#### **Defence Construction Canada**

# The Collection of Landfill Monitoring Data at the CAM-4 Kugaaruk Site – 2008 FINAL Report

privileged and confidential

#### Prepared by:

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In association with:

Kitnuna Projects Inc.

Date:

November, 2008

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#### **AECOM**

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November 25, 2008 Project Number: 80-297-4

Ms. Janis Hamacher Contract Coordinator Defence Construction Canada Constitution Square, Suite 1720 350 Albert Street Ottawa, ON K1A 0K3

privileged and confidential

Dear Ms. Hamacher:

## Re: FINAL Report for the 2008 Collection of Landfill Monitoring Data at the CAM-4 Dew Line Site, Kugaaruk, Nunavut

AECOM is pleased to submit eight hard copies of the 2008 Report on Collection of Landfill Monitoring Data at the CAM-4 DEW Line Site at Kugaaruk (formerly Pelly Bay), Nunavut. This report documents the data collected from the site visit to the CAM-4 Site between August 14 and 17, 2008. In addition to the hard copy reports, also attached are three digital data discs to the report which contains:

- a) all numeric data files including analytical results, thermistor data and associated graphs, submitted in MS Excel 2003;
- b) all text files submitted in MS Word 2003;
- c) all Drawings submitted in AutoCAD Version 2008;
- all photographic records of the soil samples collected at each landfill. These have been provided as an attachment to the main report and include and index of the photo numbers and the locations;
- e) all photographic records of the condition of the thermistor casings and dataloggers, along with maintenance report forms;
- all photographic records of the condition of the monitoring wells. These have been provided as attachments to the main report and include and index of the photo numbers and the locations; and,
- g) all field notes have been attaché to each specific landfill investigation report.

The digital information contained on the CD/DVD disc has also been uploaded to the DCC FTP server.

Page 2 Defence Construction Canada 8BNovember 25, 2008

Visual inspections were completed at the following landfills: Station Area Non-hazardous Waste Landfill, DCC Tier II Soil Disposal Facility, Upper Site Landfill, Lower Site Non-hazardous Waste Landfill, and the Lower Site Landfill. The CAM-4 landfills all appear to be in stable physical condition and overall landfill performance is rated as "acceptable". No erosion or issues of concern requiring immediate attention were identified. The observed conditions are documented in the attached appendices and photographs.

Soil samples were collected at two depths from test pits at the following landfills: DCC Tier II Soil Disposal Facility, Upper Site Landfill, and the Lower Site Landfill. Sample results are located within each specific landfill report. DCC should compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

Fourteen of the fifteen monitoring wells monitored in 2008 contained sufficient water to collect a sample for analysis. Monitor MW-10 (Upper Site Landfill) was dry, thus no sample was collected at that location. Sample results are located within each specific landfill report. DCC should compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

All thermistors were downloaded successfully. Data loggers were reset in accordance with the instructions provided by other consultants representing DCC.

If you have any questions or comments concerning this report, please do not hesitate to call me.

Sincerely,

Gartner Lee Limited doing business as AECOM

Darrin C. Johnson, M.Sc., P.Eng. Geotechnical Engineer

DCJ:pc Encl.





## **Signature Page**

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- A. Station Area Non-hazardous Landfill
- B. DCC Tier II Soil Disposal Facility
- C. Upper Site Landfill
- D. Lower Site Non-hazardous Waste Landfill
- E. Lower Site Landfill
- F. Laboratory Reports
- G. Quality Assurance/Quality Control

#### 1. Introduction

The Department of National Defence (DND) in co-operation with Nunavut Tunngavik Incorporated (NTI) has developed a Landfill Monitoring Plan to address post closure monitoring requirements for the landfills at the DEW Line sites. Defence Construction Canada (DCC) is managing the clean-up monitoring programs on behalf of DND. Kitnuna Projects Inc. (Kitnuna) and AECOM, in a joint venture, were awarded the contract for the purposes of providing services for the collection of landfill monitoring data at the CAM-4 Kugaaruk (formerly Pelly Bay) Site in the Nunavut Settlement Area for 2008. This report will provide the procedures and the results for interpretation on the monitoring completed in 2008.

## 2. Background

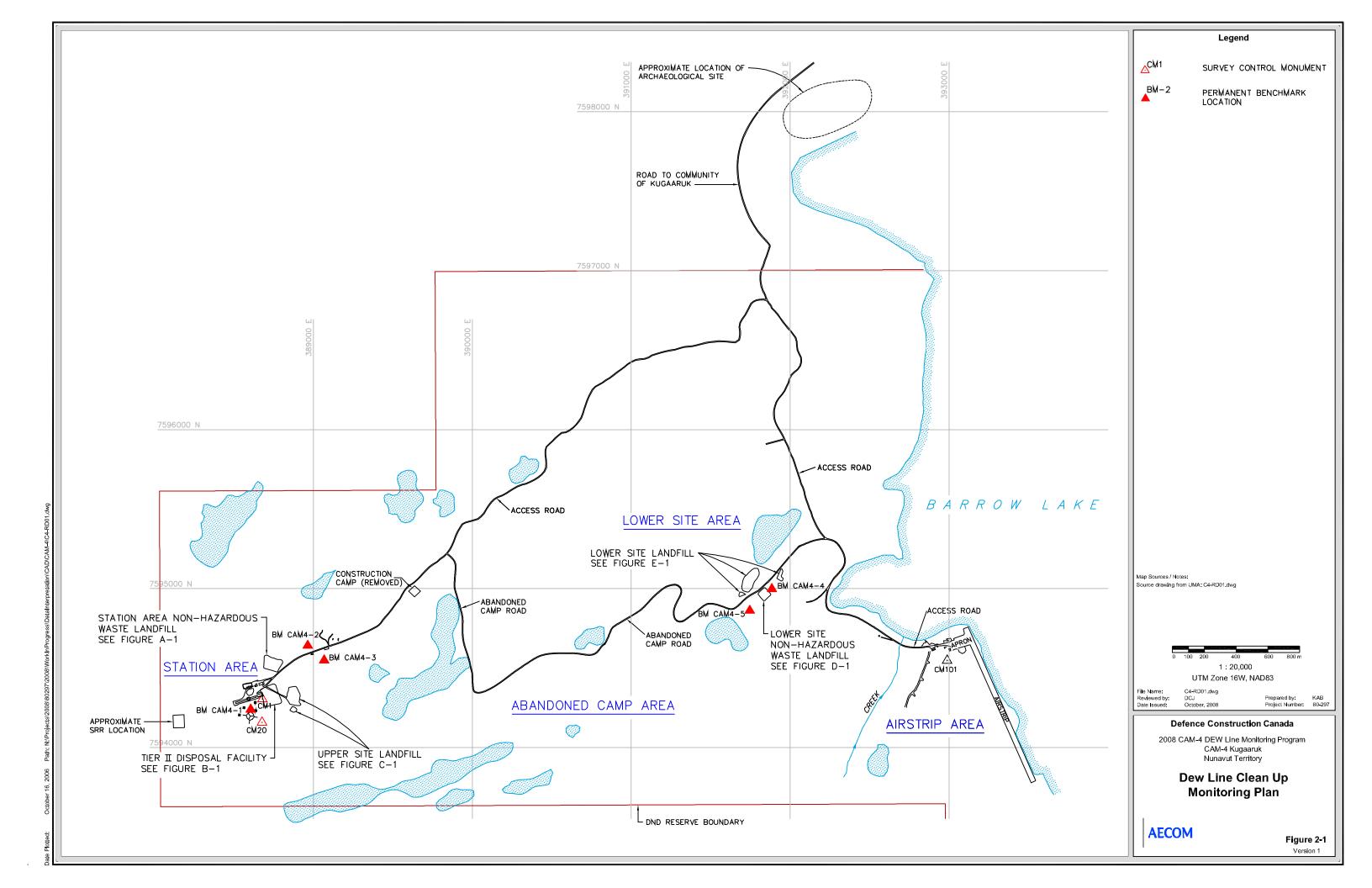
The CAM-4 Kugaaruk DEW Line site is located on the Simpson Peninsula at 68° 27' north latitude and 89° 45' west longitude, and is approximately 340 kilometres southwest of the community of Hall Beach, and 640 kilometres east of Cambridge Bay. The station is located inland about 14 kilometres southeast of the community of Kugaaruk (formerly Pelly Bay).

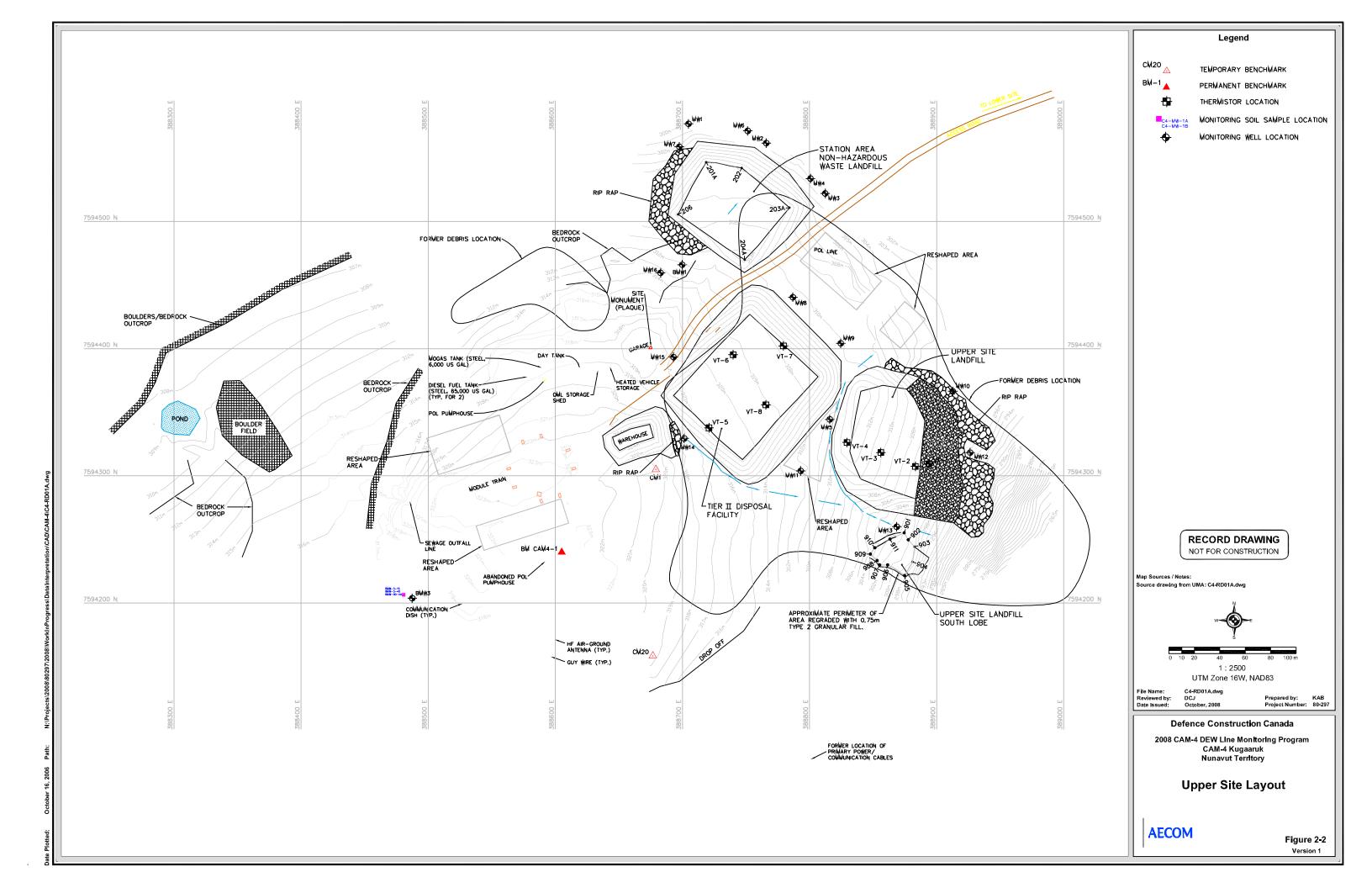
CAM-4 was converted to a Short Range Radar (SRR) site in the early 1990s. The environmental cleanup and demolition of facilities not required for the operation of the SRR site commenced in 2001 and was completed in 2006. The cleanup included the closure and remediation of four existing landfills as well as the construction of two landfills for the disposal of non-hazardous wastes generated from demolition, and collection of site debris, at the upper and lower sites. Additionally, a DCC Tier II soil disposal facility was constructed at this site. A total of 5 landfills exist at the CAM-4 site today:

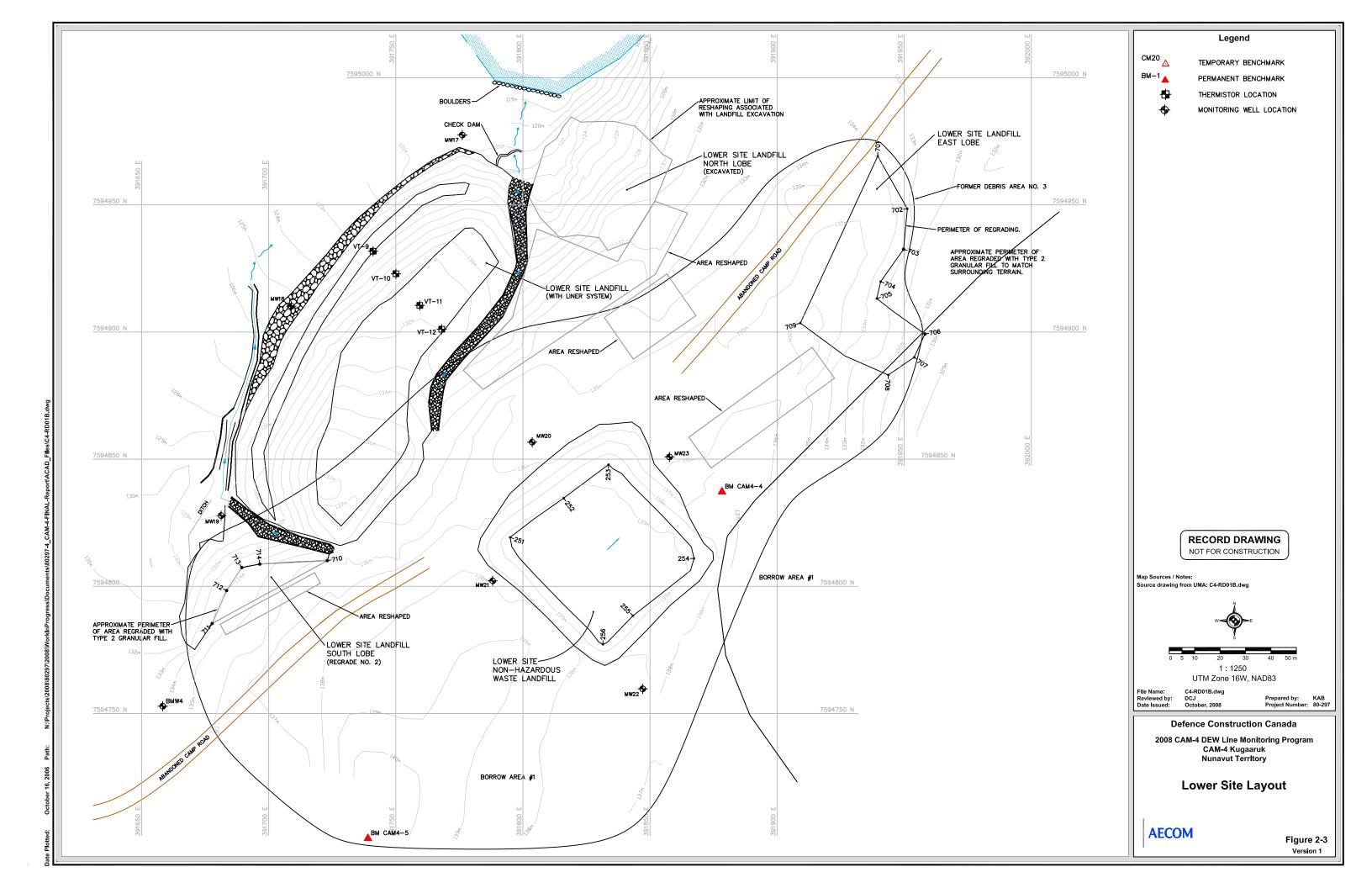
- Upper Site Landfill
- Lower Site Landfill
- Lower Site Non-Hazardous Waste Landfill
- Station Area Non-Hazardous Waste Landfill
- DCC Tier II Soil Disposal Facility

The locations of the various landfills are shown on Figure 2-1. Access to the landfills was gained through on-site roads. The baseline monitoring of the landfills commenced in 2007. 2008 was the first year of monitoring by external consultant.

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#### 2.1 Project Objectives

The objective of the landfill monitoring program is to collect sufficient information to assess the performance of the landfill from a geotechnical and environmental perspective. The Landfill Monitoring Plan specified the requirements for the visual inspection as well as the chemical and thermal monitoring of the landfills. The long term monitoring plan consists of visual monitoring for signs of settlement, erosion and/or slope instability, collection of soil and groundwater samples to evaluate the effectiveness of the leachate containment systems, and monitoring of the sub-surface ground temperatures along the toe of and within the main body of specific landfills.

#### 2.2 2008 Monitoring Event

Between August 14 and 17, 2008 field data collection was conducted at the CAM-4 DEW Line site. The monitoring event consisted of visual inspections of all landfill locations, as well as soil and groundwater sampling, and thermal monitoring. The landfill monitoring requirements as outlined in the Terms of Reference (TOR) are displayed in Table 1 below.

Table 1. Summary of Landfill Monitoring Requirements for 2008

Landfill Designation	Visual Inspection	Soil Sampling	Groundwater Sampling	Thermal Monitoring
YEAR 2008				
CAM-4 Kugaaruk (Pelly Bay)				
Station Area Non-Hazardous Waste Landfill	✓			
DCC Tier II Disposal Facility	✓	✓	✓	✓
Upper Site Landfill	✓	✓	✓	✓
Lower Site Non-Hazardous Waste Landfill	✓			
Lower Site Landfill	✓	✓	✓	✓

On August 14, 2008 the weather was sunny, clear sky, strong wind and about 5 degrees Celsius. On August 15, 2008 the weather in the morning was sunny, clear sky and about 10 degrees Celsius becoming overcast, raining, cold wind, and about 2 degrees Celsius in the afternoon. On August 16, 2008 the weather was overcast, raining and about 5 degrees Celsius.

At each of the landfill locations, a field inspection was conducted to observe whether there were any visual signs of impact (such as seepage or stressed vegetation caused by the landfill) and for physical stability. Photographic records were taken to show the condition of the landfill and any area of concern that was observed. The observations and the photographic record for each of the landfills are discussed individually in the landfill reports presented in Appendices A through E.

Soil sampling was conducted at the Upper Site Landfill, the DCC Tier II Soil Disposal Facility, and the Lower Site Landfill for 2008. Generally, soil samples were collected at depths of approximately 0.10 m to 0.15 m and approximately 0.25 m to 0.50 m although there were some variations in sample depths dependent on

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the ground conditions. The soil samples were analyzed for Polychlorinated Biphenyls (PCB) analyzed for Total Aroclors, Total Petroleum Hydrocarbons (TPH) as defined by the Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards (CWS) Fraction 1 to Fraction 3 and inorganic elements analyzed for total metals using low level detection limits. The analytical results for each sampled landfill are discussed individually in the landfill reports presented in Appendices B, C and E.

Where possible, groundwater elevations were measured using an interface meter at each observation well at the Upper Site Landfill, the DCC Tier II Soil Disposal Facility, and the Lower Site Landfill. The monitoring conditions and field measurements were documented and collected at each monitoring well. The field measurements included the following: presence and thickness of free product (if present), depth to bottom of well, stick up height and visual condition of the observation well. Prior to sampling, wells were purged to remove at least one well volume of water, and field chemistry was monitored using a flow-through cell and a digital probe for stability of the following parameters: Temperature, pH, conductivity, and turbidity. Following purging, groundwater samples were collected from observation wells that had sufficient water volumes to obtain samples. The groundwater samples were analyzed for PCB, TPH, and inorganic elements. Both purging and collection of water samples were conducted using a peristaltic pump for low flow extraction with disposable tubing used for each well. Further discussion regarding the field measurements, the field chemistry and the analytical results are discussed in the landfill reports presented in Appendices B, C, and E. The well sampling records are appended to the relevant sections in Appendices B, C, and E.

Thermal Monitoring was conducted at the Upper Site Landfill, the DCC Tier II Soil Disposal Facility, and the Lower Site Landfill in 2008. The data was downloaded from the system using the Lakewood Systems Ltd. Software *Prolog*. The information downloaded is further discussed in the individual landfill reports presented in Appendices B, C, and E.

## 3. Landfill Monitoring

As requested by DCC, AECOM has presented the landfill monitoring reports as individual reports under the cover of this main report. The Landfill Monitoring Reports for each locality are presented in the appendices of this main report as follows:

Appendix A Station Area Non-hazardous Waste Landfill;

Appendix B DCC Tier II Soil Disposal Facility;

Appendix C Upper Site Landfill;

Appendix D Lower Site Non-hazardous Waste Landfill; and,

Appendix E Lower Site Landfill.

All information collected that is relevant to these individual areas is presented in these sections or as attachments at the end of the respective appendices.

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## 4. Quality Assurance/Quality Control

For the soil and groundwater samples collected, a blind duplicate was collected with a frequency of approximately one in ten samples collected. Tables used for the calculation of RSD values are located in Appendix G.

A total of three blind duplicate soil samples and two blind duplicate groundwater samples were collected for submission. All duplicate samples were submitted to both ALS Environmental and Cantest Ltd. for analysis. As well, duplicate soil samples were sent to the Environmental Services Group for archival purposes. The soil and water samples submitted and the corresponding sample locations are documented in Table 2.

Table 2. Blind Duplicates

Sample Identification	Duplicate of Sample	Sample Location	Depth (m)	Matrix (soil/water)	Landfill
BMW-30-40	BMW-3-40	BMW-3	0.40	Soil	Tier II
MW-140-A-30	MW-14-A-30	MW-14-A	0.30	Soil	Tier II
MW-200-35	MW-20-35	MW-20	0.35	Soil	Lower
MW-150	MW-15	MW-15	-	Water	Tier II
MW-200	MW-20	MW-20	-	Water	Lower

Each soil sample was analyzed for fourteen (14) parameters yielding a total of forty two (42) sets of numbers to be calculated for relative standard deviation (RSD). Of the 42 RSD values calculated, twenty four (24) returned a value of "n/a" due to one or more concentrations being below the detection limit. Seventeen (17) sets returned an acceptable RSD of below 20% for inorganics. It should be noted that one (1) set returned an RSD of 20% for copper. The duplicate soil sample collected at monitoring location BMW-3 at a depth of 0.40 meters returned an RSD value of 20% for copper although this does not exceed the acceptable RSD value of 20%.

Each groundwater sample was analyzed for 12 parameters yielding a total of twenty four (24) sets of numbers to be calculated for RSD. Of the 24 RSD values calculated, seventeen (17) returned a value of "n/a" due to one or more concentrations being below the detection limit. Four (4) sets returned acceptable RSD values of below 20% for inorganics and two (2) sets returned acceptable RSD values of below 30% for inorganics. One set returned an unacceptable RSD value of 31.5% for F2 (C10-C16).

The duplicate groundwater sample collected at MW-20 returned an RSD value of 31.5% for F2 (C10-C16). This exceedance can be attributed to non-laminar flow being discharged from the peristaltic pump into one or more sample containers, and/or portions of the composite sample not distributed equally into each sample container.

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### 5. Conclusions

Based on the visual geotechnical inspection, there does not appear to be any indications of imminent cover instability or significant erosion at the landfills. All landfills at CAM-4 have been assigned an overall landfill performance rating of "acceptable". Minor erosion rills on some landfill slopes at the Station Area Non-Hazardous Waste Landfill and Lower Site Landfill appear to be self-armouring. Minor seepage was observed from the lower half of some landfill slopes at the Station Area Non-Hazardous Waste Landfill, Lower Site Landfill, and Tier II Soil Disposal Facility. Minor orange staining was observed on the Station Area Non-Hazardous Waste Landfill northeast slope and at the northeast toe of the Tier II Soil Disposal Facility. No issues of concern requiring immediate attention were identified.

Soil samples were collected at all designated monitoring locations for the 2008 monitoring year. Two samples were collected, (one shallow and one deeper) at each monitoring location. Total Petroleum Hydrocarbon (TPH) concentrations were detected at four monitoring locations at the Tier II Disposal Facility (MW-8, MW-9, MW15 and MW-16) and at two locations at the Upper Site Landfill (MW-11 and MW-13). These concentrations should be compared to the internal DCC Dew Line Cleanup standards as well as in the context of this monitoring program.

Groundwater samples were collected at all designated monitoring wells for the 2008 monitoring year, with the exception of MW-10, which was dry. The mid-August timing of the sampling event appears to have occurred during maximum thaw. TPH concentrations were detected at six monitoring wells at the Tier II Disposal Facility (MW-5, MW-8, MW-9, MW-14-A, MW-15 and MW-16) and at three monitoring wells at the Upper Site Landfill (MW-11, MW-12 and MW-13). Additionally, elevated chromium and lead concentrations were detected at MW-12. TPH concentrations were also detected at three monitoring wells at the Lower Site Landfill (MW-17, MW-19 and MW-20). These concentrations should be compared to the internal DCC Dew Line Cleanup standards as well as in the context of this monitoring program.

### 6. Limitations

This report has been prepared as an assessment of the environmental condition of the subject site located at near Kugaaruk (Pelly Bay), Nunavut. The monitoring and investigation programs as described in this report, were 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 and in agreement with the Terms of Reference prepared by Defence Construction Canada.

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. AECOM 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.

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The content of this report is based on information collected during our investigation, our present understanding of the site conditions, and our professional judgement in light of such information at the time of this report. This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions, advice 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 in future work, including excavations, borings, or other studies, AECOM should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

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## **Appendix A**

### Station Area Non-hazardous Waste Landfill

- A1 Site Condition/Visual Inspection Records
- A2 Geotechnical Inspection Photographic Records
- A3 Field Notes



#### A1. Station Area Non-hazardous Landfill

#### A1.1 Landfill Summary

The Station Area Non-Hazardous Waste Landfill is located on the Upper Site, approximately 500 m northeast of the main facilities area. The landfill contains non-hazardous wastes and debris generated and collected during clean up of the site. The landfill consists of perimeter berms and a cap of compacted granular fill. The location of the Station Area Non-Hazardous Waste Landfill is presented in Figure A-1.

