPLING SITE: DEW Line SAMPLED BY:

5/11/1 EI/10 6/7 EI/10 EI/															
				Soi	l Ana	alysis	3								
RPT Date: Sep 15, 2016				DUPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	МАТ	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value		Acceptable Limits			ptable mits	Recovery	1 1:0	eptable mits
	Id Id		·	·			value	Lower Upper			Lower	Upper		Lower	Upper
CCME Metals Scan (Soil) (incl	. Hg)														
Arsenic	7787168		3	2	NA	< 1	105%	70%	130%	102%	80%	120%	103%	70%	130%
Cadmium	7787168		<0.5	<0.5	NA	< 0.5	106%	70%	130%	111%	80%	120%	107%	70%	130%
Cobalt	7787168		5.3	4.8	9.9%	< 0.5	102%	70%	130%	108%	80%	120%	106%	70%	130%
Chromium	7787168		12	12	0.0%	< 1	88%	70%	130%	104%	80%	120%	100%	70%	130%
Copper	7787168		12	11	8.7%	< 1	97%	70%	130%	106%	80%	120%	100%	70%	130%
Lead	7787168		5	5	0.0%	< 1	103%	70%	130%	104%	80%	120%	105%	70%	130%
Mercury	7787168		<0.10	<0.10	NA	< 0.10	118%	70%	130%	92%	80%	120%	93%	70%	130%
Nickel	7787168		9	8	11.8%	< 1	99%	70%	130%	108%	80%	120%	105%	70%	130%
Zinc	7787168		24	24	NA	< 1	98%	70%	130%	111%	80%	120%	105%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.



### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1530908-2000 SAMPLING SITE:DEW Line AGAT WORK ORDER: 16Z126843
ATTENTION TO: Alyssa Troke

SAMPLED BY:

			Trac	e Or	ganio	s Ar	alysi	is							
RPT Date: Sep 15, 2016			[	DUPLICATE			REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Batch Sample Id		Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	منا ا	ptable nits	Recovery		ptable nits
		lu lu					value	Lower Upper			Lower	Upper		Lower	Upper
PCBs (Total) - Soil PCBs	7779859		< 0.05	< 0.05	NA	< 0.05	118%	60%	140%	99%	60%	140%	101%	60%	140%
PCBs (Total) - Water PCBs	7773484		< 0.05	< 0.05	NA	< 0.05	118%	60%	140%	117%	60%	140%	87%	60%	140%
Petroleum Hydrocarbon F1 - F4 ir	n Water														
C6 - C10 (F1)	7771856		< 25	< 25	NA	< 25	104%	70%	130%	115%	70%	130%	89%	70%	130%
C>10 - C16 (F2)		TW	< 100	< 100	NA	< 100	102%	70%	130%	81%	70%	130%	70%	70%	130%
C>16 - C34 (F3)		TW	< 100	< 100	NA	< 100	107%	70%	130%	96%	70%	130%	71%	70%	130%
C>34 - C50 (F4)		TW	< 100	< 100	NA	< 100	100%	70%	130%	85%	70%	130%	102%	70%	130%
Petroleum Hydrocarbons F1 - F4	(C6 - C50) i	n Soil													
C6 - C10 (F1)	7783958		< 5	< 5	NA	< 5	96%	60%	130%	105%	60%	130%	92%	60%	130%
C>10 - C16 (F2)	7785901		< 10	< 10	NA	< 10	102%	70%	130%	96%	70%	130%	70%	70%	130%
C>16 - C34 (F3)	7785901		< 50	< 50	NA	< 50	103%	70%	130%	97%	70%	130%	72%	70%	130%
C>34 - C50 (F4)	7785901		< 50	< 50	NA	< 50	98%	70%	130%	97%	70%	130%	83%	70%	130%





### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843 PROJECT: 1530908-2000 ATTENTION TO: Alyssa Troke

SAMPLING SITE: DEW Line SAMPLED BY:

Water Analysis															
RPT Date: Sep 15, 2016			DUPLICATE				REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value			Recovery	منا أ	ptable nits	Recovery	1 1:0	ptable nits
		Id	·				value	Lower	Upper		Lower	Upper	,		Upper
CCME Metals - (Water) - (incl. Hg)															
Arsenic	7778482		< 0.001	< 0.001	NA	< 0.001	99%	90%	110%	98%	90%	110%	106%	70%	130%
Cadmium	7778482		< 0.0001	< 0.0001	NA	< 0.0001	99%	90%	110%	97%	90%	110%	100%	70%	130%
Chromium	7778482		< 0.001	< 0.001	NA	< 0.001	102%	90%	110%	103%	90%	110%	106%	70%	130%
Cobalt	7778482		< 0.0005	< 0.0005	NA	< 0.0005	105%	90%	110%	105%	90%	110%	100%	70%	130%
Copper	7778482		< 0.005	< 0.005	NA	< 0.005	105%	90%	110%	104%	90%	110%	99%	70%	130%
Lead	7778482		< 0.0001	< 0.0001	NA	< 0.0001	100%	90%	110%	99%	90%	110%	96%	70%	130%
Mercury	7779737		<0.0001	<0.0001	NA	< 0.0001	101%	90%	110%	100%	90%	110%	98%	80%	120%
Nickel	7778482		< 0.005	< 0.005	NA	< 0.005	107%	90%	110%	106%	90%	110%	102%	70%	130%
Zinc	7778482		< 0.005	< 0.005	NA	< 0.005	104%	90%	110%	103%	90%	110%	97%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

# **Method Summary**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLING SITE:DEW Line SAMPLED BY:

SAMPLING SITE: DEW LINE		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Trace Organics Analysis			
PCBs	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD
PCBs	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Initial Sample Volume			GC/FID
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
C6 - C10 (F1)	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
C>10 - C16 (F2)	VOL-91-5010	MOE PHC-E3421	GC/FID
C>16 - C34 (F3)	VOL-91-5010	MOE PHC-E3421	GC/FID
C>34 - C50 (F4)	VOL -91- 5010	MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC-E3421	BALANCE
C6 - C10 (F1)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
C>10 - C16 (F2)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
C>16 - C34 (F3)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
C>34 - C50 (F4)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL - 5012	CCME Tier 1 Method	GRAVIMETRIC ANALYSIS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	Balance
Water Analysis			
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



5835 Coopers Avenue Mississauga, Ontario L4Z 1Y2 Ph: 905.712.5100 Fax: 905.712.5122 **Laboratory Use Only** 

Chain of Custody Record If this is a Drinking Water sample, please  Report Information: Golder Associacks	Regulatory Requ	irements:								rrival Sustod	ly Sea	ıl Inta	ęt:	Q □Ye	3 6		4   No	9./ 5 DN	1//
Company: Contact: Address:  Address:  Phone: Reports to be sent to: 1. Email:  2. Email:  Contact:  Alyssa Troke Aplenderleth egolder com Alyssa troke egolder com Aplenderleth egolder com	(Please check all applicable boxes,  Regulation 153/04  Table	Sewer I	One		CC Pro Ob	ov. Water jectives ( her Indicate 0	Quality PWQO)		Tu	ırna egula ısh 1	roui ar TA TAT (F 3 Bus Days	nd T AT Rush Su siness	urcharge S	es Apply)	to 7 Bu Busine Days	usiness	s Days	L Business Day	3
Project Information:  Project: /530908 - 2000  Site Location:  Sampled By:	Is this submission Record of Site Co	ndition?	C	ertif	Report Guideline on ertificate of Analysis  Yes No						Pl	ease ,	provid	de prio	r notific	ation f	for rush		
AGAT Quote #:  PO: Please note: If quotathun number is not provided, client will be billed full price for analysis.  Invoice Information:  Bill To Same: Yes   No    Company:  Contact:  Address:  Email:	Sample Matrix Legend  B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg, CrVI (Please Circle)	Metals and Inorganics	Metal Scan Hydride Forming Metals	Client Custom Metals	JCN: O <sub>3</sub> /NO <sub>2</sub> SAR	0	□ vос □ втех □ тнм	CCME Fractions 1 to 4		henols		Organochlorine Pesticides	TCLP Metals/Inorganics	ok 69566				
Sample Identification  Date Sampled  Sampled  Fine Sample Matrix  MW-18 B dup Ag6  Aug 7  Aug 7  1010 5  W	Comments/ Special Instructions	Y/N	Metals	Metal Scan Hydride For	Client C	ORPs:	Nutrien	Volatiles:	CCME	PAHS	Chlorophenols	PCBs	Organo	TCLP Meta	TO SO XXX				
						\		_								_			
Samples Relinquished By (Print Name and Sign):  Samples Relinquished By (Print Name and Sign):  Date  Time  Samples Relinquished By (Print Name and Sign):  Date  Time	Samples Received By (Pr	fint Name and Sirok	u	n	N		Da Da	tra tra	15)	16	Time (	2h	\$ <b>0</b> 2		Page			<u></u>	

# **Appendix C5**

Certificate Of Analysis – AGAT Laboratories Ltd., Nov. 2, 2016; Order #16Z126843



CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1530908-2000

AGAT WORK ORDER: 16Z126843

SOIL ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Nov 02, 2016

PAGES (INCLUDING COVER): 9

VERSION\*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 9

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

SAMPLED BY:

				PCBs (Total) - Water
DATE RECEIVED: 2016-08-16				DATE REPORTED: 2016-11-02
		SAMPLE DESCRIPTION:	MW-5 dup	
		SAMPLE TYPE:	Water	
		DATE SAMPLED:	2016-08-07	
Parameter	Unit	G/S RDL	7777719	
PCBs	mg/L	0.00005	<0.00005	
Initial Sample Volume			0.68	
Surrogate	Unit	Acceptable Limits		
Decachlorobiphenyl	%	60-130	109	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard





CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

Gravimetric Heavy Hydrocarbons

Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

#### Petroleum Hydrocarbon F1 - F4 in Water

DATE RECEIVED: 2016-08-16				
		SAMPLE DESC	CRIPTION:	MW-5 dup
		SAMF	PLE TYPE:	Water
		DATE S	SAMPLED:	2016-08-07
Parameter	Unit	G/S	RDL	7777719
C6 - C10 (F1)	mg/L		0.025	<0.025
C>10 - C16 (F2)	mg/L		0.1	<0.1
C>16 - C34 (F3)	mg/L		0.1	<0.1
C>34 - C50 (F4)	mg/L		0.1	<0.1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

mg/L

7777719 The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

NA

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

0.5

nC6 and nC10 response factors are within 30% of Toluene response factor. nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.

NA = Not Applicable

Certified By:

Jung



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: DEW Line

## Certificate of Analysis

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CCME Metals - (Water) - (incl. Hg)

				CCME I	letais - (Water) - (Incl. Hg)
DATE RECEIVED: 2016-08-16					DATE REPORTED: 2016-11-02
	S	SAMPLE DES	CRIPTION:	MW-5 dup	
		SAM	PLE TYPE:	Water	
		DATE	SAMPLED:	2016-08-07	
Parameter	Unit	G/S	RDL	7777719	
Arsenic	mg/L		0.001	<0.001	
Cadmium	mg/L		0.0001	<0.0001	
Chromium	mg/L		0.001	<0.001	
Cobalt	mg/L		0.0005	< 0.0005	
Copper	mg/L		0.005	< 0.005	
Lead	mg/L		0.0001	<0.0001	
Mercury	mg/L		0.0001	< 0.0001	
Nickel	mg/L		0.005	< 0.005	
Zinc	mg/L		0.005	0.005	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Mile Munemon



### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843 PROJECT: 1530908-2000 ATTENTION TO: Alyssa Troke

SAMPLING SITE: DEW Line SAMPLED BY:

0/ tim En to 6/12/52/7 Em 0															
				Soi	l Ana	alysis	6								
RPT Date: Nov 02, 2016				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Batch Sample		Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	منا ا	ptable nits	Recovery	Lin	ptable mits
		Iu	·	·			value	Lower	Upper		Lower	Upper		Lower	Upper
CCME Metals Scan (Soil) (inc	I. Hg)														
Arsenic	7787168		3	2	NA	< 1	105%	70%	130%	102%	80%	120%	103%	70%	130%
Cadmium	7787168		< 0.5	<0.5	NA	< 0.5	106%	70%	130%	111%	80%	120%	107%	70%	130%
Cobalt	7787168		5.3	4.8	9.9%	< 0.5	102%	70%	130%	108%	80%	120%	106%	70%	130%
Chromium	7787168		12	12	0.0%	< 1	88%	70%	130%	104%	80%	120%	100%	70%	130%
Copper	7787168		12	11	8.7%	< 1	97%	70%	130%	106%	80%	120%	100%	70%	130%
Lead	7787168		5	5	0.0%	< 1	103%	70%	130%	104%	80%	120%	105%	70%	130%
Mercury	7787168		<0.10	<0.10	NA	< 0.10	118%	70%	130%	92%	80%	120%	93%	70%	130%
Nickel	7787168		9	8	11.8%	< 1	99%	70%	130%	108%	80%	120%	105%	70%	130%
Zinc	7787168		24	24	NA	< 1	98%	70%	130%	111%	80%	120%	105%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.



### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1530908-2000 SAMPLING SITE:DEW Line AGAT WORK ORDER: 16Z126843
ATTENTION TO: Alyssa Troke

SAMPLED BY:

			Trac	e Or	ganio	cs Ar	alysi	S							
RPT Date: Nov 02, 2016				UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	1 :	ptable nits	Recovery	منا أ	ptable
		la la		·			value	Lower	Upper	•	Lower	Upper		Lower	Upper
PCBs (Total) - Soil															
PCBs	7779859		< 0.05	< 0.05	NA	< 0.05	118%	60%	140%	99%	60%	140%	101%	60%	140%
PCBs (Total) - Water															
PCBs	7773484		< 0.05	< 0.05	NA	< 0.05	118%	60%	140%	117%	60%	140%	87%	60%	140%
Petroleum Hydrocarbon F1 - F4 i	n Water														
C6 - C10 (F1)	7771856		< 25	< 25	NA	< 25	104%	70%	130%	115%	70%	130%	89%	70%	130%
C>10 - C16 (F2)		TW	< 100	< 100	NA	< 100	102%	70%	130%	81%	70%	130%	70%	70%	130%
C>16 - C34 (F3)		TW	< 100	< 100	NA	< 100	107%	70%	130%	96%	70%	130%	71%	70%	130%
C>34 - C50 (F4)		TW	< 100	< 100	NA	< 100	100%	70%	130%	85%	70%	130%	102%	70%	130%
Petroleum Hydrocarbons F1 - F4	(C6 - C50) i	n Soil													
C6 - C10 (F1)	7783958		< 5	< 5	NA	< 5	96%	60%	130%	105%	60%	130%	92%	60%	130%
C>10 - C16 (F2)	7785901		< 10	< 10	NA	< 10	102%	70%	130%	96%	70%	130%	70%	70%	130%
C>16 - C34 (F3)	7785901		< 50	< 50	NA	< 50	103%	70%	130%	97%	70%	130%	72%	70%	130%
C>34 - C50 (F4)	7785901		< 50	< 50	NA	< 50	98%	70%	130%	97%	70%	130%	83%	70%	130%

Certified By:

Jeurg



### **Quality Assurance**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843 PROJECT: 1530908-2000 ATTENTION TO: Alyssa Troke

SAMPLING SITE: DEW Line SAMPLED BY:

				Wate	er Ar	nalysi	S								
RPT Date: Nov 02, 2016			С	UPLICATE			REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	منا ا	ptable nits	Recovery	1 1 1 1 1	ptable nits
		Id		·			value	Lower	Upper	·	Lower	Upper	,	Lower	Upper
CCME Metals - (Water) - (incl. Hg)	)														
Arsenic	7778482		< 0.001	< 0.001	NA	< 0.001	99%	90%	110%	98%	90%	110%	106%	70%	130%
Cadmium	7778482		< 0.0001	< 0.0001	NA	< 0.0001	99%	90%	110%	97%	90%	110%	100%	70%	130%
Chromium	7778482		< 0.001	< 0.001	NA	< 0.001	102%	90%	110%	103%	90%	110%	106%	70%	130%
Cobalt	7778482		< 0.0005	< 0.0005	NA	< 0.0005	105%	90%	110%	105%	90%	110%	100%	70%	130%
Copper	7778482		< 0.005	< 0.005	NA	< 0.005	105%	90%	110%	104%	90%	110%	99%	70%	130%
Lead	7778482		< 0.0001	< 0.0001	NA	< 0.0001	100%	90%	110%	99%	90%	110%	96%	70%	130%
Mercury	7779737		<0.0001	<0.0001	NA	< 0.0001	101%	90%	110%	100%	90%	110%	98%	80%	120%
Nickel	7778482		< 0.005	< 0.005	NA	< 0.005	107%	90%	110%	106%	90%	110%	102%	70%	130%
Zinc	7778482		< 0.005	< 0.005	NA	< 0.005	104%	90%	110%	103%	90%	110%	97%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

# **Method Summary**

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 16Z126843

PROJECT: 1530908-2000

ATTENTION TO: Alyssa Troke

SAMPLING SITE:DEW Line SAMPLED BY:

SAMPLING SITE: DEW LINE		SAMPLED BY:	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			•
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Trace Organics Analysis			
PCBs	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD
PCBs	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
Initial Sample Volume			GC/FID
Decachlorobiphenyl	ORG-91-5112	EPA SW-846 3510 & 8082	GC/ECD
C6 - C10 (F1)	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
C>10 - C16 (F2)	VOL-91-5010	MOE PHC-E3421	GC/FID
C>16 - C34 (F3)	VOL-91-5010	MOE PHC-E3421	GC/FID
C>34 - C50 (F4)	VOL -91- 5010	MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC-E3421	BALANCE
C6 - C10 (F1)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
C>10 - C16 (F2)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
C>16 - C34 (F3)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
C>34 - C50 (F4)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL - 5012	CCME Tier 1 Method	GRAVIMETRIC ANALYSIS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	Balance
Water Analysis			
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS



5835 Coopers Avenue Mississauga, Ontario L4Z 1Y2 Ph: 905.712.5100 Fax: 905.712.5122 **Laboratory Use Only** 

Chain of Custody Record If this is a Drinking Water sample, please		<u> </u>	156	-	111.0	earth aga					uantit	-	es:	9.	3 1	7.4	9.1
Report Information: Golder Associates	Regulatory Requ	irements:				rhuman c					Seal II			S □Yes	6	S4 □No	FON
Contact:  Alyssa Troke  Address:  1931 Robertson Road  K2H 5BT  Phone: Reports to be sent to:  1. Email:  2. Email:  Alyssa troke @ golder.com  Aplenderleth @golder.com	Regulation 153/04  Table	Sewer I Sanita Storm Region Indicate	ry	2	<b>√</b> cci	ov. Water jectives (	Quality PWQO)		Tur	naro gular sh TA	TAT T (Rus Busin	d Tin	me	(TAT) 5 t Apply) 2 l Da	Requi	ness Day	1 Business Day
Project Information:  Project: /530908 - 2000  Site Location:  Sampled By:	Is this submission Record of Site Co.		C		cate	of And				-	Plea	se pi	rovide	e prior	notificati	on for ru	
AGAT Quote #: PO:    Please note: If quotation number is not provided, client will be billed full price for analysis.	Sample Matrix Legend  B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg CrVI. (Please Circle)	and Inorganics	Hydride Forming Metals	Custom Metals	B-HWS   C  CN   EC   FOC   No <sub>2</sub> /No <sub>2</sub>   N   Hg   DH   SAR	☐ TP ☐ NH <sub>3</sub> ☐ IO <sub>2</sub> ☐ NO <sub>2</sub> ☐ NO <sub>3</sub> NO <sub>2</sub>	□ voc □ BTEX □ THM	3		henols		Organochlorine Pesticides	TCLP Metals/Inorganics Sewer Use	otc 69566		
Sample Identification  Date Sampled  Sampled  Sampled  Sampled  Containers  Matrix  MW - 18 B dup Ag 6  Awg 7  1010 5  W	Comments/ Special Instructions	Y/N	Metals and	Hydride	Client C	ORPs: □	Nutrients:	Volatiles:	ABNS	PAHS	Chlorophenols	PCBS	Organoc	TCLP Meta	XXX		
Samples Relinquished By (Print Name and Sign):  Samples Relinquished By (Print Name and Sign):  Date  Time  Samples Relinquished By (Print Name and Sign):  Date  Time	Samples Received By (Pr. Samples Received By (Pr. Samples Received By (Pr.	int Name and Sinok	u	W.			Day Da	to the later to th	59/	Tim	(2 °/O	hS 42	-	Nº:	Page	/ or	7

# **Appendix C6**

Certificate Of Analysis –
Paracel Laboratories Ltd.,
Sept. 2, 2016; Order #1635445



300 - 2319 St. Laurent Blvd Ottawa, ON, K1G 4J8 1-800-749-1947 www.paracellabs.com

# Certificate of Analysis

#### Golder Associates Ltd. (Ottawa)

1931 Robertson Rd. Ottawa, ON K2H 5B7 Attn: Alyssa Troke

Client PO:

Project: 1530908-2000 Custody: 20409/102554 Report Date: 2-Sep-2016 Order Date: 26-Aug-2016

Order #: 1635445

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1635445-01	MW-6
1635445-02	MW-16
1635445-03	MW-12
1635445-04	MW-13
1635445-05	MW-15
1635445-06	MW-14
1635445-07	MW-9
1635445-08	MW-10
1635445-09	Probe Blank
1635445-10	MW-7
1635445-11	Field Blank
1635445-12	Trip Blank

Approved By:



Dale Robertson, BSc Laboratory Director



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 26-Aug-2016

Client PO: Project Description: 1530908-2000

#### **Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Mercury by CVAA	EPA 245.1 - Cold Vapour AA	30-Aug-16	30-Aug-16
Metals, ICP-MS	EPA 200.8 - ICP-MS	1-Sep-16	2-Sep-16
PCBs, total	EPA 608 - GC-ECD	30-Aug-16	30-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	26-Aug-16	29-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Aug-16	30-Aug-16



Report Date: 02-Sep-2016

Order Date: 26-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

	Client ID: Sample Date: Sample ID:	MW-6 19-Aug-16 1635445-01	MW-16 20-Aug-16 1635445-02	MW-12 20-Aug-16 1635445-03	MW-13 20-Aug-16 1635445-04
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001 mg/L	<0.0001	<0.0001	0.0003	<0.0001
Chromium	0.001 mg/L	<0.001	<0.001	<0.001	0.001
Cobalt	0.0005 mg/L	0.0045	0.0128	0.0244	0.0120
Copper	0.0005 mg/L	0.0064	0.0031	0.0082	0.0141
Lead	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001 mg/L	0.053	0.033	0.097	0.069
Zinc	0.005 mg/L	0.008	0.759	0.037	0.012
Hydrocarbons					
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [2]	<0.025 [2]	<0.025 [2]	<0.025 [2]
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [2]	<0.216 [1] [2]	<0.100 [2]	-
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [2]	<0.216 [1] [2]	<0.100 [2]	-
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [2]	<0.216 [1] [2]	<0.100 [2]	-
PCBs					
PCBs, total	0.00005 mg/L	<0.00005		<0.00005	-
Decachlorobiphenyl	Surrogate	85.5%	-	88.8%	-