For 2008, the monitoring requirements for the Station Area Non-Hazardous Waste Landfill included visual inspection only.

#### **A1.2 Visual Monitoring**

No significant erosion, settlement or indications of slope instability were observed at the Station Area Non-Hazardous Waste Landfill. Overall landfill performance is assessed as "acceptable". Appendix A1 presents a summary of the 2008 visual inspection results.

Minor erosion gullies were observed on the east slope that appear to be self-armouring (Photo SNH-8 in Appendix A2). An area of minor seepage and orange staining was observed on the lower half of the northeast slope (Photos SNH-7A and 7B in Appendix A2). Some minor drainage was observed along the road at the south toe (Photo SNH-10 in Appendix A2). No issues of concern that require immediate attention were identified.

#### A1.3 Soil Sampling

Soil sampling was not scheduled for the 2008 monitoring year.

#### A1.4 Groundwater Sampling

Groundwater sampling was not scheduled for the 2008 monitoring year.

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A1 – Site Condition/Visual Inspection Records

#### Visual Inspection Checklist Inspection Report – Page 1 of 2

SITE NAME:	CAM-4 - Pelly Bay
LANDFILL/AREA DESIGNATION:	Station Area Non-Hazardous Waste Landfill
DATE OF INSPECTION:	August 14, 2008
DATE OF PREVIOUS INSPECTION:	August 24 - 26, 2007
INSPECTED BY:	Darrin Johnson, P.Eng.
REPORT PREPARED BY:	Darrin Johnson, P.Eng.

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

#### **Preliminary Stability Assessment**

Feature	Severity Rating	Extent	
Settlement	Not observed	None	
Erosion	Acceptable	Isolated	
Frost Action	Not observed	None	
Animal Burrows	Not observed	None	
Vegetation	Not observed	None	
Staining	Acceptable	Isolated	
Vegetation Stress	Not observed	None	
Seepage Points	Acceptable	Isolated	
Debris Exposed	Not observed	None	
Tension Crack	Not observed	None	
Overall Landfill			
Performance	Acceptable		

#### Station Area Non-Hazardous Waste Landfill - Inspection Report - Page 2 of 2

Checklist Item	Present Yes/No	Location	Dimensions (L x W) (m)	Depth (m)	Extent (%)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
Settlement	No							
Erosion	Minor	East slope	10m x 10m	0.1m	1%	Isoloated area of minor erosion that appears to be self-armouring.	SNH-8	Acceptable
Frost Action	No							
Animal Burrows	No							
Vegetation	No							
Staining	Yes	Northeast corner slope	10m x 10m	N/A	1%	Isolated area of minor orange staining.	SNH-7A and SNH-7B	Acceptable
Vegetation Stress	No							
Seepage Points	Yes	Northeast corner slope	10m x 10m	N/A	1%	Isolated area of minor seepage.	SNH-7A and SNH-7B	Acceptable
Debris Exposed	No							
Presence/ Condition of Monitoring Instruments	Good							
Other Features of Note.	Yes	South toe along road	50m x 5m	N/A	3%	Drainage along road at toe. No staining.	SNH-10	Acceptable
Additional Photos						General	SNH-1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 5, 6A, 6B, 9A, 9B	

Legend

TEMPORARY BENCHMARK

COORDINATE POINT

MONITORING WELL LOCATION

PHOTOGRAPH LOCATION

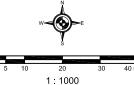
AREA OF MINOR SEEPAGE

AREA OF MINOR EROSION AREA OF WATER DRAINAGE

**RECORD DRAWING** 

NOT FOR CONSTRUCTION

Map Sources / Notes:
-Source drawing from UMA: C4-RD02.dwg
-Photograph numbers refer to those found in Appendix A2 - Visual Inspection Photographs



UTM Zone 16W, NAD83

C4-RD02.dwg DCJ October, 2008

Defence Construction Canada

2008 CAM-4 DEW Line Monitoring Program CAM-4 Kugaaruk Nunavut Territory

**Station Area Non-Hazardous** Waste Landfill

> Figure A-1 Version 1



A2 – Geotechnical Inspection Photographic Records





Photograph SNH-1A. Southwest corner at the toe, facing northeast. ↑



Photograph SNH-1B. Southwest corner at the toe, facing north. •



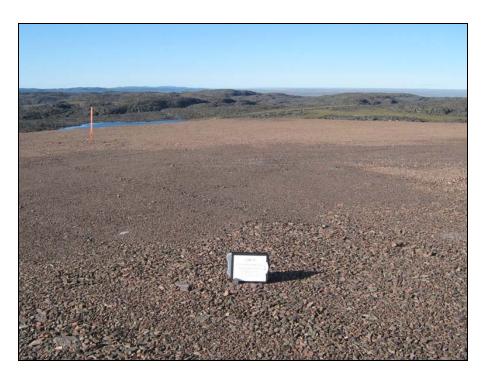


**Photograph SNH-2A.** Southwest corner at the crest facing northeast. Some tire tracks from a vehicle that tried to drive up onto the landfill near clipboard. **↑** 



Photograph SNH-2B. Southwest corner at the crest, facing north. •





Photograph SNH-3A. Facing northeast over landfill surface. ↑



Photograph SNH-3B. Facing southeast over landfill top. ↑





Photograph SNH-4A. Northwest corner crest, facing south.



Photograph SNH-4B. Northwest corner crest, facing east. ↑





Photograph SNH-5. Panoramic of the north slope. ↑



Photograph SNH-6A. Northeast corner facing south. ↑





Photograph SNH-6B. Northeast corner facing west. ↑



**Photograph SNH-7A.** Facing slope. Some seepage and orange staining over 10m x 10m area on lower half of east slope, towards the northeast corner toe. ♠



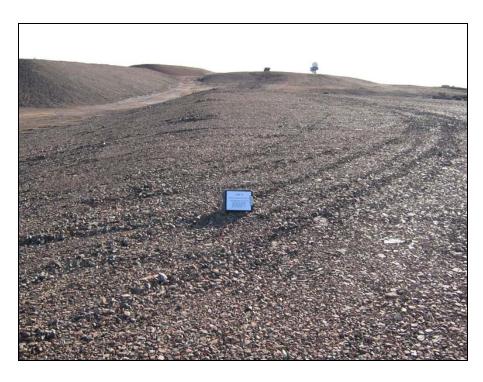


**Photograph SNH-7B.** Toe of slope near northeast corner. Orange staingin and seepage discharging onto rocks at toe of landfill. Down-slope of photo SNH-12. ↑

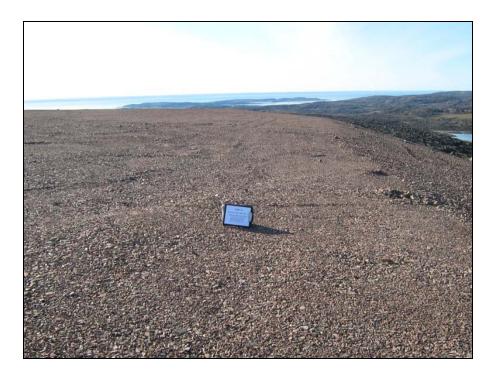


Photograph SNH-8. East slope. Area of possible minor erosion with gullies about 0.5m wide and less than 0.1m deep that appear to be self healing with larger rock in cover fill. ↑



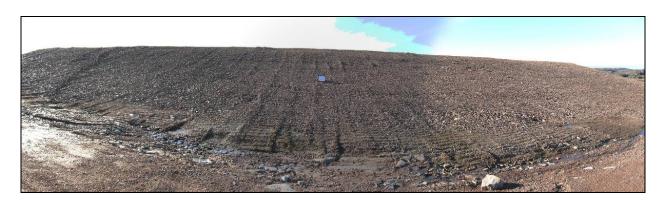


Photograph SNH-9A. Facing west along south crest. ↑



Photograph SNH-9B. Facing north along east crest. Some tire tracks but no damage. ↑





**Photograph SNH-10.** Panoramic of the south face. Some seepage and drainage along road at toe. No staining. ↑

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14	
	STATION ARCA NON-HAZ/PAGEZ)
	The state of the s
	-PHOTO LOC, 4 (WAMPOINT 28)
	-NORTHWEST CHENER CREST
34.	- PHOTO 52 (FACING SOUTH)
-	- PHOTO 53 (FACING EAST)
	- PHOTO SY (OCEAN IN DISTANCE)
-	- PHOTO LUC. 5 (WAYPOINT 29)
	- NORTH SLOPE
	- PHOTOS 55, 56 AST (PANORAMIC)
	- NO EROSION DE CRACKS DESERVED
	- LARGE IM DIA, ROCKS AT
	TRE
	-NO SEEPAGE OBSORVED
-	- PHOTO LOC, 6 (MAY POINT 30-NE CARNED)
	- PHOTO 58 (FACING SOUTH)
	- PHOTOS9 (FACING WET)
and the T	
	PHOTO LOC; 7 (WAYPAINT 3T)
	-PHOTO GO (FACING SLOPE)
	- SOME SURPAGE AND GRANGE
	STAINING OVER IOM X10n ARM
	TOWARDS NE CORNER TOE.
	TOWNROS NE CORNER TOE.

STATION AFOR NOWHAZ UP (PAGE 3) - PHOTO GI ( TOU OF SLOPE NEAR NE CORNOR - GRANGE STAINING AND SUPPAGE DISCHARGING ONTO ROCKS AT TOX OF LANDFILL - DOWNSCOPE OF PHOTO 60 -PHOTO 62 (EAST SWPE) -AREA OF POSSIBLE MINTOR GROSION WITH GULLOS ABOUT 0.5m WIDE AND CUSS THAN O. IM DUTP. THAT MARTERA TO GE SUF HEALING WITH LARGER PACK IN COVER -PHOTO LOC. 9 WAYPOINT -PHOTO 63 (FARING WITT AVOID JONTH CONT) - PHOTO GY (FACING NORTH ALONG LAST CANST) - SOME TIRE TRACKS -NO DAMAGE PHOTA LOC. IO (WAYPOINT 34- SONTH FALE) -PHOTOS 65 664 67 (PANJORAMIC) / -SOME SUPPAGE AND DRAINABE ALONG RUAD AT TOE, NO STAINING

## **Appendix B**

### **DCC Tier II Soil Disposal Facility**

- B1 Site Condition/Visual Inspection Records
- B2 Geotechnical Inspection Photographic Records
- B3 Monitoring Photographic Records
- B4 Monitoring Well Sampling Records
- B5 Thermistor Maintenance Records
- B6 Thermistor Graphs
- B7 Field Notes



### **B1. Tier II Soil Disposal Facility**

#### **B1.1 Landfill Summary**

The Tier II Soil Disposal Facility is located approximately 550 m west of the main facilities area. The landfill was constructed for disposal of Tier II soil excavated during the clean up. The location and plan of the Tier II Disposal Facility is presented in Figure B-1.

The landfill has a double containment system consisting of a geomembrane liner and placement of sufficient surface fill to promote permafrost aggradation through the landfill contents. The liner was placed across the bottom of the landfill, along the berms and over top of the landfilled material.

For 2008, the monitoring requirements for the Tier II Soil Disposal Facility included visual inspection, soil sampling, groundwater sampling and thermal monitoring.

#### **B1.2 Visual Monitoring**

No significant erosion, settlement or indications of slope instability were observed at the Tier II Soil Disposal Facility. Overall landfill performance is assessed as "acceptable". Appendix B1 presents a summary of the 2008 visual inspection results.

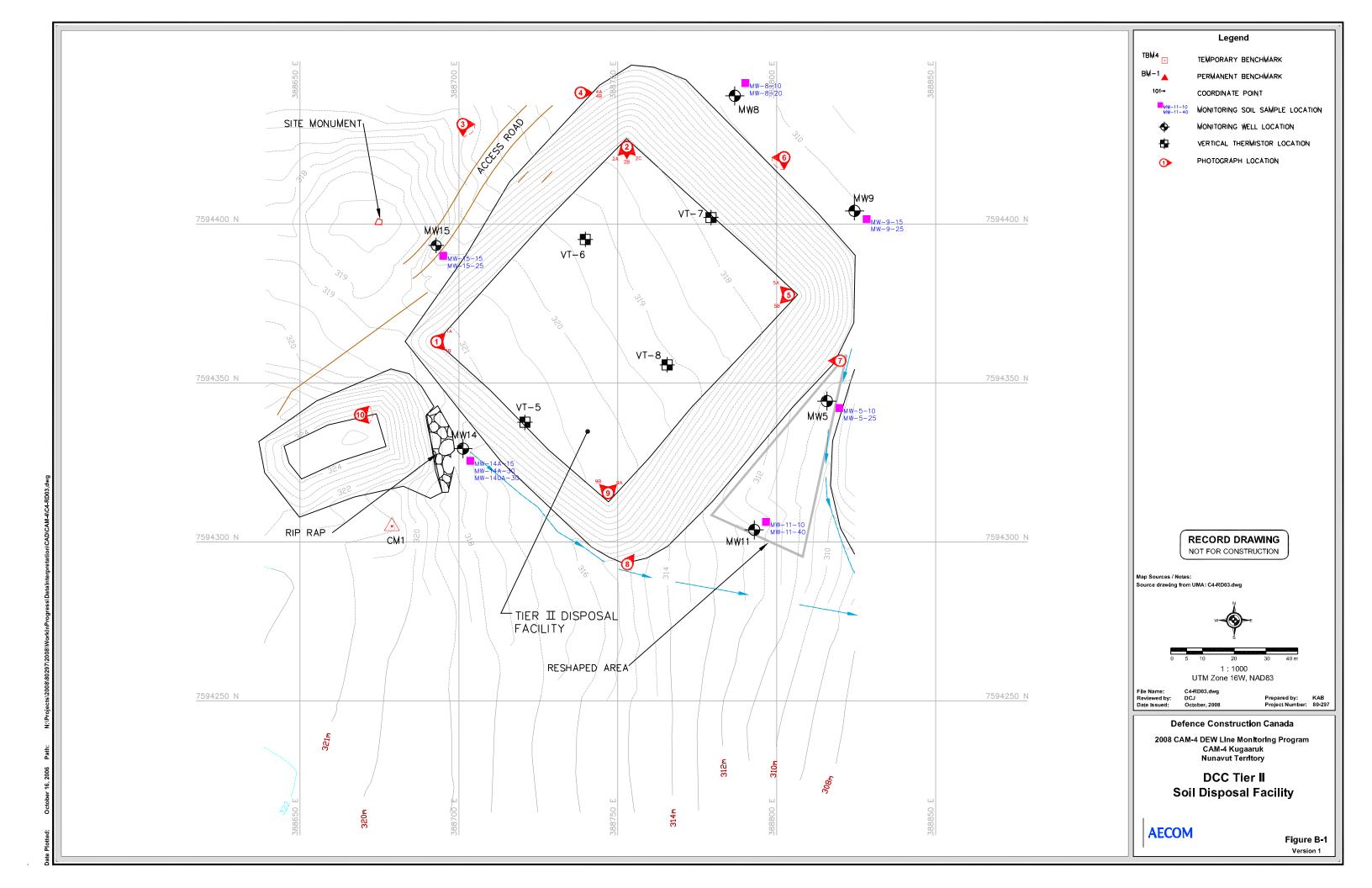
An area of minor orange staining was observed at the toe of the northeast slope (TII-4A in Appendix B2). Seepage was observed from the lower half of the northeast and southeast slopes (TII-6 and 7 in Appendix B2). No staining was observed on the slopes. Minor ponding of water and drainage was observed along the toes of the northwest, southeast and southwest slopes (TII-3, 9A and 10 in Appendix B2). No issues of concern that require immediate attention were identified.

#### **B1.3 Soil Sampling**

Soil samples were collected at the designated locations (BMW-3, MW-5, MW-8, MW-9, MW-14-A, MW-15 AND MW-16). Sampling locations are shown on Figure B-1. Two samples were collected at each station at depths of 0.10 – 0.15 m below ground surface and between 0.25 – 0.40 meters below ground surface. The photographs of each monitoring well and test pit location are included in Attachment B3.

No staining or free product was observed during the sampling event at the Tier II Soil Disposal Facility. There were no odours documented during the Tier II Disposal Facility sampling event, with the exception of one monitoring location, MW-16. An ambient hydrocarbon-like odour was detected during soil sampling at the MW-16 monitoring location.

(cam4-appb0-tieriireport.doc)





The laboratory analyses detected concentrations of TPH (C6-34) at monitoring locations MW-8, MW-9, MW-15 and MW-16. It is recommended that these results be evaluated in the context of the Landfill Monitoring Plan.

The analytical results and depths of samples are provided in Table B-1. The Laboratory Certificates of Analysis are provided in Appendix F.

#### **B1.4 Groundwater Sampling**

Groundwater measurements and monitoring system condition records were documented for observation wells BMW-3, MW-5, MW-8, MW-9, MW-14-A, MW-15 and MW-16. These records are provided in Attachment B4.

All groundwater monitoring wells slated for monitoring in 2008 at the Tier II Soil Disposal Facility contained sufficient volume for sampling. Samples were collected at a flow rate equal to the recharge rate of the monitoring well (and not exceeding 100mL/min). All monitors were sampled using a peristaltic pump and disposable LDPE tubing with the exception of BMW-3 and MW-16. The rechargeable battery provided with the peristaltic pump from the supplier proved to be faulty, thus monitors that were accessible by vehicle were sampled with the peristaltic pump runoff the vehicle battery. Monitors BMW-3 and MW-16 were not accessible by vehicle, therefore were purged and sampled using a disposable bailer.

Groundwater samples were not filtered and not preserved. Samples were analyzed for total concentration of inorganic metals, TPH (C6-C32) and PCB.

TPH (C6-C32) was detected in monitoring wells MW-5, MW-8, MW-9, MW-14-A, MW-15 and MW-16. The results should be evaluated in the context of the Landfill Monitoring Plan as well as compared with DCC internal standards.

The results are presented in Table B-2. The laboratory Certificates of Analysis are provided in Appendix F.

#### **B1.5 Thermal Monitoring**

All thermistors at the Tier II Soil Disposal Facility were in good condition. Thermistor data was downloaded on August 15, 2008, programming was checked and the data loggers were reset. The data logger clocks were adjusted to local (Standard Time). Battery charge was checked to ensure sufficient remaining charge and batteries were not changed in 2008.

Thermistor Maintenance Records were completed for all thermistors located at the Lower Landfill and are located in Appendix B5. Selected data has been plotted into graphs for each thermistor which are provided as Graphs B-1 through B-4 located in Appendix B6.

(cam4-appb0-tieriireport.doc) - B3 -

Table B-1. CAM-4 Kugaaruk, Summary of 2008 Soil Analysis - Tier II Soil Disposal Facility

		Donth	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	PCB	F1	F2	F3	TPH
Sample Ident.	Sample Location	Depth	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	<b>Total Aroclors</b>	C6-C10	C10-C16	C16-C34	C6-34
		(m)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)						
Upgradient Sample	pgradient Samples															
BMW-3-15	BMW-3	0.15	13.9	15.7	8.5	< 0.50	9.3	44.0	31.8	<5.0	<0.0050	< 0.050	<10	<30	<50	0
BMW-3-40	BMW-3	0.40	16.8	17.5	9.0	< 0.50	10.9	53.7	35.0	<5.0	0.0086	< 0.050	<10	<31	<51	0
BMW-30-40*	BMW-3	0.40	12.0	13.9	7.1	< 0.50	8.0	38.3	28.4	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-14-A-15	MW-14-A	0.15	11.0	13.3	6.2	< 0.50	8.0	33.2	28.0	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-14-A-30	MW-14-A	0.30	12.1	14.2	6.7	< 0.50	8.3	35.8	28.1	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-140-A-30*	MW-14-A	0.30	11.8	13.9	6.1	< 0.50	8.0	33.8	27.4	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-15-15	MW-15	0.15	9.8	9.4	6.5	< 0.50	8.0	41.3	17.1	<5.0	< 0.0050	< 0.050	<10	118	235	353
MW-15-25	MW-15	0.25	11.2	9.3	7.0	< 0.50	7.4	43.9	17.9	<5.0	< 0.0050	< 0.050	<10	119	302	421
MW-16-15	MW-16	0.15	14.2	16.0	7.8	< 0.50	8.4	43.1	31.9	<5.0	< 0.0050	< 0.050	<10	286	133	419
MW-16-40	MW-16	0.40	12.3	15.2	7.8	< 0.50	8.0	39.3	29.5	<5.0	< 0.0050	< 0.050	<10	49	<50	49
Downgradient Sam	ples			•	•											
MW-5-10	MW-5	0.10	11.5	9.4	6.6	<0.50	6.6	33.0	18.3	<5.0	<0.0050	< 0.050	<10	<30	<50	0
MW-5-25	MW-5	0.25	11.6	9.0	6.3	< 0.50	6.8	33.5	19.0	<5.0	0.0051	< 0.050	<10	<30	<50	0
MW-8-10	MW-8	0.10	11.9	10.6	6.8	< 0.50	7.9	40.5	19.8	<5.0	<0.0050	< 0.050	<10	<30	<50	0
MW-8-20	MW-8	0.20	11.9	10.6	6.4	< 0.50	13.5	38.6	22.5	<5.0	0.0066	< 0.050	<10	296	121	417
MW-9-15	MW-9	0.15	10.3	8.9	6.4	< 0.50	11.6	35.6	18.1	<5.0	0.0070	< 0.050	<10	<30	69	69
MW-9-25	MW-9	0.25	10.4	7.9	6.2	<0.50	9.7	35.6	16.6	<5.0	0.0056	<0.050	<10	<30	<50	0

<sup>\*</sup> Denotes duplicate sample. (Further information located in Table 2 of main report,

Note: mg/kg = ug/g

TPH is represented as the total of F1, F2 and F3 as defined by CCME Tier I Method - Rev. 5 Analysis of Petroleum Hydrocarbons in Soil



Table B-2. CAM-4 Kugaaruk, Summary of 2008 Groundwater Analysis - Tier II Soil Disposal Facility

		Groundwater	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	PCB	F1	F2	F3	TPH
Sample Identification	Location	Elevation	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	<b>Total Aroclors</b>	C6-C10	C10-C16	C16-C34	C6-34
		(masl)	(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)
Upgradient Samples	5															
BMW-3	BMW-3	316.84	0.0155	0.0180	0.00817	0.000061	0.0091	0.0513	0.0437	0.00230	< 0.000020	<0.0010	<0.10	< 0.30	< 0.30	0
MW-14A	MW-14A	317.24	0.0146	0.0091	0.00135	0.000067	0.00112	2.41	0.0100	0.00067	< 0.000020	< 0.0010	<0.10	< 0.30	0.33	0.33
MW-15	MW-15	317.76	< 0.0020	0.0065	0.00216	< 0.000034	< 0.0010	0.250	0.0024	0.0020	< 0.000020	< 0.0010	0.35	5.98	1.65	7.98
MW-150*	MW-15	317.76	< 0.0020	0.0063	0.00208	< 0.000034	< 0.0010	0.239	< 0.0030	0.0020	< 0.000020	< 0.0010	0.33	5.15	1.40	6.88
MW-16	MW-16	312.96	0.0040	0.0120	0.00210	0.000082	0.00056	0.0149	0.0025	0.00076	< 0.000020	<0.0010	2.23	76.7	8.01	86.94
Downgradient Samp	oles															
MW-5	MW-5	310.34	0.0043	0.0086	0.00030	0.000039	0.00142	0.0366	0.0051	< 0.00050	< 0.000020	< 0.0010	<0.10	< 0.30	0.33	0.33
MW-8	8-WM	310.20	0.0228	0.0268	0.0031	0.000170	< 0.0025	0.0391	< 0.0050	< 0.0025	< 0.000020	<0.0010	2.89	8.17	1.84	12.9
MW-9	MW-9	310.14	0.0071	0.0079	< 0.0015	< 0.000085	< 0.0025	0.0382	0.0183	< 0.0025	< 0.000020	< 0.0010	<0.10	0.44	0.63	1.07

<sup>\*</sup> Denotes duplicate sample. (Further information located in Table 2 of main report,

Note: mg/L = 1000 ug/L

**AECOM** 



**B1 – Site Condition/Visual Inspection Records** 

#### Visual Inspection Checklist Inspection Report – Page 1 of 2

SITE NAME:	CAM-4 - Pelly Bay
LANDFILL/AREA DESIGNATION:	DCC Tier II Soil Disposal Facility
DATE OF INSPECTION:	August 14, 2008
DATE OF PREVIOUS INSPECTION:	August 24 - 26, 2007
INSPECTED BY:	Darrin Johnson, P.Eng.
REPORT PREPARED BY:	Darrin Johnson, P.Eng.

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

#### **Preliminary Stability Assessment**

Feature	Severity Rating	Extent
Settlement	Not observed	None
Erosion	Not observed	None
Frost Action	Not observed	None
Animal Burrows	Not observed	None
Vegetation	Not observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not observed	None
Seepage Points	Acceptable	Occasional
Debris Exposed	Not observed	None
Tension Crack	Not observed	None
Overall Landfill		
Performance	Accep	otable

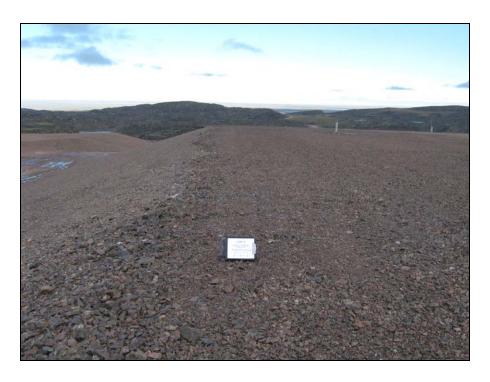
#### DCC Tier II Soil Disposal Facility - Inspection Report - Page 2 of 2

	Present		Dimensions	Depth	Extent		Photographic Records	
Checklist Item	Yes/No	Location	(L x W) (m)	(m)	(%)	Description	(Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
Settlement	No							
Erosion	No							
Frost Action	No							
Animal Burrows	No							
Vegetation	No							
Staining	Yes	Northeast toe	10 m x 10 m	N/A	1%	Orange staining at toe of slope.	TII-4A	Acceptable
Vegetation Stress	No							
Seepage Points	Yes	Lower half of northeast and southeast slopes.	60 m x 10 m	N/A	6%	Some seepage from lower half of slope. No staining on slopes observed.	TII-6 and TII-7	Acceptable
Debris Exposed	No							
Presence/ Condition of Monitoring Instruments	Good							
Other Features of Note.	Yes	Ponded water along toes of northwest, southeast and southwest slopes.	50m x 5m x3	N/A	8%	Minor ponding of water and drainage along toe.	TII-3, 9A, 10	Acceptable
Additional Photos							TII-1A, 1B, 2A, 2B, 2C, 4B, 5A, 5B, 8, 9B	



**B2 – Geotechnical Inspection Photographic Records** 





Photograph TII-1A. Northwest corner of landfill facing east along crest. ↑



Photograph TII-1B. Northwest corner of landfill facing south along crest. ↑

(cam4-appb2-visisnpphotos.doc)





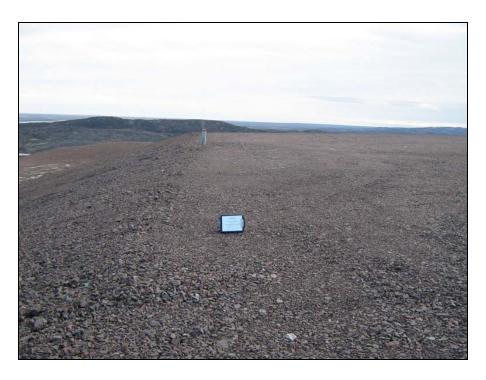
Photograph TII-2A. Northeast corner of landfill facing west. ↑



Photograph TII-2B. Northeast corner of landfill facing southwest. ↑

(cam4-appb2-visisnpphotos.doc) -2 -





Photograph TII-2C. Northeast corner of landfill facing south. ↑



Photograph TII-3. Panoramic photo of the north slope. ↑

(cam4-appb2-visisnpphotos.doc)





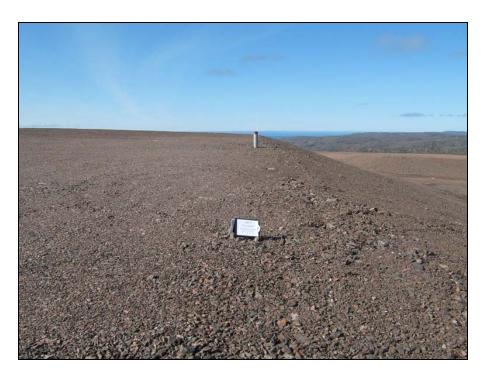
Photograph TII-4A. At the northeast toe. Some seepage with orange staining. Some water drainage along the road at the toe. ↑



Photograph TII-4B. Northeast corner and toe. ↑

(cam4-appb2-visisnpphotos.doc)





Photograph TII-5A. Southeast crest facing north.



Photograph TII-5B. Southeast crest facing west. Some coarse rockfill along crest edge but there does not appear to be tension cracks. ↑

(cam4-appb2-visisnpphotos.doc) -5 -





Photograph TII-6. Panoramic photo of the southeast slope. Some water seeping out of slope face. No staining. ↑



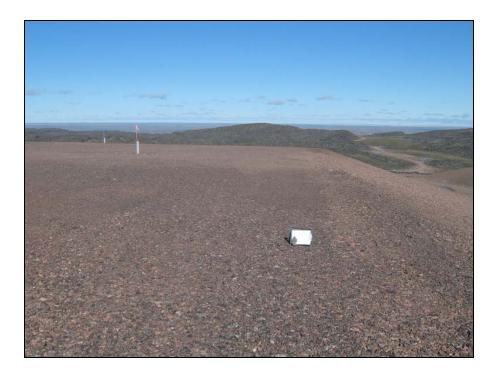
Photograph TII-7. South slope from southeast toe facing west. Some seepage from south slope and minor ponding at toe. No staining. ↑

(cam4-appb2-visisnpphotos.doc) -6 -





Photograph TII-8. South slope from southwest toe facing east. •



Photograph TII-9A. Facing east along crest from the southwest corner of the landfill. ↑

(cam4-appb2-visisnpphotos.doc)





Photograph TII-9B. Facing north along crest from the southwest corner of the landfill. Some ponded water along toe. No staining. ↑



Photograph TII-10. Panoramic photo of Tier II landfill facing east from raised gravel pad. ↑

(cam4-appb2-visisnpphotos.doc)



**B3** – Monitoring Photographic Records





Photograph 1. Monitoring Location BMW-3 (Upgradient) Facing South. ↑



Photograph 2. Monitoring Location MW-14-A (Upgradient). Facing North. •

(cam4-appb3-mwphotos.doc) -1 -





Photograph 3. Monitoring Location MW-15 (Upgradient). Facing East. ↑



Photograph 4. Monitoring Location MW-16 (Upgradient). Facing South. •

(cam4-appb3-mwphotos.doc) - 2 -





Photograph 5. Monitoring Location MW-5 (Downgradient). Facing Northwest. ↑



Photograph 6. Monitoring Location MW-8 (Downgradient). Facing Northwest. •

(cam4-appb3-mwphotos.doc) - 3 -





Photograph 7. Monitoring Location MW-9 (Downgradient). Facing North. ↑

(cam4-appb3-mwphotos.doc) - 4 -



**B4 – Monitoring Well Sampling Records** 

## 2008 Monitoring Well Sampling Log (BMW-3)

	Site name:	CAM-4				
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	BMW-3				
	Facility:	Tier II Soil Disposa	l Facility			
	·	<u> </u>	•			
			Known I	Data		
	Depth of installation* (m):	3.45	Tanovin	Julu		
	of screened section (m):	2.03				
		0.46				
Det	oth to top of screen* (m):	0.46				
				D-1-		
			<i>l</i> leasured	Data		
	Condition of well:	1			Procedure/Equipment:	
	Procedure/Equipment:	Interface Meter		Dep	th to water surface (m):	0.92
Well h	eight above ground (m):	0.76			Depth to bottom (m):	2.25
	Diameter of well (m):	0.05		Free	product thickness (mm):	-
	Calculations				Notes	
	Depth of water (m):	1.33			Evidence of sludge:	-
V	Vell volume of water (L):	2.61		Evide	nce of freezing/siltation:	-
	Static water level* (m):	0.16			<u>-</u>	
Length of scre	een collecting water (m):	1.03				
20119111 01 0011	Join Joine James (111).		ent/Purai	ng Information		
	Equipment:	Disposable Bailer,		_		
	Equipment	Disposable Baller,	11011ba 0-22	<u>-</u>		
B	I 5	0			T 1112 ATTIN	D 1 11 111 1
Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08	3	2.81	8.73	0.504	-	Silty, greyish brown, N/O
	Water Samplin	g			Soil Sampling	
	Date & Time Collected:	16-Aug-0	)8	D	ate and Time Collected:	14-Aug-08
S	Sample Number - Water:	BMW-3			Sample Number - Soil:	BMW-3-15
						BMW-3-40
					Dup	BMW-30-40
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	8 x 250mL Glass
	•	2 x VOC vials			·	
	Procedure/Equipment:	Disposable Bailer			Procedure/Equipment:	SS Trowel
	i rocedure/Equipment.	Sp 222.2.0			i iocedule/Equipment.	TOWE!
	Motor Deceription	Silty, greyish browr	n N/O		Cail Decariation	Craviah hrawa ailt till
	Water Description:	only, groyion brown	., 14/0		Soil Description:	Greyish brown silt till,
						some gravel.
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Y
	Number Washes:	1			Number Washes:	2
	Number Rinses:	2			Number Rinses:	2

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-5)

	Site name:	CAM-4				
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	MW-5				
			l Facility			
	,					
			Known I	)ata		
F	Depth of installation* (m):	3.60	TAILOWII E	Julu		
	of screened section (m):	2.03				
Det	oth to top of screen* (m):	0.60				
			Measured	Data		
	Condition of well:				Procedure/Equipment:	Interface Meter
	Procedure/Equipment:	Interface Meter		Dep	oth to water surface (m):	1.17
Well h	eight above ground (m):	0.60			Depth to bottom (m):	3.25
	Diameter of well (m):	0.05		Free	product thickness (mm):	-
	Calculations				Notes	
	Depth of water (m):	2.08			Evidence of sludge:	-
V	Vell volume of water (L):	4.08		Evide	nce of freezing/siltation:	-
	Static water level* (m):	0.57			<u> </u>	
Length of scre	een collecting water (m):	2.05				
Longin or sore	cen concoung water (m).		ont/Durai	ng Information		
	Equipment	-			DE .	
	Equipment:	Pensiallic Pump, F	1011ba U-22	with flow through cell, LD	<u>''''</u>	
	I <b>-</b>					
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08	4.8	2.05	7.32	0.887	6.1	C&C,
						Slight chemical odour
	Water Samplin	g			Soil Sampling	
	Date & Time Collected:	15-Aug-0	)8	D	ate and Time Collected:	14-Aug-08
	Sample Number - Water:	MW-5			Sample Number - Soil:	MW-5-10
				Refusal @ 0.25 m		MW-5-25
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	4 x 250mL Glass
		2 x VOC vials				
	Procedure/Equipment:	Peristaltic Pump, H	loriba LI-22		Procedure/Equipment:	SS Trowol
	r rocedure/Equipment:	. chotalio i amp, ii	.5.100 0 22		r rocedure/Equipment:	33 HOWEI
	Woton December	C&C, Slight chemic	ral odour		Call Descript	Cravials brazes = 94 499
	Water Description:	out, ongrit oriennit	Jai Jajui		Soil Description:	Greyish brown silt till,
						some gravel.
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Υ
	Number Washes:	1			Number Washes:	2
	Number Rinses:	2			Number Rinses:	2

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-8)

	I				
	e: CAM-4				
Date of sampling eve	-				
Names of sample	s: TFB				
Monitoring well	D: MW-8				
Facil	ty: Tier II Soil Disposa	l Facility			
	•				
		Known [	Data		
Depth of installation* (i	n): 4.08				
Length of screened section (i	<u></u>				
Depth to top of screen* (i	·				
	.,,				
		Measured	Data		
Condition of w		vicasurca	Data	Procedure/Equipment:	Interface Meter
Procedure/Equipme			Dor	oth to water surface (m):	0.97
			Det		
Well height above ground (r	*		-	Depth to bottom (m):	2.45
Diameter of well (	n): 0.05		Free	product thickness (mm):	-
Calculation	1			Notes	
Depth of water (	·			Evidence of sludge:	-
Well volume of water (	.): 2.91		Evide	nce of freezing/siltation:	-
Static water level* (	n): 0.00				
Length of screen collecting water (	n): 0.51				
	Developm	ent/Purgi	ng Information		
Equipme	nt: Peristaltic Pump, F	loriba U-22	with flow through cell, LD	PE	
Date & Time Volume Removed (	) Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08 3	3.7	7.01	1150	10.7	C&C
					Chemical odour
Water Samp	ina			Soil Sampling	
Date & Time Collect		08	D	ate and Time Collected:	14-Aug-08
Sample Number - Wat				Sample Number - Soil:	•
Cample Number Wat				•	MW-8-20
					10100-0-20
0	2 2 0 51			Comple Contains	4 v 250ml Olass
Sample Containe	s: 3 x 0.5L Amber Gla	455		Sample Containers:	4 x 200ml Glass
	2 x VOC vials				
	Deviatelé - Dun -	lariba II 00			
Procedure/Equipme	nt: Peristaltic Pump, F	1011Da U-22		Procedure/Equipment:	SS Frowel
	000 01 110	I			
Water Description	n: C&C, Chemical Oc	lour		Soil Description:	Brown sandy silt till,
					some gravel.
Sampling Equipment Decontamination (Y/	I): Y		Sampling Equipment	Decontamination (Y/N):	Υ
Number Wash	s: 1	-		Number Washes:	2
Trainboi vvaoii					

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-9)

_				
TFB				
MW-9				
Tier II Soil Disposa	I Facility			
	Known [	Data		
3.32				
2.01				
0.40				
	Measured	Data		
	vicasureu	Data	Procedure/Equipment:	Interface Meter
		Dor		0.29
		Det	• , ,	
		-	. ,	1.98
0.05		Free	product thickness (mm):	-
1.69				-
3.32		Evide	nce of freezing/siltation:	-
-0.04				
1.25				
Developm	ent/Purgi	ng Information		
Peristaltic Pump, H	loriba U-22	with flow through cell, LD	PE	
Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
2.62	11.34	1060	41.3	C&C
				Chemical odour
<u> </u>			Soil Sampling	
	)8	D		14-Aug-08
	-			
		Patusal @ 0.25 m	•	MW-9-25
		iverusar @ 0.25 iii		10100-9-25
2 v 0 El A			Comple Contains	4 x 250ml Olac-
	155		Sample Containers:	4 x 200111L Glass
z x voc viais				
Deviateltic Duran	lariba II 00			
renstattic Pump, H	1011Da U-22		Procedure/Equipment:	SS Frowel
0000				
C&C Chemical odd	our		Soil Description:	Brown sandy silt till,
				some gravel.
Υ		Sampling Equipment	Decontamination (Y/N):	Υ
1			Number Washes:	2
	3.32 2.01 0.40  Good Interface Meter 0.33 0.05  1.69 3.32 -0.04 1.25  Developm Peristaltic Pump, F  Temperature (°C) 2.62  g 16-Aug-C MW-9  3 x 0.5L Amber Gla 2 x VOC vials  Peristaltic Pump, F	14-17 Aug 2008  TFB  MW-9  Tier II Soil Disposal Facility  Known E  3.32 2.01 0.40  Measured  Good Interface Meter 0.33 0.05  1.69 3.32 -0.04 1.25  Development/Purgi Peristaltic Pump, Horiba U-22  Temperature (°C) pH 2.62 11.34  g  16-Aug-08  MW-9  3 x 0.5L Amber Glass 2 x VOC vials  Peristaltic Pump, Horiba U-22  C&C Chemical odour	### Transparence	14-17 Aug 2008   TFB

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-14-A)

_		T .				
	Site name:					
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	MW-14-A				
	Facility:	Tier II Soil Disposa	I Facility			
		-				
			Known I	Data		
	Depth of installation* (m):	4.66				
	of screened section (m):	2.03				
	oth to top of screen* (m):	1.67				
50,	our to top or soreen (m).	1.07				
			/logourod	Data		
	On aliting of wells		Measured	Data	D d /F i	lataria a Matar
	Condition of well:			_	Procedure/Equipment:	
	Procedure/Equipment:			Dep	oth to water surface (m):	1.07
Well h	eight above ground (m):	0.51			Depth to bottom (m):	2.47
	Diameter of well (m):	0.05		Free	product thickness (mm):	-
	Calculations				Notes	
	Depth of water (m):	1.40			Evidence of sludge:	-
V	Vell volume of water (L):	2.75		Evide	nce of freezing/siltation:	-
	Static water level* (m):	0.56				
Length of scre	een collecting water (m):	0.29				
3, 1	, , , , , , , , , , , , , , , , , , ,		ent/Purai	ng Information		
	Fauinment:	_		with flow through cell, LD	DE	
	Lquipinent.	r enstattic r ump, ri	1011ba 0-22	with now throught cen, LD	T L	
D-4- 0 Ti	\/-\	T (00)	-11	0	Touch Salte of ATTLIN	December of Weter
Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08	3	1.01	6.73	0.95	-	Grey, slightly cloudy
						N/O
	Water Samplin	ĭ .			Soil Sampling	
	Date & Time Collected:	16-Aug-0	)8	D	ate and Time Collected:	14-Aug-08
5	Sample Number - Water:	MW-14-A			Sample Number - Soil:	MW-14-A-15
				Refusal @ 0.30 m		MW-14-A-30
					Dup	MW-140-A-30
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	8 x 250mL Glass
	·	2 x VOC vials			·	
	Procedure/Equipment:	Peristaltic Pump, H	loriba U-22		Procedure/Equipment:	SS Trowel
	Frocedure/Equipment.	onotation amp, in	1011BQ 0 22		Frocedure/Equipment.	33 Howel
	W ( D ) (	Grey, slightly cloud	ly N/O		0.35	D 1 26.00
	Water Description:	Grey, slightly cloud	iy, IN/O		Soil Description:	Brown sandy silt till.
Sampling Equipment	Decontamination (Y/N):	Υ		Sampling Equipment	Decontamination (Y/N):	Υ
	Number Washes:	2			Number Washes:	2
	Number Rinses:	2			Number Rinses:	2

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-15)

		1				-
S	ite name:	CAM-4				
Date of sample	ng event:	14-17 Aug 2008				
Names of	samplers:	TFB				
Monitorin	g well ID:	MW-15				
		Tier II Soil Disposa	l Facility			
			Known I	)ata		
Depth of installa	ation* (m):	3.25	TAILOWII E	Julu		
Length of screened se		1.97				
		1				
Depth to top of sci	een" (m):	0.33				
			Measured	Data		
	on of well:				Procedure/Equipment:	Interface Meter
		Interface Meter		Dep	oth to water surface (m):	0.45
Well height above gr	ound (m):	0.51			Depth to bottom (m):	2.45
Diameter o	f well (m):	0.05		Free	product thickness (mm):	-
Calcu	ılations				Notes	
Depth of v	water (m):	2.00			Evidence of sludge:	-
Well volume of		3.93		Evide	nce of freezing/siltation:	-
Static water I		-0.06				
Length of screen collecting v	. ,	1.61				
Length of screen deliceting to	vator (III).	l.	ont/Durai	ng Information		
	auinmont:	_		<del>-</del>	NDE	
	quipment:	Pensiallic Pump, F	1011ba U-22	with flow through cell, LD	YPE	
					I as	
Date & Time Volume Rem	oved (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08 4.5		2.08	6.31	0.846	13.5	Clear, slightly yellow
						Chemical odour
Water 9	Samplin	g			Soil Sampling	
Date & Time (	Collected:	16-Aug-0	)8	D	ate and Time Collected:	14-Aug-08
Sample Numbe	r - Water:	MW-15			Sample Number - Soil:	MW-15-15
	Dup	MW-150		Refusal @ 0.25 m		MW-15-25
				1		
Sample C	ontainers:	6 x 0.5L Amber gla	SS		Sample Containers:	4 x 250mL Glass
		4 x VOC vials		1		
2 v 41 - 1.~	her disec	1 x 0.25L Plastic		ł		
			loriha H-22		Procedure/Equipment	SS Trowol
Procedure/E	quipinent:	i onstanto rump, r	1011DG U-ZZ		Procedure/Equipment:	33 Howel
		Clear, slightly yello	\A/		0.11-	
Water De	escription:	chemical odour	w,		Soil Description:	Brown sandy silt till,
						some gravel.
Sampling Equipment Decontaminat	ion (Y/N):	Υ		Sampling Equipment	Decontamination (Y/N):	Y
Number	Washes:	2			Number Washes:	2
	er Rinses:	2			Number Rinses:	2

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-16)

	Site name:	CAM-4				
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	MW-16				
	Facility:	Tier II Soil Disposa	I Facility			
		!				
			Known I	Data		
	Depth of installation* (m):	Data not available				
	n of screened section (m):					
	epth to top of screen* (m):					
	1 ( )					
			Measured	l Data		
	Condition of well:	ı			Procedure/Equipment:	Interface Meter
	Procedure/Equipment:			Der	oth to water surface (m):	1.34
Well	height above ground (m):	0.60			Depth to bottom (m):	3.00
	Diameter of well (m):	0.05		Free	product thickness (mm):	-
		3.33		1.00	,	
	Calculations				Notes	
	Depth of water (m):	1.66			Evidence of sludge:	-
	Well volume of water (L):	3.30		Evide	nce of freezing/siltation:	-
	Static water level* (m):	0.74				
Length of sc	reen collecting water (m):			1		
	<u>`</u>	Developm	ent/Pura	ing Information		
	Equipment:	Disposable Bailer,		_		
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08	4	1.7	6.9	0.544	54	C&C, sheen on surface
_						Hydrocarbon odour
	Water Samplin	a			Soil Sampling	,
	Date & Time Collected:	16-Aug-0	)8	D	ate and Time Collected:	14-Aug-08
	Sample Number - Water:				Sample Number - Soil:	_
	,			Refusal @ 0.40 m		MW-16-40
	Sample Containers:	3 x 0 5l Amber Gla	988		Sample Containers:	4 x 250ml Glass
	Campio Comanioni	2 x VOC vials			Campio Comanioro	1 X 2001112 01000
		Z X V O O VIGIO		-		
	Procedure/Equipment:	Disposable Bailer			Procedure/Equipment:	SS Trowel
					1 Toccdure/Equipment.	OO HOWEI
Water Description:		C&C, sheen on surface, Hydrocarbon odour			Soil Description:	Brown, sandy silt till
Sampling Equipmen	nt Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Υ
	Number Washes:	2			Number Washes:	3
	Number Rinses:	3			Number Rinses:	3

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel



**B5** – Thermistor Maintenance Records

		Temperatu		<del></del>				
Contarctor Name:	AECOM			Inspe	ection Date:	15-Aug-	08	
Prepared By:	Darrin Johnson							
Thermistor Information Site Name:	CAM-4	Thormist	ar Location		Tior II Dien	and Engi	1:4,,	
Thermistor Number:		Inclination	or Location		Tier II Dispo Vertical	OSAI FACII	ity	
Install Date:	13-Aug-06	First Date			27-Aug-07	7 Last Dat	- Fvent	15-Aug-08
Coordinates and Elev			LVCIII	Е	Zi-Aug v.	Lasi Dai	Elev	320.975
Length of Cable (m)			ove Ground (m)		Nodal Point	is	13	
Datalogger Serial #	111092		,,,	- 1	Cable Seria	Number		1616
Code CAM-4VT05								
Thermistor Inspection	<u>on</u>	2		.,				
		Good	_		ds Maintenai	nce		
Casing		~						
Cover		<b>~</b>						
Data Logge	er	<u>~</u>						
Cable		<b>~</b>						
Beads		<b>~</b>						
Battery Ins	stallation Date	Batteries	s not replaced in	1 2008.				
Battery Le	Battery Levels		11.34 V			Aux	13.14 V	
-						-		
Manual Ground Tem	nperature Reading	<u>gs</u>	-					
Bead	ohms	Temp. (°C)	_		Bead	ohms	Tem	np. (ºC)
1		8.4	1		9			-5.5
2		10.9	4	-	10		<u> </u>	-6.4
3		3.4	_		11			-7.1
4		1.4	_		12			-7.9
5		-0.5			13			-8.0
6		-2.3	_	- 1				
7		-3.4	_	-	,			
8		-4.4	_	l				
Observations and P		ance						
Lock lubri	cated.							

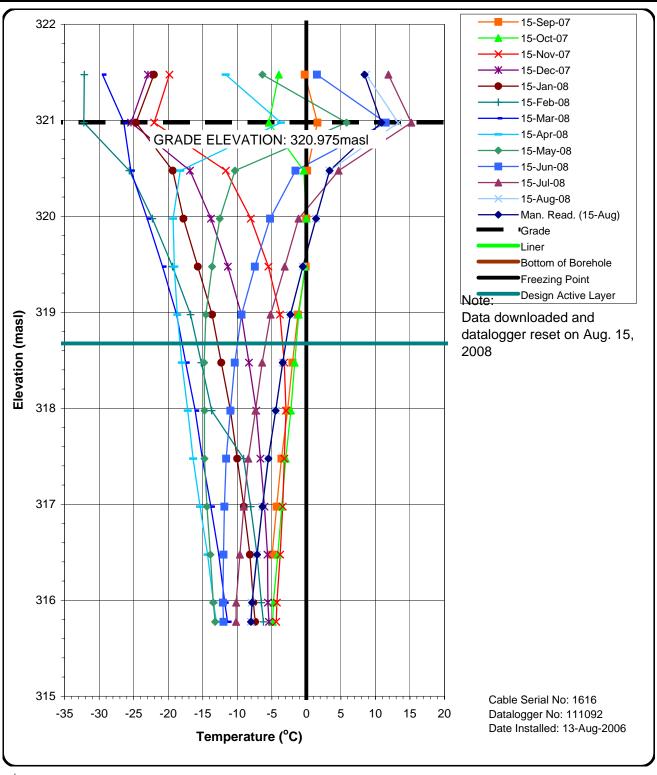
	Ground	remperatu	re Annuai M	amter	iance K	eport		
Contarctor Name:	AECOM			Inspe	ction Date:	15-Aug-	08	
Prepared By:	Darrin Johnson	l						
Thermistor Informati	on							
Site Name:	CAM-4		or Location			osal Facil	ity	
Thermistor Number: Install Date:		Inclination		\	/ertical	7 Loot Dot	o Event	45 Aug 00
Coordinates and Ele	13-Aug-06	First Date	Event	E	27-Aug-0	7 Last Date	Elev	15-Aug-08 319.3
Length of Cable (m)		Cable Lead Abo	ve Ground (m)		Nodal Poin	ts	10	313.3
Datalogger Serial #	111102		, , , , , , , , , , , , , , , , , , , ,		Cable Seria		-	1620
Code CAM-4VT06								
Thermistor Inspect	ion	Good		Needs	s Maintena	nce		
Casing		<u> </u>	_		3 Wall to le			
Cover		V		_				
Data Logo	ner	<b>▽</b>						
Cable	y Ci	<b>V</b>						
Beads		▼						
	stallation Date		not replaced in	_				
•				2000.		•	40.00.1/	
Battery Le	eveis	Main	11.43 V			_Aux	13.02 V	
Manual Ground Ter	mperature Readin	as						
Bead	ohms	Temp. (°C)	]		Bead	ohms	Tem	np. (ºC)
1		9.9	]		9			-5.4
2		9.4	_		10			-5.6
3		4.9						
4		3.1		L				
5		0.2	1					
6		-1.5		-  -				
7		-3.0	_	-				
8		-4.3	]	L				
Observations and I		<u>iance</u>						
Lock lubi	ricated.							