Report Date: 02-Sep-2016

Certificate of Analysis Client: Golder Associates Ltd. (Ottawa)

Order Date: 26-Aug-2016 Client PO: Project Description: 1530908-2000

	Client ID:	MW-15	MW-14	MW-9	MW-10
	Sample Date:	20-Aug-16	20-Aug-16	20-Aug-16	20-Aug-16
	Sample ID:	1635445-05	1635445-06	1635445-07	1635445-08
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001 mg/L	0.0003	0.0001	0.0002	0.0007
Chromium	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt	0.0005 mg/L	0.0094	0.0133	0.0243	0.0673
Copper	0.0005 mg/L	0.0056	0.0078	0.0079	0.0613
Lead	0.0001 mg/L	<0.0001	<0.0001	<0.0001	0.0003
Nickel	0.001 mg/L	0.036	0.042	0.102	0.256
Zinc	0.005 mg/L	0.024	0.025	0.043	0.119
Hydrocarbons					
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [2]	<0.025 [2]	<0.025 [2]	<0.025 [2]
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [2]	<0.100 [2]	<0.100 [2]	<0.100 [2]
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [2]	<0.100 [2]	<0.100 [2]	<0.100 [2]
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [2]	<0.100 [2]	<0.100 [2]	<0.100 [2]
PCBs		_	_	_	
PCBs, total	0.00005 mg/L	<0.00005	<0.00005	<0.00005	<0.00005
Decachlorobiphenyl	Surrogate	90.7%	90.2%	97.1%	77.8%



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 26-Aug-2016

Client PO: Project Description: 1530908-2000

	Client ID: Sample Date: Sample ID:	Probe Blank 19-Aug-16 1635445-09	MW-7 19-Aug-16 1635445-10	Field Blank 19-Aug-16 1635445-11	Trip Blank 08-Aug-16 1635445-12
	MDL/Units	Water	Water	Water	Water
Metals				1	,
Mercury	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	0.0001 mg/L	<0.0001	0.0003	<0.0001	<0.0001
Chromium	0.001 mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt	0.0005 mg/L	<0.0005	0.0308	<0.0005	<0.0005
Copper	0.0005 mg/L	<0.0005	0.0097	<0.0005	<0.0005
Lead	0.0001 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001 mg/L	<0.001	0.201	<0.001	<0.001
Zinc	0.005 mg/L	0.006	0.059	<0.005	<0.005
Hydrocarbons					
F1 PHCs (C6-C10)	0.025 mg/L	<0.025 [2]	<0.025 [2]	<0.025 [2]	<0.025 [2]
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [2]	<0.100 [2]	-	<0.100 [2]
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [2]	<0.100 [2]	-	<0.100 [2]
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [2]	<0.100 [2]	-	<0.100 [2]
PCBs					
PCBs, total	0.00005 mg/L	<0.00005	<0.00005	<0.00005	<0.00005 [2]
Decachlorobiphenyl	Surrogate	74.8%	90.5%	93.1%	83.4% [2]



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 26-Aug-2016

Client PO: Project Description: 1530908-2000

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L						
F2 PHCs (C10-C16)	ND	0.100	mg/L						
F3 PHCs (C16-C34)	ND	0.100	mg/L						
F4 PHCs (C34-C50)	ND	0.100	mg/L						
Metals									
Mercury	ND	0.0001	mg/L						
Arsenic	ND	0.001	mg/L						
Cadmium	ND	0.0001	mg/L						
Chromium	ND	0.001	mg/L						
Cobalt	ND	0.0005	mg/L						
Copper	ND	0.0005	mg/L						
Lead	ND	0.0001	mg/L						
Nickel	ND	0.001	mg/L						
Zinc	ND	0.005	mg/L						
PCBs									
PCBs, total	ND	0.00005	mg/L						
Surrogate: Decachlorobiphenyl	0.00019		mg/L		77.9	60-140			



Report Date: 02-Sep-2016

Order Date: 26-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons F1 PHCs (C6-C10)	ND	0.025	mg/L	ND				30	
Metals									
Mercury	ND	0.0001	mg/L	ND				20	
Arsenic	ND	0.001	mg/L	ND				20	
Cadmium	ND	0.0001	mg/L	ND				20	
Chromium	ND	0.001	mg/L	ND			0.0	20	
Cobalt	0.00083	0.0005	mg/L	0.00083			0.1	20	
Copper	0.00055	0.0005	mg/L	0.00062			12.0	20	
Lead	ND	0.0001	mg/L	ND				20	
Nickel	ND	0.001	mg/L	ND			0.0	20	
Zinc	ND	0.005	mg/L	ND			0.0	20	



Report Date: 02-Sep-2016 Order Date: 26-Aug-2016

Project Description: 1530908-2000

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa) Client PO:

Method Quality Control:	Spike								
Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1.93	0.025	mg/L		96.4	68-117			
F2 PHCs (C10-C16)	1.98	0.100	mg/L		110	60-140			
F3 PHCs (C16-C34)	4.07	0.100	mg/L		109	60-140			
F4 PHCs (C34-C50)	2.58	0.100	mg/L		104	60-140			
Vietals									
Mercury	0.00292	0.0001	mg/L	ND	97.2	70-130			
Arsenic	44.0		ug/L		88.1	80-120			
Cadmium	47.0		ug/L		93.9	80-120			
Chromium	47.4		ug/L		94.7	80-120			
Cobalt	47.0		ug/L		94.0	80-120			
Copper	47.0		ug/L		94.0	80-120			
Lead	44.7		ug/L		89.4	80-120			
Nickel	46.4		ug/L		92.8	80-120			
Zinc	46		ug/L		91.9	80-120			
PCBs									
PCBs, total	0.00112	0.00005	mg/L		112	60-140			
Surrogate: Decachlorobiphenyl	0.00022		mg/L		89.3	60-140			



Report Date: 02-Sep-2016 Order Date: 26-Aug-2016

Project Description: 1530908-2000

Certificate of Analysis

# Client: Golder Associates Ltd. (Ottawa) Client PO:

#### **Qualifier Notes:**

#### Login Qualifiers :

Sample - One or more parameter received past hold time -

Applies to samples: MW-6, MW-7, Trip

Sample - Insufficient volume - low volume PHCs - if analysis possible run as per client

Applies to samples: MW-16

#### Sample Qualifiers:

1: Elevated Reporting Limits due to limited sample volume.

2: Holding time had been exceeded upon receipt of the sample at the laboratory.

#### **Sample Data Revisions**

None

#### **Work Order Revisions / Comments:**

None

#### **Other Report Notes:**

n/a: not applicable ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

#### CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

<b>OPARACEL</b>		UST		E	, 50 F	300-2 Ottav	Office 2319 St. L va, Ontar 300-749-	io K1G	4J8				(Lab Us	Custo e Only)		
LABORATORIES LTD.	8	LIAE				e: pa	racel@pa .paracella	aracella	bs.com			Pa		204 2 of 4		
Client Name: GAC A A A A	STOLEGE STOLEGE		Project	Reference: 1530	2908-20	cop		1		Brozza Brozza	TAT: [	LKegula	1	[] 3 Day	1	
Contact Name: See and			Quote #			-						[] 2 Day		[] 1 Day	4	-
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Telephone:					~		315 ( 305 ) M	le de la constant			7 1					
Criteria: [ ] O. Reg. 153/04 (As Amended) Table [ ]	RSC Filing	[]0.	Reg. 558	/00 [ ] PWQO X	TCCME [ ] SI	UB (Storm)	[]SUE	(Sanita	iry) Mui	oicipalit	y		[ ] Othe	r		
Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) S	SS (Storm Sa	mitary Se	wer) P (	Paint) A (Air) O (O	ther)	-			di	Requ	ired Ar	nalyses	95		41/14	
Paracel Order Number: 1635440-Soil 16354418-Water	ix	Volume	of Containers	Sample	Taken	2 gook								Bar	(2) (1)	A distance of the second
Sample ID/Location Name	Matrix	Air	# of	Date	Time	Se			4							
1 F2-3a	5		2	Aug 21/16		X			1	10 mm (1)		601	nlt	250	mi-	1
2 MW-6	W		6	Ava 19/16	15:45	X					-					
3 MW-16	W		5	Aug 20/16	11:00	X	no	P	CBS		anai	yse	SPH	Cs /	F pos	5,6/
4 MW-12	W	e aca	6	Aug 20/16	16:00	X	M	as	660	3			>		-	-
5 MW-13	W	Transa.	4	Aug 20/16	10:00	X	10	PC	Bs	or	PH	45	2			
6 MW-15	W		6	Aug 20/16	12:00	X			X		1		\$	10.11		1
7 MW-14	W	/I	6	Aug 20/16	13:00	X	g = 1	ang 8					>	40	in an	1
8 MW-9	W.		6	AUG 20/16	560	X						11	>	-		
9 MW-10	W	la constant	6	Aug 20/16	14:00	X	4-5	1	2			- 1	4	· Village	4=	1
10 Probe Blank	W		6	Aug 19/16	17:00	X										1
Comments: MW-16: analyse PHCs if HW-13: no PCB or PHC MULTER	1										+		Menio Po	d of Deliv		
Relinquished By (Sign):  Outstand Tyrake  Relinquished By (Rign): A	Receive	-	ver/Depo	TROUSE	SU	ved at Lab;	ORN	-	l M		Verifie	Rai	···	TOTAL CONTRACTOR	bject	Section Assessment
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Date/Time:



Date/Time:

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Nº 102554

OTTAWA @ KINGSTON @ NIAGARA @ MISSISSAUGA @ SARNIA Page 5 of 5 www.paracellabs.com Project Reference: 15 30 908 TAT; Regular [] 3 Day Contact Name: [] 2 Day [] 1 Day Address: PO# Date Required: Email Address: see page Telephone: Criteria: [ ] O. Reg. 153/04 (As Amended) Table \_ [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO X CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: [ ] Other: Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other) Required Analyses Paracel Order Number: PHCs F1-F4+BTEX Containers cote 1635440-501 Air Volume Sample Taken 10 by 1635445-water. 100 B (HWS) Matrix VOCs of Sample ID/Location Name Time Date 1 W 14:250 2 PHC Blank W 3 4 5 6 7 8 9 10 Mothod of Delivery Comments: Relinquished By (Sign): Verified By: Received by Driver/Depot DOK MAI Rachel Subject 00 Date/Time: M/696 2016 Date/Time:

Temperature: 12,3 %

pH Verified [ WBy: 1

# **Appendix C7**

Certificate Of Analysis –
Paracel Laboratories Ltd.,
Sept. 2, 2016; Order #1634163



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# Certificate of Analysis

Golder Associates Ltd. (Ottawa)

1931 Robertson Rd. Ottawa, ON K2H 5B7 Attn: Alyssa Troke

Client PO:

Project: 1530908-2000 Custody: 26765 Report Date: 2-Sep-2016 Order Date: 16-Aug-2016

Revised Report

Order #: 1634163

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

 Paracel ID
 Client ID

 1634163-01
 MW98-02

 1634163-02
 Fox 4 - Rinsate

Approved By:

2:MX

Tim McCooeye Senior Advisor



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 16-Aug-2016

Client PO: Project Description: 1530908-2000

#### **Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Mercury by CVAA	EPA 245.1 - Cold Vapour AA	17-Aug-16	17-Aug-16
Metals, ICP-MS	EPA 200.8 - ICP-MS	18-Aug-16	19-Aug-16
PCBs, total	EPA 608 - GC-ECD	18-Aug-16	18-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	16-Aug-16	18-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Aug-16	19-Aug-16



Report Date: 02-Sep-2016

Order Date: 16-Aug-2016

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO: Project Description: 1530908-2000

	Client ID:	MW98-02	Fox 4 - Rinsate	<u> </u>	_
	Sample Date:	04-Aug-16	05-Aug-16	-	-
	Sample ID:	1634163-01	1634163-02	-	-
	MDL/Units	Water	Water	-	-
Metals			•		
Mercury	0.0001 mg/L	<0.0001	<0.0001	-	-
Arsenic	0.001 mg/L	0.004	<0.001	-	-
Cadmium	0.0001 mg/L	<0.0001	<0.0001	-	-
Chromium	0.001 mg/L	<0.001	<0.001	-	-
Cobalt	0.0005 mg/L	0.0030	<0.0005	-	-
Copper	0.0005 mg/L	0.0006	<0.0005	-	-
Lead	0.0001 mg/L	0.0001	<0.0001	-	-
Nickel	0.001 mg/L	0.006	<0.001	-	-
Zinc	0.005 mg/L	0.090	<0.005	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	0.025 mg/L	0.395 [1]	<0.025 [1]	-	-
F2 PHCs (C10-C16)	0.100 mg/L	<0.100 [1]	<0.100 [1]	-	-
F3 PHCs (C16-C34)	0.100 mg/L	<0.100 [1]	<0.100 [1]	-	-
F4 PHCs (C34-C50)	0.100 mg/L	<0.100 [1]	<0.100 [1]	-	-
PCBs	-		-		
PCBs, total	0.00005 mg/L	<0.00005	<0.00005	-	-
Decachlorobiphenyl	Surrogate	54.8% [4]	72.4%	-	-



Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Report Date: 02-Sep-2016

Order Date: 16-Aug-2016

Client PO: Project Description: 1530908-2000

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L						
F2 PHCs (C10-C16)	ND	0.100	mg/L						
F3 PHCs (C16-C34)	ND	0.100	mg/L						
F4 PHCs (C34-C50)	ND	0.100	mg/L						
Metals									
Mercury	ND	0.0001	mg/L						
Arsenic	ND	0.001	mg/L						
Cadmium	ND	0.0001	mg/L						
Chromium	ND	0.001	mg/L						
Cobalt	ND	0.0005	mg/L						
Copper	ND	0.0005	mg/L						
Lead	ND	0.0001	mg/L						
Nickel	ND	0.001	mg/L						
Zinc	ND	0.005	mg/L						
PCBs			J						
PCBs, total	ND	0.00005	mg/L						
Surrogate: Decachlorobiphenyl	1.00020		mg/L		80.6	60-140			



Report Date: 02-Sep-2016

Page 5 of 7

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Order Date: 16-Aug-2016 Client PO: Project Description: 1530908-2000

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons F1 PHCs (C6-C10)	ND	0.025	ma/l	ND				30	
	טוו	0.025	mg/L	ND				30	
Metals									
Mercury	ND	0.0001	mg/L	ND				20	
Arsenic	ND	0.001	mg/L	0.0013			0.0	20	
Cadmium	ND	0.0001	mg/L	ND			0.0	20	
Chromium	ND	0.001	mg/L	ND			0.0	20	
Cobalt	ND	0.0005	mg/L	ND			0.0	20	
Copper	ND	0.0005	mg/L	ND				20	
Lead	ND	0.0001	mg/L	ND			0.0	20	
Nickel	ND	0.001	mg/L	ND				20	
Zinc	ND	0.005	mg/L	ND			0.0	20	



Report Date: 02-Sep-2016 Order Date: 16-Aug-2016

Project Description: 1530908-2000

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1.83	0.025	mg/L		91.3	68-117			
F2 PHCs (C10-C16)	1.67	0.100	mg/L		93.0	60-140			
F3 PHCs (C16-C34)	3.16	0.100	mg/L		85.0	60-140			
F4 PHCs (C34-C50)	2.12	0.100	mg/L		85.3	60-140			
Metals									
Mercury	0.00309	0.0001	mg/L	ND	103	70-130			
Arsenic	39.0		ug/L	1.3	75.3	80-120		C	M-07
Cadmium	49.2		ug/L	0.01	98.4	80-120			
Chromium	49.9		ug/L	0.1	99.6	80-120			
Cobalt	49.0		ug/L	0.02	98.1	80-120			
Copper	48.0		ug/L	ND	96.0	80-120			
Lead	47.5		ug/L	0.08	94.8	80-120			
Nickel	49.2		ug/L	ND	98.5	80-120			
Zinc	52		ug/L	0.2	103	80-120			
PCBs									
PCBs, total	0.00110	0.00005	mg/L		110	60-140			
Surrogate: Decachlorobiphenyl	0.00021		mg/L		87.2	60-140			



Order #: 1634163

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)

Client: Golder Associates Ltd. (Ottawa)

Order Date: 16-Aug-2016

Client PO:

Project Description: 1530908-2000

#### **Qualifier Notes:**

**Login Qualifiers:** 

Sample - One or more parameter received past hold time - CCME F1-F4 past hold time Applies to samples: MW98-02, Fox 4 - Rinsate

Sample Qualifiers:

1: Holding time had been exceeded upon receipt of the sample at the laboratory.

4: The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.

Report Date: 02-Sep-2016

Page 7 of 7

QC Qualifiers:

QM-07: The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

#### **Sample Data Revisions**

None

#### **Work Order Revisions / Comments:**

Revision 1, all results reported as mg/L.

#### **Other Report Notes:**

n/a: not applicable ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

#### CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.



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www.paracellabs.com

Nº 26765

Page 2 of 2

Chain of Custody

(Lab Use Only)

differs:    Compared	Chent Name:	Project Refer	ronos 1 /-	2 . 0 00	2	Α.			-	rage 🕿	10	202
Criteria: [10 Reg. 153.04 (As Amended) Table [1 RSC Films [1] O. Reg. SSE00 [1 Films [1] O. Reg. SSE00	Contact Name:		15.	50908	1	1000	18 8.	TA	T: K Regi	ılar [1	3 Day	
Criteria: [10 Reg. 153.04 (As Americal) Table	Address: See page	1 12	2-304	Golder	Den	i Lines,	Monito	119	,			
Aplendarie: the golder com  Criteria: [10. Reg. [5304 (As Amendal) Table_ [1] SSC Filing [10. Reg. 58300 [1] PMOD (Accuse) [1808 (Saminary) Municipality [1] Others  arrich Type Soil Scal) (City (Ground Water) SW (Surface Water) SS (Soom Sanitary Sever) P (Paint) A (Air) O (Other)  Required Analyses  arracel Order Number: [634 62-50]				7		4		J	[ ] 2 Da	iy []	1 Day	
Tatrit Type Soil Soil (Ground Water) SW (Surface Water) SS (Storm Sanitary Sever) P (Paint) A (Air) O (Other)  Required Analyses    G34 G2-Soil	Telephone:	Email Addres		e_trok	eeg	0/dlr.(0	M	Da	te Required:			
Arracel Order Number: 1634 162 - Soil   Sample Taken   Sample Taken   Sample ID/Location Name	Criteria: [ ] O. Reg. 153/04 (As Amended) Table [ ] RSC Filing [ ] O.	Dan \$59/00	dela	enderi	e.th	@go/de	er.con	١				_
Sample ID/Location Name  Sample ID/Location Name  MW98-02  Fox 4-Rinsele  Municipal Sample Sample Taken  Sample ID/Location Name  MW98-02  Municipal Sample Taken  Municipal S	Matrix Type(S)Soil/Sed.) (GV) (Ground Water) SW (Surface Water) SS (State State  , Keg. 739/00	1 11 MOO 1/10	CMB [JSU	B (Storm)	L PSUB (Sar	nitary) Mun	icipality:		[]Other:			
Sample ID/Location Name  Sample ID/Location Name  MW98 - 02  Fox 4 - Rinsort  MW98 - 03  Method of Delivery  Proceled regardless of hold time per Prussa & C. Method of Delivery	Paracel Order Number: 16 21146 2	sewer) P (Paint)	A (Air) O (Other	r).				Required	d Analyse:	S		
1 MW98-62 GW 6 Aug 4 1700 X 2 Fox 4 - Rinsak GW 6 Aug 5 - X 3 4 5 6 7 8 9 10 mments: Samples not preserved, not field filtered. Sc. Method of Delivery.  Proceed regardless of hold time per Aussa &	1634162-5011	ers							T	T		
1 MW98-62 GW 6 Aug 4 1700 X 2 Fox 4 - Rinsak GW 6 Aug 5 - X 3 4 5 6 7 8 9 10 mments: Samples not preserved, not field filtered. Sc. Method of Delivery.  Proceed regardless of hold time per Aussa &		Contain	Sample Ta	aken	ofe							
1 MW98-62 GW 6 Aug 4 1700 X 2 Fox 4 - Rinsak GW 6 Aug 5 - X 3 4 5 6 7 8 9 10 mments: Samples not preserved, not field filtered. Sc. Method of Delivery.  Proceed regardless of hold time per Aussa &	Sample ID/Location Name	l of C	Date	Time	28							
Fox 4 - Rinsak  M  A  B  B  B  B  B  B  B  B  B  B  B  B	1111100				V			_				9
and the state of t	2 Fox 4 - Rinsote MIN			700	X	-	$\vdash$	_		1 1	2.3	
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mments: Samples not preserved, not field fittered. Sc. Method of Delivery.  Proceed regardless of hold time per Prussa &c.	4	-		$\overline{}$	-	_				J		
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Proceed regardless of hold time per Plyssa &c. Method of Delivery.	9					`						
Proceed regardless of hold time per Plyssa &c. Method of Delivery.	10											
Proceed regardless of hold time per Aussa &c. Method of Delivery:		100			, ,							
nowaries By (Sign):	Proceed regardless of ho	Ved Lal +	7	- fi-	eld	filts	rec	1. X	Ċ.	Method of I	Delivery:	
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Time 1 a 1/ 100 i localitato de la local	elinquished By (Print): Joseph Woodhouse Date/Time: Onto 103/2		61/2	Date/Tim	e: AUG	16 9016	03.10	Date	Time: A	0 16/1	DACT C	10
Time: Aug 16/2016 1030 Temperature: 8.8°C Temperature: 8.8°C pH Verified [VB: RS	Temperature: 8	1.50		Temperat	ure: 💆	8 1c		pH '	Verified [V	R. RS	V ().()	1()