Prepared Thermisto Site Name	Ву:	Darrin Johnson			Inspec				
Site Name		Dairiii Joillison	1						
Site Name	r Informatio	n							
		CAM-4	Thermisto	r Location	Т	ier II Disp	osal Facil	ity	
Thermisto	r Number:	VT07	Inclination	Inclination		/ertical			
Install Dat		13-Aug-06		First Date Event		27-Aug-07	Last Dat	e Event 15-Aug-0	
Coordinates and Elevation N					E			Elev 16	317.82
Length of			Cable Lead Abo	ble Lead Above Ground (m)		1.5 Nodal Points Cable Serial Number			460
Datalogge Code	CAM-4VT07	209067				able Seria	Number		162
Code	CAIVI-4 V 107								
<b>Thermist</b>	or Inspection	<u>on</u>							
			Good	Good		Maintena			
	Casing		<b>~</b>						
	Cover		✓						
	Data Logge	er	<b>~</b>		_				
	Cable		<b>~</b>						
	Beads		~						
	Battery Inst	tallation Date	Batteries	not replaced in	2008.				
	Battery Levels Main			11.34 V			Aux	13.14 V	
	•						_		
Manual G	round Tem	perature Readin	as						
	Bead	ohms	Temp. (°C)	1	Γ	Bead	ohms	Ter	np. (ºC)
	1	<u> </u>	4.6	1	F	9	- Cillio		-7.4
				1	F	10			- <del>7.4</del> -8.1
	2		2.4	1	F				
	3		-0.4		-	11			-8.7
	4		-2.0	ł	F	12			-9.3
	5		-3.3		F	13			-9.7
	6		-4.5		-	14			-10.0
	7		-5.5	-	⊢	15			-9.8
	8		-6.5	J		16			-9.4
Observat	ions and P	roposed Mainter	nance						
	Lock lubric								

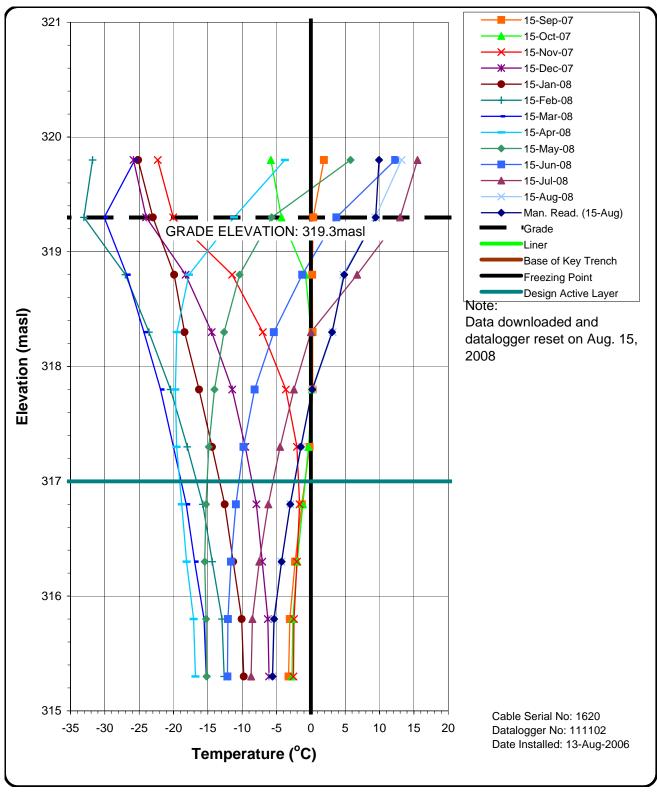
		•	Te Allilual Wi			-		
Contarctor Name:	AECOM			Inspe	ction Date:	15-Aug-0	08	
Prepared By:	Darrin Johnson	1						
Thermistor Information	n							
Site Name:	CAM-4		or Location		Tier II Disp	osal Facil	ity	
Thermistor Number:	VT08	Inclination		'	Vertical			
Install Date:	13-Aug-06	First Date	Event		27-Aug-0	7 Last Date		15-Aug-08
Coordinates and Elev Length of Cable (m)		N Cable Lead Abo	ove Ground (m)	E	Nodal Poin	to	Elev 10	319.18
Datalogger Serial #	108038	Cable Lead Abo	ove Ground (III)		Cable Seria		10	1622
Code CAM-4VT08	100000							
Thermistor Inspection	on							
	<del></del>	Good	_	Need	s Maintena	ince		
Casing		<b>v</b>						
Cover		~						
Data Logge	er	<b>v</b>						
Cable		~						
Beads		~						
Battery Ins	tallation Date	Batteries	not replaced in	– 1 2008.				
Battery Lev		Main	11.34 V			Aux	13.02 V	
Danoi, 20	. 0.0	.viaii.					10102 1	
Manual Ground Tem	nperature Readir	ngs						
Bead	ohms	Temp. (°C)			Bead	ohms	Tem	np. (ºC)
1		11.3			9			-5.7
2		9.4			10			-6.6
3		4.9		_				
4		3.2		L				
5		0.2		L				
6		-1.8		F				
7		-3.6		-				
8		-4.8	_	L				
Observations and P	roposed Mainter	<u>nance</u>						
Lock lubri	cated.							



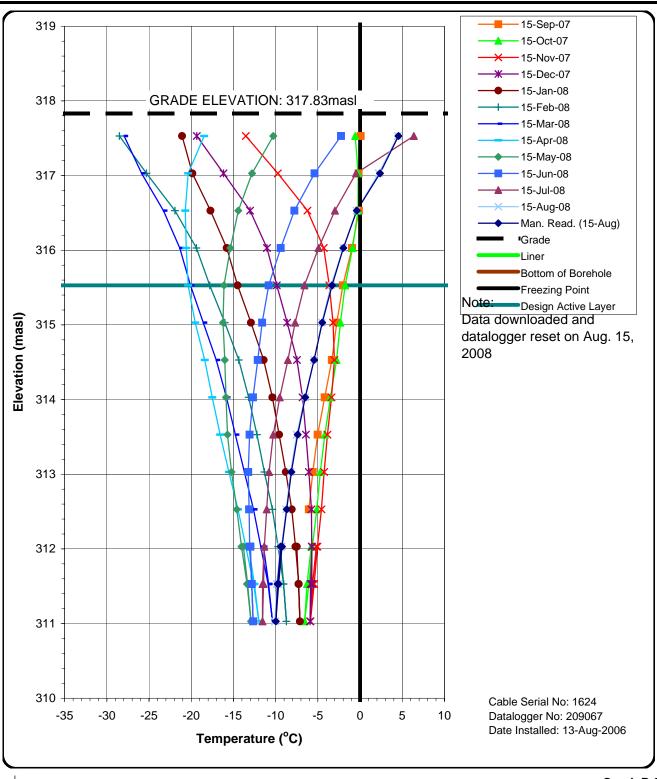
**B6** – Thermistor Graphs



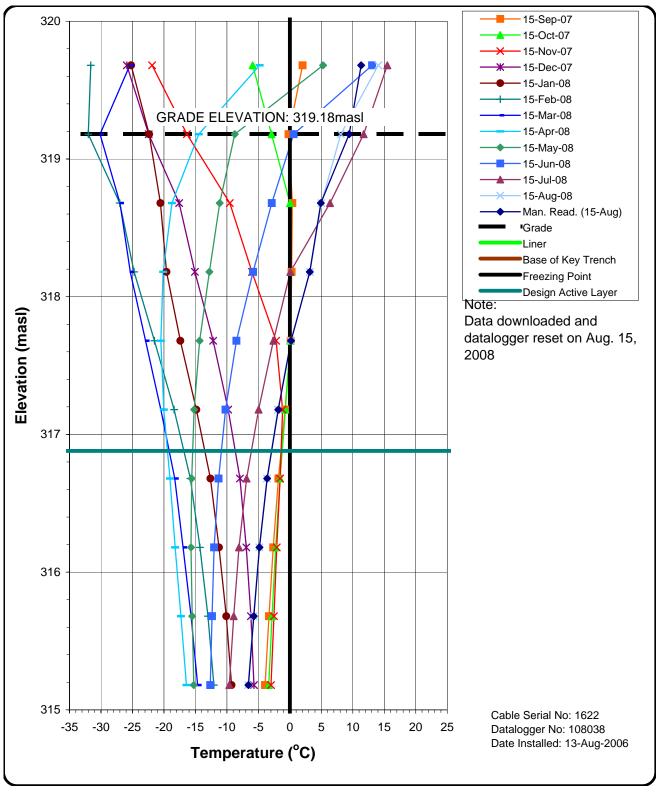
Graph B-1 Ground Temperature Profile Tier II Soil Disposal Facility Vertical GTC VT-5



Graph B-2 Ground Temperature Profile Tier II Soil Disposal Facility Vertical GTC VT-6



Graph B-3 Ground Temperature Profile Tier II Soil Disposal Facility Vertical GTC VT-7



Graph B-4 Ground Temperature Profile Tier II Soil Disposal Facility Vertical GTC VT-8 **B7 – Field Notes** 

Ang. 14/08 I LANDFILL (TIT) INSPECTION @ 12:30PM CHINAL S. PANORAMIC PHOTO OF TUR I CF FACING SAST FROM GRAVER PAD (WP 3) CTEIR THE PHOTO LOC. 20) WAMPONT 4 ( NW CORNOR OF LF) -PHOTO 7 (FAC)NG EAST ANNO - PHOTO 7 / FACING SONTH PHOTO LOC 1 NY CORNER OF LF) - PHATO 8 YFAUNG WEST) - PHOTO 9 (FACING SW) - PHOTO 10 (FACING SOUTH) { TEYPE II PHOTO LUC. 2) - WAYPAINT 6 ( NORTH SURPE) CAR XXXXXX VIV (TIER I PHOTO LOC. 3)

- TIME II (PAGE 3) -WAYPOINT 8 (SONTH FACE FROM SE TOE) - PHOTO 19 (FACING WEST) - SUM G SURPAGE FRAM SONTH SLAPE AND MINDE PONDING AT TOO, NO STAINING CTIEN II PHOTA LOC. 7 WAYPOINT 11 (SOWH FACE RAM ON TOU) - PHOTO 20 (FACING COST (Tiex II phons Luc. 8) - WAYPOINT LZ (SW CARNOR CROST) - PHOTO ZI (FACING HAST) - PHOTO IZ (FACING WORTH) (THER II PHOTY LOC. 9) - SAME PONDER WATER ALDER TOU - NO STAINING GASTRIFTO ONEAU CANOFILL PERFORMANCE - ACCEPTABLE, NO SETTLEMENT, EROS NOW THATION CRACKS POSTERNO - James SEUMAGE WITH STAINING AT NORTHEAST TOE

BMW-3

# 2008 Monitoring Well Sampling Log (\(\frac{\pm W #\_\_\_\_}{2}\)

							-		
	Site name:	CAM-	4						
	Date of sampling event:	AUG - 1	7-16	12608					
	Names of samplers:	TFB							
		Z AM . *3							
	Monitoring well ID:	BMW-3							
	Facility:	UPPER ST	TE				-		
			16 F				-		
D	anth of installation* (m)	2 /15	Known E	Jata					
	epth of installation* (m):  f screened section (m):	3,73							
	h to top of screen* (m):	0 40	, 						
Бері	Trio top or screen (III).	0,18	3				İ		
		,	Measured	Data					
	Condition of well:	GOOD			Procedure/Equipment:	INTERPAREME	EN		
	Procedure/Equipment:	INTERPACEN	NETEL		h to water surface (m):	042			
Well he	eight above ground (m):	0.76			Depth to bottom (m):	2.29			
λ	Diameter of well (m):	2 "		Free pi	roduct thickness (mm):				
							1		
	Calculations			<u>, , ,</u>	Notes		-		
	Depth of water (m):	0.42	1401		Evidence of sludge:	Amely a NOV play of the NOV play and Amely and	-		
W	/ell volume of water (L):	7.60		Eviden	ice of freezing/siltation:	£ and a second s	1		
	Static water level* (m):	0.16		LI MORES NO	~ <b>~</b>		'		
Length of scre	en collecting water (m):	<b>7.3</b>		T KALLEY 1.0.	<u> </u>		ł		
			ent/Purgi コン	ng Information			ļ		
	Equipment:	LOGICE					1		
Data 8 Time	\/-l	- 1 (90)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	1		
Date & Time	Volume Removed (L)	Temperature (°C)			raiblaity (NTO)	SILLI ( ROLL'A	1,		
16-1060	3.0L	[2.8]	8.73	0.404	But I'm and the standard of the	to and	LV0		
	Water Samplir	ď	1		Soil Sampling	V/COV/	7		
	Date & Time Collected:		0B	Da	ite and Time Collected:	19-AUG 08_	1		
	ample Number - Water:	BMW-	3		Sample Number - Soil:	PMW3-15	1		
	•	Zene		Mr =					
1				BMW-36	0-40	BMW-3-40			
				· <b>&amp;</b>		1	]		
	Sample Containers:	3 600	LAPTE		Sample Containers:	1/ TOM	]		
*		2 0003				Clear			
						PER SAMKE			
	Procedure/Equipment:	BAILER	,		Procedure/Equipment:	TROUBL			
	Water Description:	Sille	1010/2		Soil Description:	GEA ULI	1		
Procedure/Equipment: BALCA  Water Description: Silty, GAM  Brown, Ly  Soil Description: Grands with Gregish Brown									
Sampling Equipment	Decontamination (Y/N):	N/	E	Sampling Equipment I	Decontamination (Y/N):	7	1		
zampinia zdaipinoni	Number Washes:	ì			Number Washes:	L.	1		
	Number Rinses:	1	;		Number Rinses:	- Lan-	1		

n/a=not applicable

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #1/5)

Site name:	CAM-4				
Date of sampling event:	AUG - 19-16	12008			
Names of samplers:	TEB				
Monitoring well ID:					
Facility:	UNER SITE				
		·			
	Known I	Data			
Depth of installation* (m):	3,75				
Length of screened section (m):	1,9,+				
Depth to top of screen* (m):	0.55				
		D-4-			
	Measured	Data	Due and walf avious ant	1	De
Condition of well:	5000 1 5000	Don		INTERFACE METO	S. Source
Procedure/Equipment:	INTERPACE METER	Debi	h to water surface (m):	7 6,5	
Well height above ground (m):	01.31		Depth to bottom (m):	Lu ( 7 4	
Diameter of well (m):		Free p	roduct thickness (mm):	ganggare di diplottituit ann distribuità	
Calculations			Notes		
Depth of water (m):	130 45		Evidence of sludge:	Company	
Well volume of water (L):	4,00	Evider	nce of freezing/siltation:	the second second	
Static water level* (m):	-0.06				
Length of screen collecting water (m):	1.6.1				
	Development/Purgi	ng Information		- V	
Equipment:	1 115 2 1 1 1 1 1 1 1 1	10,192			
Date & Time Volume Removed (L)	Temperature (°C) pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	
16-AUG-03 4.5L	2.08 6.31	0.8%	13,5	Clear, Sligh	Hy
Water Samplin	) a		Soil Sampling		<i>2.2~G</i>
Date & Time Collected	1 0 0 00 0	Da	ate and Time Collected:	14-AUG-68	
Sample Number - Water			Sample Number - Soil:	MW 15-15	
,	MU 19		•	NO 15-25	
DUP	MW-190	Refusal @ 2			
		refusal Q L	y Cr		
Sample Containers	@ gont Anile)		Sample Containers:	Z/25DenC	
	4 000 .	]		'Cler	l
7/16 AMBERS	1 METALS (GOML)			MER SAMPLE	
Procedure/Equipment	NEL GIALTLE		Procedure/Equipment:	MOUEL	
Water Description	CIPAT, Shirldh		Soil Description:	Silty Garel	
			•	7.11	
	Ye Nor Chronical values			111	
Sampling Equipment Decontamination (Y/N)		Sampling Equipment	Decontamination (Y/N):	4	]
Number Washes	ż		Number Washes:	7	
Number Rinses	. 2		Number Rinses:	2	

n/a=not applicable

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #///A)

	Cita nama:	( 101 - 11			
	Site name:	CAM-4	Pan O.		
	Date of sampling event:	AUG-14-16/8	and the second second		
	Names of samplers:	TFB	9.78		
	NA	ΛΛ(12 111 Λ			
	Monitoring well ID:	MW-14-A			
	Facility:	UPPERSITE			
		Known	Data		
	epth of installation* (m):	4.66			
Length o	of screened section (m):	2.03			
Dep	th to top of screen* (m):	1.6t			
		Measured	l Data		
	Condition of well:	600		Procedure/Equipment:	INTERFACE METER
	Procedure/Equipment:	INTERFACE METER	Dep	th to water surface (m):	1107
Well he	eight above ground (m):	0.5		Depth to bottom (m):	247
	Diameter of well (m):	2"	Free p	product thickness (mm):	**************************************
		•			
	Calculations			Notes	
	Depth of water (m):	1.07		Evidence of sludge:	
V	Vell volume of water (L):	7.80	Evider	nce of freezing/siltation:	at the control of the
· · · · · · · · · · · · · · · · · · ·	Static water level* (m):	0.56			
I enath of scre	een collecting water (m):	0.70	†		İ
Longth of sole	on concounty water (III).	Development/Purg	ing Information		
	Equipment:	OBJUGIALTU #	UMIT		
	Ечиртет.	I reaching in	~ f'		
Data & Tima	Volume Removed (L)	Temperature (°C) pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Date & Time	volume Removed (L)		B orderes	WELL PAGOD	
11. Allh. 2	13.00	1.01 6.73	0.47	TO GOODLY & FLO	STADNY 14 CAB
100 / 1110 "	Water Carrell	3		Soil Sampling	VIVILLADOT CEIL
	Water Samplin	<del></del>	5.	ate and Time Collected:	(LML000
	Date & Time Collected:	16-406-08	Da		F-A6608
S	Sample Number - Water:	1414. 1714		Sample Number - Soil:	MW 17-4-11
		MV-17-4	1 1 1 1		MU164-30
			Refusal @	Do on	04. 11/10 1 12
		2 1 25 Car 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			1/1/2 / 1/V / 1/O
	Sample Containers:	3 TOURL AMPRIC	+ 2/250M	Sample Containers:	2/20mc
		2006	7/2001	CON -CHORI	Clear
			M LOUNT	CXW1 - 676.	VUL SAMPLE
	Procedure/Equipment:	MUTALIL		Procedure/Equipment:	
		JUM!			
	Water Description:	Subth deals	1	Soil Description:	SA 204 514
		Nista	ş.		A drawn
		1640, V/O			TWINGER !
Sampling Equipment	Decontamination (Y/N):	Y	Sampling Equipment	Decontamination (Y/N):	/
, , , , , , , , , ,	Number Washes:			Number Washes:	Ź
	Number Rinses:	**		Number Rinses:	***
	110111001 11111003				1 2

n/a≃not applicable

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #/6)

	Site name:	CAM- 4			
	Date of sampling event:	AUG-14-16	/ Z008_		
	Names of samplers:	TFB			
	Monitoring well ID:	Mw-16			
	Facility:	UPPER SITE			
-				3 4	
		Knowr	Data - OATA N	SOTAVALABLE	
	epth of installation* (m):				
	of screened section (m):				
Dept	th to top of screen* (m):				
		Measure	nd Data		
	Condition of well:	GOOD	Julia	Procedure/Equipment:	INTERPRE METER
	Procedure/Equipment:	INTERPACE METER	Dep	th to water surface (m):	1.32
Well he	eight above ground (m):	(0.60)		Depth to bottom (m):	200
	Diameter of well (m):	7 v	Free p	roduct thickness (mm):	National Contraction of the Cont
		400		many	
	Calculations		•	Notes	
	Depth of water (m):	11.34		Evidence of sludge:	N. To be before the state of th
W	/ell volume of water (L):	30	Evider	nce of freezing/siltation:	*Approximation and the contract and a Color contract and approximation of the color contract and and approximation of the color contract and approximation of the color contract and approximation of the color co
	Static water level* (m):	0.74			
Length of scre	en collecting water (m):				
		Development/Pur	ging Information		
	Equipment:	BALER			
Date & Time	Volume Removed (L)	Temperature (°C) pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-406-08	400	1,70 6.90	0.594	54.0	Hydroxarbon adour
	Water Samplin			Soil Sampling	
İ	Date & Time Collected:	16-AU6-09	Da	ate and Time Collected:	14-AU6-08
S	ample Number - Water:	MW-16	_	Sample Number - Soil:	Mw 16-15
					MW 19- 70
			Refusil @ 9	Dem	
					7 /7-0
	Sample Containers:	3 KON AMPLE	<u>(t.)</u>	Sample Containers:	C/ COM
		20003			Cler
,		0			POUSANICE -
	Procedure/Equipment:	BAILER		Procedure/Equipment:	7700VEL
	Water Description:	CK) Seer o		Soil Description:	Sardy Silf
		TOP OF WATER HYMOCOMER COLOR			Till Brown
		Hillocatur aclas			31/12/2
Sampling Equipment	Decontamination (Y/N):	y	Sampling Equipment	Decontamination (Y/N):	1
	Number Washes:	2		Number Washes:	3
	Number Rinses:	3		Number Rinses:	3

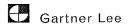
n/a=not applicable



<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW # $\underline{\mathcal{S}}$ )

	Site name:	CAM-	H				ĺ
I	Date of sampling event:	AUG- 14	-16/	2008			
	Names of samplers:	TEB					
				,			ŀ
	Monitoring well ID:						
	Facility:	UPPER SI	TE				
			Vo avvo F	) oto			
D	epth of installation* (m):	4.08	Known D	Jala	<u>, , , , , , , , , , , , , , , , , , , </u>		
	of screened section (m):	2.01					
	th to top of screen* (m):	0.47					ĺ
Бер	un to top or soreer (m).	00.11					İ
			Measured	Data			
	Condition of well:	6000			Procedure/Equipment:	INTELPACE METER	2
	Procedure/Equipment:	INTERPACE I	HETER		h to water surface (m):	0,17	
Well he	eight above ground (m):	0.47			Depth to bottom (m):	2.45	
	Diameter of well (m):	211		Free pi	roduct thickness (mm):	<u> </u>	
	Calculations				Notes		
	Depth of water (m):	0,97,			Evidence of sludge:	State State	
V	Vell volume of water (L):	3.00	257	Eviden	ce of freezing/siltation:	Managerinn (SA)	
	Static water level* (m):	Occ	<u> </u>		-		
Length of scre	een collecting water (m):	0.0	1				
		Developm	ent/Purgi	ng Information フレバス			
	Equipment:	PLICITA	-I'C P	/ U V " N / k			
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	
Date & Time	Volume Removed (L)	remperature ( C)	PII	) # mm.	, arbitalty (1110)	CIC	
16-AU6-04	100	10,70	401	1. 19 Mila	10:7	HANG Che	8 0 6 4
100 0	Water Samplin	q	_		Soil Sampling	I	04
	Date & Time Collected:	10-AUS-0	Ą	Da	te and Time Collected:	14-AUG-08	
S	ample Number - Water:				Sample Number - Soil:	MW 8-10	
		MW-8		VERY lake		MCJ 8-20	
				ISI SAMPLE @	, 1000		
				Resusal @	ZOCA		
	Sample Containers:	3 5000	Aunely		Sample Containers:	2(25000	
		1 000				Clear	
		2				VEILSAMPLE	
	Procedure/Equipment:	PERCUTA	LTIL		Procedure/Equipment:	neove	
	Water Description:	CACI	- Control Cont		Soil Description:	Sandy slt	
		Extrave Ce	Mich			Till pro-	
		odos.				OTPL. GRALL	/
Sampling Equipment	Decontamination (Y/N):	7		Sampling Equipment [	Decontamination (Y/N):	Y	1
	Number Washes:	Zienous			Number Washes:	7	1
	Number Rinses:	-1	,		Number Rinses:	5	l



n/a=not applicable
\*From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW # \_\_\_\_\_)

			<del>- :</del>		0.40		1
	Site name:	CAM-	4				
[	Date of sampling event:	AUG-14-	-16/	2008			
	Names of samplers:	TFB	,				
	Monitoring well ID:	MW-9					
	Facility:	UPPER SIT	E				
					. ,		
			Known D	Data			
De	epth of installation* (m):	3,32					
Length o	of screened section (m):	Z.01					1
Dept	th to top of screen* (m):	0,40					
			Measured				
	Condition of well:	G000			Procedure/Equipment:	INTERPACE METER	-
	Procedure/Equipment:			Dept	h to water surface (m):	0.79	
Well he	eight above ground (m):	Con To	0,33		Depth to bottom (m):	i, 39	
	Diameter of well (m):	2"		Free pr	oduct thickness (mm):	\$-moods/enrolledvellengs*	
	Calculations		1 77		Notes		
	Depth of water (m):	0.19 m	47 or		Evidence of sludge:	< semiconomiconistation (semiconistation)	
V	/ell volume of water (L):	3.20		Eviden	ce of freezing/siltation:	Constitution and the second second second	
	Static water level* (m):	-0.04					
Length of scre	en collecting water (m):						
				ng Information			
	Equipment:	PERLISTAR	710	PUMP			
A	MUCED DI	C/	T				1
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	ł
15-AU6-U8	LIPL	2.62	11.34	1.06 ms/2	41.3	Charical or	Po
	Water Samplin	ıg _			Soil Sampling		
	Date & Time Collected:	160-AU6-0	<b>18</b>	Da	te and Time Collected:	19-AUG-08	
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	ample Number - Water:	MW 9			Sample Number - Soil:	MW9-15	1
W- 10-4	06-08	,				MW9-25	
1.01	my Toll			Kefusa(a	2500		_
	Sample Containers:	3 500 ML	ANNERS	- American Company	Sample Containers:	2/www	1
	,		MALS			cler	1
			10100			PER SAMPLE	1
ACRISTALTI PUMP,	erocedure/Equipment:		UL		Procedure/Equipment:	Movel	
	Water Description:	Citi			Soil Description:	5 ANN 5:1+	1
	water Description.	CTC	Æ		Con Doodington.	THE GRALETY	
		Cherical e	dove			brom or PL	
Sampling Equipment	Decontamination (Y/N):	CAKINGAL T	1000	Sampling Equipment [	Decontamination (Y/NI)	V	1
Camping Equipment	Number Washes:	1	<u> </u>	Samping Equipment	Number Washes:	Z	1
	Number Rinses:	<del>                                     </del>			Number Rinses:	3	1
1	140111001 1011303.	1		1	110111001 1111000.		_

n/a=not applicable



<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #<u></u><u></u>)

	Site name:	CAM- L	F						
[	Date of sampling event:	AUG-19-1	6/20	ගරි					
	Names of samplers:	TFB							
	Monitoring well ID:								
	Facility:	UMSIL SI	E						
			Known E	Data					
	epth of installation* (m):	3,60							
	f screened section (m):	2.03				,			
Dept	h to top of screen* (m):	0.60							
				B (					
	0	40	Measured		Dragadura/Equipment	LATER FROM ALLERY			
	Condition of well:	6000	Asuran		Procedure/Equipment:	NTECTALE METER			
ما الم ۱۸۷	Procedure/Equipment: eight above ground (m):	NTERFACE	14616	Depth to water surface (m): 117 ハインド Depth to bottom (m): つっとって みんだり					
vveii ne		0.60		Eroo p	roduct thickness (mm):	27.69 M 3/3/			
	Diameter of well (m):			L Free pr	oddet tillekness (IIIII).				
	Calculations				Notes				
	Depth of water (m):	1.17 m)	100		Evidence of sludge:	No. of the second conference of the second s			
W	/ell volume of water (L):	4.70	· (3),	Eviden	ce of freezing/siltation:	Expecting the Company of the Company			
	Static water level* (m):	0.52	-						
Lenath of scre	en collecting water (m):	7,05							
	<u> </u>		ent/Purgi	ng Information					
	Equipment:	20 30 00 00 00000		PUMP					
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water			
155 At 12 00	11 20		7.32	0.887	61	CHC			
IM-AU6-08	710	L109	+1/6	U.50 T	6,1	Self- Charical.			
	Water Samplin				Soil Sampling				
	Date & Time Collected:		98		te and Time Collected:	14-A608			
S	ample Number - Water:	MLU - 2	7		Sample Number - Soil:	MW 5-10			
				2 5		MU5-25			
				Refusal @	25cm				
	Sample Containers:	3 hwal	( desir)		Sample Containers:	2/250MC			
		(7)	Augus	An Flora na	ell	Sec			
		LUL 41	463	<i>J</i>		VER SAMILE			
	Procedure/Equipment:	PERMACT	ic haup		Procedure/Equipment:	TROVEL			
		250	<del> </del>		0.75	CA.104 ( ) /			
	Water Description:	LAC	2		Soil Description:	SAUDY SILF			
		Slight chem	ial elar			TILL, GRAVELI BROWN DIPL			
		ý .							
Sampling Equipment	Decontamination (Y/N):		<u>Y</u>	Sampling Equipment [	Decontamination (Y/N):				
	Number Washes:		1		Number Washes:	4			
I	Number Rinses:		4 .	I	Number Rinses:	4			

n/a=not applicable



<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

38					
	VT-18	AGINERO	oko At	4;55Pm	
	RAT	MAIN	111341	1	
	BAT	AMY	13.02	V	
	CHANNE	tem	0(00)	7	
	1 1 5 1	11.5	33	*	
	2)	9,1	12		
	3	4.9	3		
	4	3.1	7		
	5	0.0	201		
	6			1	
	7	-1.8	0		
	10	-4.8	2		
	9	-5.	73		
	10	-5.5	7		
-	- CIJAKAN	ans 6 DA	mmING		
	- Upparm c	WILL DW	o "STOP	WHOW GULL	7)
	- RUSTANION	DDIA 1	Ubben		
,	0.0				
			in Maria		
				5.	
	1/0074m2/	TIMO.	= VA	211 WINPY	
	WEATHER /	2000	al p	''	1
	U		V		
	-				

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	C	V		1						1 '	V	W	
	C	HA				AL	۸۷		1	3.16	11		
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	-	4											
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		6	_					_ !					
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	- 12	11	- 10	30		N	2 - 2	1	12/	WH		- w	d'
		101	77 /	211		0	74	C	106	601	10		
				+1									
	_	- Cl	- CHEC-UPE	12 13 - CHECK -UPDAT	12 12 13 - CHECKO - WROATIO	5 6 7 10 11 13 - CHELLO P.	12 - CALCUS PROG - UPDATIO CULL	3 4 5 -0 6 -2 -3 -4 -9 -6 -12 -7 -13 -8 -4 -8 -4 -8 -4 -8 -4 -8 -4 -8 -4 -8 -4 -8 -4 -8 -8 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9	3 3.3.  4 1.41  5 -0.5;  6 -2.3;  7 -3.42  -4.44  9 -5.5  10 -6.35  -12 -7.13  12 -7.13  -8.07  - CHECKO PROGRAMA  - WARDATIO CHECK & "S	3 3,37 1,41 5 -0.51 6 -2.31 7 -3.42 -4.44 9 -5.50 10 -6.35 -6.35 11 -7.13 -13 -8.02 -CHECCO PROGRAMMIN -WORRESO CHECK & "STOR	3,37 1,41 5, -0.51 6, -2.31 7, -3.42 -4.44 9, -5.50 -6.35 -6.35 -7.13 -7.13 -7.13 -7.13 -7.13 -7.13 -7.13 -7.86 -8.02 -4.44 -7.13 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.02 -8.03	3 3,37 1,41 5 -0.51 6 -2.31 7 -3.42 -4.44 9 -5.50 10 -6.35 -7.35 11 -7.86 13 -8.02 -CHEYED PROGRAMMING	3.37 1.41 5 -0.51 6 -2.31 7 -3.42 -4.44 9 -5.50 10 -6.35 -6.35 -7.13

40					
					5:25 pm
	BA	MENGLI	VAIN 11.31	IV	
		Av	1x 13.0	LV	
	CH	MUNE	1	comp ( )	)
		1		9,92	
		2		7,44	
		3		4.86	1
		4		4.86 3.09 0.201	
		5		0.201	N N
*		9 10		1.45	,
	5	7	-	3.00	
		A	_	4.16	
		9	_	5.36	
		10		5.78	
	- CHI	TORRO	PW6	MAMMI	IN THEY
	- CHAI	1000	Cock 1	7-10P W(	100 Lucy
	PENT.	TARTIO	DATI	1 (06)	S. C.
					W.

	V1-7	NOON	HLOA	OW A	5:	YOPM
B	ATTORY	MAIL	1	11.34	1	
	,	ANX	0. 1	3.14V		
	CHAN	155	100	VI: P   7	U)	
			Y	,55		
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	5		-3			
	0		- 4	48		
	B		-1	140		-
	a		-6.	77		
	10		-7 -8	ייי		
	11		- 8	19	199	
	12		- 8 - 9 - 9	25		
	13		- 9	.65		
	14	4	- 9	98		
	15	**	-9.	78		
	16		- 9	.40		
- c	TKKK80	0, 11	20614	mmly	6	
-0	HANGER CHECK	/wPOH	THO	crock	- AN	0
	CHECK	100	STOP	WHO	w RI	ul!
TR	ETTART	CO K	DATA	LOGGY	r	

# **Appendix C**

# **Upper Site Landfill**

- C1 Site Condition/Visual Inspection Records
- C2 Geotechnical Inspection Photographic Records
- C3 Monitoring Photographic Records
- C4 Monitoring Well Sampling Records
- C5 Thermistor Maintenance Records
- C6 Thermistor Graphs
- C7 Field Notes



# C1. Upper Site Landfill

#### C1.1 Landfill Summary

The Upper Site Landfill is located approximately 625 m east of the main facilities area. The original landfill consisted of three lobes (South, Central and North) that encompass an area of approximately 4,500 m<sup>2</sup>. The location of the landfill is presented in Figure C-1.

A previous evaluation and geophysical survey determined landfilled material is continuous throughout the north and central lobes and more isolated in the south lobe. Tier I and Tier II contaminated soil was found downgradient of the central lobe, indicating contaminant migration from the landfill, thus, The Upper Site Landfill was classified as high potential environmental risk.

Remediation of the Upper Site Landfill involved complete excavation of the north lobe, partial excavation of the central lobe and installation of a leachate containment system in the central lobe and regrading of the south lobe.

Monitoring requirements for the 2008 monitoring year include visual inspection, soil sampling, groundwater sampling and thermal monitoring.

# **C1.2 Visual Monitoring**

No significant erosion, settlement or indications of slope instability were observed at the Upper Site Landfill. Overall landfill performance is assessed as "acceptable". Appendix C1 presents a summary of the 2008 visual inspection results.

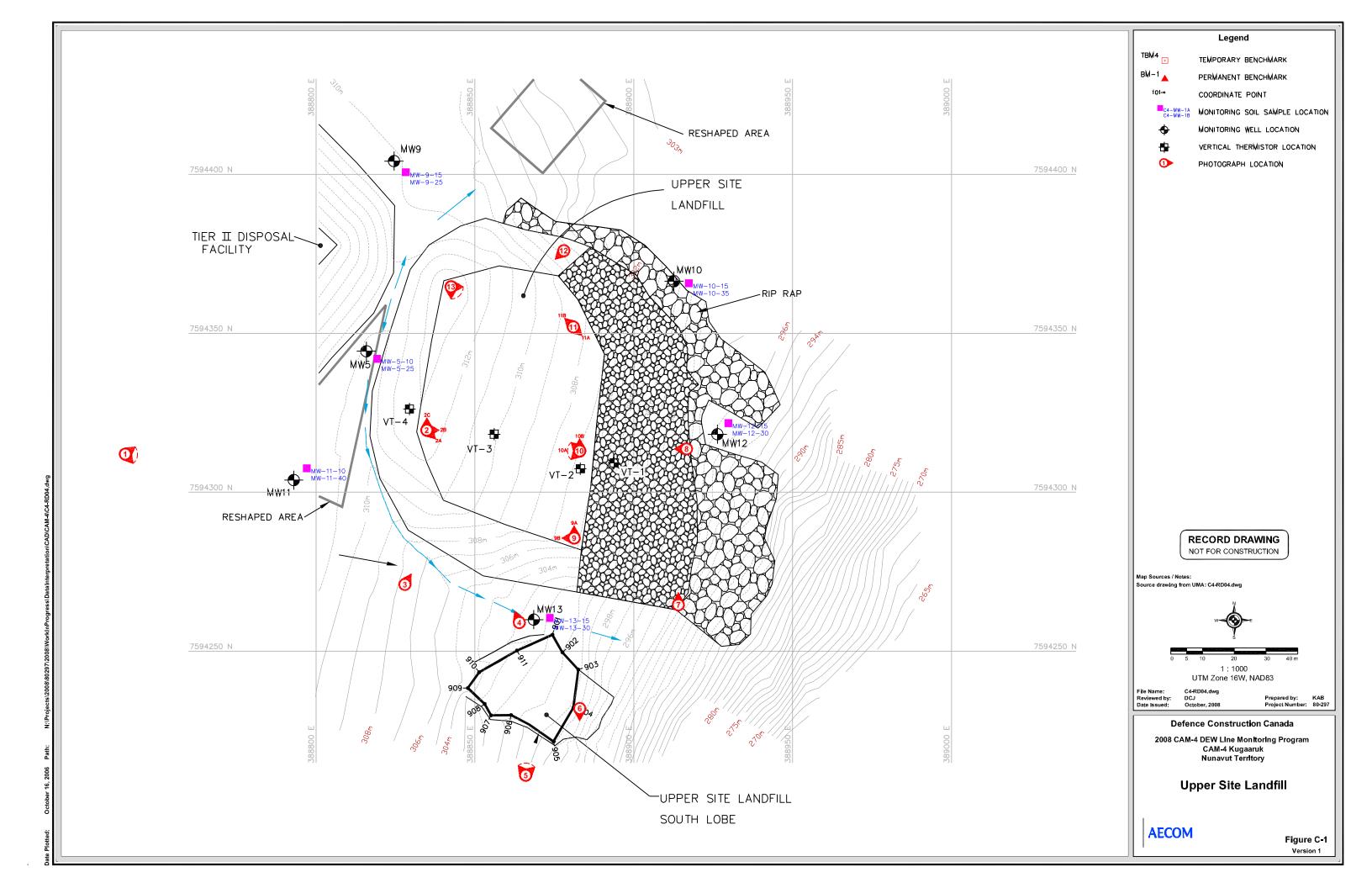
No issues of concern that require immediate attention were identified.

# C1.3 Soil Sampling

Soil samples were collected at monitoring locations MW-10, MW-11, MW-12 and MW-13. The sampling locations are presented in Figure C-1. Two samples were collected at each monitoring location at depths of approximately 0.10 to 0.15 m and 0.30 to 0.40 m below ground surface. The photographs of each monitoring well and test pit location are included in Attachment C3.

No staining or free product was observed during the sampling event at the Upper Site Landfill. No odours were detected during the sampling event at the Upper Site Landfill.

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Laboratory analysis detected concentrations of TPH (C6-34) at monitoring locations MW-11 and MW-13. It is recommended that these results be evaluated in the context of the Landfill Monitoring Plan. The soil sample at MW-10-35 (0.35 m depth) returned an arsenic concentration of 93.6 mg/kg. This value is presumed to be anomalously high, given the non-detection at the 0.15 m soil sample. At the time of issuing this draft report the results of the confirmatory analysis are awaited from ALS Laboratory Group.

The analytical results and depths of samples are provided in Table C-1. The Laboratory Certificates of Analysis are provided in Appendix F.

#### C1.4 Groundwater Sampling

Groundwater measurements and monitoring system condition records were documented for monitoring wells MW-10, MW-11, MW-12 and MW-13. These records are provided in attachment C4.

All groundwater monitoring wells slated for monitoring in 2008 at the Upper Site Landfill contained sufficient volume for sampling, with the exception of MW-10, which was completely dry. Samples were collected at a flow rate equal to the recharge rate of the monitoring well (and not exceeding 100mL/min). Monitor MW-11 was sampled using a peristaltic pump and disposable LDPE tubing. The rechargeable battery provided with the peristaltic pump from the supplier proved to be faulty, thus monitors that were accessible by vehicle were sampled with the peristaltic pump run off the vehicle battery. Monitors MW-12 and MW-13 were not accessible by vehicle, therefore were purged and sampled using a disposable bailer. It should be noted that monitoring well MW-12 was found to have a blockage in the well pipe at approximately 0.64 m below ground surface. Sand was discovered on the interface meter as well as the disposable bailer. The blockage in the well pipe may be attributed to a broken coupling, presumably allowing sand pack from the borehole annulus to enter the well.

Groundwater samples were not filtered and not preserved. Samples were analyzed for total concentration of inorganics, TPH (C6-C32) and PCB.

TPH (C6-C32) was detected in monitoring wells MW-11, MW-12 and MW-13. Elevated concentrations of Chromium and Lead were also reported for monitor MW-12. The results should be evaluated in the context of the Landfill Monitoring Plan as well as compared with DCC internal standards.

The results are presented in Table C-2. The laboratory Certificates of Analysis are provided in Appendix F.

#### **C1.5 Thermal Monitoring**

All thermistors at the Upper Site Landfill were in good condition. Thermistor data was downloaded on August 15, 2008, programming was checked and the data loggers were reset. The data logger clocks were adjusted to local (Standard Time). Battery charge was checked to ensure sufficient remaining charge and batteries were not changed in 2008.

Tabulated ground temperature data since the last download in August 2007 are included in Appendix C5. Graphs of ground temperature versus depth are presented in Appendix C6.

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Table C-1. CAM-4 Kugaaruk, Summary of 2008 Soil Analysis - Upper Site Landfil

Samula Idant	Sample Location	Depth	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	PCB Total Aroclors	F1	F2	F3	TPH
Sample Ident.	Sample Location	(m)	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)	(mg/kg)	C6-C10 (mg/kg)	C10-C16 (mg/kg)	C16-C34 (mg/kg)	C6-34 (mg/kg)
Upgradient Samples																
MW-11-10	MW-11	0.10	11.2	11.9	7.0	<0.50	19.1	43.9	27.7	<5.0	<0.0050	<0.050	<10	<30	1230	1230
MW-11-40	MW-11	0.40	10.0	11.6	6.5	<0.50	8.1	33.3	22.6	<5.0	<0.0050	<0.050	<10	<30	1150	1150
Downgradient Sam	ples															
MW-10-15	MW-10	0.15	6.5	10.5	5.0	<0.50	5.6	22.9	22.3	<5.0	<0.0050	<0.050	<10	<30	<50	0
MW-10-35	MW-10	0.35	8.4	20.0	9.0	<0.50	6.2	27.0	24.8	93.6	< 0.0050	< 0.050	<10	<30	<50	0
MW-12-15	MW-12	0.15	6.0	6.8	3.6	< 0.50	4.9	23.3	17.0	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-12-30	MW-12	0.30	5.4	6.9	3.8	< 0.50	4.9	21.0	15.4	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-13-15	MW-13	0.15	7.1	8.6	5.1	< 0.50	5.7	31.4	17.5	<5.0	0.0117	< 0.050	<10	<30	76	76
MW-13-30	MW-13	0.30	3.5	6.6	3.6	<0.50	3.7	17.2	14.9	<5.0	<0.0050	<0.050	<10	<30	<50	0

Note: mg/kg = ug/g

TPH is represented as the total of F1, F2 and F3 as defined by CCME Tier I Method - Rev. 5 Analysis of Petroleum Hydrocarbons in Soil



Table C-2. CAM-4 Kugaaruk, Summary of 2008 Groundwater Analysis - Upper Site Landfil

		Groundwater	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	РСВ	F1	F2	F3	TPH
Sample Identification	Location	Elevation	Cu	Ni	Со	Cd	Pb	Zn	Cr	As	Hg	Total Aroclors	C6-C10	C10-C16	C16-C34	C6-34
		(masl)	(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)
Upgradient Samples																
MW-11	MW-11	311.16	<0.0020	0.0026	0.00146	<0.000034	<0.0010	<0.0050	<0.0020	0.0011	<0.000020	<0.0010	<0.10	<0.30	0.47	0.47
Downgradient Samples																
MW-10	MW-10	<299.13	-	-	1	-	-	-	-	-	-	-	-	-	-	-
MW-12	MW-12	294.18	0.0433	0.0418	0.0156	0.000135	0.0158	0.208	0.0540	0.0051	<0.000020	<0.0012	<0.10	1.26	2.02	3.28
MW-13	MW-13	301.12	0.0288	0.0257	0.00978	0.000176	0.00725	0.0809	0.0205	0.00216	<0.000020	<0.0011	<0.10	<0.30	1.11	1.11

<sup>-</sup> Denotes dry well; no sample obtained Note: mg/L = 1000 ug/L





C1 – Site Condition/Visual Inspection Records

# Visual Inspection Checklist Inspection Report – Page 1 of 2

SITE NAME:	CAM-4 - Pelly Bay
LANDFILL/AREA DESIGNATION:	Upper Site Landfill
DATE OF INSPECTION:	August 14, 2008
DATE OF PREVIOUS INSPECTION:	August 24 - 26, 2007
INSPECTED BY:	Darrin Johnson, P.Eng.
REPORT PREPARED BY:	Darrin Johnson, P.Eng.

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

# **Preliminary Stability Assessment**

Feature	Severity Rating	Extent		
Settlement	Not observed	None		
Erosion	Not observed	None		
Frost Action	Not observed	None		
Animal Burrows	Not observed	None		
Vegetation	Not observed	None		
Staining	Not observed	None		
Vegetation Stress	Not observed	None		
Seepage Points	Not observed	None		
Debris Exposed	Not observed	None		
Tension Crack	Not observed	None		
Overall Landfill				
Performance	Acceptable			

# Upper Site Landfill - Inspection Report - Page 2 of 2

	Present		Dimensions	Depth	Extent		Photographic Records	Additional Comments/ Bushiminans	
Checklist Item	Yes/No	Location	(L x W) (m)	(m)	(%)	Description	(Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment	
Settlement									
	No								
Erosion									
	No								
Frost Action									
	No								
Animal Burrows									
	No								
Vegetation									
	No								
Staining									
	No								
Vegetation Stress									
	No								
Seepage Points									
	No								
Debris Exposed									
	No								
Presence/ Condition									
of Monitoring Instruments	Good								
Other Features of									
Note.	No								
Additional Photos							USL-1, 2A, 2B, 2C, 3, 4, 5, 6,		
						General	7, 8, 9A, 9B, 10A, 10B, 11A, 11B, 12, 13		



C2 – Geotechnical Inspection Photographic Records



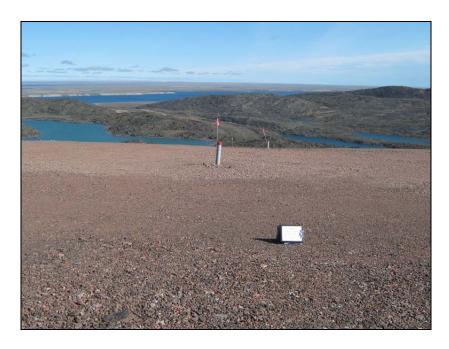


Photograph USL-1. Panoramic photo facing southeast towards west slope of Upper Site Landfill. ↑



Photograph USL-2A. Facing southeast along crest. ↑



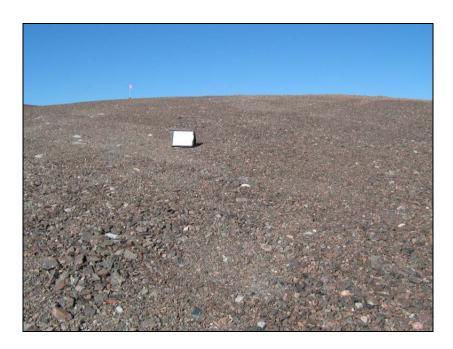


Photograph USL-2B. Facing east along line of thermistors. ↑



Photograph USL-2C. Facing north along west crest. ↑





Photograph USL-3. Facing south slope. ↑



Photograph USL-4. Facing west along south slope. ↑





Photograph USL-5. Panoramic photo from the southwest corner of south lobe. ↑



Photograph USL-6. Facing south along the south slope of the south lobe from the southeast corner. ↑



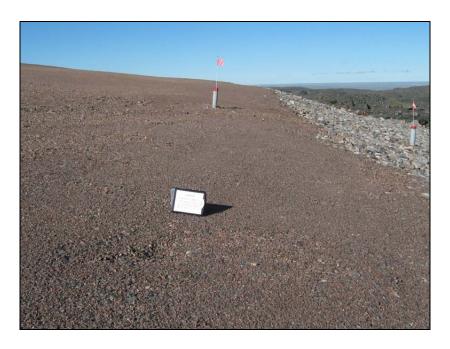


Photograph USL-7. Facing north from the southeast corner of the rip-rap. ↑



Photograph USL-8. Toe of rip-rap below thiermistors. ↑



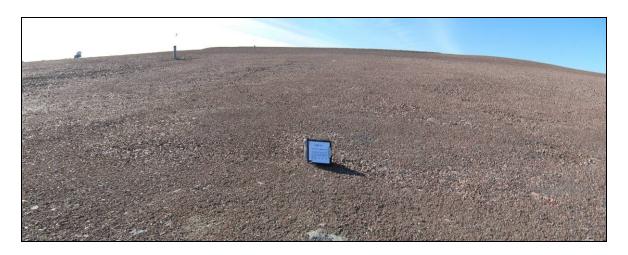


Photograph USL-9A. Facing north along crest from southeast corner.  $\uparrow$ 



Photograph USL-9B. Facing west along south crest from the southeast corner. ↑





Photograph USL-10A. Panoramic photo of the top of the landfill facing west. ↑



Photograph USL-10B. Facing north along crest. ↑





Photograph USL-11A.

Facing southeast.



Photograph USL-11B.

Facing northwest.





Photograph USL-12. North gravel slope. ↑



Photograph USL-13. Panoramic photo of the landfill top from the northwest corner. ↑



C3 – Monitoring Photographic Records





Photograph 1. Monitoring Location MW-11 (Upgradient) Facing Southeast. ↑



Photograph 2. Monitoring Location MW-10 (Downgradient). Facing North. ↑

(cam4-appc3-mwphotos.doc) -1 -





Photograph 3. Monitoring Location MW-12 (Downgradient). Facing North. ↑



Photograph 4. Monitoring Location MW-13 (Downgradient). Facing Northeast. ↑

(cam4-appc3-mwphotos.doc) - 2 -



C4 – Monitoring Well Sampling Records

# 2008 Monitoring Well Sampling Log (MW-10)

	Site name:	e: CAM-4						
	Date of sampling event:	14-17 Aug 2008						
	Names of samplers:	TFB						
	Monitoring well ID:	MW-10						
	Facility:	Upper Site Landfill						
	•							
			Known I	Data				
I	Depth of installation* (m):	3.37						
Length	of screened section (m):	2.03						
De	pth to top of screen* (m):	0.38						
	· · · · · · · · · · · · · · · · · · ·							
		N	Measured	Data				
	Condition of well:	1			Procedure/Equipment:	Interface Meter		
	Procedure/Equipment:	Interface Meter						
Well h	neight above ground (m):	0.68			Depth to bottom (m):	2.38		
	Diameter of well (m):	0.05 Free product thickness (mm):				-		
	,				,			
Calculations Notes								
	Depth of water (m):	Dry @ 2.38			Evidence of sludge:	-		
,	Well volume of water (L):	0.00		Evide	nce of freezing/siltation:	-		
	Static water level* (m):				<u> </u>			
Length of scr	reen collecting water (m):							
Ů	<u> </u>	Developm	ent/Purai	ng Information				
	Equipment:		J					
		l						
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
16-Aug-08		( )	'	, ,	, ,			
	Water Samplin	a			Soil Sampling			
	Date & Time Collected:	<u> </u>		D	ate and Time Collected:	14-Aug-08		
	Sample Number - Water:			_	Sample Number - Soil:			
						MW-10-35		
	Sample Containers:				Sample Containers:	4 x 250ml Glass		
	Campio Comanioro.			1	Campio Contamoro.	TX EGGINE GIGGS		
	Procedure/Equipment:				Procedure/Equipment:	SS Trowel		
	r rooddaro, Equipmont.				1 1000aa10/Equipmonii	00 1104101		
	Water Description:				Soil Description:	Brown sandy silt till,		
	a.c. Booonpaon.				Co Docompation.	some gravel.		
						Joseph Gravon		
Sampling Equipmen	t Decontamination (Y/N):			Sampling Equipment	Decontamination (Y/N):	Y		
Camping Equipmen	Number Washes:			Camping Equipment	Number Washes:	2		
	Number Rinses:				Number Rinses:			
Ī	MUTIDEI MITSES.	1			indilibel Milises.			