#### **Appendix C8**

# Historical Soil Water Chemistry Data

FOX-5 Qiki	qtarjuaq (Brou	ıghtoı	n Island	) Tier II	Dispo	osal F	acility	and N	Non-H	lazard	ous W	/aste	Landf	ill (M	liddle Si	ite)- S	umma	iry of 200	)7-2024 Soil	Analy	ytica
Sample IID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH I	Identity % Lub Oil
Background Da	<u>ta - Average</u>					<u>10</u>	<u>5.3</u>	4.0	1.0	<u>5.0</u>	<u>46</u>	<u>19</u>	1.93	0.5	0.001				5.0		
Baseline Data	- Average					7.6	5.2	5.0	1.0	10.0	31.7	20.0	2.0	0.1	0.003				10		1
Baseline Data - Sta	ndard Deviation					1.4	1.8	1.6	0.0	0.0	6.2	0.0	0.6	0.00	0.000				7.1		
Baseline Data Aver	age + 3xSD					12	11	9.8	1.0	10	50	20	3.8	0.1	0.003				31		
Detection Limit						<3.0	<5.0	<5.0	<1.0	<10	<15	<20	<1	< 0.1	< 0.003				<10		
* If haseline averao	re was below the detec	tion lim	it, the averae	e has been m	odified to	o match	the detec	tion limit	value.												
DEW Line Cleans			l weng						, and c	200					1						
	up Tier II Criteria &	DLCU	Hydrocarbon	Action .		100	100	50	5	500	500	250	30	2	5				2500		
Monitoring Da	ata																				
Upgradient																					1
	MW-5 Surface															TPH Su	m will appe	ear when F1, F	2 and F3 fraction re	sults are er	ntered
4720/21	MW 5	2007	1	Phase I	10	5.5	< 5.0	< 5.0	<1.0	<10	30	<20	1.2	< 0.10	< 0.0030	<10	11	110	<u>126</u>		
10808-146-FOX-5	MW 5	2008	2	Phase I	0-10	<u>16</u>	<u>13</u>	8.0	< 0.5	<u>10</u>	<u>63</u>	<u>29</u>	2.7	< 0.1	< 0.02	<20	<20	<20	30		
509-5WA	MW 5	2009	3	Phase I	0-15	10	<u>18</u>	9.0	< 0.5	8.0	<u>47</u>	<u>37</u>	3.6	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
510-5WA	MW 5	2010	4	Phase I	0-15	10	<u>15</u>	4.0	< 0.5	6.0	40	<u>30</u>	1.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		<u> </u>
2-19560	MW-5	2012	6	Phase I	0-10	5.3	4.4	2.4	< 0.5	<u>5.6</u>	24	10	1.8	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
75-MID-MW-5-S	MW-5	2014	8	Phase II	0-15	8.1	6.7	4.5	< 0.10	7	41	17	<1.0	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
AW-5b	MW-5	2016	10	Phase II	0-15	6.8	<u>6.2</u>	<u>4</u>	< 0.5	7.6	32.8	14.3	<1.0	< 0.1	< 0.05	<7	<4	<8	<u>9.5</u>		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		<u> </u>
		1							<u> </u>										#N/A		<u> </u>
		1					1		<del></del>										#N/A		—
	10W # F .						-		<del></del>										#N/A		<del></del>
	MW-5 Depth		-											-0.10	-0		_				-
4722	MW 5	2007	1	Phase I	40 40-50	6.4	6.2	6.2	<1.0 <0.5	<10	37	<20	<1.0	<0.10	<0.0030	<10	5.3	26	36		<del></del>
10808-147-FOX-5 509-5WB	MW 5	2008	2	Phase I	40-50	16 8.0	<u>17</u> <u>17</u>	<u>7</u> <u>8.0</u>	<0.5	<u>11</u> 7.0	<u>59</u> 41	41 34	2.5 2.7	<0.1	<0.02	<20 <20	<20 <20	<20	30 30		<del>                                     </del>
510-5WB	MW 5 MW 5	2009	4	Phase I Phase I	40-50	11	12	5.0	<0.5	8.0	45	<u>26</u>	1.0	<0.1	<0.02	<10	<20	<20 <20	<u>30</u>		<del>                                     </del>
2-19562	MW-5	2010	6	Phase I Phase I	40-50	7.1	6.1	3.3	<0.5	7.1	33	14	2.4	<0.010	<0.02	<5.0	<10	<50	33		
2-19562 5-MID-MW-5-D	MW-5	2012	8	Phase II	40-50	9.7	8.1	4.9	<0.10	8	45	19	1.1	<0.010	< 0.020	<10	<10	<50	35		
1W-5a	MW-5	2014	10	Phase II	30-40	6.9	6.2	4.1	<0.5	6.9	33	14.1	<1.0	<0.1	<0.05	<7	<4	<8	9.5		
Ja	111 W -3	2021	15	Phase II												-1		*0	#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		

FUX-5 Qiki	qtarjuaq (Brou	ghto	<u>n Island'</u>	) I ier II	Dispo	osal Fa	<u>acılity</u>	and I	Non-H	<u>lazar</u> d	<u>ous W</u>	'aste I	<u>∟andf</u>	111 (M	iddle S	ite)- S	<u>umm</u> a	ry of 200	<i>J7-</i> 2024 Soil	<u>Analy</u>	ytıcal
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH I	Identity % Lube Oil
Downgradient																					
	MW-6 Surface																				
24726	MW 6	2007	1	Phase I	10	5.1	5.3	5.0	<1.0	<10	29	<20	<1.0	< 0.10	< 0.0030	<10	4.2	34	43		
210808-143-FOX-5	MW 6	2008	2	Phase I	0-10	11	11	6.0	< 0.5	8.0	44	23	1.7	< 0.1	< 0.02	<20	<20	30	50		
F509-6WA	MW 6	2009	3	Phase I	0-15	5.0	8	5.0	< 0.5	6.0	27	12	2.9	< 0.1	< 0.02	<20	<20	<20	30		
F510-6WA	MW 6	2010	4	Phase I	0-15	8.0	11	4.0	< 0.5	7.0	38	22	1.0	< 0.1	< 0.02	<10	<10	<20	20		
12-19564	MW 6	2012	6	Phase I	0-10	7.3	6.5	3.6	< 0.5	7.6	35	14	2.2	< 0.010	< 0.020	<5.0	<10	<50	33		
F5-MID-MW-6-S	MW-6	2014	8	Phase II	0-15	7.2	5.3	3.55	< 0.5	6.1	32.5	13	1	< 0.10	< 0.05	<10	<10	<50	<u>35</u>		
MW-6b	MW-6	2016	10	Phase II	0-15	5.5	4.9	3.5	< 0.5	6.6	27.6	12.2	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
			1																#N/A		
			1																#N/A		
			1																#N/A		
	MW-6 Depth																				
24728	MW 6	2007	1	Phase I	40	5.7	5.4	5.3	<1.0	<10	32	<20	<1.0	< 0.10	< 0.0030	<10	<4.0	29	<u>36</u>		
210808-144-FOX-5	MW 6	2008	2	Phase I	40-50	10	12	6	<0.5	8	52	26	2.1	<0.1	<0.02	<20	<20	<20	30		
F509-6WB	MW 6	2009	3	Phase I	40-50	8.0	12	7.0	<0.5	7.0	40	<u>19</u>	2.9	<0.1	< 0.02	<20	<20	<20	30		
F510-6WB	MW 6	2010	4	Phase I	40-50	8.0	12	4.0	<0.5	7.0	37	23	<1	<0.1	< 0.02	<10	<10	<20	20		
12-19566	MW 6	2012	6	Phase I	40-50	6.9	6.1	3.3	<0.5	7.9	34	14	2.1	< 0.010	<0.020	<5.0	<10	<50	33		
F5-MID-MW-6-D	MW-6	2014	8	Phase II	40-50	8	6.9	4.4	< 0.10	7.6	40	16	<1.0	< 0.050	< 0.010	<10	<10	<50	35		
MW-6a	MW-6	2016	10	Phase II	40-50	5.5	5.3	3.5	<0.5	6.4	27.4	12.1	<1.0	<0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-7 Surface																				
24730/31	MW 7	2007	1	Phase I	10	6.4	6.0	5.0	<1.0	<10	35	<20	<1.0	< 0.10	< 0.0030	<10	4.1	63	72	$\vdash$	
210808-139-FOX-5	MW 7	2007	2	Phase I	0-10	10	11	<u>5</u>	<0.5	7	40	22	<1.0	<0.1	<0.02	<20	<20	<20	30	$\vdash$	
210808-140-FOX-5	MW 7	2008	2	Phase I	0-10	11	18	6	<0.5	7	48	37	1.5	<0.1	<0.02	<20	<20	<20	30		
F509-7WA	MW 7	2009	3	Phase I	0-10	8.0	22	7.0	<0.5	8.0	45	40	3.2	<0.1	<0.02	<20	<20	<20	30		
F510-7WA	MW 7	2010	4	Phase I	0-15	10	17	5.0	<0.5	9.0	49	35	1.0	<0.1	<0.02	<10	<10	25	35		
12-19568	MW 7	2010	6	Phase I	0-13	7.2	6.1	3.3	<0.5	7.3	34	13	2.0	0.012	< 0.020	<5.0	<10	<50	33		
F5-MID-MW-7-S	MW-7	2014	8	Phase II	0-15	10	6	3.7	< 0.10	6	56	13	<1.0	< 0.050	< 0.010	<10	<10	<50	35		
MW-7b	MW-7	2016	10	Phase II	0-15	6.7	5.6	3.9	<0.5	7.2	32.4	13.4	<1.0	<0.1	< 0.05	<7	<4	<8	9.5		
	2.2.77	2021	15	Phase II	0.13					_				-		-	<u> </u>		#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
l	1	1	+	1							<del>                                     </del>		$\overline{}$		<del>                                     </del>	+			#N/A	+	

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Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	% Fuel	// Mentity // Lube
	MW-7 Depth				(cm)															Oil	Oil
24732	MW 7	2007	1	Phase I	40	6.9	6.5	5.8	<1.0	<10	42	<20	<1.0	< 0.10	< 0.0030	<10	8.7	30	44		
210808-141-FOX-5	MW 7	2007	2	Phase I	40-50	12	14	<u> </u>	<0.5	8.0	57	30	2	<0.1	<0.02	<20	<20	<20	30		
F509-7WB	MW 7	2009	3	Phase I	40-50	9.0	13	8.0	<0.5	7.0	<u>51</u>	23	3.2	<0.1	<0.02	<20	<20	<20	30		
F510-7WB	MW 7	2010	4	Phase I	40-50	11	14	5.0	<0.5	8.0	55	27	1.0	<0.1	<0.02	<10	<10	<20	20		
12-19570	MW 7	2010	6	Phase I	40-50	7.5	6.4	3.5	<0.5	6.7	37	14	1.9	0.012	< 0.020	<5.0	<10	<50	33		
F5-MID-MW-7-D	MW-7	2014	8	Phase II	40-50	9.2	7.5	4.6	< 0.10	7.6	45	17	<1.0	< 0.050	< 0.010	<10	<10	<50	35		
MW-7a (Dup Avg)	MW-7	2016	10	Phase II	40-50	8	7	4.4	< 0.5	7	40	16	2	< 0.1	< 0.05	<6	<7	<29	21		
( 1 3		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-8 Surface																				
24736	MW 8	2007	1	Phase I	10	4.9	< 5.0	< 5.0	<1.0	<10	26	<20	1.2	< 0.10	< 0.0030	<10	6.3	47	<u>58</u>		
210808-135-FOX-5	MW 8	2008	2	Phase I	0-10	9.0	7.0	5.0	< 0.5	6.0	34	15	3.4	< 0.1	< 0.02	<20	<20	27	27		
F509-8WA	MW 8	2009	3	Phase I	0-15	8.0	<u>15</u>	7.0	< 0.5	6.0	39	30	3.8	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-8WA	MW 8	2010	4	Phase I	0-15	8.0	7.0	3.0	< 0.5	7.0	33	15	2	< 0.1	< 0.02	<10	<10	<20	20		
12-19572	MW 8	2012	6	Phase I	0-10	5.9	5.0	2.7	< 0.5	5.9	27	11	2.3	0.015	< 0.020	< 5.0	<10	53	<u>61</u>		
F5-MID-MW-8-S	MW-8	2014	8	Phase II	0-15	7.1	5.1	3	< 0.10	6.8	27	12	1	< 0.050	< 0.010	<10	<10	71	<u>81</u>		
MW-8b	MW-8	2016	10	Phase II	0-15	5.5	5.2	3.4	< 0.5	<u>6</u>	26.4	12.4	<1.0	< 0.1	< 0.05	<7	<4	<8	<u>9.5</u>		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-8 Depth																				
24738	MW 8	2007	1	Phase I	40	4.5	< 5.0	< 5.0	<1.0	<10	27	<20	<1.0	< 0.10	< 0.0030	<10	6.0	37	<u>48</u>		
210808-136-FOX-5	MW 8	2008	2	Phase I	40-50	10	<u>11</u>	5.0	< 0.5	7.0	35	<u>24</u>	2.7	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-8WB	MW 8	2009	3	Phase I	40-50	7.0	<u>15</u>	6.0	< 0.5	6.0	34	<u>26</u>	3.2	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-8WB	MW 8	2010	4	Phase I	40-50	9.0	<u>13</u>	4.0	< 0.5	7.0	38	<u>29</u>	2.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19574	MW 8	2012	6	Phase I	40-50	5.1	4.5	2.3	< 0.5	<u>5.8</u>	24	10	2.4	0.012	< 0.020	< 5.0	<10	63	<u>71</u>		
F5-MID-MW-8-D	MW-8	2014	8	Phase II	40-50	7	5.9	3.9	< 0.10	7.2	33	14	1.1	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
MW-8a	MW-8	2016	10	Phase II	40-50	5.9	<u>5.6</u>	3.4	<0.5	<u>5.8</u>	27	12.6	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
							-							-		-			#N/A		
		1				<u> </u>	-							-		-			#N/A		
			l	L											1				#N/A		

1 On 5 Quan	quarjuaq (Dioc	giito	ii islaliu	, I ICI II	Dispe	Jour I a	acmity	and	1011-17	lazaru	ous n	asic	Land	111 (111	iddic oi	$\iota \iota \iota \iota \iota \iota \iota \iota$	umma	1y 01 200	77-2024 5011	TXIIAI	y ticai
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lube Oil
	MW-9 Surface																				
24740/41	MW 9	2007	1	Phase I	10	5.2	5.2	< 5.0	<1.0	<10	31	<20	<1.0	< 0.10	< 0.0030	<10	7.3	22	<u>34</u>		
210808-132-FOX-5	MW 9	2008	2	Phase I	0-10	9.0	9.0	5.0	< 0.5	7.0	42	20	3.1	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-9WA	MW 9	2009	3	Phase I	0-15	7.0	<u>15</u>	7.0	< 0.5	6.0	36	<u>27</u>	3.8	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-9WA	MW 9	2010	4	Phase I	0-15	7.0	7.0	4.0	< 0.5	8.0	33	14	2.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19576	MW 9	2012	6	Phase I	0-10	6.6	5.8	3.3	< 0.5	7.5	30	13	3.0	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
F5-MID-MW-9-S	MW-9	2014	8	Phase II	0-15	5.6	4.5	2.9	< 0.10	<u>5.9</u>	26	11	1.4	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
MW-9a	MW-9	2016	10	Phase II	0-15	7.2	5	3.3	< 0.5	6.6	25.8	11.3	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-9 Depth																				
24742	MW 9	2007	1	Phase I	40	4.6	< 5.0	< 5.0	<1.0	<10	28	<20	1.1	< 0.10	< 0.0030	<10	6.2	12	<u>23</u>		
210808-133-FOX-5	MW 9	2008	2	Phase I	40-50	11	<u>10</u>	5.0	< 0.5	6.0	40	22	3.0	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-9WB	MW 9	2009	3	Phase I	40-50	7.0	12	6.0	< 0.5	5.0	34	18	3.9	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-9WB	MW 9	2010	4	Phase I	40-50	8.0	<u>11</u>	4.0	< 0.5	7.0	35	23	2.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19578	MW 9	2012	6	Phase I	40-50	7.0	6.1	3.4	< 0.5	8.2	31	14	3.4	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
F5-MID-MW-9-D	MW-9	2014	8	Phase II	40-50	5.6	5.1	3	< 0.10	7	26	12	1.3	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
Not sampled - refusal	MW-9	2016	10	Phase II															#N/A		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		

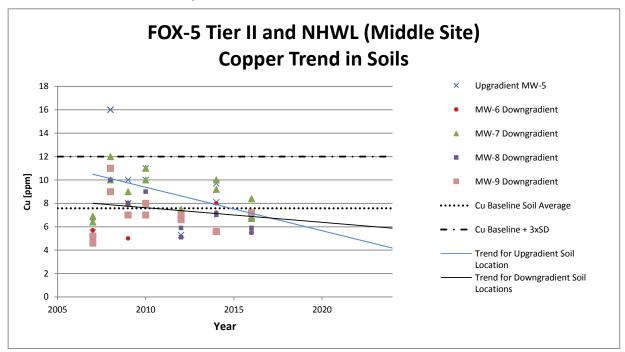
^Note: Total Hydrocarbons (C<sub>6</sub>-C<sub>34</sub>) has been calculated by adding results for F1, F2 and F3.

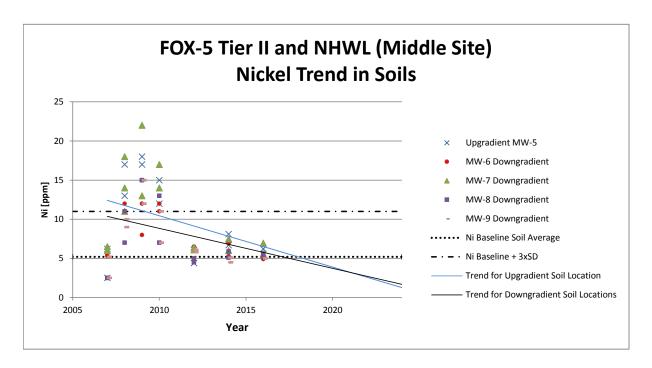
Legend

XX sample exceeds background
XX sample exceeds baseline
XX sample exceeds DLCU Tier I criteria
XX sample exceeds DLCU Tier II criteria

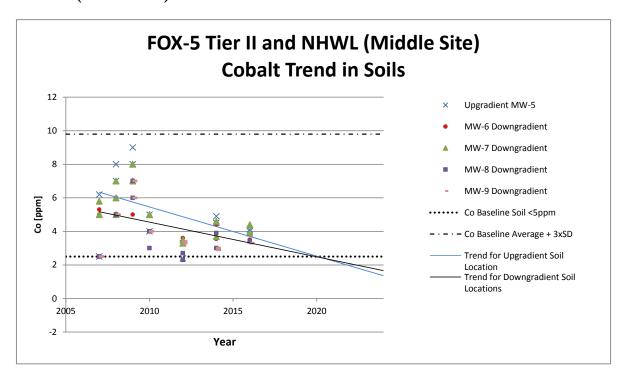
FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends

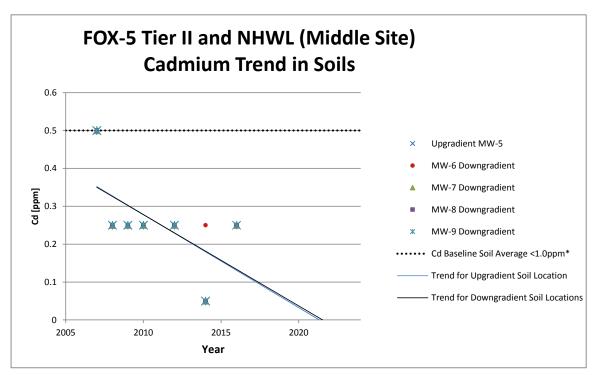
Where results are below detection, half of the detection limit has been used in the charts.





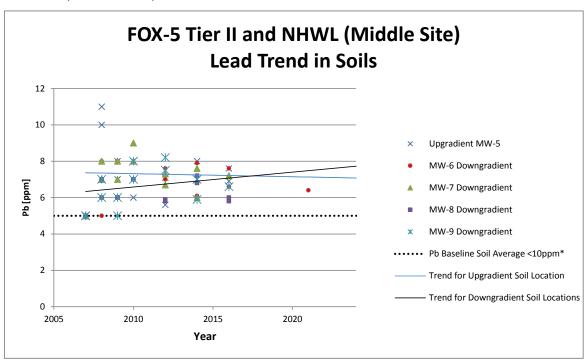
FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends



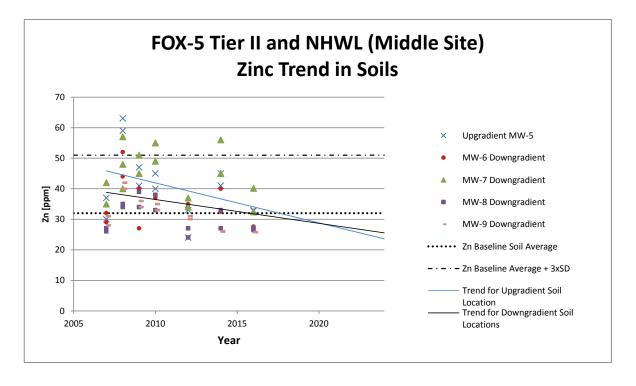


<sup>\*</sup> Cd Baseline SD = 0, all Cd results below detection. Changes in detection limit cause change in trend.

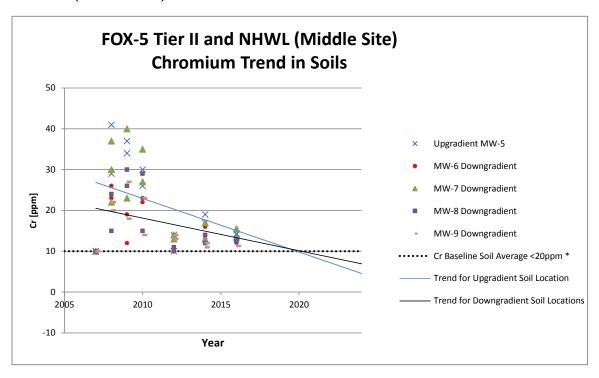
FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends



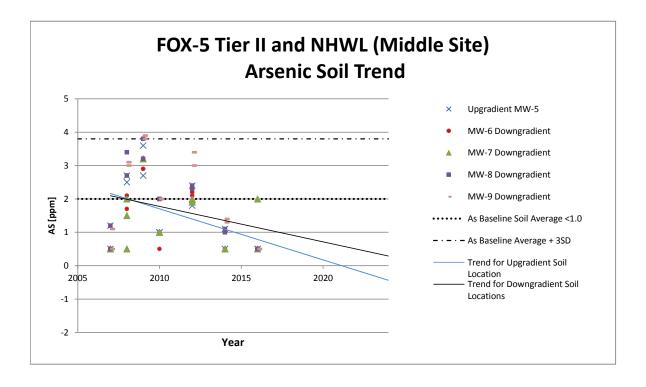
<sup>\*</sup> Pb Baseline Standard Deviation = 0



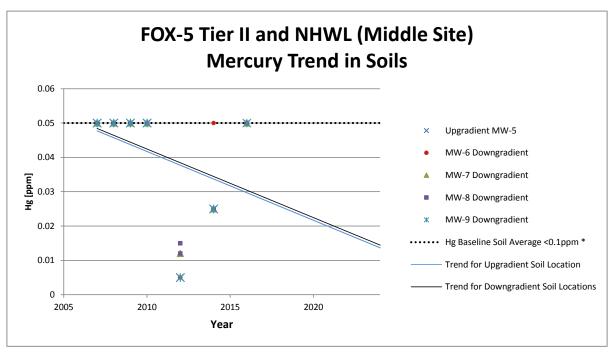
FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends



<sup>\*</sup> Cr Baseline Standard Deviation = 0

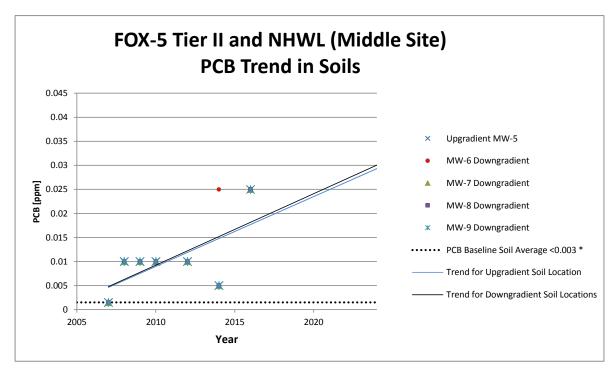


FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends



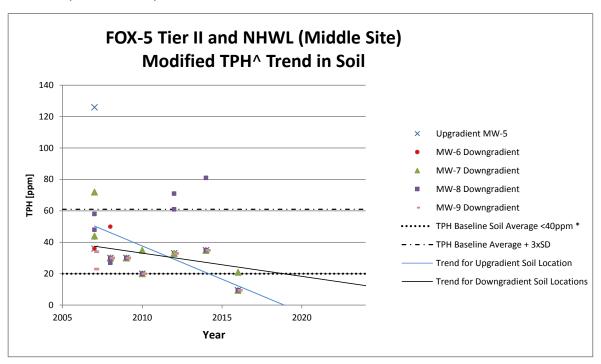
\* Hg Baseline SD = 0 Detectable Hg seen in 2012 but at levels lower than detection limits from earlier years.