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

# 2008 Monitoring Well Sampling Log (MW-11)

		0414.4				1		
	Site name:							
	Date of sampling event:							
	Names of samplers:	TFB						
	Monitoring well ID:	MW-11						
	Facility:	Upper Site Landfill						
			Known [	Data				
C	epth of installation* (m):	3.85						
Length	of screened section (m):	2.03						
Dep	oth to top of screen* (m):	0.86						
		N	/leasured	Data				
	Condition of well:				Procedure/Equipment:	Interface Meter		
	Procedure/Equipment:			Der	oth to water surface (m):	1.97		
Well h	eight above ground (m):	0.56			Depth to bottom (m):	2.82		
***************************************	Diameter of well (m):	0.05		Free	product thickness (mm):	-		
	Diameter of well (III).	0.00		1166	oroduct triotaless (IIIII).			
	Calculations				Notes			
		0.05			Evidence of sludge:			
	Depth of water (m):	0.85		F. du		-		
V	Vell volume of water (L):	1.67		Evide	nce of freezing/siltation:	-		
	Static water level* (m):	1.41						
Length of scre	een collecting water (m):	0.85						
				ng Information				
	Equipment:	Peristaltic Pump, H	loriba U-22	with flow through cell, LD	PE			
					T			
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
15-Aug-08	2.5	2.71	6.62	0.97	2.3	C&C		
						Chemical odour		
	Water Sampling	g			Soil Sampling			
	Date & Time Collected:	15-Aug-0	8	Date and Time Collected:		14-Aug-08		
S	Sample Number - Water:	MW-11			Sample Number - Soil:	MW-11-10		
				Refusal @ 0.40 m		MW-11-40		
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	4 x 250mL Glass		
		2 x VOC vials						
	Procedure/Equipment:	Peristaltic Pump, H	loriba U-22		Procedure/Equipment:	SS Trowel		
	Water Description:	C&C, Chemical od	our		Soil Description:	Brown sandy silt till,		
	Trater Description.				Con Description.	some gravel.		
						Somo giavon.		
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (V/N)	V		
Sampling Equipment	Number Washes:	1		Sampling Equipment Decontamination (Y/N): Y				
		2			Number Washes:	3		
	Number Rinses:	2			Number Rinses:	3		

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

# 2008 Monitoring Well Sampling Log (MW-12)

	Site name:							
	Date of sampling event:	_						
	Names of samplers:	TFB						
	Monitoring well ID:	MW-12						
	Facility:	Upper Site Landfill						
		,						
			Known D	)ata				
D	epth of installation* (m):	3.67						
Length	of screened section (m):	2.03						
	oth to top of screen* (m):	0.68						
			Measured	Data				
	Condition of well:	1			Procedure/Equipment:	Interface Meter		
	Procedure/Equipment:			Der	oth to water surface (m):	1.53		
الم الم	eight above ground (m):	0.66		Бер	Depth to bottom (m):	2.20		
vveiri	Diameter of well (m):	0.05		Eroo :	product thickness (mm):	-		
Note: Pleakage in walls	. ,		unling Con-		, ,	-		
Note - Blockage in well approx. 1.30 mBTOP. Possible damaged coupling. Sand pack allowed to enter well at damaged area.								
	Onlandad's as				Notes			
	Calculations							
	Depth of water (m):	0.67			Evidence of sludge:	-		
V	Vell volume of water (L):	1.32		Evide	nce of freezing/siltation:	-		
	Static water level* (m):	0.87						
Length of scre	een collecting water (m):	0.67						
		Developme	ent/Purgi	ng Information				
	Equipment:	Disposable Bailer, I	Horiba U-22	<u>-</u>				
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
16-Aug-08	1.4		Insufficient	t volume for field paramet	ters	Grey, cloudy, silty		
						Chemical odour		
	Water Samplin	g		Soil Sampling				
	Date & Time Collected:	16-Aug-0	)8	Date and Time Collected:		14-Aug-08		
S	Sample Number - Water:	MW-12		Sample Number - Soil:		MW-12-15		
	•			Refusal @ 0.32 m		MW-12-30		
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	4 x 250ml Glass		
	Campio Contaniolo.	2 x VOC vials			capio contaniois.	2002 0.000		
		v 0 0 viaio						
	Procedure/Equipment:	Disposable Bailer			Procedure/Equipment:	SS Trowol		
	Frocedure/Equipment:	2.0p00able ballel			Frocedure/Equipment:	33 HOWEI		
Water Description: Grey, cloudy, silty, o		chemical		Call December	Drawn andth			
	Water Description:	odour	Gileitileai		Soil Description:	Brown sandy silt,		
						some gravel.		
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Y		
I	Number Washes:	3		i	Number Washes:	2		
	Number Rinses:	5			Number Rinses:	2		

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing. n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

# 2008 Monitoring Well Sampling Log (MW-13)

		I .				
	Site name:					
	Date of sampling event:	_				
	Names of samplers:	TFB/DAJ				
	Monitoring well ID:	MW-13				
	Facility:	Upper Site Landfill				
			Known [	Data		
]	Depth of installation* (m):	3.18				
Length	of screened section (m):	1.90				
De	pth to top of screen* (m):	0.20				
	· · · · · · · · · · · · · · · · · · ·					
		N	/leasured	Data		
	Condition of well:				Procedure/Equipment:	Interface Meter
	Procedure/Equipment:			Der	oth to water surface (m):	1.88
Well h	neight above ground (m):	0.64		201	Depth to bottom (m):	2.18
V V CII I	Diameter of well (m):	0.05		Free	product thickness (mm):	-
	Diameter of well (III).	0.03		Fiee	broduct triickriess (min).	
	Calculations			1	Notes	
	Calculations	0.00			Notes	
	Depth of water (m):	0.30			Evidence of sludge:	-
`	Well volume of water (L):	0.59		Evide	nce of freezing/siltation:	-
	Static water level* (m):	1.24				
Length of scr	reen collecting water (m):	0.30				
		-		ng Information		
	Equipment:	Disposable Bailer,	Horiba U-22	2		
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-Aug-08	0.8	2.91	5.98	0.392	903	Grey, cloudy
						Chemical odour
	Water Samplin	g		Soil Sampling		
	Date & Time Collected:	16-Aug-0	)8	Date and Time Collected:		14-Aug-08
;	Sample Number - Water:	MW-13			Sample Number - Soil:	MW-13-15
	·			Refusal @ 0.30 m	·	MW-13-30
	Sample Containers:	2 x 0.5L Amber Gla	ass		Sample Containers:	4 x 250mL Glass
	Campio Comanioro.	2 x VOC vials			campio contamoro.	TX ZOOTTE Glado
		- X VOO VIGIO				
	Procedure/Equipment:	Disposable Bailer			Procedure/Equipment:	SS Trowel
	r rocedure/Equipment.	2.000000.0 200.			r rocedure/Equipment.	33 Howel
	Water Description	Cloudy, grey, chem	nical odour		Poil Deseries:	Prouse conditional till
	Water Description:	Journal of the state of the sta	noai ououi			•
						some gravel.
	<u> </u>					
Sampling Equipmen	t Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Y
	Number Washes:	2			Number Washes:	2
	Number Rinses:	3		Number Rinses:		3

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel



**C5 – Thermistor Maintenance Records** 

Contarctor Name:	AECOM			Inspect	ion Date:	15-Aug-0	)8	
Prepared By:	Darrin Johnson	n						
Thermistor Informa	otion							
Site Name:	CAM-4	Thermisto	or Location	Ur	pper Site	Landfill		
Thermistor Number	er: VT01	Inclination	n	Ve	ertical			
Install Date:	28-Sep-06	First Date		2		Last Date		15-Aug-08
Coordinates and E		N		E			Elev	304.43
Length of Cable (n Datalogger Serial		Cable Lead Abo	ve Grouna (m)		odal Point able Seria		13	1615
Code CAM-4VT01					ADIO OCITA	HAUITIDGE		1010
Thermistor Inspe	<u>ction</u>	- ·						
		Good	_		Maintena	nce		
Casing		~						
Cover		<b>~</b>						<del></del>
CUVEI		•						
Data Lo	gger	~						
Cable		~						
Beads		•						
	Installation Date		not replaced in	 2008				
			-	1 2000.				
Battery	Levels	Main	11.34 V			Aux	12.29 V	
Manual Ground T	Гетрегаture Readir	<u>ngs</u>	1	_				
Bead	d ohms	Temp. (°C)	_		Bead	ohms	Ten	np. (ºC)
1		10.1			9			-3.9
2		12.5			10			-5.2
3		5.6			11			-6.4
4		4.8			12			-5.9
5		4.5			13			-4.9
6		3.3						
7		-0.2						
8		-2.4						
Observations on	- Drawaged Mainta		4					
	d Proposed Mainter ubricated.	<u>nance</u>						
Look ia	Di icaica.							

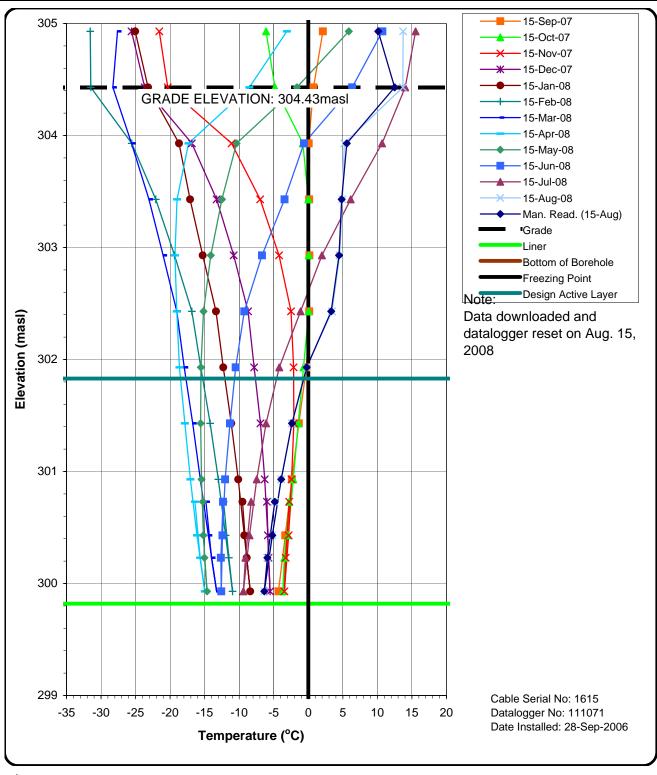
Contarctor Name:	AECOM			Inspection	on Date:	15-Aug-(	 18	
Prepared By:	Darrin Johnson			Inspecti	on Date.	13-Aug-t	<del>,</del>	
Thermistor Information		The americate	an Lagation	Ha	nor Cito	l on df:II		1
Site Name: Thermistor Number:	CAM-4 VT02	Inclination	or Location		per Site rtical	Landfill		
Install Date:	28-Sep-06	First Date				7 Last Date	- Event	15-Aug-08
Coordinates and Ele			LVOIR		r rag o	Laot Batt	Elev	306.71
Length of Cable (m)			ove Ground (m)	<b>1.2</b> No	dal Point	S	11	
Datalogger Serial #	2020175			Ca	ble Seria	ıl Number		1617
Code CAM-4VT02								
Thermister Inches	ion							
Thermistor Inspect	<u>ion</u>	Good		Needs N	//aintena	nce		
Cooing		<u> </u>	_					
Casing								
Cover		~						
Data Logg	er	~						
Cable		~						
Beads		~						
Battery Ins	stallation Date	Batteries	not replaced in	2008.				
Battery Le	vels	Main	11.34 V			Aux	12.77 V	
						_		
Manual Ground Ter	mperature Readin	<u>gs</u>	_					
Bead	ohms	Temp. (°C)			Bead	ohms	Ten	np. (ºC)
1		11.2	_		9			-4.8
2		8.9			10			-6.2
3		5.3			11			-7.6
4		4.0						
5		1.4						
6		-0.9	_					
7		-2.6	_					
8		-3.7						
Observations and F	Proposed Mainten	ance						
Lock lubr		<del></del>						

Contarctor Name:	AECOM			Insp	ection Date:	15-Aug-0	08	
Prepared By:	Darrin Johnso	n		•				
Thermistor Information	. n							
		Thermisto	or Location		Upper Site	Landfill		
Site Name: Thermistor Number:	VT03	Inclination			Vertical	Lanam		
Install Date:	28-Sep-06	First Date			27-Aug-06	Last Date	e Event	15-Aug-08
Coordinates and Elev		N		E			Elev	310.09
Length of Cable (m)	7.2	Cable Lead Abo	ove Ground (m)	1.2	Nodal Point	S	12	4040
Datalogger Serial #	111126				Cable Seria	l Number		1618
Code CAM-4VT03								
Thermistor Inspecti	on							
		Good	_	Nee	ds Maintena	nce		
Casing		~						
_								
Cover		~						
Data Logg	er	~						
Cable		<b>V</b>						
Beads		~						
Battery Ins	tallation Date	Batteries	not replaced in	2008	<b>3.</b>			
Battery Lev	vels	Main	11.34 V			Aux	13.5 V	
·						_		
Manual Ground Ten	nperature Readi	<u>ngs</u>	1	1				
Bead	ohms	Temp. (°C)			Bead	ohms	Ten	np. (ºC)
1		14.2	_		9			-5.3
2		9.2			10			-6.7
3		4.1			11			-7.6
4		2.3	1		12			-8.2
5		0.0	1					
6		-1.5	1					
7		-2.8	1					
8		-4.2	1					
Observations and E			_	l.				
Observations and P		enance						
Look labit								

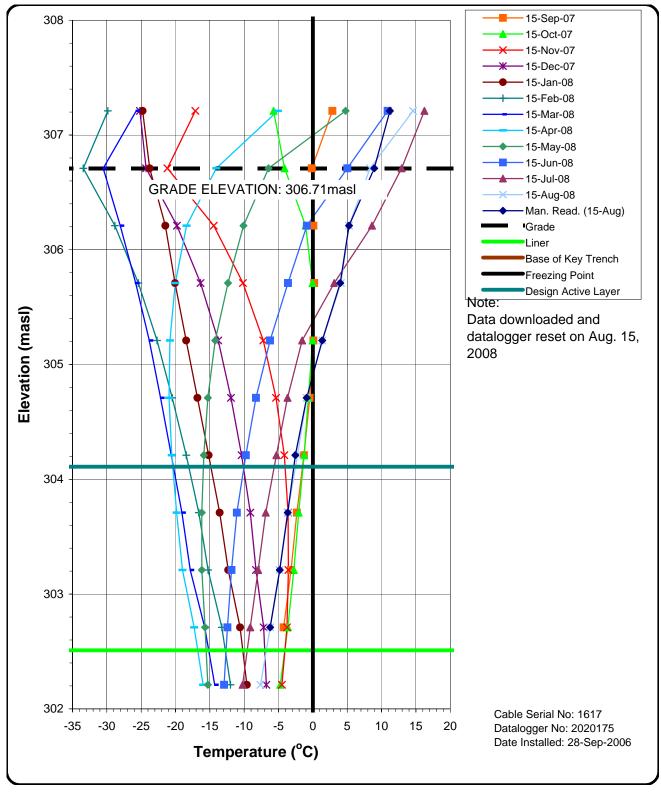
Contarctor Name:	AECOM			Inene	oction Date	: 15-Aug-(		
	Darrin Johnson			IIISPE	ction Date	. IJ-Aug-	<del>,,,</del>	
Prepared By:	Darrin Johnson							
Thermistor Information								
Site Name:	CAM-4		or Location		Upper Site	Landfill		
Thermistor Number:		Inclination			Vertical	<u> </u>		
Install Date:	26-Sep-06	First Date	Event	_	27-Aug-0	7 Last Date		15-Aug-08
Coordinates and Elev	vation N	اما ممما ۸۵	over Charles of (no.)	E 4 0	Nadal Dain	4	Elev 10	312.8
Length of Cable (m) Datalogger Serial #	207046	ne Lead Abo	e Lead Above Ground (m)		1.2 Nodal Points Cable Serial Numbe			1619
Code CAM-4VT04	207040			<u> </u>	Cable Sell	ai ivuilibei		1013
Code CAIVI-4V 104								
Thermistor Inspecti	on							
		Good		Need	s Maintena	ance		
Cooling		~	_					
Casing		•						
Cover		~						
Data Laure		_						
Data Logg	er	~						
Cable		~						
Beads		~						
Battery Ins	tallation Date	Batteries	not replaced ir	- 1 2008.				
•							40.00.1/	
Battery Lev	vels	Main	11.34 V			Aux	13.63 V	
Manual Ground Ten	nperature Readings		=	<b>!-</b>				
Bead	ohms T	emp. (ºC)	_		Bead	ohms	Ten	np. (ºC)
1		13.7			9			-5.2
2		9.6			10			-5.3
3		5.0						
4		3.4	]					
5		1.2						
6		-1.1						
7		-2.5						
8		-4.0	]					
Observations and P	Pronosed Maintenan							
Lock lubri		CE						
Lock lubii	caltu.							



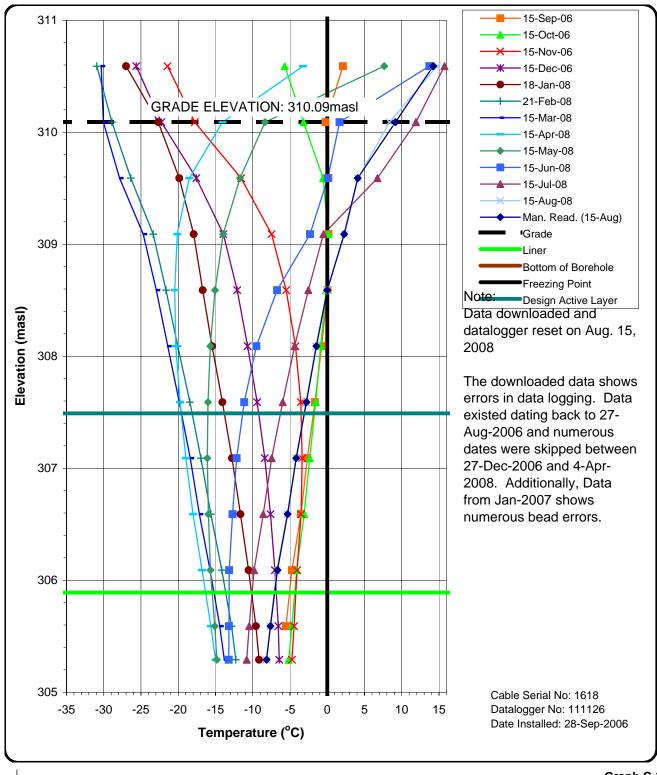
**C6 – Thermistor Graphs** 



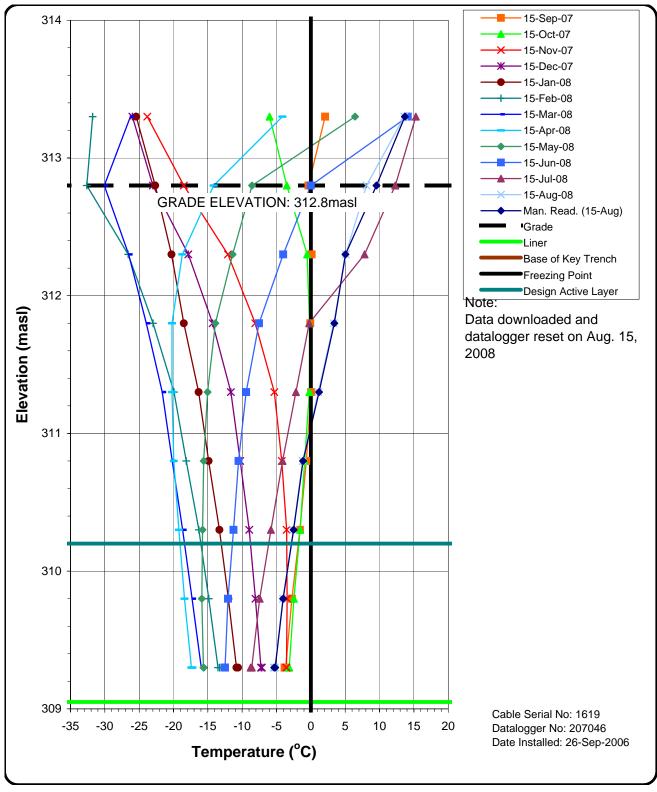
Graph C-1 Ground Temperature Profile Upper Site Landfill Vertical GTC VT-1



Graph C-2 Ground Temperature Profile Upper Site Landfill Vertical GTC VT-2



Graph C-3 Ground Temperature Profile Upper Site Landfill Vertical GTC VT-3



Graph C-4
Ground Temperature Profile
Upper Site Landfill
Vertical GTC VT-4

C7 - Field Notes

		Au6. 15/118
	2-4 27 1	- LOWER SITE NOW HAZ LF (SNH) - STARTED INSPERT) ON AT JOAN
		- STARTOO INSPLAT ON AT IDAM
		- LSNH PHOTO LOC I (LAYPOINT 34)
1 1 1 1 1 1 1 1		- FRAM MW-20 (NORTH GOOD)
		- PHOTOS 68,69270 (PANURAMIC)
		- CONTER ROUFFILL ON SUPE
Leady bur rie		WITH NO PROSION OR CRACKS
A CONTRACTOR OF THE	(AV   MAG   AT   1	OBS VIEVOD, NO SEUPAGE AT TO
		- LSNH PHITO LOC. 2(WP 35)
		- CONTAD OF WORTH CRUST
		ABOVE PHOTO LOC. 2
		- PHOTO 7) (COUST FACING (SAST))
Market Control	3.0	- PHOTO 73 (TOP OF LF FACING SOM
	C	- PHOTO 72 PCRAT FACIUG WEST)
A STORY A LAND	914 154 Y + SQL - 114 TH- 114 E	-NO CRACKS OBSERVED PLANTS
	3.4.17	CAPT
	the desirent setting	-NO SIGNIFICANT SETTLEMENT OF
I have be	9 1955 1100	CONLIDEN ON TOP OF CF
VI (6 16 16 17 VI		- Some TIRE TRACKS VISIBUL
1 1 30 4 55 4	646 0 148	BUT NO DANVAGE OR RUTTING
-		
	-	
4		

Aw6. 15/08 21 LSNH LF (PAGE 3) LSNH PHOTO LOC. 7 (WP TO)
- WEST SLOPE OF LF
-PHOTO 82 (FACUE NE)
- PHOTO 83 (FACUE SE) - OVERALL LANOFIL APPEARS NO BROSIAN OR CRACKING -NO SUSPAGE FROM TOES. - NO ULBETATION.

# 2008 Monitoring Well Sampling Log (MW #\_\_i\_)

				<del></del>				
	Site name:	CAM-	4					
	Date of sampling event:	AUG- 14-	16/20	න <u>ලි</u>				
	Names of samplers:	TFB						
	Monitoring well ID:							
	Facility:	WAL SIT	E					
			Known E	ata		*		
De	epth of installation* (m):	3.85						
Length o	f screened section (m):	2.03						
Dept	th to top of screen* (m):	0.86						
į į								
		1	Measured	Data				
	Condition of well:	GOOD			Procedure/Equipment:	INTECFACE MUST		
	Procedure/Equipment:	NIGLFACE	WETER		h to water surface (m):	1. 17 m580		
Well he	eight above ground (m):					2.82. Myras		
	Diameter of well (m):							
	Calculations				Notes			
	Depth of water (m):	1.47	410,7	Evidence of sludge:				
1/1	Vell volume of water (L):	4	7 20	Evider	nce of freezing/siltation:	P. CHICKEN AND DESCRIPTION OF STREET,		
	Static water level* (m):		41					
Longth of sere	een collecting water (m):	47,40	1 • /1			• .		
Length of Scie	err collecting water (iii).	J.,	ont/Durai	ng Information				
		1 2 - 30 1 2 5 4 4		SW				
	Equipment:	1 SCICITIFE	IIC V	d 5. 3				
Data 0 Time	Notice Demond (I)	T (80)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
Date & Time	Volume Removed (L)	Temperature (°C)	<del>                                     </del>		ruibidity (NTO)	Description of Water		
15-AU3-03	2.50	24	6,62	0.97	2.3	claminal cakes		
	Water Samplin	ng		Soil Sampling				
	Date & Time Collected:	19-14000 c	R	Date and Time Collected: 19-AU-08				
S	ample Number - Water:	Mu>- 11			Sample Number - Soil:	MW (1-10		
		171,000				MU 11-40		
				lefusale.	F1/i			
				LACUSA(CA)	40 cm			
	Sample Containers:	3 50 mL	Ambers		Sample Containers:	7/25000		
	<b>4</b> • • • • • • • • • • • • • • • • • • •	1 VOL 1				Close		
			3 / 1 1	Zm FReins	W	PER SAMPLE		
	Procedure/Equipment:	PENSTALT	TIC MB		Procedure/Equipment:	Thorse		
	Water Description:		7		Soil Description:	S1.104 5.14		
	Trater Description.	clerical				DAY Aloud		
		Carmon order	S			My Spaling y of		
Compline Facion and	Decentemination (V/N)	000		Sampling Equipment	Decontamination (Y/N):	1		
Sampling Equipment	Decontamination (Y/N):			Jamping Equipment	Number Washes:			
	Number Washes:	- A				+		
I	Number Rinses:		ن	1	Number Rinses:	~		

n/a=not applicable
\*From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #<u>IS</u>)

	Site name:	CAM.	- land						
	Date of sampling event:	AUG- 19-	16/2	2008					
	Names of samplers:	TFB /1	クゴ (	soil)					
	Monitoring well ID:								
	Facility:	UPPEL SI	75						
				-					
			Known D	)ata					
De	epth of installation* (m):	3.18							
Length o	f screened section (m):	1.90							
Dept	h to top of screen* (m):	0.20							
Measured Data									
			Measured			NTELFACE METER			
	Condition of well:	600V	11 Acord						
		INTELLACE	WICIEIL	Dept	h to water surface (m):	1.33			
Well he	eight above ground (m):	0.64		Essan	Depth to bottom (m):	*** 1 ( C)			
	Diameter of well (m):	<u> </u>		Free pi	roduct thickness (mm):	And the second s			
	Calculations				Notes				
	Depth of water (m):	1.88		Evidence of sludge:					
M	/ell volume of water (L):	0.6 L		Eviden	ce of freezing/siltation:	National Confession Co			
	Static water level* (m):	1.74							
Length of scre	en collecting water (m):	1,34							
			ent/Purgi	ng Information					
	Equipment:	BAILER							
				97 SOUL S	TAGKANT	(WELL MAY)			
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water			
16-206-08	0.86	2,41	5,98	0.392	9070	Chamical exter			
	Water Samplin	g			Soil Sampling				
	Date & Time Collected:	16 A VE-	<b>U</b> 4	Da	ite and Time Collected:	19-406-08			
S	ample Number - Water:	MW-12,			Sample Number - Soil:	MW13-15			
				relusace	300	My 13-30			
						di i mag dana			
	Sample Containers:	2000			Sample Containers:	4 12 Fac			
		2 500 M	<u> </u>			clean.			
		/3M1)	CK-			0 11			
	Procedure/Equipment:	BAILER	e lee '		Procedure/Equipment:	TROUEL			
	Water Description:	(lady 6	KEY		Soil Description:	SANTY SITT			
		Clady, 6		TILL, 15/01					
		Le-night	M' CHOV.			THE PSPORE			
Sampling Equipment	Decontamination (Y/N):			Sampling Equipment	Decontamination (Y/N):				
	Number Washes:	· Zem			Number Washes:	has .			
	Number Rinses:	3			Number Rinses:	3			

n/a=not applicable
\*From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW # <u>\( \brace \) \( \) \</u>