All previous years showed no detectable Hg



<sup>\*</sup> PCB Baseline SD = 0 All PCB Monitoring Results below detection. Trend reflects changes in detection limits.

FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Disposal Facility and Non-Hazardous Waste Landfill (Middle Site)- Landfill Trends



<sup>^</sup> Baseline samples from 2002 were analyzed as TPH, results from 2003 and later are Sum of PHC F1-F3 fractions.

FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Facility and NHWL (Middle Site) Groundwater Summary F2 F3  $C_{10}$ - $C_{16}$ C<sub>16</sub>-C<sub>34</sub> Modified TPH -Monitoring Monitoring TPH Identity Sample ID Location Year Year Phase Cu Ni Co\* Cd\* Pb\* Zn Cr As\* Hg\* Total PCBs<sup>4</sup> Total C6-C34 % Lube [mg/L] % Fuel Oil Oil [mo/L] [mo/L] [mg/L] [mo/L] Baseline Data - Average 0.012 0.043 0.063 0.084 0.003 0.0004 0.00002 Baseline Data - Standard Deviation 0.009 0.048 0.001 0 0.098 0.092 0 Baseline Data Average + 3xSD 0.03917 0.18744 0.01 0.3571 0.003 0.0004 0.006 0.001 0.36 0.00002 Detection Limit < 0.010 < 0.0010 < 0.0020 < 0.0010 < 0.010 < 0.0010 < 0.0030 < 0.00040 < 0.000020 <1.0 \* If baseline average was below the detection limit, the average has been modified to match the detection limit value. Monitoring Data Total TPH will appear when F1, F2, F3 fractions are entered Upgradient MW-5 24724 MW 5 2007 Phase I 0.012 0.044 < 0.0010 < 0.010 0.086 0.089 < 0.0030 < 0.00040 < 0.000020 < 0.050 < 0.50 MW 5 210808-148-FOX-5 2008 2 Phase I 0.011 < 0.005 0.001 < 0.0001 0.002 0.020 0.002 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 < 0.2 0.300 F509-5W MW 5 2009 0.002 < 0.005 0.000 0.000 < 0.001 < 0.01 0.002 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 0.300 Phase I < 0.2 F510-5W MW 5 < 0.001 < 0.0001 0.200 2010 Phase I 0.004 < 0.005 0.000 0.000 0.010 < 0.001 < 0.001 < 0.0001 < 0.1 < 0.1 < 0.2 12-19540/41 MW-5 2012 0.001 < 0.025 Phase I 0.003 0.004 < 0.00010 0.001 0.013 0.004 < 0.0010 < 0.00010 < 0.000020 < 0.10 < 0.25 0.188 F5-MID-MW-5 MW-5 2014 Phase II 0.021 0.002 0.000 0.004 0.028 0.036 0.001 < 0.00001 < 0.025 < 0.1 < 0.2 0.163 MW-5 (Dup Avg < 0.025 MW-5 2016 < 0.003 < 0.003 < 0.0005 < 0.0001 < 0.0001 0.005 < 0.001 < 0.001 < 0.0001 < 0.00005 < 0.1 < 0.1 2031 25 Phase II #N/A Phase III #N/A #N/A #N/A #N/A Downgradient MW-6 24729 MW 6 2007 Phase I 0.018 0.100 < 0.0030 < 0.0010 < 0.010 0.039 0.210 < 0.0030 < 0.00040 < 0.000020 < 0.050 < 0.50 < 1.0 0.775 210808-145-FOX5 MW 6 2008 Phase I < 0.005 < 0.0002 < 0.0001 < 0.001 < 0.01 < 0.001 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 < 0.2 0.300 F509-6W MW 6 2009 Phase I 0.001 < 0.005 0.000 0.000 < 0.001 0.070 0.001 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 < 0.2 0.300 E510\_6W/ MW 6 2010 < 0.0002 < 0.0001 < 0.1 0.200 Phase I 0.002 < 0.005 0.001 < 0.001 0.020 < 0.001 < 0.001 < 0.0001 < 0.1 < 0.2 12-19542 MW 6 2012 Phase I 0.002 0.003 < 0.00050 < 0.00010 < 0.0010 0.008 0.003 < 0.0010 < 0.00010 < 0.000020 < 0.025 < 0.10 < 0.25 0.188 No sample collected - well was dry MW-6 2014 Phase II #N/A MW-6 MW-6 2016 Phase II < 0.0005 < 0.001 < 0.0005 < 0.0001 < 0.0001 < 0.005 < 0.001 < 0.001 < 0.0001 < 0.025 #N/A 2021 Phase II #N/A 2031 Phase II #N/APhase III #N/A #N/A #N/A 24734 MW 7 2007 Phase I 0.017 0.076 0.004 < 0.0010 < 0.010 0.032 0.140 < 0.0030 < 0.00040 < 0.000020 < 0.050 MW 7 2008 Phase I < 0.005 < 0.0004 < 0.0001 < 0.001 < 0.01 0.002 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 0.300 0.006 MW 7 2009 < 0.0001 F509-7W Phase I 0.001 < 0.005 < 0.0002 < 0.0001 < 0.001 < 0.01 0.002 < 0.001 < 0.0001 < 0.2 < 0.2 < 0.2 0.300 MW-7 2010 Phase I 0.800 No sample collected - well was dry 2014 Phase II #N/A 2016 Phase II #N/A 2021 Phase II #N/A 2031 25 Phase II #N/A

> #N/A #N/A #N/A

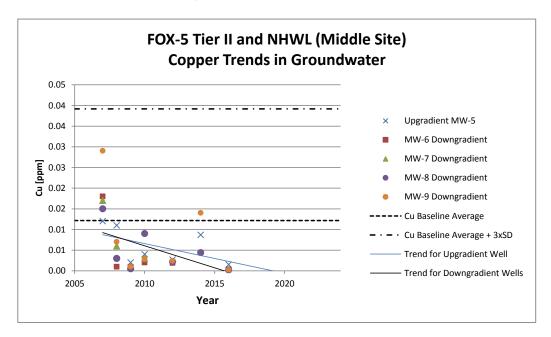
Phase III

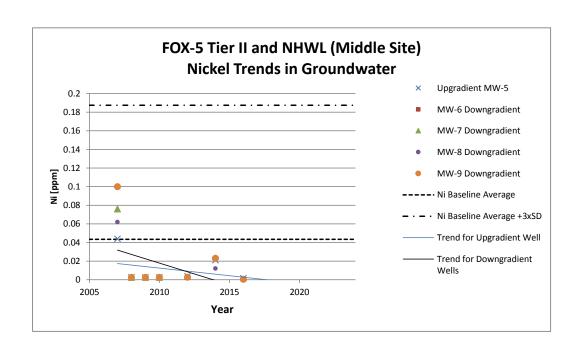
FOX-5 Qikiqtarjuaq (Broughton Island) Tier II Facility and NHWL (Middle Site) Groundwater Summary

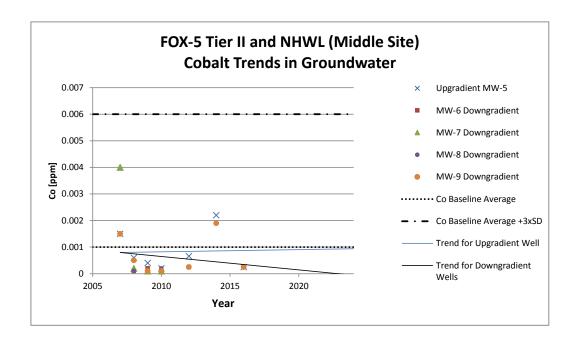
FOX-5 Qikiqtarjuaq	(Diougnion is	sianu) 1	ici ii i ac	inty and	1411 W	r (min	aute Sit	e) Giot	muwan	or Sullin	mary									
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Cu	Ni	Co*	Cd*	Pb*	Zn	Cr	As*	Hg*	Total PCBs*	F1 C <sub>6</sub> -	F2 C <sub>10</sub> -C <sub>16</sub>	F3 C <sub>16</sub> -C <sub>34</sub>	Modified TPH - Total C6-C34	ТРН І	dentity % Lube
					[ma/I]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	% Fuel Oil	Oil
	MW-8	I.		ļ	IIIg/L	Ing/L	Ing/L	mg/L	Ing/L	IIIg/L]	Ing/L	Ing/L	IIIg/L]	Ing/L	Jing/L	Ing/L	Jing/ L	Inig/ L	70 Tuci On	Oli
24739	MW 8	2007	1	Phase I	0.015	0.062	< 0.0030	< 0.0010	< 0.010	0.180	0.120	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.775		
210808-137-FOX5	MW 8	2008	2	Phase I	0.003	< 0.005	< 0.0002	0.000	< 0.001	0.030	0.001	< 0.001	< 0.0001	< 0.0001	<0.2	<0.2	< 0.2	0.300		
210808-138-FOX5	MW 8	2008	2	Phase I	0,003	<0.005	< 0.0002	0.000	< 0.001	0.010	< 0.001	< 0.001	< 0.0001	< 0.0001	<0.2	< 0.2	<0.2	0.300		
F509-8W	MW 8	2009	3	Phase I	< 0.001	< 0.005	< 0.0002	0.000	< 0.001	0.040	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.300		
F510-8W	MW 8	2010	4	Phase I	0.009	< 0.005	0.000	0.001	< 0.001	0.020	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.1	< 0.1	< 0.2	0.200		
12-19543	MW 8	2012	6	Phase I	0.002	0.003	< 0.00050	< 0.00010	< 0.0010	0.012	0.004	< 0.0010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.188		
F5-MID-MW-8	MW-8	2014	8	Phase II	0.004	0.012	0.002	0.000	0.002	0.037	0.020	0.001	< 0.00001	< 0.00005	< 0.025	< 0.1	< 0.2	0.163		
MW-8	MW-8	2016	10	Phase II	< 0.0005	< 0.001	< 0.0005	< 0.0001	< 0.0001	0.006	< 0.001	< 0.001	< 0.0001	< 0.00005	< 0.025	< 0.100	< 0.100	0.113		
		2021	15	Phase II														#N/A		
		2031	25	Phase II														#N/A		
				Phase III														#N/A		
																		#N/A		
																		#N/A		
			<u> </u>															#N/A		
	MW-9																			
24744	MW 9	2007	1	Phase I	0.029	0.100	< 0.0030	< 0.0010	< 0.010	0.042	0.200	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.775		
210808-134-FOX5	MW 9	2008	2	Phase I	0.007	< 0.005	0.001	0.000	< 0.001	0.020	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.300		
F509-9W	MW 9	2009	3	Phase I	0.001	< 0.005	< 0.0002	< 0.0001	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.300		
F510-9W	MW 9	2010	4	Phase I	0.003	< 0.005	< 0.0002	0.000	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.1	< 0.1	< 0.2	0.200		
12-19544	MW 9	2012	6	Phase I	0.002	0.003	< 0.00050	< 0.00010	< 0.0010	0.006	0.003	< 0.0010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.188		
F5-MID-MW-9	MW-9	2014	8	Phase II	0.014	0.023	0.002	0.000	0.003	0.064	0.036	0.001	< 0.00001	< 0.00005	< 0.025	< 0.1	< 0.2	0.163		
MW-9	MW-9	2016	10	Phase II	< 0.0005	< 0.001	< 0.0005	< 0.0001	< 0.0001	< 0.005	< 0.001	< 0.001	< 0.0001	< 0.00005	< 0.025	< 0.100	< 0.100	0.113		
		2021	15	Phase II														#N/A		
		2031	25	Phase II														#N/A		
				Phase III														#N/A		
			1		-													#N/A		
			1															#N/A		
	İ																	#N/A		

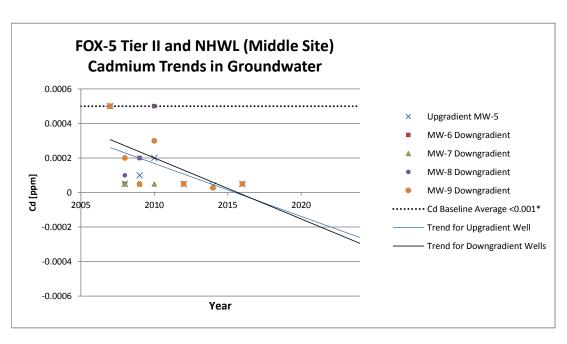
<sup>^</sup>Note: Total Hydrocarbons (C<sub>6</sub>-C<sub>34</sub>) has been calculated by adding results for F1, F2 and F3.

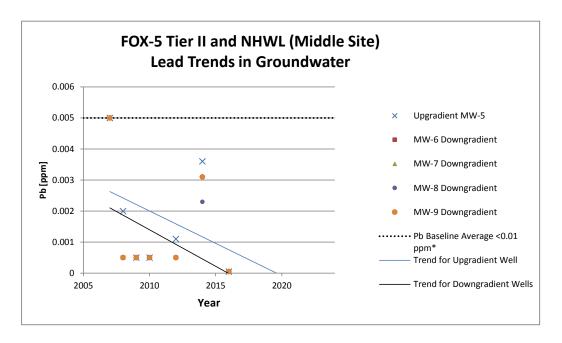
Where results are below detection, half of the detection limit has been used in the charts.



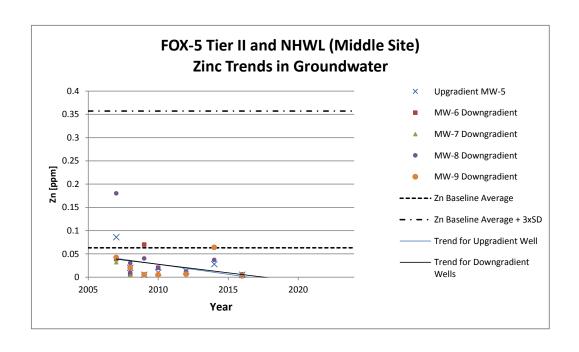


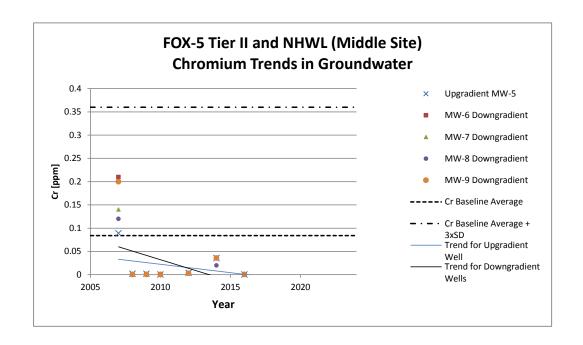


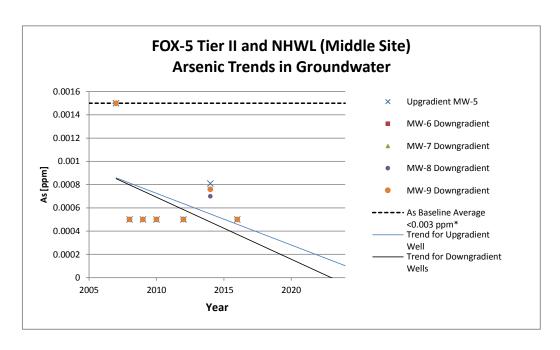




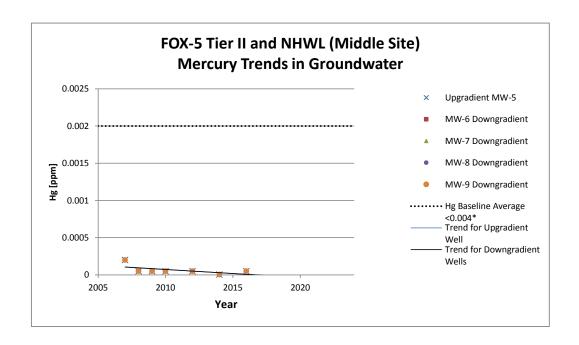
<sup>\*</sup> Pb Baseline SD = 0



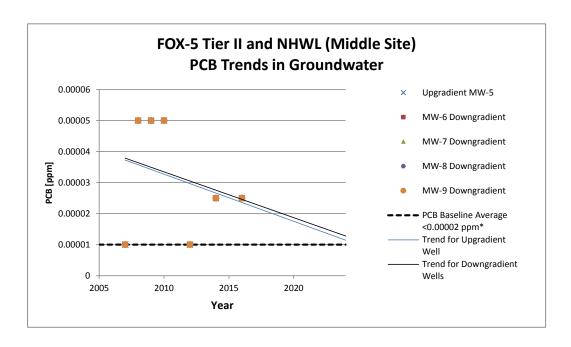




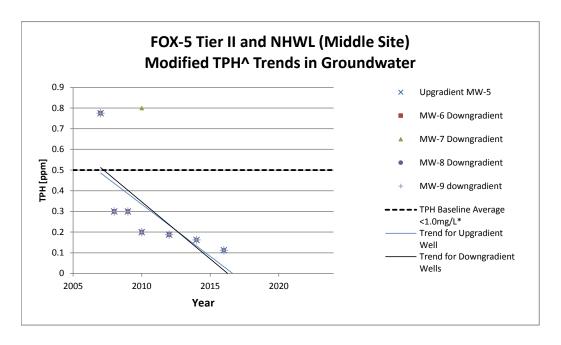
\* As Baseline SD = 0 All As monitoring results below detection. Trend reflects changes in



<sup>\*</sup> Hg Baseline SD = 0. All Hg results below detection. Trend reflects changes in detection li



<sup>\*</sup> PCB Baseline SD = 0. All PCB results below detection. Trend reflects changes in detect



<sup>\*</sup> TPH Baseline SD = 0

Most TPH results below detection. Trend shows changes in detection limits.

<sup>^</sup> Modified TPH are Sum of PHC F1-F3 fractions.

FOX-5 Qiki	qtarjuaq (Brou	ghton	n Island) M	Iain Landf	ill - S	umma	ry of	2007-2	2024 Sc	oil Ana	lytica	1 Data	ı	_	1	1	ı	ı	Т		
ample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lui Oil
2 1 15						- 11	F 0	5.0	1.0	40	14	20	4.0	0.5	0.040				5.0		1
Background Da	ata - Average					<u>11</u>	5.3	5.0	1.0	<u>10</u>	<u>46</u>	<u>20</u>	1.9	0.5	0.010	-			5.0		
Baseline Data	- Average					8.5	5.0	5.0	1.0	10	38	20	2	0.10	0.003				69	n/a	n/
Baseline Data - Sta	andard Deviation					3.9	2.3	0.6	0.10	6.5	27	1.7	1.4	0.00	0.10				182		
Baseline Data Ave	rage + 3xSD					20	12	6.8	1.3	30	119	25	6	0	0				615		
Detection Limit						<3.0	<5.0	< 5.0	<1.0	<10	<15	<20	<1	< 0.1	< 0.003				<40		
* If hasalina avaras	ge was below the detect	ion limi	t the average ha	a baan madified	to matal	the det	ation lim	it valua													
		IOH HIM	., ше average па	s veen mounted	io maici	i ine dete	сион ит	u value.		200					1						
DEW Line Cleani	up 11er 1 Crueria					400	400	#O	5	500	500	250	20		-				2500		
DEW Line Clean	up Tier II Criteria ጵ l	Hydroca	rbon Action Let	rel		100	100	50	,	500	500	250	30	2	5				2500		
Monitoring Da	ata																				
Upgradient																					
	MW-10 Surface															TPH S	um will a	appear whe	n F1-F3 results	are ente	red.
4746	MW 10	2007	1	Phase I	10	4.9	< 5.0	< 5.0	<1.0	<10	32	<20	<1.0	< 0.10	< 0.0030	<10	4.0	11	20		
200808-128-FOX5	MW-10	2008	2	Phase I	0-10	<u>11</u>	14	5.0	< 0.50	<u>10</u>	44	28	2.0	< 0.1	< 0.02	<20	<20	1750	<u>1770</u>		
509-10WA	MW 10	2009	3	Phase I	0-15	6.0	<u>14</u>	6.0	< 0.5	9.0	33	17	2.7	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
510-10WA	MW-10	2010	4	Phase I	0-15	10	<u>11</u>	4.0	< 0.5	10	<u>49</u>	21	2.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
2-19600	MW-10	2012	6	Phase I	0-10	6.7	5.8	3.2	< 0.50	8.6	35	13	2.6	< 0.010	< 0.020	<10	<10	<50	<u>35</u>		
F5-MN-MW-10-S	MW-10	2014	8	Phase II	0-15	6.7	<u>5.6</u>	3.5	< 0.10	7.6	37	13	<1.0	< 0.050	< 0.010	<10	<10	< 50	<u>35</u>		
MW-10b	MW-10	2016	10	Phase II	0-15	6.3	5.2	3.6	< 0.5	7	31.7	11.7	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
	1111110	2021	15	Phase II	0.15														#N/A		
		2031	25	Phase II															#N/A		
		2031	20	Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-10 Depth																				
24748	MW 10	2007	1	Phase I	40	4.4	< 5.0	< 5.0	<1.0	<10	31	<20	<1.0	< 0.10	< 0.0030	<10	4.5	11	21		
200808-129-FOX5	MW-10	2008	2	Phase I	40-50	<u>13</u>	24	7.0	< 0.5	<u>10</u>	<u>60</u>	<u>54</u>	2.3	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-10WB	MW 10	2009	3	Phase I	40-50	6.0	22	7.0	< 0.5	7.0	34	<u>25</u>	2.5	< 0.1	< 0.02	<20	<20	<20	30		
510-10WB	MW-10	2010	4	Phase I	40-50	10	<u>27</u>	4.0	< 0.5	9.0	<u>47</u>	<u>55</u>	1.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
2-19602	MW-10	2012	6	Phase I	40-50	7.2	6.0	3.2	< 0.50	8.3	37	13	2.5	< 0.010	< 0.020	< 5.0	<10	<50	33		
5-MN-MW-10-D	MW-10	2014	8	Phase II	40-50	8	6.5	4.4	< 0.10	8.7	43	15	<1.0	< 0.050	< 0.010	<10	<10	< 50	<u>35</u>		
√W-10a	MW-10	2016	10	Phase II	40-50	6.3	5.5	3.6	< 0.5	7.9	32.3	12.6	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		<u> </u>
	1			1															#N/A	1	1

OX-5 Qikiq	tarjuaq (	(Broug	ghton	Island)	Main	Landf	ï11 - Sι	ımma	ry of 2	2007-2	024 Sc	oil Ana	lytica	l Data	i

Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH :	Identity % Lube
D " .					(cm)															Oil	Oil
Downgradient	3 cm; 44 0 0		I	1			1										1				
	MW-11 Surface																				Ļ—
24750/51	MW 11	2007	1	Phase I	10	6.6	<u>5.8</u>	<u>5.5</u>	<1.0	<u>12</u>	32	<20	3.4	< 0.10	< 0.0030	<10	6.0	< 9.0	<u>16</u>		
200808-116-FOX5	MW 11	2008	2	Phase I	0-10	<u>12</u>	<u>13</u>	6.0	< 0.5	<u>12</u>	<u>53</u>	<u>28</u>	4.0	<0.1	< 0.02	<20	<20	<20	30		
F509-11WA	MW 11	2009	3	Phase I	0-15	9.0	32	<u>10</u>	< 0.5	<u>13</u>	43	<u>35</u>	5.0	<0.1	< 0.02	<20	<20	40	<u>60</u>		<u> </u>
F510-11WA	MW 11	2010	4	Phase I	0-15	9.0	10	4.0	< 0.5	<u>13</u>	42	19	2.0	<0.1	< 0.02	<10	<10	<20	20		
12-19616	MW-11	2012	6	Phase I	0-10	5.1	4.0	2.1	< 0.50	<u>18</u>	24	7.6	<u>5.1</u>	< 0.010	< 0.020	<5.0	<10	<50	33		—
F5-MN-MW-11-S	MW-11	2014	8	Phase II	0-15	8	6.4	3.8	< 0.10	14.0	40	14	1.2	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		ــــــ
MW-11a	MW-11	2016	10	Phase II	0-15	6.8	<u>5.4</u>	3.7	< 0.5	<u>13</u>	29.8	13.3	<1.0	<0.1	< 0.05	<7	<4	<8	9.5		Ь—
		2021	15	Phase II															#N/A		—
		2031	25	Phase II		1													#N/A		—
				Phase III		1			1										#N/A		<u> </u>
																			#N/A		ــــــ
																			#N/A		ــــــ
																			#N/A		Ļ—
	MW-11 Depth																				
24752	MW 11	2007	1	Phase I	40	4.7	< 5.0	< 5.0	<1.0	<10	20	<20	<u>2.9</u>	< 0.10	< 0.0030	<10	8.1	19	<u>32</u>		
200808-117-FOX5	MW 11	2008	2	Phase I	40-50	<u>11</u>	<u>12</u>	<u>5.0</u>	< 0.5	<u>16</u>	42	<u>27</u>	2.8	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-11WB	MW 11	2009	3	Phase I	40-50	8.0	<u>19</u>	8.0	< 0.5	9.0	38	<u>30</u>	5.4	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-11WB	MW 11	2010	4	Phase I	40-50	<u>11</u>	<u>13</u>	5.0	< 0.5	<u>13</u>	<u>47</u>	<u>26</u>	3.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19618	MW-11	2012	6	Phase I	40-50	6.1	5.0	2.4	< 0.50	9.4	25	10	3.4	< 0.010	< 0.020	< 5.0	<10	<50	33		
F5-MN-MW-11-D	MW-11	2014	8	Phase II	40-50	8.6	6.5	3.7	< 0.10	14.0	34	15	1.2	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
Not sampled - refusal	MW-11	2016	10	Phase II															#N/A		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-12 Surface																				
24756	MW 12	2007	1	Phase I	10	3.9	< 5.0	< 5.0	<1.0	<10	29	<20	1.6	< 0.10	< 0.0030	<10	5.2	35	<u>45</u>		
200808-119-FOX5	MW 12	2008	2	Phase I	0-10	10	<u>8</u>	4.0	< 0.5	<u>11</u>	<u>57</u>	17	2.2	< 0.1	< 0.02	<20	<20	<20	30		
Dup 200808-120-FOX5	MW 12	2008	3	Phase I	0-10	10	14	4.0	< 0.5	14	<u>57</u>	31	1.8	< 0.1	< 0.02	<20	<20	<20	30		
F509-12WA	MW 12	2009	4	Phase I	0-15	9.0	<u>17</u>	6.0	0.6	<u>21</u>	<u>67</u>	28	<u>25</u>	< 0.1	< 0.02	<20	<20	71	91		
F510-12WA	MW-12	2010	6	Phase I	0-15	22	<u>13</u>	4.0	< 0.5	<u>18</u>	<u>76</u>	<u>26</u>	2.0	< 0.1	0.43	<10	<10	39	49		
12-19612	MW-12	2012	8	Phase II	0-10	8.3	5.9	3.2	< 0.50	<u>13</u>	41	13	3.1	< 0.010	0.06	<5.0	<10	77	<u>85</u>		
F5-MN-MW-12-S	MW-12	2014	8	Phase II	0-15	5	2.8	1.7	< 0.10	7.7	26	5.7	<1.0	< 0.050	0.013	<10	<10	<50	35		
MW-12a	MW-12	2016	10	Phase II	0-15	5.5	3.8	2.7	< 0.5	9.6	40.6	8.5	<1.0	< 0.1	< 0.05	<7	<4	35	40.5		
		2021	25	Phase II															#N/A		
		2031		Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		<b>†</b>
									<b>†</b>							<b>†</b>			#N/A	1	t-

FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Analytical Data

Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lube Oil
	MW-12 Depth																				
24758	MW 12	2007	1	Phase I	40	3.6	< 5.0	< 5.0	<1.0	<10	26	<20	1.1	< 0.10	< 0.0030	<10	6.3	17	<u>28</u>		1
200808-121-FOX5	MW 12	2008	2	Phase I	40-50	<u>11</u>	<u>14</u>	5.0	< 0.5	<u>17</u>	<u>59</u>	<u>32</u>	<u>3</u>	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-12WB	MW 12	2009	3	Phase I	40-50	6.0	<u>19</u>	6.0	< 0.5	7.0	40	28	2.9	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-12WB	MW 12	2010	4	Phase I	40-50	8.0	<u>11</u>	3.0	< 0.5	<u>14</u>	35	22	2.0	< 0.1	< 0.02	<10	<10	33	<u>43</u>		
12-19614	MW-12	2012	6	Phase I	40-50	5.2	4.4	2.4	< 0.50	<u>11</u>	33	8.6	3.3	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
F5-MN-MW-12-D	MW-12	2014	8	Phase II	40-50	8.5	3.6	2.1	0.12	13.0	38	7.7	<1.0	< 0.050	0.085	<10	<10	110	120		
Not sampled - refusal	MW-12	2016	10	Phase II															#N/A		
г		2021	15	Phase II															#N/A		<b>†</b>
		2031	25	Phase II															#N/A		t
		2031	2.7	Phase III															#N/A	1	t
				111430 111		1			1										#N/A	+	<del>                                     </del>
																			#N/A		+
																			#N/A		+
	MW-13 Surface																		#1 <b>1</b> /11		
24760/61	MW 13	2007	1	Phase I	10	< 3.0	< 5.0	< 5.0	<1.0	<10	21	<20	<1.0	< 0.10	0.005	<10	6.8	33	<u>45</u>		
200808-122-FOX5	MW 13	2008	2	Phase I	0-10	<u>11</u>	<u>15</u>	5.0	< 0.5	<u>11</u>	<u>52</u>	30	1.9	< 0.1	< 0.02	<20	<20	47	<u>67</u>		
F509-13WA	MW 13	2009	3	Phase I	0-15	7.0	20	7.0	< 0.5	8.0	39	20	3.3	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-13WA	MW 13	2010	4	Phase I	0-15	<u>11</u>	9.0	4.0	< 0.5	<u>13</u>	<u>54</u>	18	2.0	< 0.1	< 0.02	<10	<10	23	33		
12-19608	MW-13	2012	6	Phase I	0-10	5.0	3.7	2.3	< 0.50	7.7	29	7.9	2.2	< 0.010	< 0.020	<5.0	<10	<50	33		<u> </u>
F5-MN-MW-13-S	MW-13	2014	8	Phase II	0-15	5.9	4.3	3.0	< 0.10	7.8	34	9.3	<1.0	< 0.050	< 0.010	<10	<10	<50	35		<u> </u>
MW-13a	MW-13	2016	10	Phase II	0-15	5.7	3.9	2.9	< 0.5	9.2	30.8	9	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		<del>                                     </del>
1111 134	11111 13	2021	15	Phase II	0.10											.,	.,		#N/A		<del>                                     </del>
		2031	25	Phase II															#N/A		
		2031	23	Phase III															#N/A		
				T Hase III															#N/A		+
																			#N/A		+
																			#N/A		+
	MW-13 Depth																		#1 <b>1</b> /11		
24762	MW 13	2007	1	Phase I	40	3.0	< 5.0	< 5.0	<1.0	<10	21	<20	<1.0	< 0.10	< 0.0030	<10	5.7	10	<u>21</u>		
200808-123-FOX5	MW 13	2008	2	Phase I	40-50	7	<u>25</u>	3.0	< 0.5	7.0	35	<u>56</u>	<1.0	< 0.1	< 0.02	<20	<20	<20	30		<b>—</b>
F509-13WB	MW-13	2009	3	Phase I	40-50	5.0	21	6.0	< 0.5	6.0	30	16	1.9	< 0.1	< 0.02	<20	<20	21	41		<b>†</b>
F510-13WB	MW 13	2010	4	Phase I	40-50	8.0	8.0	3.0	< 0.5	9.0	44	17	1.0	< 0.1	< 0.02	<10	<10	<20	20		<b>†</b>
12-19610	MW-13	2012	6	Phase I	40-50	5.2	3.7	2.3	< 0.50	6.4	29	7.4	1.7	< 0.010	< 0.020	<5.0	<10	<50	33		<b>†</b>
F5-MN-MW-13-D	MW-13	2014	8	Phase II	40-50	5.5	3.9	2.5	< 0.10	9.4	31	8.1	<1.0	< 0.050	< 0.010	<10	<10	<50	35		<u> </u>
Not sampled - refusal	MW-13	2016	10	Phase II	10 50											-10	-10	.50	#N/A		<u> </u>
camped reresar		2021	15	Phase II															#N/A	<u> </u>	<del>                                     </del>
		2021	25	Phase II															#N/A	+	<del>                                     </del>
		2031	23	Phase III															#N/A	+	+
				FHASC 111		1				<del>                                     </del>									#N/A	+	+
										<del>                                     </del>									#N/A	+	$\vdash$
																			#N/A	1	+

FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Analytical Data

Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lube Oil
	MW-14 Surface																				
24766	MW 14	2007	1	Phase I	10	< 3.0	< 5.0	< 5.0	<1.0	<10	19	<20	1.3	< 0.10	< 0.0030	<10	4.1	9.2	<u>18</u>		
200808-125-FOX5	MW-14	2008	2	Phase I	0-10	8	<u>10</u>	4.0	< 0.5	<u>10</u>	41	<u>20</u>	1.1	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-14WA	MW-14	2009	3	Phase I	0-15	4.0	4.0	3.0	< 0.5	6.0	19	8.0	2.9	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F510-14WA	MW-14	2010	4	Phase I	0-15	7.0	8.0	3.0	< 0.5	<u>10</u>	35	15	1.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19604/05abc	MW-14	2012	6	Phase I	0-10	4.2	2.8	2.1	< 0.50	<u>10</u>	23	5.7	2.7	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
F5-MN-MW-14-S	MW-14	2014	8	Phase II	0-15	7.55	4.7	3.4	< 0.5	10.1	36	9.9	2	< 0.10	< 0.05	<10	<10	<50	<u>35</u>		
MW-14a	MW-14	2016	10	Phase II	0-15	4.2	3.5	2.8	< 0.5	8.7	25.5	7.3	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-14 Depth																				
24768	MW 14	2007	1	Phase I	40	3.8	< 5.0	< 5.0	<1.0	<10	27	<20	1.5	< 0.10	< 0.0030	<10	6.7	< 9.0	<u>16</u>		
200808-126-FOX5	MW-14	2008	2	Phase I	40-50	9	<u>12</u>	4.0	< 0.5	<u>11</u>	43	24	1.3	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
F509-14WB	MW 14	2009	3	Phase I	40-50	5.0	9.0	6.0	< 0.5	8.0	34	21	3.2	< 0.1	< 0.02	<20	<20	<20	30		
F510-14WB	MW 14	2010	4	Phase I	40-50	8.0	7.0	3.0	< 0.5	9.0	35	14	1.0	< 0.1	< 0.02	<10	<10	<20	<u>20</u>		
12-19606/07abc	MW-14	2012	6	Phase I	40-50	5.5	3.9	3.3	< 0.50	7.8	32	8.0	2.0	< 0.010	< 0.020	< 5.0	<10	<50	33		
F5-MN-MW-14-D	MW-14	2014	8	Phase II	40-50	5	3.5	2.8	< 0.10	7.2	30	7.7	<1.0	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
Not sampled - refusal	MW-14	2016	10	Phase II	1														#N/A		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		

^Note: Total Hydrocarbons (C<sub>6</sub>-C<sub>34</sub>) has been calculated by adding results for F1, F2 and F3.

Legend

XX sample exceeds background

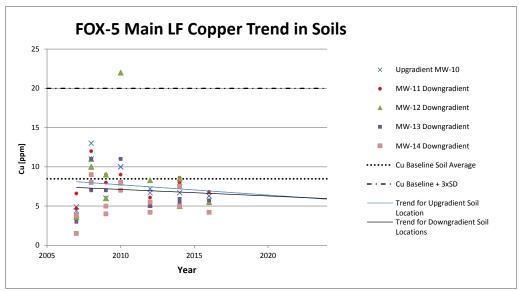
XX sample exceeds baseline

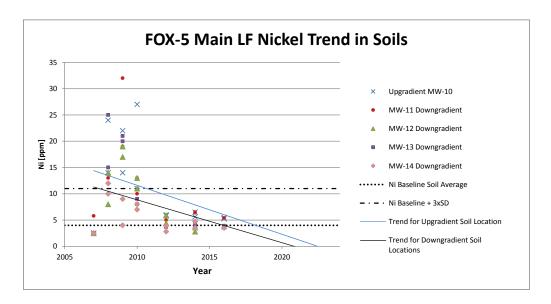
XX sample exceeds DLCU Tier I criteria

XX sample exceeds DLCU Tier II criteria

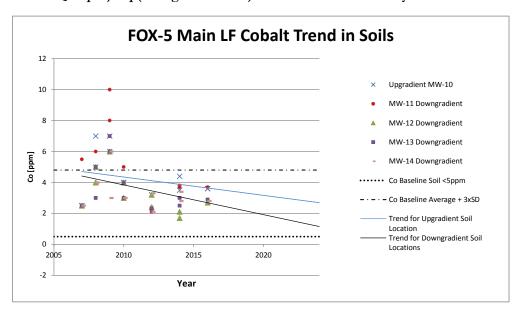
#### FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts

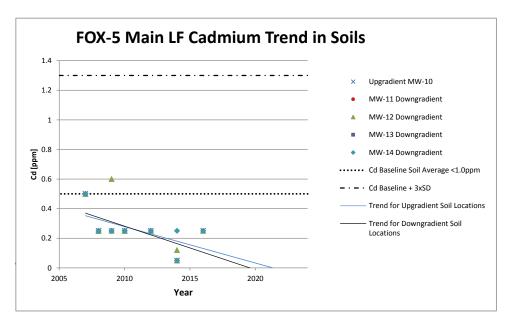
Where results are below detection, half of the detection limit has been used in the charts.



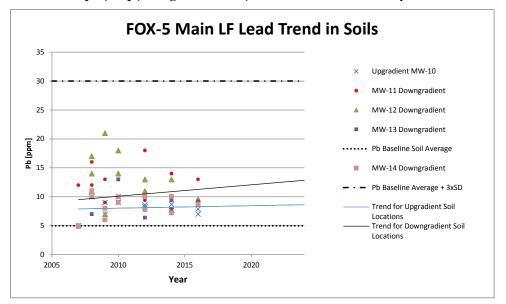


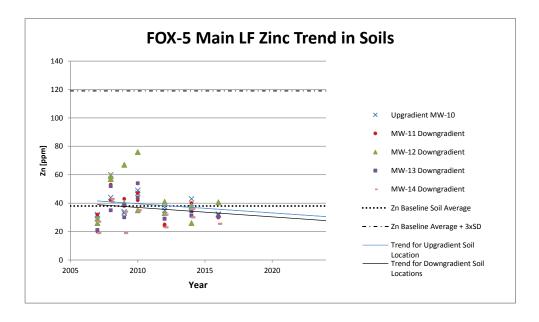
FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts



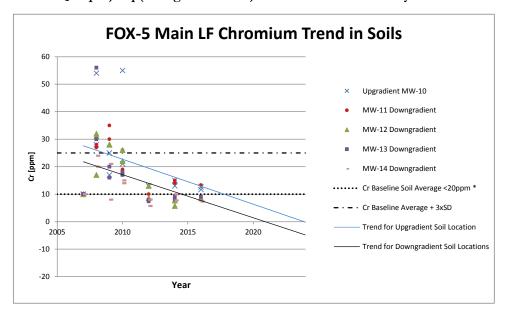


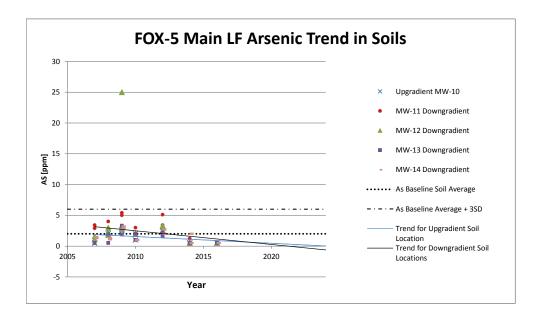
FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts



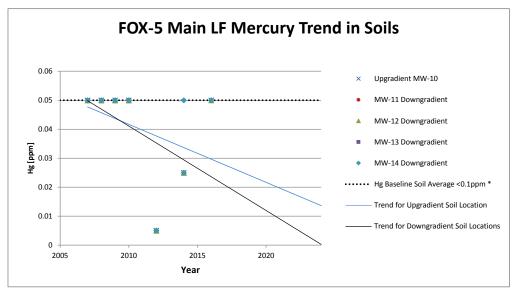


FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts

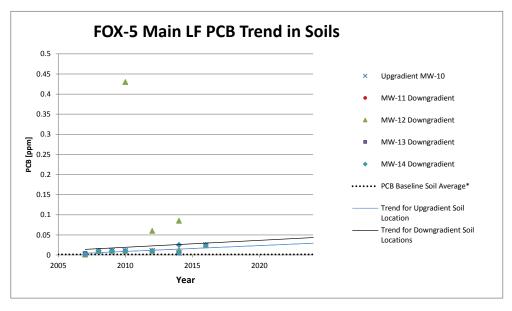




FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts

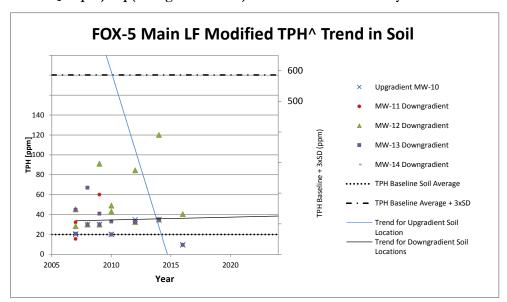


\* Hg Baseline SD = 0 All Hg results below detection. Trend reflects changes in detection limits.