Site name:	CAM- 2	+			
Date of sampling event:	AUG- 14-16	120	28		
Names of samplers:	TFB				
Monitoring well ID:	MW-10				
Facility:	UPPERSIT	E			
		Known D	ata		
Depth of installation* (m):	3.37				
Length of screened section (m):	2.03 0.38				
Depth to top of screen* (m):	0.38				
		/leasured		,	
Condition of well:	6000				NEPARE METER
Procedure/Equipment: Well height above ground (m):	INTELFACE I	YETER	Dept	h to water surface (m):	()/()/@ 7 3
Well height above ground (m):	0.68			Depth to bottom (m):	
Diameter of well (m):	"Z"		Free pr	oduct thickness (mm):	* income an annual and a second
Calculations				Notes	
Depth of water (m):	DRYW 1	49		Evidence of sludge:	
Well volume of water (L):	y, / C C	( / "-	Eviden	ce of freezing/siltation:	
Static water level* (m):					
Length of screen collecting water (m):	1.32				
	Developm	ent/Purgi	ng Information		
Equipment:	And the second district th	AS A LANGE THE PARTY AND A STATE OF THE PARTY AND A PA	the first of the state of the s	A CONTRACT OF THE CONTRACT OF	
Date & Time Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
11/11/18/19/19	7 /	magical literature (the house of the court o	والمكافئ المناور والمناول والمناور والم	\$ - gagget an accordance is the set of the control	oligis olik elingenomya kenjara kilahan
10-406 W	<u> </u>				
Water Samplir	ig			Soil Sampling	V . 4
Date & Time Collected:				te and Time Collected:	17406 08
Sample Nymber - Water:		_/		Sample Number - Soil:	MU10-15
I (	, se	<i>A</i>			MW 10-35
\					a land
Sample Containers				Sample Containers:	40mc
					Clear
	/				PELSAMNE
Procedure/Equipment	/			Procedure/Equipment:	TROWEL
Water Description	/			Soil Description:	2007/2014
	The control of the co				BROYNING
					BREAL HIVE
Sampling Equipment Decontamination (Y/N)			Sampling Equipment	Decontamination (Y/N):	<u> </u>
Number Washes				Number Washes:	4
Number Rinses				Number Rinses:	Z

n/a=not applicable
\*From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

# 2008 Monitoring Well Sampling Log (MW #1/2)

Site	e name:	CAM-4			
Date of sampling	g event:	AUG-197-16/	Z008		
Names of sa	amplers:	TFB			
Monitoring	well ID:	MW-12			
	Facility:	UMERSITE			
		Known I	Oata		
Depth of installati	ion* (m):	3.67			
Length of screened sect	tion (m):	2.03			
Depth to top of scre	en* (m):	0.68			
D. A. O. MARINA MARIA MARINA M					
0	6 !!.	Measured	Data	Drooduro/Equipment	is well to A to A A STER
Conditior Procedure/Equ	i or well.	CHEC MELOW INTERFACE MOTER	Don	th to water surface (m):	INTERPREMETER
		0.66	Deb	Depth to bottom (m):	2:20
Well height above gro		- O(00	Free n	roduct thickness (mm):	There & Lander
Diameter of	170n (III <i>)</i> .		1 170e p		
Calculation	ns			Notes	
Depth of wa	ater (m):	1.53		Evidence of sludge:	
Well volume of w	vater (L):	1,40	Evider	nce of freezing/siltation:	
Static water le	vel* (m):	0.87			
Length of screen collecting wa	ater (m):	0.86			
		Development/Purg	ing Information		
Equ	uipment:	BAILER			
Date & Time Volume Remo	oved (L)	Temperature (°C) pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
16-AU6-08 400 1	14/04	WELL MY	9474 SAN	ME COLL	CCTION !
Water S	Sampling	g		Soil Sampling	
		16-A66-08	. Da	ite and Time Collected:	14-A16-UB
Sample Number		3 86		Sample Number - Soil:	MW12-19
Stockey 10 rel	y 7	NV-12			W11/2-20
SA. 10 1. 1 10 000	oling.		lefusal @	77	
SAND PACK 70 co				2011	
Sample Co	ntainers:	3 500 N AMBY		Sample Containers:	2/20MC
					clear
		1000			VER SAMPLE
Procedure/Eq	uipment:	BAILEIL		Procedure/Equipment:	Move
Water Des	scription:	closely GREY		Soil Description:	54M7 5121
		SILTIII			Sine Charles
Sampling Equipment Decontamination	on (V/NI):	chinical succe	Sampling Equipment	Decontamination (Y/N):	V
Number N		~2	Camping Equipment	Number Washes:	Z
	r Rinses:	5		Number Rinses:	7
. 1dinbol			1		

n/a=not applicable

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

			13	ATT	en	4	M	Alr	-	11.	31	1 V		
		-	11.0		^		A	WX	-	100	12	V	11	out XI
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			1	4		J	4	2.0	7					
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2		8.94	Ĵ,		
3	. e <sup>2</sup> 2	5.27			
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5	18 11 1	1.36	14.	120	
6		0.90	5)		
7		-2.55			
8		-3.66	-		
7	es are 117	-4,82	16.5		
0		-6,27			
- 11		-7.5			
- CHE	KO P	NO GRAN	mipt6	<i>(</i> ) .	
- MPS	PATUD C	COUL A	CHRKEN	STOP WI	Men .
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0.1,1	70.13 1	M. 103 E.			
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# **Appendix D**

#### Lower Site Non-hazardous Waste Landfill

- D1 Site Condition/Visual Inspection Records
- D2 Geotechnical Inspection Photographic Records
- D3 Field Notes



### D1. Lower Site Non-hazardous Landfill

#### **D1.1 Landfill Summary**

The Lower Site Non-Hazardous Waste Landfill is located approximately 1.5 kilometres west of the west end of the airstrip, across the road from the Lower Site Landfill. The landfill contains non-hazardous wastes and debris generated and collected during clean up of the site. The location of the Lower Site Non-Hazardous Waste Landfill is presented in Figure D-1.

The landfill design consists of perimeter berms and a permanent cap of compacted granular fill over the landfilled material.

The monitoring requirements for 2008 include visual inspection only.

#### **D1.2 Visual Monitoring**

No significant erosion, settlement or indications of slope instability were observed at the Lower Site Non-Hazardous Waste Landfill. Overall landfill performance is assessed as "acceptable". Appendix D1 presents a summary of the 2008 visual inspection results.

No issues of concern that require immediate attention were identified.

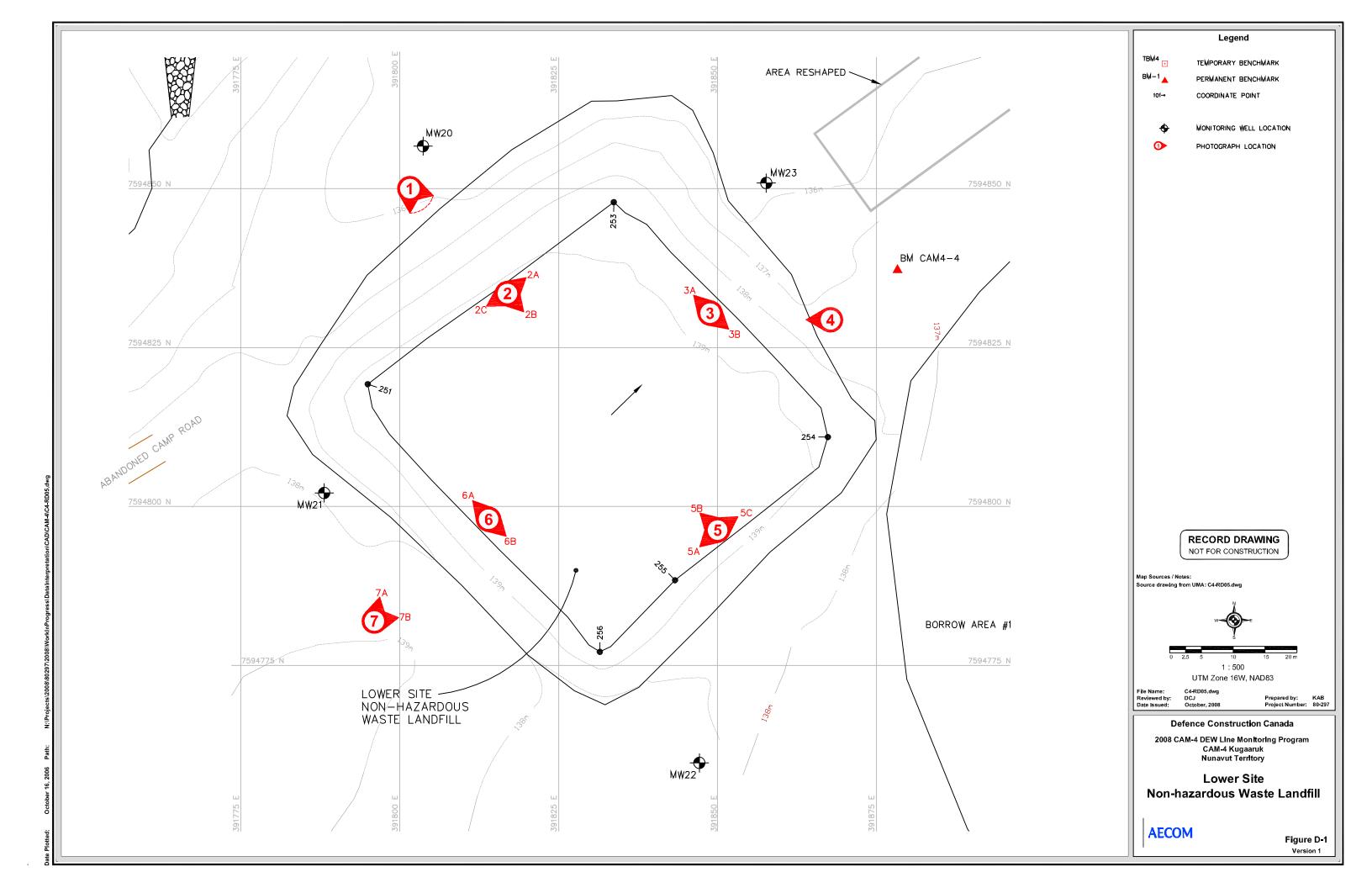
#### **D1.3 Soil Sampling**

Soil sampling was not scheduled for the 2008 monitoring year.

#### **D1.4 Groundwater Sampling**

Groundwater sampling was not scheduled for the 2008 monitoring year.

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D1 – Site Condition/Visual Inspection Records

#### Visual Inspection Checklist Inspection Report – Page 1 of 2

SITE NAME:	CAM-4 - Pelly Bay
LANDFILL/AREA DESIGNATION:	Lower Site Non-Hazardous Waste Landfill
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 24 - 26, 2007
INSPECTED BY:	Darrin Johnson, P.Eng.
REPORT PREPARED BY:	Darrin Johnson, P.Eng.

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

#### **Preliminary Stability Assessment**

Feature	Severity Rating	Extent		
Settlement	Not observed	None		
Erosion	Not observed	None		
Frost Action	Not observed	None		
Animal Burrows	Not observed	None		
Vegetation	Not observed	None		
Staining	Not observed	None		
Vegetation Stress	Not observed	None		
Seepage Points	Not observed	None		
Debris Exposed	Not observed	None		
Tension Crack	Not observed	None		
Overall Landfill				
Performance	Acceptable			

#### Lower Site Non-Hazardous Waste Landfill - Inspection Report - Page 2 of 2

	Present		Dimensions	Depth	Extent		Photographic Records	Additional Commental Bustinsins
Checklist Item	Yes/No	Location	(L x W) (m)	(m)	(%)	Description	(Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
Settlement	No							
Erosion	No							
Frost Action	No							
Animal Burrows	No							
Vegetation	No							
Staining	No							
Vegetation Stress	No							
Seepage Points	No							
Debris Exposed	No							
Presence/ Condition of Monitoring Instruments	Good							
Other Features of Note.	No							
Additional Photos						General	LNH-1, 2A, 2B, 2C, 3A, 3B, 4, 5A, 5B, 5C, 6A, 6B, 7A, 7B	



D2 – Geotechnical Inspection Photographic Records





Photograph LNH-1. Panoramic photo of the north slope. \_\_\_\_ ↑



Photograph LNH-2A. Facing east along crest from the centre of the north crest. ↑

(cam4-appd2-visisnpphotos.doc)





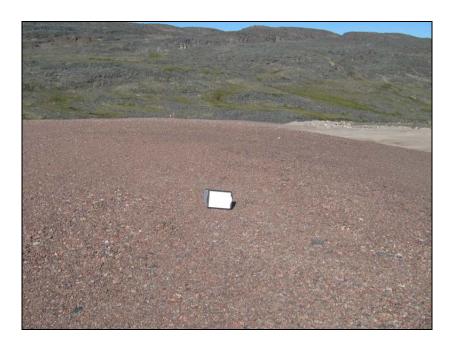
Photograph LNH-2B. Facing west along the crest from the centre of the north crest. Some tire tracks visible but no damage or rutting. ↑



Photograph LNH-2C. Top of the landfill facing south from the centre of the north crest. ↑

(cam4-appd2-visisnpphotos.doc) -2 -





Photograph LNH-3A. Facing north from the centre of the east crest.  $\uparrow$ 



Photograph LNH-3B. Facing south from the centre of the east crest.  $\uparrow$ 

(cam4-appd2-visisnpphotos.doc)





Photograph LNH-4. Facing northwest along the east slope. ↑



Photograph LNH-5A. Facing west along the crest from the centre of the south crest.





Photograph LNH-5B. Facing north along the top of the landfill from the centre of the south crest. ↑



Photograph LNH-5C. Facing east along the crest from the centre of the south crest. ↑

(cam4-appd2-visisnpphotos.doc) -5 -





Photograph LNH-6A. Facing north along the crest from the centre of the west crest.



Photograph LNH-6B. Facing south along the crest from the centre of the west crest.





Photograph LNH-7A. Facing northeast towards the west slope. ↑



Photograph LNH-7B. Facing southeast towards the west slope. ↑

D3 - Field Notes

		Au6. 15/118
	2-4 27 14 227	- LOWER SITE NOW HAZ LF (SNH) - STARTED INSPERT) ON AT JOAN
		- STARTOO INSPLAT ON AT IDAM
		- LSNH PHOTO LOC I (LAYPOINT 34)
1 1 1 1 1 1 1 1 1		- FRAM MW-20 (NORTH GOOD)
		- PHOTOS 68,69270 (PANURAMIC)
		- CONTRB ROUFFILL ON SUPE
Leady bur rie		WITH NO PROSION OR CRACKS
A CONTRACTOR OF THE	(AV   MAG   AT   1	OBS VIEVOD, NO SEUPAGE AT TO
		- LSNH PHITO LOC. 2(WP 35)
		- CONTAD OF WORTH CRUST
		ABOVE PHOTO LOC. 2
		- PHOTO 7) (COUST FACING (SAST))
Market Control	3.0	- PHOTO 73 (TOP OF LF FACING SOM
	C	- PHOTO 72 PCRAT FACIUG WEST)
A STORY A LOOP	914 154 Y + SE 114 114 114 114	-NO CRACKS OBSERVED PLANTS
	3.4.17	CAPT
	the desirent setting	-NO SIGNIFICANT SETTLEMENT OF
I have be	9 1955 1100	CONLIDEN ON TOP OF CF
VI (6 16 16 17 VI		- Some TIRE TRACKS VISIBUL
1 1 30 4 55 4	646 0 148	BUT NO DANVAGE OR RUTTING
-		
	-	
4		

Aw6. 15/08 21 LSNH LF (PAGE 3) LSNH PHOTO LOC. 7 (WP TO)
- WEST SLOPE OF LF
-PHOTO 82 (FACUE NE)
- PHOTO 83 (FACUE SE) - OVERALL LANOFIL APPEARS NO BROSIAN OR CRACKING -NO SUSPAGE FROM TOES. - NO ULBETATION.

## **Appendix E**

#### **Lower Site Landfill**

- E1 Site Condition/Visual Inspection Records
- E2 Geotechnical Inspection Photographic Records
- E3 Monitoring Photographic Records
- E4 Monitoring Well Sampling Records
- E5 Thermistor Maintenance Records
- E6 Thermistor Graphs
- E7 Field Notes

#### E1. Lower Site Landfill

#### **E1.1 Landfill Summary**

The Lower Site Landfill is located approximately 1.5 kilometres west of the west end of the airstrip. The original landfill consisted of four lobes (north, main, south and east), encompassing an area of approximately 10,000m<sup>2</sup>. The location of the landfill is presented in Figure E-1.

A previous evaluation determined the north, main and south lobes drained into an intermittent channel along the toe, ultimately draining into a small lake near the north lobe. No contaminated soil was found downgradient of the landfill, however, a localized stain of Tier I concentration was identified south of the landfill perimeter. The Lower Site Landfill was classified as a moderate potential environmental risk.

Remediation of the Lower Site Landfill included installation of a double synthetic liner system anchored into the permafrost at the toe, regrading and placement of additional granular fill, complete excavation of the north lobe and regrading of the south and east lobes.

Monitoring requirements for the 2008 monitoring year include visual inspection, soil sampling, groundwater sampling and thermal monitoring.

#### **E1.2** Visual Monitoring

No significant erosion, settlement or indications of slope instability were observed at the Lower Site Landfill. Overall landfill performance is assessed as "acceptable". Appendix E1 presents a summary of the 2008 visual inspection results.

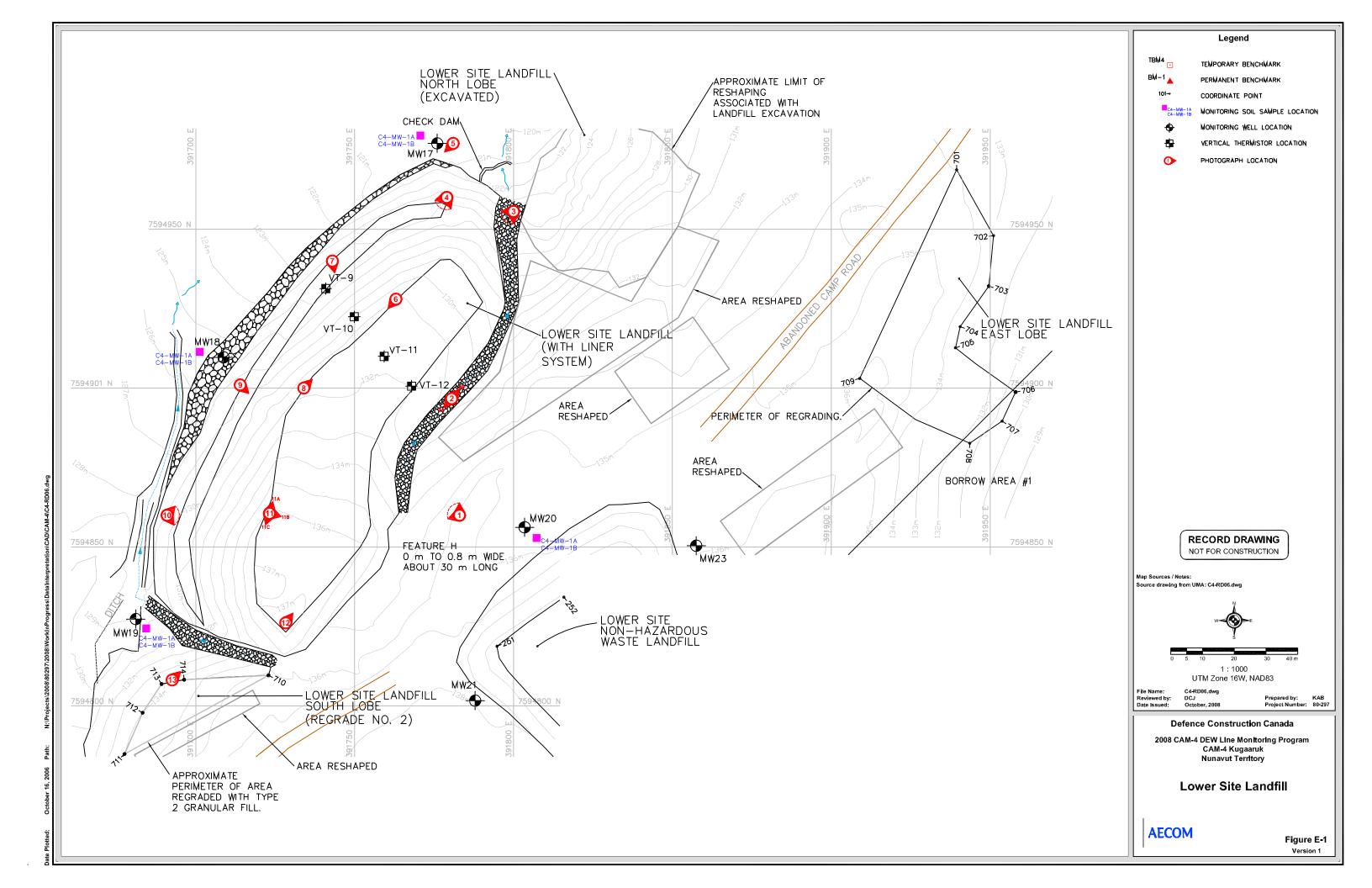
Minor erosion of fines was observed at the southwest end of the west slope (LSL-10 in Appendix E2). The erosion of fines appears to be self-armouring and is not a concern. Seepage was observed from the lower half of the north slope near the thermistors (LSL-7 in Appendix E2). No staining was observed on the slope. No issues of concern that require immediate attention were identified.

#### E1.3 Soil Sampling

Soil samples were collected at monitoring locations MW-17, MW-18, MW-19 and MW-20. The sampling locations are presented in Figure E-1. Two samples were collected at each monitoring location at depths of approximately 0.15 - 0.20 meters and 0.30 - 0.50 meters below ground surface. The photographs of each monitoring well and test pit location are included in Attachment E3.

No staining or free product was observed during the sampling event at the Lower Site Landfill. No odours were detected during the sampling event at the Lower Site Landfill.

(cam4-appe0-lowerlfreport.doc) - E1 -





No significant concentrations were detected at any of the soil monitoring locations at the Lower Site Landfill.

The analytical results and depths of samples are provided in Table E-1. The Laboratory Certificates of Analysis are provided in Appendix F.

#### **E1.4 Groundwater Sampling**

Groundwater measurements and monitoring system condition records were documented for monitoring wells MW-17, MW-18, MW-19 and MW-20. These records are provided in attachment E4.

All groundwater monitoring wells slated for monitoring in 2008 at the Lower Site Landfill contained sufficient volume for sampling. Samples were collected at a flow rate equal to the recharge rate of the monitoring well (and not exceeding 100mL/min). Monitor MW-19 was sampled using a peristaltic pump and disposable LDPE tubing. The rechargeable battery provided with the peristaltic pump from the supplier proved to be faulty following purging and sampling at monitors MW-17 and MW-18. Subsequently, monitors that were accessible by vehicle were sampled with the peristaltic pump running off the vehicle battery. Monitor MW-19 was not accessible by vehicle, therefore were purged and sampled using a disposable bailer.

Groundwater samples were not filtered and not preserved. Samples were analyzed for total concentration of inorganic metals, TPH (C6-C32) and PCB.

TPH (C6-C32) was detected in monitoring wells MW-17, MW-19 and MW-20. The results should be evaluated in the context of the Landfill Monitoring Plan as well as compared with DCC internal standards.

The results are presented in Table E-2. The laboratory Certificates of Analysis are provided in Appendix F.

#### **E1.5 Thermal Monitoring**

All thermistors at the Lower Site Landfill were in good condition. Thermistor data was downloaded on August 15, 2008, programming was checked and the data loggers were reset. The data logger clocks were adjusted to local (Standard Time). Battery charge was checked to ensure sufficient remaining charge and batteries were not changed in 2008.

Thermistor Maintenance Records were completed for all thermistors located at the Lower Landfill and are located in Appendix E5. Selected data has been plotted into graphs for each thermistor which are provided as Graphs E-1 through E-4 located in Appendix E6.

(cam4-appe0-lowerlfreport.doc) - E3 -

Table E-1. CAM-4 Kugaaruk, Summary of 2008 Soil Analysis - Lower Site Landfil

		Depth	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	РСВ	F1	F2	F3	TPH
Sample Ident.	Sample Location	_ op	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total Aroclors	C6-C10	C10-C16	C16-C34	C6-34
		(m)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Upgradient Sample	s															
MW-20-15	MW-20	0.15	12.3	9.6	5.9	<0.50	10.6	37.4	18.0	<5.0	<0.0050	<0.050	<10	<30	<50	0
MW-20-35	MW-20	0.35	10.0	8.7	4.7	< 0.50	10.8	25.6	16.7	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-200-35*	MW-20	0.35	10.8	10.3	5.0	<0.50	10.7	26.8	20.8	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
Downgradient Sam	ples															
MW-17-15	MW-17	0.15	6.6	6.6	3.8	<0.50	5.4	18.2	14.0	<5.0	<0.0050	<0.050	<10	<30	<50	0
MW-17-40	MW-17	0.40	13.9	10.2	5.5	< 0.50	8.7	32.0	20.8	<5.0	0.0052	< 0.050	<10	<30	<50	0
MW-18-15	MW-18	0.15	9.5	8.0	3.8	< 0.50	7.2	31.4	15.8	<5.0	0.0120	< 0.050	<10	<30	<50	0
MW-18-30	MW-18	0.30	10.1	8.7	3.8	< 0.50	8.9	35.5	17.9	<5.0	0.0085	< 0.050	<10	<30	<50	0
MW-19-20	MW-19	0.20	7.4	7.2	3.9	< 0.50	6.4	26.5	14.7	<5.0	< 0.0050	< 0.050	<10	<30	<50	0
MW-19-50	MW-19	0.50	7.1	6.6	3.9	<0.50	7.8	29.0	12.1	<5.0	<0.0050	<0.050	<10	<30	<50	0

<sup>\*</sup> Denotes duplicate sample. (Further information located in Table 2 of main report) Note: mg/kg = ug/g

TPH is represented as the total of F1, F2 and F3 as defined by CCME Tier I Method - Rev. 5 Analysis of Petroleum Hydrocarbons in Soil



Table E-2. CAM-4 Kugaaruk, Summary of 2008 Groundwater Analysis - Lower Site Landfill

		Groundwater	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	PCB	F1	F2	F3	TPH
Sample Identification	Location	Elevation	Cu	Ni	Co	Cd	Pb	Zn	Cr	As	Hg	Total Aroclors	C6-C10	C10-C16	C16-C34	C6-34
		(masl)	(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)
Upgradient Samples	3															
MW-20	MW-20	133.69	0.0029	<0.0010	<0.00030	0.000024	<0.00050	<0.0050	<0.0010	<0.00050	<0.000020	<0.0010	0.75	1.99	<0.30	2.74
MW-200*	MW-20	133.69	0.0035	<0.0010	< 0.00030	0.000028	< 0.00050	<0.0050	< 0.0010	<0.00050	<0.000020	<0.0010	0.74	2.33	< 0.30	3.07
Downgradient Samp																
MW-17	MW-17	119.66	0.0069	0.0024	0.00285	0.000056	< 0.00050	< 0.0050	0.0014	0.00062	< 0.000020	< 0.0010	<0.10	<0.30	0.33	0.33
MW-18	MW-18	125.44	0.0023	0.0014		0.000025	< 0.00050	0.0081	< 0.0010	< 0.00050	< 0.000020	< 0.0010	<0.10	< 0.30	< 0.30	0
MW-19	MW-19	128.87	0.0033	0.0041	0.00199	0.000210	< 0.00050	0.0856	0.0014	< 0.00050	< 0.000020	< 0.0010	<0.10	< 0.30	0.32	0.32

<sup>\*</sup> Denotes duplicate sample. (Further information located in Table 2 of main report) Note:  $mg/L = 1000 \ ug/L$ 





E1 – Site Condition/Visual Inspection Records

#### Visual Inspection Checklist Inspection Report – Page 1 of 2

SITE NAME:	CAM-4 - Pelly Bay
LANDFILL/AREA DESIGNATION:	Lower Site Landfill
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 24 - 26, 2007
INSPECTED BY:	Darrin Johnson, P.Eng.
REPORT PREPARED BY:	Darrin Johnson, P.Eng.