<sup>\*</sup> PCB Baseline SD = 0

FOX-5 Qikiqtarjuaq (Broughton Island) Main Landfill - Summary of 2007-2024 Soil Charts



<sup>^</sup> Baseline samples from 2002 and earlier were analyzed as TPH, results from 2003 and later are Sum of PHC F1-F3 fraction:

FOX-5 Broughton Island Main Landfill - Summary of Groundwater Analytical Data

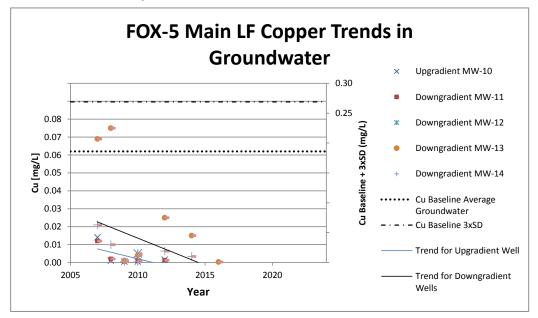
TOX-5 Droughton Isl	una mum Bu	iuiii - O	ummany	or Groun	uwaic	i rinany	ticai D	ata												
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Cu	Ni	Co*	Cd*	Pb*	Zn	Cr	As*	Hg*	Total PCBs*	F1 C <sub>6</sub> -C <sub>10</sub>	F2 C <sub>10</sub> -C <sub>16</sub>	F3 C <sub>16</sub> -C <sub>34</sub>	Modified TPH - Total C6-C34	ТРН І	dentity
					[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	% Fuel Oil	% Lube Oil
Baseline Data - Average					0.062	0.047	0.003	0.001	0.01	0.11	0.084	0.003	0.0004	0.00002				1		
Baseline Data - Standard Deviati	on				0.069	0.036	0.015	0	0	0.138	0.101	0.0046	0	0				0		
Baseline Data Average + 3xSD					0.27	0.16	0.048	0.001	0.01	0.52	0.39	0.017	0.0004	0.00002				1		
Detection Limit					< 0.0010	< 0.0020	< 0.0030	< 0.0010	< 0.010	< 0.010	< 0.0010	< 0.0030	< 0.00040	< 0.000020				<1.0		
* If baseline average was below t	he detection limit, th	e average ha	s been modifi	ed to match t	he detecti	on limit va	lue.													
Monitoring Data																				
Upgradient													Total TI	H will appear v	when F1, F2,	F3 fractions	are entered			
	MW-10																			1
24749/97	MW 10	2007	1	Phase I	0.014	0.067	0.004	< 0.0010	< 0.010	0.026	0.13	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.8		
200808-130-FOX5	MW-10	2008	2	Phase I	0.001	< 0.005	< 0.0002	0.00010	< 0.001	0.01	0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.3		
F509-10W	MW 10	2009	3	Phase I	< 0.001	< 0.005	< 0.0002	0.00010	< 0.001	0.07	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.3		
F510-10W	MW10	2010	4	Phase I	< 0.001	< 0.005	< 0.0002	0.00020	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.1	< 0.1	< 0.2	0.2		
12-19550/51	MW-10	2012	6	Phase I	0.002	0.004	0.001	< 0.00010	< 0.0010	0.011	0.0073	< 0.0010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.2		-
No sample collected - well was dry	MW-10	2014	8	Phase II														#N/A		-
Not sampled - dry	MW-10	2016	10	Phase II														#N/A		<del></del>
		2021	15 25	Phase II														#N/A		-
		2031	25	Phase III Phase III														#N/A #N/A		<del>                                     </del>
				Phase III														#N/A #N/A		
																		#N/A		
																		#N/A		
Downgradient	J	l	1															,		
	MW-11																			
		2007		TN Y	0.012	0.081	< 0.0030	< 0.0010	< 0.010	0.012	0.16	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.0		
24754 200808-118-FOX-5	MW 11 MW-11	2007	2	Phase I Phase I	0.012	0.081	0.0030	0.0000	<0.010	0.012	0.16	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 0.2	0.8		
F509-11W	MW 11	2009	3	Phase I	< 0.002	< 0.005	<0.0002	0.0001	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0001	<0.0001	<0.2	<0.2	<0.2	0.3		
F510-11W	MW-11	2010	4	Phase I	0.001	< 0.005	< 0.0002	0.0006	<0.001	< 0.01	< 0.001	< 0.001	< 0.0001	<0.0001	<0.1	<0.1	<0.2	0.2		
12-199554	MW-11	2012	6	Phase I	0.001	0.006	< 0.00050	< 0.00010	< 0.0010	0.0045	0.0059	< 0.0010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.2		
No sample collected - insufficient water	MW-11	2014	8	Phase II														#N/A		
Not sampled - dry	MW-11	2016	10	Phase II														#N/A		
		2021	15	Phase II														#N/A		
		2031	25	Phase II														#N/A		
				Phase III														#N/A		
																		#N/A		-
																		#N/A		-
	MW 10																	#N/A		
24759	MW-12 MW 12 - dry	2007	1	DL. Y														#N/A		
24/39	MW 12 - dry MW-12 - dry	2007	2	Phase I Phase I														#N/A #N/A		
F510-12W	MW-12 - dry	2010	3	Phase I	0.005	< 0.005	< 0.0002	0.0004	< 0.001	0.02	< 0.001	< 0.001	< 0.0001	< 0.0001				#N/A		
1 010'12 W	MW-12 - frozen	2010	4	Phase I Phase I	0.003	~0.003	NO.0002	0.0004	~0.001	0.02	~0.001	~0.001	~0.0001	NO.0001				#N/A		
No sample collected - well was dry	MW-12	2012	6	Phase I														#N/A		
Not sampled - dry	MW-12	2014	8	Phase II														#N/A		
^ *	-	2021	10	Phase II														#N/A		
		2031	15	Phase II														#N/A		
			25	Phase II														#N/A		
				Phase III														#N/A		
																		#N/A		1
																		#N/A		-
	2.5777.4.0																	#N/A		
	MW-13																			

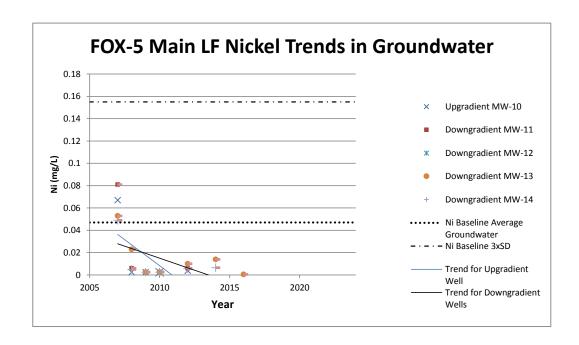
24764	MW 13	2007	1	Phase I	0.069	0.053	0.004	< 0.0010	< 0.010	0.23	0.087	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.8	
200808-124-FOX-5	MW-13	2008	2	Phase I	0.075	0.023	0.001	0,0003	0.004	0.07	0.08	< 0.001	<0.0001	<0.0001	<0.2	<0.2	<0.2	0.3	
F509-13W	MW 13	2009	3	Phase I	0.001	< 0.005	<0.001	0.0007	< 0.001	0.14	< 0.001	< 0.001	<0.0001	< 0.0001	<0.2	<0.2	<0.2	0.3	
F510-13W	MW-13	2010	4	Phase I	0.004	< 0.005	< 0.0002	< 0.0007	< 0.001	0.02	0.001	< 0.001	< 0.0001	<0.0001	<0.1	0.6	0.6	1.3	
12-19553	MW-13	2012	6	Phase I	0.025	< 0.020	< 0.0050	<0.00090	0.011	0.061	0.042	< 0.010	<0.00010	10.0001	-0.3	0.0	0.0	#N/A	
F5-MN-MW-13	MW-13	2014	8	Phase II	0.015	0.014	0.003	0.000	0.005	0.22	0.034	0.0014	0.00001	< 0.00005	< 0.025	< 0.100	< 0.100	0.1	
MW-13	MW-13	2016	10	Phase II	<0.0005	< 0.001	<0.0005	<0.0001	< 0.0001	< 0.005	< 0.001	<0.001	<0.0001	0.00000	< 0.025			#N/A	
	1111 13	2021	15	Phase II	-0.0003	-0.001	10.0003	-0.0001	-0.0001	-0.005	-0.001	-0.001	-0.0001					#N/A	
		2031	25	Phase II														#N/A	
				Phase III														#N/A	
																		#N/A	
																		#N/A	
																		#N/A	
	MW-14																	,	
24769	MW 14	2007	1	Phase I	0.021	0.049	< 0.0030	< 0.0010	< 0.010	0.089	0.088	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.8	
200808-127-FOX-5	MW-14	2008	2	Phase I	0.010	0.005	0.000	0.001	0.001	0.02	0.012	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.3	
F509-14W	MW 14	2009	3	Phase I	< 0.001	< 0.005	< 0.0002	0.001	< 0.001	0.2	0.001	< 0.001	< 0.0001	< 0.0001	< 0.2	< 0.2	< 0.2	0.3	
F510-14W	MW-14	2010	4	Phase I	< 0.001	< 0.005	< 0.0002	0.0002	< 0.001	0.01	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.1	< 0.2	ND	0.2	
12-19552	MW-14	2012	6	Phase I	0.006	0.006	< 0.00050	< 0.00010	0.001	0.041	0.011	< 0.0010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.2	
F5-MN-MW-14	MW-14	2014	8	Phase II	0.003	0.007	0.001	0.000	0.002	0.048	0.015	0.00072	< 0.0001	< 0.0001	< 0.025	< 0.1	< 0.1	0.1	
Not sampled - frozen	MW-14	2016	10	Phase II														#N/A	
		2021	15	Phase II														#N/A	
		2031	25	Phase II														#N/A	
				Phase III														#N/A	
																		#N/A	
																		#N/A	
																		#N/A	

<sup>^</sup>Note: Total Hydrocarbons ( $C_6$ - $C_{34}$ ) has been calculated by adding results for F1, F2 and F3.

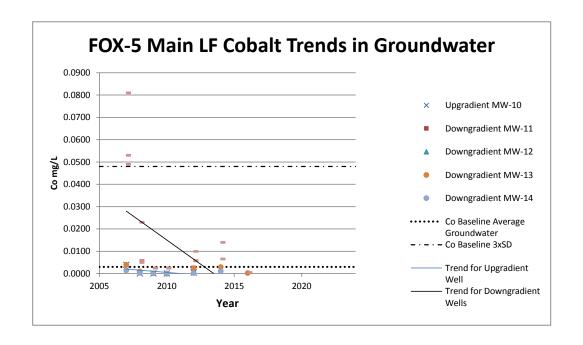
## FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

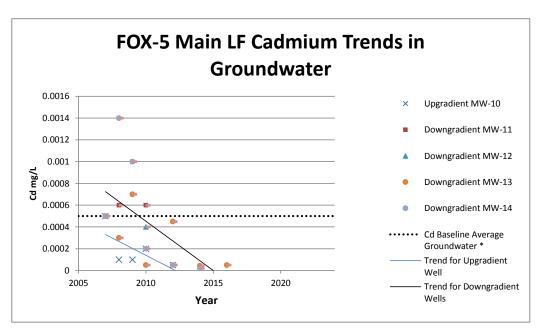
Where results are below detection, half of the detection limit has been used in the charts.





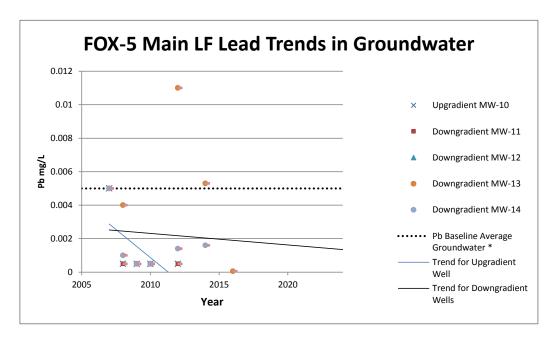
### FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples



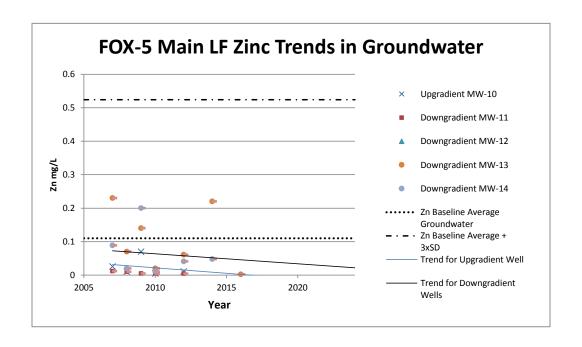


\*Cd Baseline SD = 0

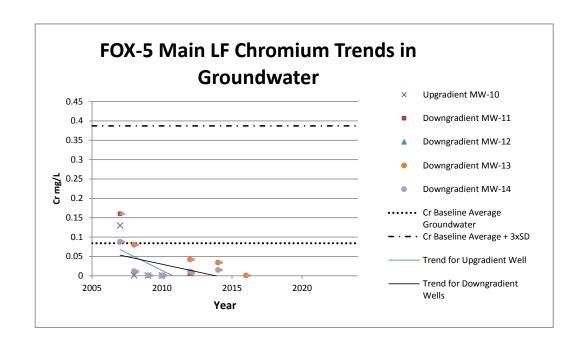
## FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

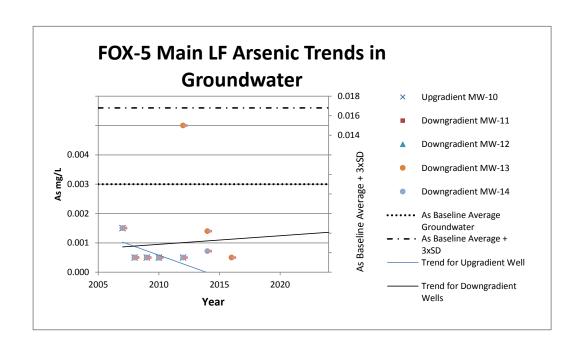


<sup>\*</sup> Pb Baseline SD = 0

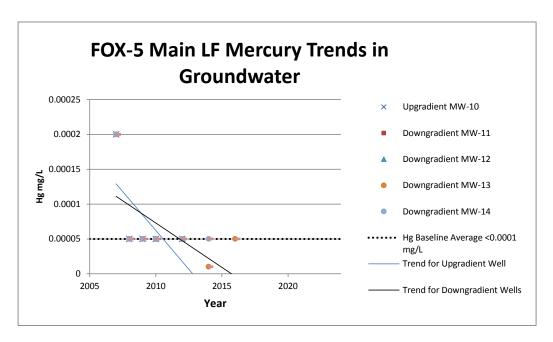


## FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

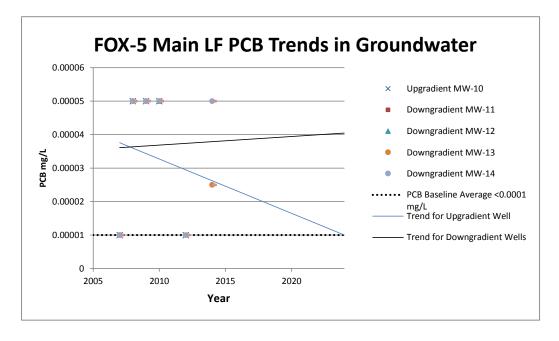




### FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples

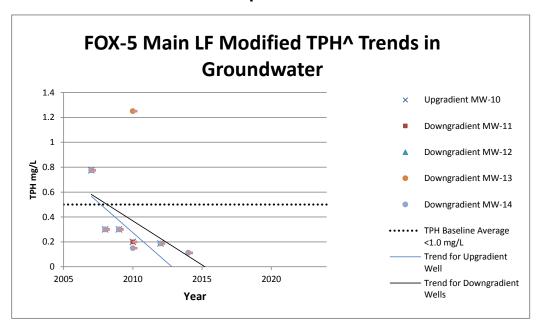


\* Hg Baseline Average SD = 0 All Hg results below detection. Trend line reflects changes in detection limits.



<sup>\*</sup> PCB Baseline Average SD = 0

# **FOX-5 Main Landfill Graphs of Trends for Inorganic Elements, PCBs and TPH in Groundwater Samples**



<sup>\*</sup> TPH Baseline Average SD = 0

<sup>^</sup> Baseline samples from 2002 were analyzed as TPH, results from 2003 and later are Sum of PHC F1-F3 fractions.

FUA-5 QIKI	qtarjuaq (Brou	gnto	n Island) S	tation Non	-Haz	ardou	s was	te Lar	iaiii s	ou An	aiytic	ai Sui	nmar	y 2007	- 2024		1	ı	T		
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 $C_6$ - $C_{10}$ $[mg/kg]$	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH :	Identity % Lube Oil
Background Da	ta - Average					10	5.3	4.0	1.0	5.0	<u>46</u>	<u>19</u>	1.93	0.5	0.001				5.0		
Baseline Data	- Average					8.6	5.0	5.0	1.0	10	35	20	1.8	0.10	0.003				299		
Baseline Data - Sta	ndard Deviation					3.5	2.6	1.7	0.00	20.0	15	4.0	0.6	0.00	0.20				654		
Baseline Data Aver	rage + 3xSD					19	13	10.1	1.0	70	80	32	3.6	0.10	0.60				2261		
Detection Limit						<3.0	<5.0	< 5.0	<1.0	<10	<15	<20	<1	< 0.1	< 0.003				<40		
* ICh 1:		: !:			4	41 1-4-	ti	· t													
· ·	e was below the detect	ion iimi	i, ale average ha	s <i>оесн тоатеа</i>	match	ine aete	Laon mmi	ı vaiue.	_	200											
DEW Line Cleans	ıp Tier I Criteria									200					1						
DEW Line Cleans	up Tier II Criteria & I	- Iydroca	rbon Action Lev	el		100	100	50	5	500	500	250	30	2	5				2500		
Monitoring Da	ata																				
Upgradient																					
- 18	MW-15 Surface																				
07-24776	MW 15	2007	1	Phase I	10	12	9.0	6.5	<1.0	<10	32	<20	1.5	< 0.10	< 0.0030	<10	4.4	< 9.0	14		
F509-15WA	MW-15	2009	3	Phase I	0-15	18	17	10	< 0.5	7.0	<u>50</u>	38	2.4	< 0.1	< 0.02	<20	<20	<20	30		
12-19580	MW-15	2012	6	Phase I	0-10	18	14	6.5	< 0.50	8.0	<u>49</u>	<u>30</u>	2.5	0.021	< 0.020	< 5.0	<10	<50	33		
F5-SA-MW-15-S	MW-15	2014	8	Phase II	0-15	22	18	9.3	< 0.10	7.7	<u>58</u>	38	3.1	< 0.050	< 0.010	<10	<10	<50	35		
MW-15b	MW-15	2016	10	Phase II	0-15	14.6	10.9	6.3	< 0.5	4.4	37.1	30.8	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
				111100 111					-										#N/A		
									1										#N/A		
									1										#N/A		
																			#N/A		
	MW-15 Depth																				
07-24778	MW 15	2007	1	Phase I	40	11	8.2	5.9	<1.0	<10	31	<20	1.1	< 0.10	< 0.0030	<10	4.5	< 9.0	14		
F509-15WB	MW-15	2007	3	Phase I	40-50	<u>15</u>	16	8.0	<0.5	3.0	40	35	1.6	<0.1	<0.02	<20	<20	<20	30		
12-19582	MW-15	2012	6	Phase I	40-50	19	15	6.9	< 0.50	6.7	50	33	2.5	0.011	< 0.020	<5.0	<10	<50	33		
F5-SA-MW-15-D	MW-15	2014	8	Phase II	40-50	20	16	8.2	< 0.10	6.1	51	33	2.7	< 0.050	< 0.010	<10	<10	<50	35		
MW-15a	MW-15	2016	10	Phase II	30-40	17	12.4	7	<0.5	5.6	41.1	33.2	<1.0	<0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II					1										#N/A		
				Phase III															#N/A		
																			#N/A		
																1			#N/A		
																			#N/A		
																			#N/A		

Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lub Oil
	MW-16 Surface																				
07-24770	MW 16	2007	1	Phase I	10	9.2	< 5.0	< 5.0	<1.0	<10	40	<20	1.4	< 0.10	< 0.0030	<10	6.0	10	<u>21</u>		
F509-16WA	MW-16	2009	3	Phase I	0-15	<u>39</u>	<u>15</u>	7.0	< 0.5	<u>23</u>	88	<u>36</u>	3.0	< 0.1	< 0.02	<20	<20	34	<u>54</u>		
12-19584	MW-16	2012	6	Phase I	0-10	14	9.6	4.9	< 0.50	<u>16</u>	63	23	2.6	0.014	0.03	< 5.0	81	180	<u>264</u>		
F5-SA-MW-16-S	MW-16	2014	8	Phase II	0-15	<u>16</u>	5.4	3.3	0.11	11.0	<u>67</u>	12	2.2	< 0.050	0.022	<10	<10	<50	<u>35</u>		
MW-16a	MW-16	2016	10	Phase II	0-15	19.4	7.7	6.3	< 0.5	19.8	103	19.7	<1.0	< 0.1	< 0.05	<7	18	59	80.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		1
																			#N/A		
																			#N/A		1
																			#N/A		
																			#N/A		
	MW-16 Depth																				
07-24772	MW 16	2007	1	Phase I	40	64	< 5.0	< 5.0	<1.0	<10	44	<20	<1.0	< 0.10	< 0.0030	<10	53	390	448		†
F509-16WB	MW-16	2009	3	Phase I	40-50	<u>17</u>	19	<u>10</u>	< 0.5	<u>19</u>	88	43	3.1	< 0.1	< 0.02	<20	213	118	341		
12-19586	MW-16	2012	6	Phase I	40-50	<u>15</u>	9.8	5.2	13	<u>29</u>	78	24	3.3	0.023	0.12	1200	770	100	2070		+
F5-SA-MW-16-D	MW-16	2014	8	Phase II	40-50	21	9.8	6.0	0.14	14.0	87	23	3.3	< 0.050	< 0.010	<10	23	51	79		1
Not sampled - refual	MW-16	2016	10	Phase II															#N/A		1
		2021	15	Phase II															#N/A		1
		2031	25	Phase II															#N/A		+
				Phase III															#N/A		1
				111100 111															#N/A		+
																			#N/A		1
																			#N/A		+
																			#N/A		+
Downgradient		l							1	l				l							
Downgrauten	MW-17 Surface																				$\overline{}$
07-24790/91	MW 17	2007	1	Phase I	10	4.5	< 5.0	<5.0	<1.0	<10	25	<20	<1.0	< 0.10	< 0.0030	<10	5.6	< 9.0	<u>15</u>		$\vdash$
F509-17WA	MW 17	2007	3	Phase I	0-15	10	13	8.0	<0.5	8.0	48	29	4.1	<0.1	<0.02	<20	<20	<20	30		+
12-19588	MW 17	2012	6	Phase I	0-13	5.8	4.3	2.4	<0.50	6.1	28	9.0	2.2	< 0.010	<0.020	<5.0	<10	<50	33		+-
F5-SA-MW-17-S	MW-17	2012	8	Phase II	0-10	9.1	5	3.2	< 0.10	13.0	43	12	2.6	< 0.050	< 0.010	<10	<10	120	130		+
MW-17b	MW-17	2014	10	Phase II	0-15	8.9	7.5	5.2	<0.5	8.1	46.4	17.1	<1.0	<0.1	<0.05	<7	<4	<8	9.5		+
IVI W - 1 / U	IVI W - 1 /	2016	15	Phase II	0-13	0.7	110	<u> </u>	.0.5	U.I.	1011		-11.0	-0.1	.0.05		\ <del>4</del>	<u>~o</u>	#N/A		+
		2021	25	Phase II															#N/A		+
		2031	23	Phase III						<del>                                     </del>									#N/A		+
				Phase III															#N/A	-	+
										<del>                                     </del>									#N/A	-	+
																			#N/A	-	+
																			#N/A		+

TOM-3 QIKI	qiaijuaq (biou	Sinto	ii isiailu) 5	14011 1 1011	-11aL	aruou	s was	tt Lai	Iuiii c	OH 2111	arytic	ai oui	IIIIIai	y 2007	- 2027						
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH % Fuel Oil	Identity % Lube Oil
	MW-17 Depth																				
07-24792	MW 17	2007	1	Phase I	40	< 3.0	< 5.0	< 5.0	<1.0	<10	18	<20	1.2	< 0.10	< 0.0030	<10	5.3	< 9.0	<u>15</u>		
F509-17WB	MW 17	2009	3	Phase I	40-50	8.0	8.0	6.0	< 0.5	7.0	41	18	3.1	< 0.1	< 0.02	<20	<20	<20	30		
12-19590	MW 17	2012	6	Phase I	40-50	6.7	5.2	3.0	< 0.50	7.4	33	11	2.9	< 0.010	< 0.020	<5.0	<10	<50	33		
F5-SA-MW-17-D	MW-17	2014	8	Phase II	40-50	8.2	6.2	4.0	< 0.10	7.3	41	14	2.9	< 0.050	< 0.010	<10	<10	<50	35		
MW-17a	MW-17	2016	10	Phase II	30-40	7	5.7	4.2	<0.5	6	40.1	14.3	<1.0	<0.1	<0.05	<7	<4	<8	9.5		
1V1 VV - 1 / &	111W-17	2021	15	Phase II	30-40							- 110				- 1			#N/A		
		2021	25	Phase II															#N/A		
		2031	23	Phase III															#N/A		-
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW 10.0 C																		#1N/ A		
	MW-18 Surface																				
07-24786	MW 18	2007	1	Phase I	10	4.6	<5.0	5.0	<1.0	<10	31	<20	1.9	< 0.10	< 0.0030	<10	5.2	14	24		
F509-18WA	MW 18	2009	3	Phase I	0-15	10	<u>15</u>	8.0	<0.5	<u>12</u>	46	33	3.8	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
12-19592/93abc	MW-18	2012	6	Phase I	0-10	6.7	5.2	2.8	< 0.50	<u>5.9</u>	30	11	2.1	< 0.010	< 0.020	< 5.0	<10	<50	33		
F5-SA-MW-18-S	MW-18	2014	8	Phase II	0-15	9.9	7.9	<u>4.5</u>	< 0.10	6.8	43	17	1.2	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
MW-18b (Dup Avg)	MW-18	2016	10	Phase II	0-15	7	5	4	< 0.5	<u>6</u>	37	13	2	< 0.1	< 0.05	<6	<7	<29	21		
		2021	15	Phase II															#N/A		<u> </u>
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		ļ
																			#N/A		
																			#N/A		
	MW-18 Depth																				
07-24788	MW 18	2007	1	Phase I	40	6.1	<5.0	<u>5.1</u>	<1.0	<u>14</u>	34	<20	1.8	< 0.10	< 0.0030	<10	52	270	<u>327</u>		
F509-18WB	MW 18	2009	3	Phase I	40-50	6	9.0	6.0	< 0.5	6.0	36	<u>20</u>	3.0	< 0.1	< 0.02	<20	<20	43	<u>63</u>		
12-19594/95abc	MW-18	2012	6	Phase I	40-50	4.9	3.9	2.2	< 0.50	<u>6.2</u>	27	8.2	2.0	< 0.010	< 0.020	<10	<50	<50	<u>55</u>		
F5-SA-MW-18-D	MW-18	2014	8	Phase II	40-50	10.1	6.55	<u>4.5</u>	< 0.5	6.5	40.5	17.5	1.6	< 0.10	< 0.05	<10	<10	<50	<u>35</u>		
MW-18a	MW-18	2016	10	Phase II	40-50	5.5	4.3	3.3	< 0.5	6.8	29.7	10.7	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
																			#N/A		

	1,1	<u> </u>												,							
Sample ID	Location	Year	Monitoring Year	Monitoring Phase	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co* [mg/kg]	Cd* [mg/kg]	Pb* [mg/kg]	Zn [mg/kg]	Cr* [mg/kg]	As [mg/kg]	Hg* [mg/kg]	Total PCB* [mg/kg]	F1 C <sub>6</sub> -C <sub>10</sub> [mg/kg]	F2 C <sub>10</sub> -C <sub>16</sub> [mg/kg]	F3 C <sub>16</sub> -C <sub>34</sub> [mg/kg]	Modified TPH^ - Total C6-C34 [mg/kg]	TPH 1	Identity % Lube Oil
	MW-19 Surface																				
07-24780	MW 19	2007	1	Phase I	10	3.9	<5.0	< 5.0	<1.0	<10	19	<20	1.4	< 0.10	< 0.0030	<10	5.5	< 9.0	<u>15</u>		
F509-19WA	MW 19	2009	3	Phase I	0-15	10	13	8.0	< 0.5	6.0	45	28	3.8	< 0.1	< 0.02	<20	<20	<20	30		
12-19596	MW-19	2012	6	Phase I	0-10	6.4	5.0	2.6	< 0.50	4.8	28	11	2.2	< 0.010	< 0.020	<5.0	<10	<50	33		
F5-SA-MW-19-S	MW-19	2014	8	Phase II	0-15	8.2	6.2	3.6	< 0.10	6.2	36	14	2	< 0.050	< 0.010	<10	<10	<50	35		
MW-19b	MW-19	2016	10	Phase II	0-15	8.7	6	4.1	< 0.5	7.2	33.4	15.1	<1.0	< 0.1	< 0.05	<7	<4	<8	9.5		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
																			#N/A		
	MW-19 Depth																				1
07-24782	MW 19	2007	1	Phase I	40	5.4	< 5.0	< 5.0	<1.0	<10	25	<20	2.4	< 0.10	< 0.0030	<10	< 4.0	< 9.0	<u>12</u>		
F509-19WB	MW-19	2009	3	Phase I	40-50	9.0	<u>12</u>	7.0	< 0.5	5.0	40	<u>27</u>	3.6	< 0.1	< 0.02	<20	<20	<20	<u>30</u>		
12-19598	MW-19	2012	6	Phase I	40-50	7.3	5.7	3.1	< 0.50	5.4	33	13	2.6	< 0.010	< 0.020	< 5.0	<10	<50	<u>33</u>		
F5-SA-MW-19-D	MW-19	2014	8	Phase II	40-50	8.4	6.7	3.8	< 0.10	5.8	36	15	1.6	< 0.050	< 0.010	<10	<10	<50	<u>35</u>		
MW-19a	MW-19	2016	10	Phase II	40-50	7.3	5.8	3.8	< 0.5	<u>6</u>	33.2	14.1	<1.0	< 0.1	< 0.05	<7	<4	<8	<u>9.5</u>		
		2021	15	Phase II															#N/A		
		2031	25	Phase II															#N/A		
				Phase III															#N/A		L
																			#N/A		
																			#N/A		
																			#N/A		<u> </u>
																			#N/A		<u> </u>

 $The \ Station \ Non-Hazardous \ Waste \ Land fill \ was \ visually \ assessed \ in \ 2008 \ and \ 2010 \ but \ soil \ and \ groundwater \ samples \ were \ not \ taken \ as \ per \ the \ monitoring \ contract.$ 

^Note: Total Hydrocarbons (C<sub>6</sub>-C<sub>34</sub>) has been calculated by adding results for F1, F2 and F3.

Legend

XX sample exceeds background

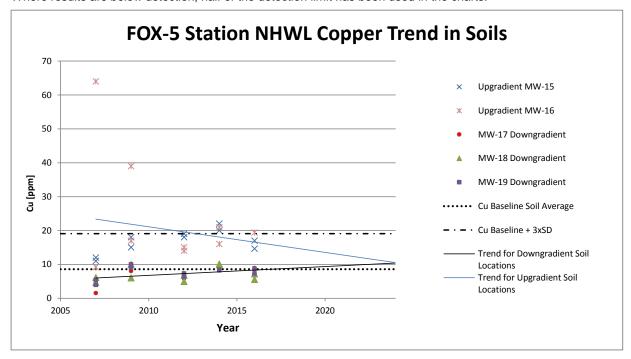
XX sample exceeds baseline

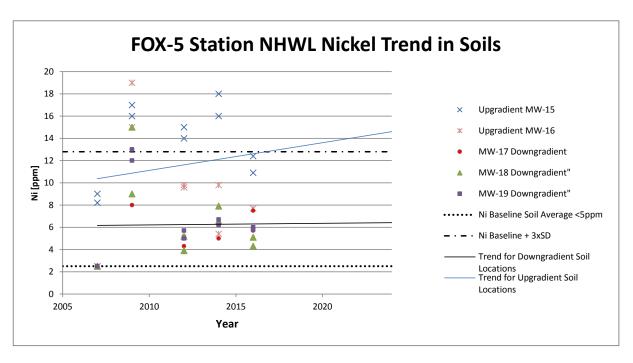
XX sample exceeds DLCU Tier I criteria

XX sample exceeds DLCU Tier II criteria

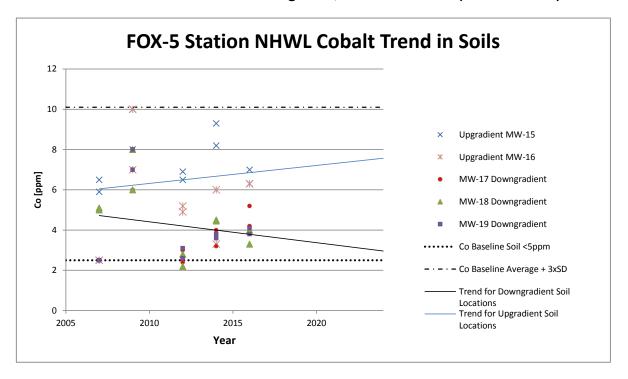
#### FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

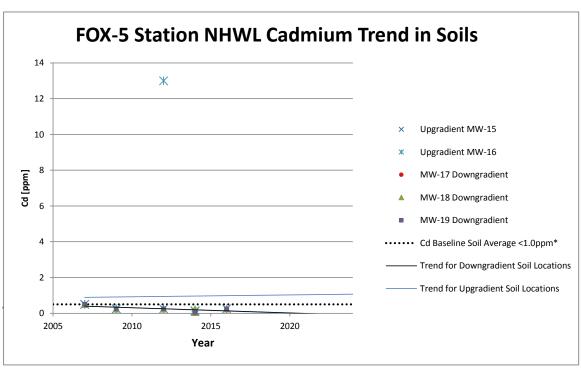
Where results are below detection, half of the detection limit has been used in the charts.





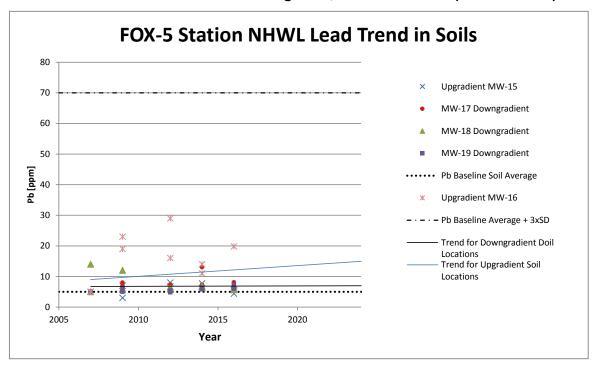
FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

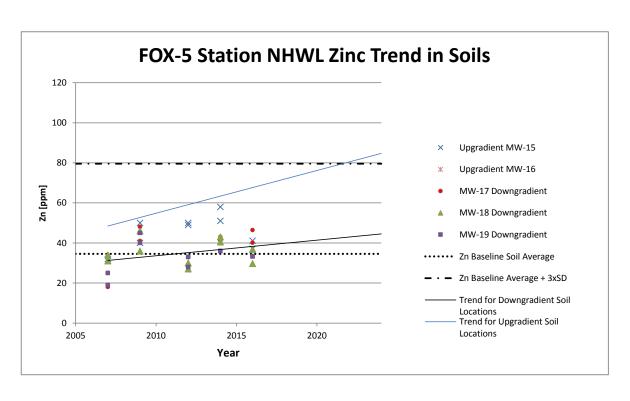




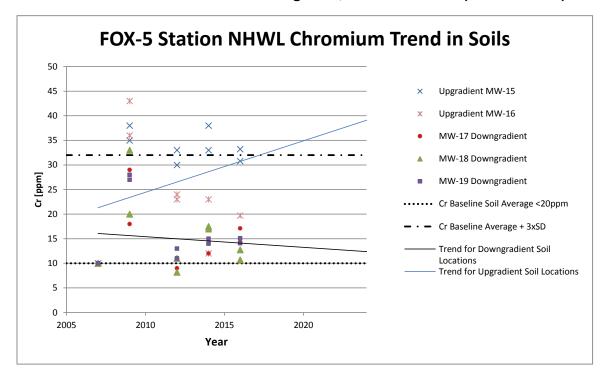
<sup>\*</sup> Cd Baseline SD = 0

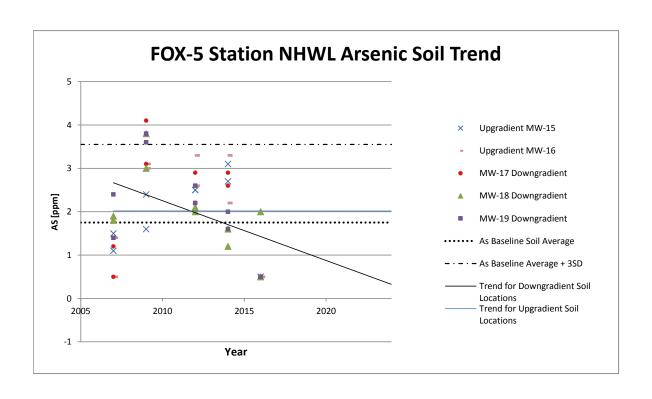
FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



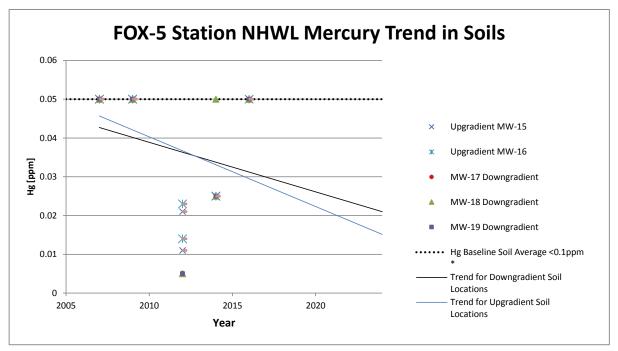


FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)

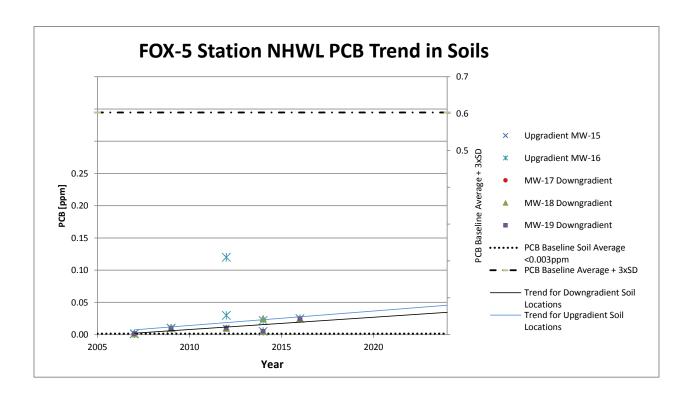




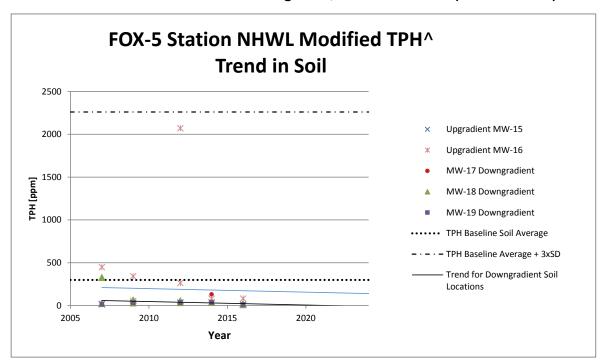
#### FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



<sup>\*</sup> Hg Baseline SD = 0



FOX-5 Station NHWL Trends in Soil Inorganics, PCBs and PHCs (modified TPH)



<sup>^</sup> Baseline samples from 2002 and earlier were analyzed as TPH, results from 2003 and later are Sum of PHC F1-F3 fractions

FOX-5 Qikiqtarjuaq (Broughton Island) Station NHWL - Summary of Groundwater Analytical Data  $C_6-C_{10}$  $C_{16}$ - $C_{34}$ Modified TPH Monitoring Location Date Cu TPH Identity Sample ID Year Phase Ni Co\* Cd\* Pb\* Zn Cr As\* Hg\* Total PCBs<sup>4</sup> Total C6-C34 % Lube [mg/L] Oil [mg/L] [mg/L] [mg/L] [mg/L] [mg/L] 6 Fuel Oil [mg/L] [mg/L] [mg/L] [mg/L] [mg/L] [mg/L] Baseline Data - Average 0.075 0.010 0.001 0.01 0.097 0.116 0.003 0.004 0.00002 Baseline Data - Standard Deviation 0.037 0.075 0.084 0.002 Baseline Data Average + 3xSD 0.0929091 0.1857273 0.04032727 0.001 0.01 0.32152961 0.3678217 0.009 0.004 0.00002 Detection Limit < 0.0010 < 0.0020 < 0.0030 < 0.010 < 0.0010 < 0.0030 < 0.00040 < 0.000020 < 0.010 < 1.0 \* If baseline average was below the detection limit, the average has been modified to match the detection limit value. Monitoring Data Upgradient Total TPH will appear when F1, F2, F3 fractions are entered MW-15 24779 MW 15 2007 Phase I 0.024 0.160 0.007 < 0.0010 < 0.010 0.052 0.33 < 0.0030 < 0.00040 < 0.000020 < 0.050 < 0.50 F509-15W < 0.2 MW 15 2009 Phase I < 0.001 < 0.005 < 0.0002 0.001 < 0.001 0.04 < 0.001 < 0.001 < 0.0001 < 0.0001 < 0.2 < 0.2 12-19545 MW-15 2012 Phase I < 0.010 < 0.020 < 0.0050 < 0.00090 < 0.010 0.032 0.03 < 0.010 < 0.00010 < 0.000022 < 0.025 < 0.10 0.56 0.623 F5-SA-MW-15 MW-15 2014 Phase II 0.009 0.000 < 0.000020 0.000 0.020 0.02 < 0.00020 < 0.00001 < 0.00005 < 0.025 < 0.1 < 0.2 0.163 MW-15 MW-15 2016 10 Phase II < 0.0005 < 0.001 < 0.0005 < 0.0001 < 0.0001 < 0.005 < 0.001 < 0.001 < 0.0001 < 0.00005 < 0.025 < 0.100 < 0.100 0.113 2021 Phase II #N/A 2031 25 Phase II #N/A Phase III #N/A #N/A MW-16 24774 MW 16 2007 Phase I 0.031 0.060 0.009 < 0.0010 < 0.010 0.12 0.11 < 0.0030 < 0.00040 < 0.000020 < 0.050 < 0.50 < 1.0 0.775 F509-16W 2009 < 0.001 0.002 < 0.0001 0.2 0.2 MW 16 Phase I 0.003 < 0.005 0.001 0.001 0.09 < 0.001 < 0.0001 < 0.2 0.500 MW-16 2012 Phase I 0.012 12-19546 0.024 0.006 < 0.00090 0.82 0.05 < 0.010 < 0.00010 < 0.000050 < 0.025 0.69 1.04 1.743 F5-SA-MW-16 MW-16 2014 Phase II 0.041 0.020 0.009 0.001 0.022 0.370 0.05 0.004 0.000 < 0.00005 < 0.025 0.45 < 0.2 0.563 MW-16 MW-16 2016 Phase II < 0.0005 < 0.001 < 0.0005 < 0.0001 < 0.0001 0.01 < 0.001 < 0.001 < 0.0001 < 0.00005 < 0.025 < 0.100 < 0.100 0.113 2021 15 Phase II #N/A 2031 25 #N/A Phase II Phase III #N/A #N/A #N/A #N/A Downgradient MW-17 2007 < 0.000020 24794 MW 17 Phase I 0.011 0.038 < 0.0030 < 0.0010 < 0.010 0.021 0.07 < 0.0030 < 0.00040 < 0.050 < 0.50 < 1.0 0.775 F509-17W MW 17 2009 Phase I < 0.005 0.000 0.003 < 0.001 0.020 0.004 < 0.001 < 0.0001 < 0.0001 < 0.2 0.001 12-19547 MW-17 2012 0.012 0.001 0.02 < 0.000020 < 0.025 < 0.10 Phase I < 0.00010 0.006 < 0.0010 < 0.00010 No sample collected - insufficient water 2014 Phase II MW-17 MW-17 2016 10 Phase II < 0.0005 < 0.001 < 0.0005 < 0.0001 < 0.0001 < 0.005 < 0.001 < 0.001 < 0.0001 < 0.025 < 0.100 < 0.100 0.113 2021 Phase II #N/A 2031 Phase II #N/A Phase III #N/A #N/A #N/A #N/A MW-18 2007 Phase I 0.058 0.160 0.120 0.32 < 0.0030 0.775 F509-18W Phase I < 0.005 0.000 0.0004 0.040 0.00 < 0.001 < 0.0001 < 0.2 < 0.025 < 0.25 12-10948 MW-18 2012 Phase I 0.013 0.025 0.001 < 0.00010 0.001 0.026 0.05 < 0.0010 < 0.00010 < 0.000023 < 0.10 0.188 2014 Phase II #N/A No sample collected - insufficient water Not sampled - dry MW-18 2016 Phase II #N/A

#N/A

2021

Phase II

FOX-5 Qikiqtarjuaq (Broughton Island) Station NHWL - Summary of Groundwater Analytical Data

FOX-5 Qikiqtarjua	q (Diougnion i	sianu) Si	anon ivi	1 W LL - 30	minima	y or or	ounaw	atti mi	ary ticai	Data										
Sample ID	Location	Date	Monitoring Year	Monitoring Phase	Cu	Ni	Co*	Cd*	Pb*	Zn	Cr	As*	Hg*	Total PCBs*	F1 C <sub>6</sub> -C <sub>10</sub>	F2 C <sub>10</sub> -C <sub>16</sub>	F3 C <sub>16</sub> -C <sub>34</sub>	Modified TPH - Total C6-C34	ТРН І	lentity
					[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	% Fuel Oil	% Lube Oil
		2031	25	Phase II														#N/A		
				Phase III														#N/A		
																		#N/A		
																		#N/A		
																		#N/A		
	MW-19																			
24784	MW 19	2007	1	Phase I	0.032	0.052	0.013	< 0.0010	< 0.010	0.100	0.11	< 0.0030	< 0.00040	< 0.000020	< 0.050	< 0.50	< 1.0	0.775		
F509-19W	MW-19	2009	3	Phase I	< 0.001	< 0.005	< 0.0002	0.004	< 0.001	< 0.01	< 0.001	< 0.001	< 0.0001	< 0.0001		< 0.2	< 0.2	0.200		
12-19549	MW-19	2012	6	Phase I	0.058	0.053	0.011	< 0.00090	0.013	0.130	0.08	< 0.010	< 0.00010	< 0.000020	< 0.025	< 0.10	< 0.25	0.188		
F5-SA-MW-19	MW-19	2014	8	Phase II	0.022	0.017	0.007	0.000	0.008	0.110	0.04	0.003	< 0.00001	< 0.00005	< 0.025	< 0.100	< 0.100	0.113		
MW-19	MW-19	2016	10	Phase II	< 0.0005	< 0.001	< 0.0005	< 0.0001	< 0.0001	< 0.005	< 0.001	< 0.001	< 0.0001	< 0.0005	< 0.025	< 0.100	< 0.100	0.113		
		2021	15	Phase II														#N/A		
		2031	25	Phase II														#N/A		
				Phase III														#N/A		
																		#N/A		
																		#N/A		
																		#N/A		

<sup>^</sup>Note: Total Hydrocarbons (C<sub>6</sub>-C<sub>34</sub>) has been calculated by adding results for F1, F2 and F3.

The Station Non-Hazardous Waste Landfill was visually assessed in 2008 and 2010 but soil and groundwater samples were not taken as per the monitoring contract.



#### 2016 FOX-5 MONITORING REPORT

### **APPENDIX D**

### **Photograph Log**

Visual Inspection Photographs

Thermistor Photographs

Monitoring Well Photographs

Soil Sampling Photographs





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Photo 1: FOX-5 – Middle Site NHWL / Tier II DF – East corner facing northwest (ATT3\_Photo3.jpg)



Photo 2: FOX-5 – Middle Site NHWL / Tier II DF - North toe facing northwest (ATT4\_Photo4.jpg)







Photo 3: FOX-5 – Middle Site NHWL / Tier II DF - North toe facing west (ATT5\_Photo5.jpg)



Photo 4: FOX-5 – Middle Site NHWL / Tier II DF - Northwest toe facing southwest (ATT6\_Photo6.jpg)





Photo 5: FOX-5 – Middle Site NHWL / Tier II DF - West toe facing southwest (ATT7\_Photo7.jpg)



Photo 6: FOX-5 – Middle Site NHWL / Tier II DF - Southwest toe facing east (ATT8\_Photo8.jpg)







Photo 7: FOX-5 – Middle Site NHWL / Tier II DF - Southwest toe facing northeast (ATT9\_Photo9.jpg)



Photo 8: FOX-5 – Middle Site NHWL / Tier II DF - South toe facing east (ATT10\_Photo10.jpg)





Photo 9: FOX-5 – Middle Site NHWL / Tier II DF - Southeast toe facing north – Previously observed settlement (Feature E) likely just rough grading (ATT11\_Photo11.jpg)



Photo 10: FOX-5 – Middle Site NHWL / Tier II DF - Southeast toe facing northwest (ATT12\_Photo12.jpg)







Photo 11: FOX-5 – Middle Site NHWL / Tier II DF – Crest facing northeast towards VT-9 (ATT13\_Photo13.jpg)



Photo 12: FOX-5 – Middle Site NHWL / Tier II DF - Crest facing northeast – Previously observed erosion channels (Feature F) were not observed in 2016 and could have been early self-armouring, north end of thin minor crack along crest edge (Feature O – not visible in photo) (ATT14\_Photo14.jpg)







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Photo 15: FOX-5 – Middle Site NHWL / Tier II DF - Crest edge facing southeast (ATT17\_Photo17.jpg)



Photo 16: FOX-5 – Middle Site NHWL / Tier II DF - Crest edge facing southwest (ATT18\_Photo18.jpg)





Photo 17: FOX-5 – Middle Site NHWL / Tier II DF - West crest edge facing northeast (ATT19\_Photo19.jpg)



Photo 18: FOX-5 – Middle Site NHWL / Tier II DF – East toe facing north (ATT2\_Photo2.jpg)







Photo 19: FOX-5 – Middle Site NHWL / Tier II DF - South crest edge facing southeast (ATT20\_Photo20.jpg)



Photo 20: FOX-5 – Middle Site NHWL / Tier II DF - Crest surface facing east towards VT-11 - Previously ponded water (Feature B) not observed in 2016 (ATT21\_Photo21.jpg)







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Photo 23: FOX-5 – Middle Site NHWL / Tier II DF – South slope facing southeast – Feature C – Self-armouring erosion, multiple channels (Acceptable) (ATT43\_Photo43.jpg)



Photo 24: FOX-5 – Middle Site NHWL / Tier II DF – South slope facing southeast – Feature C – Self-armouring erosion (Acceptable) (ATT42\_Photo42.jpg)







Photo 25: FOX-5 – Middle Site NHWL / Tier II DF – Southeast crest surface facing southeast – Feature D – Vehicle tracks from trucks, quads and dirt bikes are present over most of the landfill surfaces (Acceptable) (ATT45\_Photo45.jpg)



Photo 26: FOX-5 – Middle Site NHWL / Tier II DF – Crest surface facing northwest towards VT-11 (ATT48\_Photo48.jpg)







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Photo 28: FOX-5 – Middle Site NHWL / Tier II DF – Northeast corner facing north – Previously observed natural staining (Feature G) not observed in 2016 may have been moisture (ATT50\_Photo50.jpg)







Photo 29: FOX-5 – Middle Site NHWL / Tier II DF – Northeast toe facing northwest – Moist ground but no ponded water at toe (ATT53\_Photo53.jpg)



Photo 30: FOX-5 – Middle Site NHWL / Tier II DF – Northeast slope facing north – Feature H – Parallel cracking on slope (Acceptable) (ATT52\_Photo52.jpg)







Photo 31: FOX-5 – Middle Site NHWL / Tier II DF – Northeast slope facing north (ATT51\_Photo51.jpg)



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Photo 34: FOX-5 – Middle Site NHWL / Tier II DF – Northwest slope facing south – Feature A - self-armouring erosion channels (Acceptable) (ATT57\_Photo57.jpg)







Photo 35: FOX-5 – Middle Site NHWL / Tier II DF – South crest edge facing southeast – Feature N – minor settlement at crest edge (Acceptable) (ATT44\_Photo44.jpg)



Photo 36: FOX-5 – Middle Site NHWL / Tier II DF – South slope facing southwest – Feature C – self-armouring erosion channels (Acceptable) (ATT46\_Photo46.jpg)







Photo 37: FOX-5 – Middle Site NHWL / Tier II DF – Southeast slope facing northeast – Feature O – tension crack with sharp edges extending from toe to crest at corner of landfill and along crest edge (ATT49\_Photo49.jpg)



Photo 38: FOX-5 – Middle Site NHWL / Tier II DF – Northeast crest facing northwest – Feature P – weathered tension crack about 4 m from crest edge (Acceptable) (ATT54\_Photo54.jpg)







Photo 39: FOX-5 – Middle Site NHWL / Tier II DF – Northwest crest surface facing southeast – Feature Q – hydrocarbon staining not related to landfill performance (Acceptable) (ATT58\_Photo58.jpg)



Photo 40: FOX-5 – Middle Site NHWL / Tier II DF – VT-9 (ATT61\_Photo61.jpg)







Photo 41: FOX-5 – Middle Site NHWL / Tier II DF – VT-10 (ATT62\_Photo62.jpg)



Photo 42: FOX-5 – Middle Site NHWL / Tier II DF – VT-11 (ATT60\_Photo60.jpg)







Photo 43: FOX-5 – Middle Site NHWL / Tier II DF – VT-12 (ATT59\_Photo59.jpg)



Photo 44: FOX-5 – Middle Site NHWL / Tier II DF – MW-5 – monitoring well (ATT63\_Photo63.jpg)







Photo 45: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 before excavation (ATT68\_Photo68.jpg)



Photo 46: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 after excavation (ATT69\_Photo69.jpg)





Photo 47: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-5 after backfilling (ATT70\_Photo70.jpg)



Photo 48: FOX-5 – Middle Site NHWL / Tier II DF – MW-6 – monitoring well (ATT64\_Photo64.jpg)







Photo 49: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 before excavation (ATT71\_Photo71.jpg)



Photo 50: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 after excavation (ATT72\_Photo72.jpg)





Photo 51: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-6 after backfilling (ATT73\_Photo73.jpg)



Photo 52: FOX-5 – Middle Site NHWL / Tier II DF – MW-7 – monitoring well (ATT65\_Photo65.jpg)







Photo 53: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 before excavation (ATT74\_Photo74.jpg)



Photo 54: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 after excavation (ATT75\_Photo75.jpg)





Photo 55: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-7 after backfilling (ATT76\_Photo76.jpg)



Photo 56: FOX-5 – Middle Site NHWL / Tier II DF – MW-8 – monitoring well (ATT66\_Photo66.jpg)







Photo 57: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 before excavation (ATT77\_Photo77.jpg)



Photo 58: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 after excavation (ATT78\_Photo78.jpg)







Photo 59: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-8 after backfilling (ATT79\_Photo79.jpg)



Photo 60: FOX-5 – Middle Site NHWL / Tier II DF – MW-9 – monitoring well (ATT67\_Photo67.jpg)







Photo 61: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 before excavation (ATT80\_Photo80.jpg)



Photo 62: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 after excavation (ATT81\_Photo81.jpg)





Photo 63: FOX-5 – Middle Site NHWL / Tier II DF – Soil sampling location MW-9 after backfilling (ATT82\_Photo82.jpg)



Photo 64: FOX-5 – Main Landfill – Drainage ditch, west of landfill, facing north – Feature H – erosion channel (Acceptable) (ATT34\_Photo34.jpg)







Photo 65: FOX-5 – Main Landfill – Boulder rip rap on west slope facing southeast (ATT35\_Photo35.jpg)



Photo 66: FOX-5 – Main Landfill – North toe facing southwest – Figure H – erosion channel along toe (Acceptable) (ATT36\_Photo36.jpg)







Photo 67: FOX-5 – Main Landfill – Northeast slope with inclined thermistors facing south (ATT37\_Photo37.jpg)



Photo 68: FOX-5 – Main Landfill – East crest surface facing southwest with boulder rip rap (ATT38\_Photo38.jpg)







Photo 69: FOX-5 – Main Landfill – Southeast toe facing northwest with boulder rip rap slope in background – Feature F erosion channel along toe in foreground (Acceptable) (ATT39\_Photo39.jpg)



Photo 70: FOX-5 – Main Landfill – South crest surface facing north with boulder rip rap (ATT40\_Photo40.jpg)







Photo 71: FOX-5 – Main Landfill – Crest surface facing west, boulder rip rap with sand and gravel on top (ATT41\_Photo41.jpg)



Photo 72: FOX-5 – Main Landfill – Feature A – Inclined thermistors facing VT-3 (ATT107\_Photo107.jpg)







Photo 73: FOX-5 – Main Landfill – Steel rebar at east toe near MW-12 – Previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT109\_Photo109.jpg)



Photo 74: FOX-5 – Main Landfill – Scattered metal debris at northeast toe near MW-11 - Previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT106\_Photo106.jpg)







Photo 75: FOX-5 – Main Landfill – Steel cable at east toe - Example of previously observed Features B, C and E which are not exposed waste materials but construction debris/remnants (Acceptable) (ATT111\_Photo111.jpg)



Photo 76: FOX-5 – Main Landfill – East toe facing northeast – Feature D – south end of erosion channel along north east toe (Acceptable) (ATT110\_Photo110.jpg)







Photo 77: FOX-5 – Main Landfill – South toe facing northeast – Previously observed cracking (Feature G) beyond rip rap at toe is not related to landfill performance (ATT112\_Photo112.jpg)



Photo 78: FOX-5 – Main Landfill – Southwest toe facing northwest – Previously observed erosion (Feature H) around toe of landfill (Acceptable) (ATT104\_Photo104.jpg)







Photo 79: FOX-5 – Main Landfill – West toe facing northwest – Feature I – metal debris exposed by erosion around toe of landfill (Acceptable) (ATT105\_Photo105.jpg)



Photo 80: FOX-5 – Main Landfill – Northeast toe facing south – Feature D – north end of erosion channel along toe (Acceptable) (ATT108\_Photo108.jpg)







Photo 81: FOX-5 – Main Landfill – South toe facing southeast – Feature K – exposed shredded plastic debris around MW-10 (Acceptable) (ATT103\_Photo103.jpg)



Photo 82: FOX-5 – Main Landfill – VT-1 – inclined 76 degrees to northeast (ATT117\_Photo117.jpg)





Photo 83: FOX-5 – Main Landfill – VT-2 inclined 77 degrees to northeast (ATT118\_Photo118.jpg)



Photo 84: FOX-5 – Main Landfill – VT-3 – inclined 70 degrees to northeast (ATT116\_Photo116.jpg)





Photo 85: FOX-5 – Main Landfill – VT-4 – inclined 63 degrees to northeast (ATT119\_Photo119.jpg)



Photo 86: FOX-5 – Main Landfill – VT-5 – inclined 84 degrees (ATT120\_Photo120.jpg)





Photo 87: FOX-5 – Main Landfill – VT-6 – inclined 84 degrees (ATT115\_Photo115.jpg)



Photo 88: FOX-5 – Main Landfill – VT-7 – inclined 85 degrees (ATT113\_Photo113.jpg)







Photo 89: FOX-5 – Main Landfill – VT-8 – inclined 87 degrees (ATT114\_Photo114.jpg)



Photo 90: FOX-5 – Main Landfill – MW-10 – monitoring well (ATT22\_Photo22.jpg)







Photo 91: FOX-5 – Main Landfill – Soil sampling location MW-10 before excavation (ATT23\_Photo23.jpg)



Photo 92: FOX-5 – Main Landfill – Soil sampling location MW-10 after excavation (ATT24\_Photo24.jpg)





Photo 93: FOX-5 – Main Landfill – Soil sampling location MW-10 after backfilling (ATT25\_Photo25.jpg)



Photo 94: FOX-5 – Main Landfill – MW-11 – monitoring well (ATT38\_Photo38.jpg)







Photo 95: FOX-5 – Main Landfill – Soil sampling location MW-11 before excavation (ATT39\_Photo39.jpg)



Photo 96: FOX-5 – Main Landfill – Soil sampling location MW-11 after excavation (ATT40\_Photo40.jpg)





Photo 97: FOX-5 – Main Landfill – Soil sampling location MW-11 after backfilling (ATT41\_Photo41.jpg)



Photo 98: FOX-5 – Main Landfill – MW-12 – monitoring well (ATT34\_Photo34.jpg)





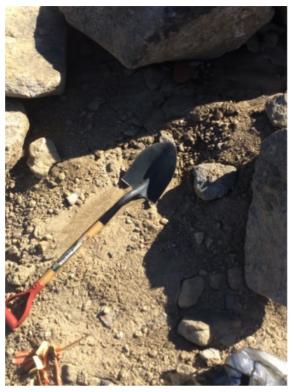


Photo 99: FOX-5 – Main Landfill – Soil sampling location MW-12 before excavation (ATT35\_Photo35.jpg)



Photo 100: FOX-5 – Main Landfill – Soil sampling location MW-12 after excavation (ATT36\_Photo36.jpg)







Photo 101: FOX-5 – Main Landfill – Soil sampling location MW-12 after backfilling (ATT37\_Photo37.jpg)



Photo 102: FOX-5 – Main Landfill – MW-13 – monitoring well (ATT30\_Photo30.jpg)







Photo 103: FOX-5 – Main Landfill – Soil sampling location MW-13 before excavation (ATT31\_Photo31.jpg)



Photo 104: FOX-5 – Main Landfill – Soil sampling location MW-13 after excavation (ATT32\_Photo32.jpg)







Photo 105: FOX-5 – Main Landfill – Soil sampling location MW-13 after backfilling (ATT33\_Photo33.jpg)



Photo 106: FOX-5 – Main Landfill – MW-14 – monitoring well with previously observed wood debris (Feature E) that is not exposed waste (ATT26\_Photo26.jpg)







Photo 107: FOX-5 – Main Landfill – Soil sampling location MW-14 before excavation (ATT27\_Photo27.jpg)



Photo 108: FOX-5 – Main Landfill – Soil sampling location MW-14 after excavation (ATT28\_Photo28.jpg)







Photo 109: FOX-5 – Main Landfill – Soil sampling location MW-14 after backfilling (ATT29\_Photo29.jpg)



Photo 110: FOX-5 – Station Area NHWL – Overview photo, southeast of landfill, facing northwest (ATT24\_Photo24.jpg)







Photo 111: FOX-5 – Station Area NHWL – Crest edge, south corner, facing northeast (ATT25\_Photo25.jpg)



Photo 112: FOX-5 – Station Area NHWL – Crest edge, east corner, facing northwest – previously observed settlement (Feature F) considered rough grading (Acceptable) (ATT26\_Photo26.jpg)







Photo 113: FOX-5 – Station Area NHWL – Crest edge, north corner, facing southwest (ATT27\_Photo27.jpg)



Photo 114: FOX-5 – Station Area NHWL – Crest edge, west corner, facing southeast (ATT28\_Photo28.jpg)







Photo 115: FOX-5 – Station Area NHWL – Northeast slope from north toe facing southeast (ATT29\_Photo29.jpg)



Photo 116: FOX-5 – Station Area NHWL – Southwest slope from toe facing northeast (ATT30\_Photo30.jpg)







Photo 117: FOX-5 – Station Area NHWL – Northeast slope from toe facing northwest (ATT31\_Photo31.jpg)



Photo 118: FOX-5 – Station Area NHWL – Northwest slope facing southeast - Motorbike tracks on slope – Previously observed settlement (Feature Q) is likely rough grading and not significant (ATT32\_Photo32.jpg)







Photo 119: FOX-5 – Station Area NHWL – Crest surface facing southeast – Previously observed vehicle tracks (Feature G) cover most of landfill surface and are not considered significant (ATT33\_Photo33.jpg)



Photo 120: FOX-5 – Station Area NHWL – Crest in north corner facing northwest – Previously observed settlement (Feature A) may just be rough grading (ATT86\_Photo86.jpg)







Photo 121: FOX-5 – Station Area NHWL – Crest surface facing northwest – Feature C – steel bolt (Acceptable) (ATT90\_Photo90.jpg)



Photo 122: FOX-5 – Station Area NHWL – Northeast crest facing north – Previously observed settlement (Feature D) is very shallow and not considered significant (ATT89\_Photo89.jpg)







Photo 123: FOX-5 – Station Area NHWL – Northeast slope facing northeast – Feature E – self-armouring erosion (Acceptable) (ATT88\_Photo88.jpg)



Photo 124:  $FOX-5 - Station Area NHWL - Crest surface facing south - Feature G - tire tracks (Acceptable) (ATT84_Photo84.jpg)$ 







Photo 125: FOX-5 – Station Area NHWL – Southeast slope facing northwest – Feature H – minor self-armouring erosion with fines washed down slope (Acceptable) (ATT94\_Photo94.jpg)



Photo 126: FOX-5 – Station Area NHWL – Southeast slope facing northwest – Feature H – minor self-armouring erosion (Acceptable) (ATT96\_Photo96.jpg)







Photo 127: FOX-5 – Station Area NHWL – Southeast slope near toe facing southwest – Feature I – minor settlement (Acceptable) (ATT95\_Photo95.jpg)



Photo 128: FOX-5 – Station Area NHWL – Southeast toe facing northwest – Feature J – metal debris (Acceptable) (ATT83\_Photo83.jpg)







Photo 129: FOX-5 – Station Area NHWL – Southwest crest surface facing northwest – Feature K – minor settlement (Acceptable) (ATT92\_Photo92.jpg)



Photo 130: FOX-5 – Station Area NHWL – Southwest slope facing northwest – Feature L – minor weathered cracking (Acceptable) (ATT93\_Photo93.jpg)







Photo 131: FOX-5 – Station Area NHWL – Southwest toe facing north – Feature M – bits of metal debris (Acceptable) (ATT91\_Photo91.jpg)



Photo 132: FOX-5 – Station Area NHWL – Southwest toe facing northwest – Feature N – steel cable and bits of metal debris (Acceptable) (ATT102\_Photo102.jpg)







Photo 133: FOX-5 – Station Area NHWL – Northwest slope northwest – Feature O – minor settlement (Acceptable) (ATT101\_Photo101.jpg)



Photo 134: FOX-5 – Station Area NHWL – North crest surface facing northwest – Previously observed settlement (Feature O) on crest are very shallow depressions and not considered significant (ATT85\_Photo85.jpg)







Photo 135: FOX-5 – Station Area NHWL – Northwest slope facing southeast – Feature P – minor self-armouring erosion (Acceptable) (ATT100\_Photo100.jpg)



Photo 136: FOX-5 – Station Area NHWL – Northwest slope facing southwest– Feature Q – minor settlement (Acceptable) (ATT98\_Photo98.jpg)







Photo 137: FOX-5 – Station Area NHWL – Northwest slope facing northwest – Feature R – minor weathered cracking (Acceptable) (ATT99\_Photo99.jpg)



Photo 138: FOX-5 – Station Area NHWL – Northwest slope facing southeast – Feature S – self-armouring erosion channels (Acceptable) (ATT87\_Photo87.jpg)







Photo 139: FOX-5 – Station Area NHWL – Northeast slope facing southeast – Feature E – self-armouring erosion channels (Acceptable) (ATT97\_Photo97.jpg)



Photo 140: FOX-5 – Station Area NHWL – MW-15 – monitoring well (ATT2\_Photo2.jpg)







Photo 141: FOX-5 – Station Area NHWL – Soil sampling location MW-15 before excavation (ATT3\_Photo3.jpg)



Photo 142: FOX-5 – Station Area NHWL – Soil sampling location MW-15 after excavation (ATT4\_Photo4.jpg)





Photo 143: FOX-5 – Station Area NHWL – Soil sampling location MW-15 after backfilling (ATT5\_Photo5.jpg)



Photo 144: FOX-5 – Station Area NHWL – MW-16 – monitoring well (ATT7\_Photo7.jpg)





Photo 145: FOX-5 – Station Area NHWL – Soil sampling location MW-16 before excavation (ATT6\_Photo6.jpg)



Photo 146: FOX-5 – Station Area NHWL – Soil sampling location MW-16 after excavation (ATT8\_Photo8.jpg)





Photo 147: FOX-5 – Station Area NHWL – Soil sampling location MW-16 after backfilling (ATT9\_Photo9.jpg)



Photo 148: FOX-5 – Station Area NHWL – MW-17 – monitoring well (ATT10\_Photo10.jpg)







Photo 149: FOX-5 – Station Area NHWL – Soil sampling location MW-17 before excavation (ATT11\_Photo11.jpg)



Photo 150: FOX-5 – Station Area NHWL – Soil sampling location MW-17 after excavation (ATT12\_Photo12.jpg)





Photo 151: FOX-5 – Station Area NHWL – Soil sampling location MW-17 after backfilling (ATT13\_Photo13.jpg)



Photo 152: FOX-5 – Station Area NHWL – MW-18 – monitoring well (ATT15\_Photo15.jpg)







Photo 153: FOX-5 – Station Area NHWL – Soil sampling location MW-18 before excavation (ATT14\_Photo14.jpg)



Photo 154: FOX-5 – Station Area NHWL – Soil sampling location MW-18 after excavation (ATT16\_Photo16.jpg)





Photo 155: FOX-5 – Station Area NHWL – Soil sampling location MW-18 after backfilling (ATT17\_Photo17.jpg)



Photo 156: FOX-5 – Station Area NHWL – MW-19 – monitoring well (ATT19\_Photo19.jpg)







Photo 157: FOX-5 – Station Area NHWL – Soil sampling location MW-19 before excavation (ATT18\_Photo18.jpg)



Photo 158: FOX-5 – Station Area NHWL – Soil sampling location MW-19 after excavation (ATT20\_Photo20.jpg)





Photo 159: FOX-5 – Station Area NHWL – Soil sampling location MW-19 after backfilling (ATT21\_Photo21.jpg)

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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