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

#### **Preliminary Stability Assessment**

Feature	Severity Rating	Extent
Settlement	Not observed	None
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Animal Burrows	Not observed	None
Vegetation	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage Points	Acceptable	Isolated
Debris Exposed	Not observed	None
Tension Crack	Not observed	None
Overall Landfill		
Performance	Accep	otable

#### Lower Site Landfill - Inspection Report - Page 2 of 2

Checklist Item	Present Yes/No	Location	Dimensions (L x W) (m)	Depth (m)	Extent (%)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
Settlement	No							
Erosion	Minor	Southwest end of west slope.	30 m x 20 m	N/A	3%	Minor erosion of fines that appears to be self-armouring.	LSL-10	Acceptable
Frost Action	No							
Animal Burrows	No							
Vegetation	No							
Staining	No							
Vegetation Stress	No							
Seepage Points	Yes	Lower half of north slope near thermistors.	20 m x 10 m	N/A	1%	Minor seepage from lower half of slope. No staining.	LSL-7	Acceptable
Debris Exposed	No							
Presence/ Condition of Monitoring Instruments	Good							
Other Features of Note.	No							
Additional Photos						General	LSL-1, 2A, 2B, 3, 4, 5, 6, 7, 8, 9, 10, 11A, 11B, 11C, 12, 13	



E2 – Geotechnical Inspection Photographic Records





Photograph LSL-1. Panoramic photo of landfill from regraded hill near MW-20 ↑



Photograph LSL-2A. Looking west, upstream, along the rip-rap lined drainage channel. ↑





Photograph LSL-2B. Facing east, downstream, along the rip-rap lined drainage channel. ↑



Photograph LSL-3. Panoramic photo of the southeast end of the landfill from the toe of the landfill near the rip-rap drainage channel outlet. ↑





Photograph LSL-4. Panoramic photo facing west to the northeast corner of the landfill. ↑



Photograph LSL-5. View of the northeast corner slope from near MW-17, facing southwest. ↑





Photograph LSL-6. Facing west long the north crest. Some seepage from lower half of north face.

No staining observed. ♠



**Photograph LSL-7.** Facing southwest to the north slope near thermistors. Seepage from lower half of slope, with no staining observed. Very small tuffs of grass/vegetation observed. ↑





Photograph LSL-8. Facing east along the north crest near thermistors. ↑



Photograph LSL-9. Facing southeast to slope. ↑





Photograph LSL-10. Panoramic photo facing southeast to the north slope at northwest end. Minor erosion of fines but self armouring. ↑



Photograph LSL-11A. Facing east along northwest crest. ↑



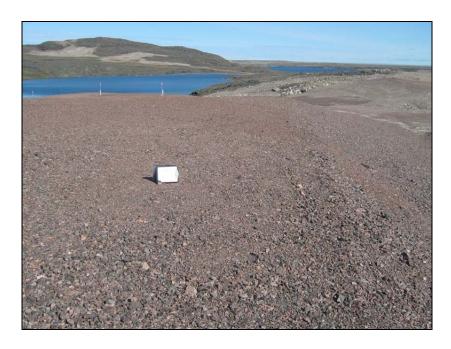


Photograph LSL-11B. Facing south over the landfill from the northwest crest. ↑

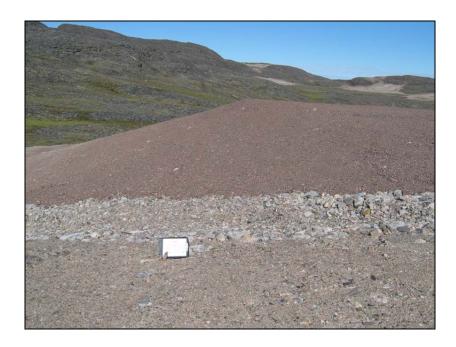


Photograph LSL-11C. Facing west along the northwest crest. ↑





Photograph LSL-12. Facing east along crest at the southwest corner. ↑



Photograph LSL-13. Facing northeast to the west slope and rip-rap lined drainage ditch at the toe of the landfill. ↑



E3 – Monitoring Photographic Records





Photograph 1. Monitoring Location MW-20 (Upgradient) Facing Northeast. ↑



Photograph 2. Monitoring Location MW-17 (Downgradient). Facing Southeast. ↑

(cam4-apps3-mwphotos.doc) -1 -





Photograph 3. Monitoring Location MW-18 (Downgradient). Facing Northwest. ↑



Photograph 4. Monitoring Location MW-19 (Downgradient). Facing Southwest. ↑

(cam4-appe3-mwphotos.doc) - 2 -



E4 – Monitoring Well Sampling Records

## 2008 Monitoring Well Sampling Log (MW-17)

	Site name:	CAM-4						
Date	e of sampling event:	14-17 Aug 2008						
1	Names of samplers:	TFB						
	Monitoring well ID:	MW-17						
	Facility:	Lower Site Landfill						
	,							
			Known E	)ata				
Denth	n of installation* (m):	3.82	KIIOWII L	<del>Jata</del>				
·	reened section (m):	2.03						
	, ,							
Depth to	top of screen* (m):	0.83						
		I	<i>l</i> leasured	Data				
	Condition of well:				Procedure/Equipment:			
	ocedure/Equipment:			Dep	oth to water surface (m):	1.48		
Well height above ground (m): 0.74					Depth to bottom (m):	2.20		
D	Diameter of well (m):	0.05		Free	product thickness (mm):	-		
Calculations Notes								
	Depth of water (m):	0.72			Evidence of sludge:	-		
	1.41		Evide	nce of freezing/siltation:	-			
	Well volume of water (L):  Static water level* (m):				<u> </u>			
	collecting water (m):	0.74 0.63						
Longar or coroon o	bollooting water (m).	Į.	ont/Durai	ng Information				
	Equipment	_		with flow through cell, LD	DE .			
	Equipment:	Pensiallic Pump, H	oriba U-22	with now through ceil, LD	<u>''''</u>			
1,,								
	lume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
15-Aug-08	3.5	5.41	6.16	0.54	27.9	C&C, N/O		
	Water Samplin	g			Soil Sampling			
Date	e & Time Collected:	15-Aug-0	8	D	ate and Time Collected:	15-Aug-08		
Samp	ole Number - Water:	MW-17			Sample Number - Soil:	MW-17-15		
						MW-17-40		
	Sample Containers:	3 x 0.5L Amber Gla	iss		Sample Containers:	4 x 250mL Glass		
	Campio Comaniore.	2 x VOC vials			campio contamore.	TX ZOOTIL OIGO		
		Z X VOO VIGIO						
D	acadura/Earriama = tr	Peristaltic Pump H	oriha H-22		Procedure/Equipment:	CC Trough		
Procedure/Equipment:		Peristaltic Pump, Horiba U-22			Procedure/Equipment:	SS I rowel		
	W ( D ) : ::	C&C, N/O			0.15	D / "		
	Water Description:	Cac, N/O			Soil Description:	Brown sandy silt		
Sampling Equipment Dec	ontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Υ		
	Number Washes:	1			Number Washes:	2		
Number Washes: 1  Number Rinses: 1					Number Rinses:	3		

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-18)

	Site name:	CAM-4						
	Date of sampling event:	14-17 Aug 2008						
	Names of samplers:	TFB/DAJ						
	Monitoring well ID:	MW_18						
	Facility:	Lower Site Landfill						
	·							
			Known [	)ata				
	Depth of installation* (m):	3.80	TUIOWII	- Cara				
	of screened section (m):	2.03						
		0.81						
Del	oth to top of screen* (m):	0.61						
			<del></del>	<b>5</b> /				
			<i>l</i> leasured	Data				
	Condition of well:				Procedure/Equipment:			
	Procedure/Equipment:	Interface Meter		Dep	oth to water surface (m):	0.73		
Well h	Well height above ground (m): 0.57				Depth to bottom (m):	2.30		
	Diameter of well (m):	0.05		Free	product thickness (mm):	-		
	Calculations				Notes			
	Depth of water (m):	1.57			Evidence of sludge:	-		
V	Vell volume of water (L):	3.08		Evide	nce of freezing/siltation:	-		
	Static water level* (m):	0.16						
Length of scre	een collecting water (m):	0.92						
Longin or sort	cerr conceding water (m).		ont/Durai	ng Information				
	Equipment	_		with flow through cell, LD	DE .			
	Equipment:	Pensiallic Pump, H	oriba U-22	with flow through cell, LD	<u>''''</u>			
	I <b>-</b>	0						
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water		
15-Aug-08	3.5	5.12	5.82	0.223	8.6	C&C		
						Slight chemical odour		
	Water Samplin	g			Soil Sampling			
	Date & Time Collected:	15-Aug-0	18	Date and Time Collected: 15-Aug-				
8	Sample Number - Water:	MW-18			Sample Number - Soil:	MW-18-15		
						MW-18-30		
	Sample Containers:	3 x 0.5L Amber Gla	iss		Sample Containers:	4 x 250mL Glass		
	•	2 x VOC vials			·			
	Procedure/Equipment:	Peristaltic Pump, H	oriba U-22		Procedure/Equipment:	SS Trowel		
	Procedure/Equipment:		024 0		r rocedure/Equipment.	33 Howel		
	Woter December:	C&C, Slight chemic	cal odour		Call December	Proum acradicalle		
	Water Description:	oso, ongrit trieffilt	odi ododi		Soil Description:	Brown sandy silt		
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Y		
	Number Washes:	2			Number Washes:	2		
	Number Rinses:	2			Number Rinses:	2		

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-19)

		I .				
	Site name:					
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	MW-19				
	Facility:	Lower Site Landfill				
			Known D	)ata		
	Depth of installation* (m):	3.83				
Length	of screened section (m):	2.03				
	epth to top of screen* (m):	0.84				
		1	/leasured	Data		
	Condition of well:	1			Procedure/Equipment:	Interface Meter
	Procedure/Equipment:			Der	oth to water surface (m):	0.78
\/\all	height above ground (m):	0.65		Dep	Depth to bottom (m):	2.10
VVCII	0.05		Eroo r	product thickness (mm):	-	
	0.03		riee (	broduct triickriess (min).	-	
	Calculations				Notes	
		4.00			Notes	
	Depth of water (m):	1.32			Evidence of sludge:	-
	Well volume of water (L):	2.59		Evide	nce of freezing/siltation:	-
	Static water level* (m):	0.13				
Length of sc	reen collecting water (m):	0.61				
		_		ng Information		
	Equipment:	Disposable bailer, I	Horiba U-22			
Date & Time	Volume Removed (L)	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
15-Aug-08	3.2	7.3	5.55	0.645	260	C&C
						Slight chemical odour
	Water Samplin	g			Soil Sampling	
	Date & Time Collected:	15-Aug-0	)8	D	15-Aug-08	
	Sample Number - Water:	MW-19			Sample Number - Soil:	MW-19-20
						MW-19-50
	Sample Containers:	3 x 0.5L Amber Gla	ass		Sample Containers:	4 x 250mL Glass
		2 x VOC vials			,	
	Procedure/Equipment:	Peristaltic Pump, H	loriba U-22		Procedure/Equipment:	SS Trowel
	. 7000aaro/Equipment.	, , , , , , , , , , , , , , , , , , , ,	<del></del>		. 1000auto, Equipinient.	100 Howel
	Water Description:	C&C, slight chemic	al odour		Sail Descriptions	Brown sandy silt
	water Description:	2.2, 3.g 011017110			Soil Description:	ויסאוו sanuy siil
Consulting 5	4 Daniel C 0/20	V		0	December 6 0/80	
Sampling Equipmen	t Decontamination (Y/N):	Y		Sampling Equipment	Decontamination (Y/N):	Y
	Number Washes:	2			Number Washes: Number Rinses:	2
1	Number Rinses:	2			2	

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel

## 2008 Monitoring Well Sampling Log (MW-20)

	Site name:	CAM-4				
	Date of sampling event:	14-17 Aug 2008				
	Names of samplers:	TFB				
	Monitoring well ID:	MW-20				
		Lower Site Landfill				
	,					
			Known E	 )ata		
D.	epth of installation* (m):	3.43	TATIOWIT E	, ata		
	of screened section (m):	2.05				
Бер	th to top of screen* (m):	0.30				
				5.1		
			<i>l</i> leasured	Data		
	Condition of well:				Procedure/Equipment:	
		Interface Meter		Dep	oth to water surface (m):	2.37
Well he	eight above ground (m):	0.66			Depth to bottom (m):	2.93
	Diameter of well (m):	0.05		Free p	product thickness (mm):	-
	Calculations				Notes	
	Depth of water (m):	0.56			Evidence of sludge:	-
W	1.10		Evide	nce of freezing/siltation:	-	
	Well volume of water (L):  Static water level* (m):					
Length of scre	en collecting water (m):	1.71 0.56				
Length of sole	err conecting water (m).		ont/Durai	ng Information		
	Facilitation				DE	
	Equipment:	Peristaitic Pump, H	orida U-22	with flow through cell, LD	PE .	
		. 1				
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
15-Aug-08	1.5	4.76	6.67	0.396	4.4	C&C, N/O
	Water Samplin	g			Soil Sampling	
	Date & Time Collected:	15-Aug-0	8	Da	15-Aug-08	
S	ample Number - Water:	MW-20			Sample Number - Soil:	MW-20-15
						MW-20-35
						MW-200-35
					•	
	Sample Containers:	6 x 0.5L Amber Gla	iss		Sample Containers:	8 x 250ml Glass
	Sample Containers.	4 x VOC vials			Sample Containers.	O A ZOOME OIGGS
	2 x 1L Amber glass					
		Peristaltic Pump, H	oriba II 22		December /F	00 T
	Procedure/Equipment:		Oliba U-22		Procedure/Equipment:	SS Frowel
			000 11/0			
	Water Description:	C&C,N/O			Soil Description:	Brown sandy silt
Sampling Equipment	Decontamination (Y/N):	Y		Sampling Equipment	Υ	
Number Washes: 1					Number Washes:	2

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.
n/a=not applicable
LDPE=Low Density Polyethylene
SS=Stainless Steel



**E5 – Thermistor Maintenance Records** 

# Thermal Monitoring Ground Temperature Annual Maintenance Report

Prepared By:  Thermistor Information Site Name: Thermistor Number: Install Date: Coordinates and Elevength of Cable (m) Potatalogger Serial #  Install Date: Coordinates and Elevength of Cable (m) Installogger Serial #  Installogger Serial #  Installogger Serial #  Installogger Serial #  Installogger Serial #  Installogger Serial #	CAM-4 VT09 29-Sep-06 vation	Thermisto Inclination First Date			Lower Site	Landfill		
Site Name: Thermistor Number: Install Date: Coordinates and Elevength of Cable (m) Datalogger Serial # Ode CAM-4VT09	CAM-4 VT09 29-Sep-06 vation	Inclination First Date	)		Lower Site	Landfill		
Site Name: Thermistor Number: Install Date: Coordinates and Elevength of Cable (m) Datalogger Serial # Ode CAM-4VT09	CAM-4 VT09 29-Sep-06 vation	Inclination First Date	)		Lower Site	Landfill		
nstall Date: Coordinates and Elevength of Cable (m) Oatalogger Serial # Ode CAM-4VT09	29-Sep-06 vation 6.2	Inclination First Date	)					
Coordinates and Elevength of Cable (m) Oatalogger Serial # Ode CAM-4VT09	ration 6.2	V	Event		Vertical			
ength of Cable (m) Datalogger Serial # Ode CAM-4VT09	6.2		Eveni		27-Aug-07	Last Date		15-Aug-0
Datalogger Serial # ode CAM-4VT09			0 1()	E	IN 115 : 1		Elev	125.769
ode CAM-4VT09		Cable Lead Abo	ove Ground (m)	1.2	Nodal Points Cable Seria		10	1623
					Oabic Ocha	Number		102.
hermistor Inspection								
	<u>on</u>							
		Good	_	Nee	ds Maintenar	nce		
Casing		~						
Cover		✓						
Data Logge	er	~						
Cable		~						
Beads		~						
Battery Ins	tallation Date	Batteries	not replaced in	2008				
						^	40.5.1/	
Battery Lev	/eis	Main	11.34 V			Aux	13.5 V	
Manual Ground Tem Bead	nperature Readin ohms	gs Temp. (°C)	]		Bead	ohms	Ten	np. (°C)
1		16.0	1		9			-4.4
2		13.2	1		10			-5.4
3		6.1	1					
4		4.5	1					
5		2.0	]					
6		-0.6	]					
7		-1.9						
8		-3.2						
Observations and P	ronosed Mainten	ance	_					
Lock lubri		<u></u>						
200K IGDII								

# Thermal Monitoring Ground Temperature Annual Maintenance Report

Contarator Name	AECOM			lnon	action Date	15 Aug		
Contarctor Name:	AECOM			IInsp	ection Date:	15-Aug-	<u>08</u>	
Prepared By:	Darrin Johnson	n						
Thermistor Information	on							
Site Name:	CAM-4		or Location		Lower Site	Landfill		
Thermistor Number:		Inclination			Vertical			
Install Date:	29-Sep-06	First Date	Event		27-Aug-07	Last Dat		15-Aug-08
Coordinates and Ele		N Cable Lead Abo	va Cround (m)	E 12	Model Deint		Elev	129.924
Length of Cable (m) Datalogger Serial #	108060	Cable Lead Abc	ve Ground (m)	1.2	Nodal Point Cable Seria		10	1625
Code CAM-4VT10	100000				Oubic Ocha	TTATTIBET		1020
Thermistor Inspect	<u>ion</u>							
		Good	_	Nee	ds Maintena	nce		
Casing		~						
Cover		~						
Data Logg	er	•						
Cable		~						
Beads		~						
Battery Ins	stallation Date	Batteries	not replaced in	2008				
Battery Le	vels	Main	11.34 V			Aux	12.53 V	
						_		
Manual Ground Ter	nperature Readi	<u>ngs</u>	1					
Bead	ohms	Temp. (°C)			Bead	ohms	Ten	np. (ºC)
1		14.0	1		9			-4.5
2		7.4	1		10			-5.2
3		4.2	_					
4		2.6						
5		1.9	-					
6		-0.1	-					
7		-1.5	-					
8		-2.8	1					
Observations and F Lock lubr		<u>nance</u>						

# Thermal Monitoring Ground Temperature Annual Maintenance Report

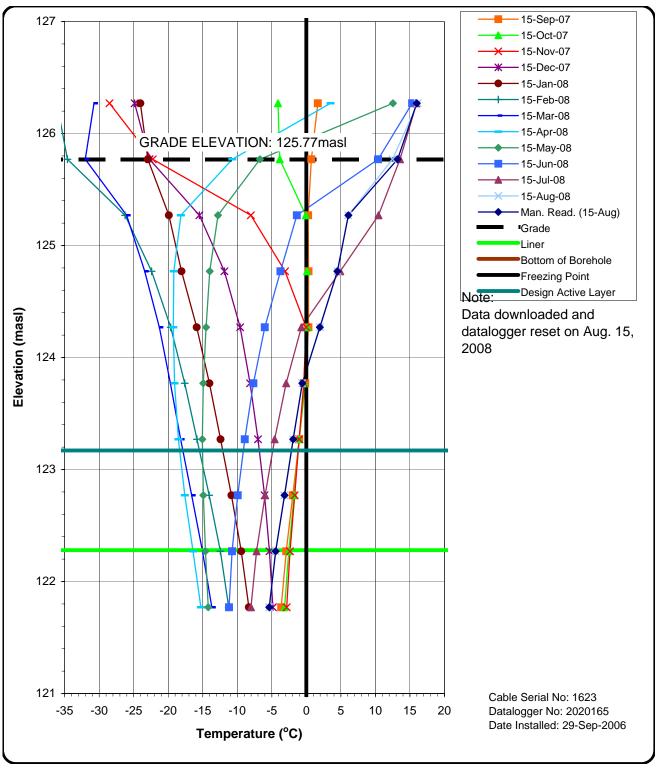
Contarctor Name:	AECOM			Inspe	ection Date:	15-Aug-(	08	
Prepared By:	Darrin Johnson							
Thermistor Information	on							
Site Name:	CAM-4	Thermisto	or Location		Lower Site	Landfill		
Thermistor Number:		Inclination			Vertical			
Install Date:	29-Sep-06	First Date				7 Last Date	e Event	15-Aug-08
Coordinates and Elev				Е			Elev	131.86
Length of Cable (m)	<b>6.2</b> C	Cable Lead Abo	ve Ground (m)		Nodal Point	ts	10	
Datalogger Serial #	111070		,		Cable Seria			1621
Code CAM-4VT11	,		,					
Thermistor Inspecti	<u>ion</u>	0		NI				
		Good	-	Need	ds Maintena	nce		
Casing		~						
Cover		~						
Data Logg	er	~		-				
Cable		~						
Beads		~						
Battery Ins	stallation Date	Batteries	not replaced in	1 <u>2008</u> .	·			
Battery Le	vels	Main	11.34 V			Aux	13.63 V	
	VOIG	ivia	11.0.1				10.00	
Manual Ground Ten	nperature Reading	<u>gs</u>	<u> </u>					
Bead	ohms	Temp. (°C)			Bead	ohms	Tem	np. (ºC)
1		14.9	1		9			-4.1
2		7.4	1	Ī	10			-2.8
3		5.8	1			<del>,</del>	,	
4		4.5	1					
5		1.8	1					
6		-0.5	1					
7		-2.1	1					
8		-3.2	1					
<u> </u>								
Observations and P	roposed Mainten	<u>ance</u>						
Lock lubri								
	loutour							
]								

# Thermal Monitoring Ground Temperature Annual Maintenance Report

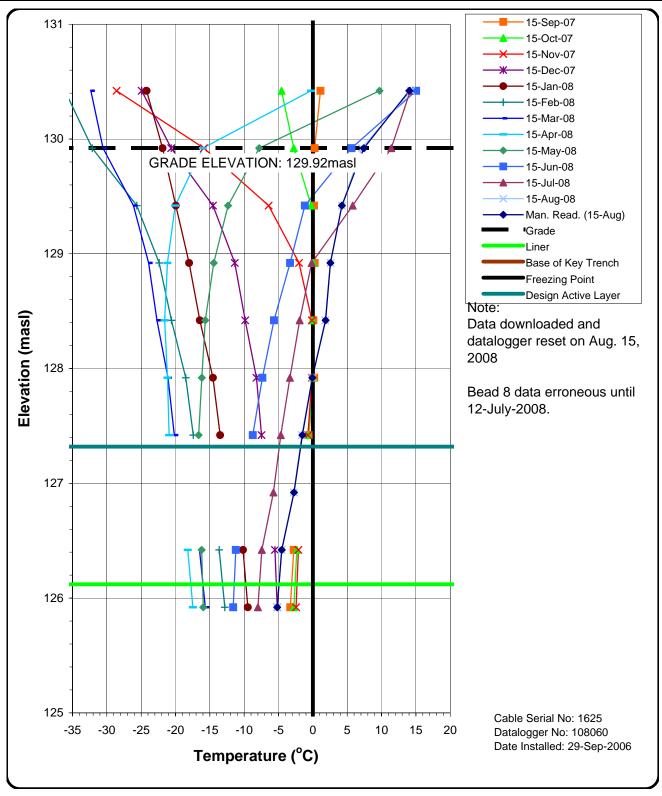
<u> </u>								
Contarctor Name:	AECOM			Insp	ection Date:	15-Aug-	08	
Prepared By:	Darrin Johnson							
Thermistor Informatio	ın							
Site Name:	CAM-4	Thermistor	r Location		Lower Site	Landfill		
Thermistor Number:		Inclination			Vertical			
Install Date:	29-Sep-06	First Date			27-Aug-07	7 Last Dat	e Event	15-Aug-08
Coordinates and Elev				Е			Elev	131.966
Length of Cable (m)		ole Lead Abo	ve Ground (m)	1.2	Nodal Point		11	
Datalogger Serial #	2020150		<u> </u>		Cable Seria	l Number		1626
Code CAM-4VT12			<del></del>					
Thermistor Inspection	<u>on</u>							
		Good			ds Maintena	nce		
Casing		•						
Cover		•						
Data Logge	ər	~			_	_	_	_
Cable		~						
Beads		~						
	tallation Date		not replaced in	2008				
				2000				
Battery Lev	/els	Main _	11.34 V			_Aux	13.38 V	
Manual Ground Tem	perature Readings		ı					
Bead	ohms T	Гетр. (ºС)			Bead	ohms	Tem	np. (ºC)
1		15.8			9			-4.1
2		10.5			10			-5.4
3		6.7			11			-5.4
4		5.3						
5		3.0						
6		0.0						
7		-1.4						
8		-2.6						
Observations and D								
Observations and P		<u>ce</u>						
Lock lubri	cated.							



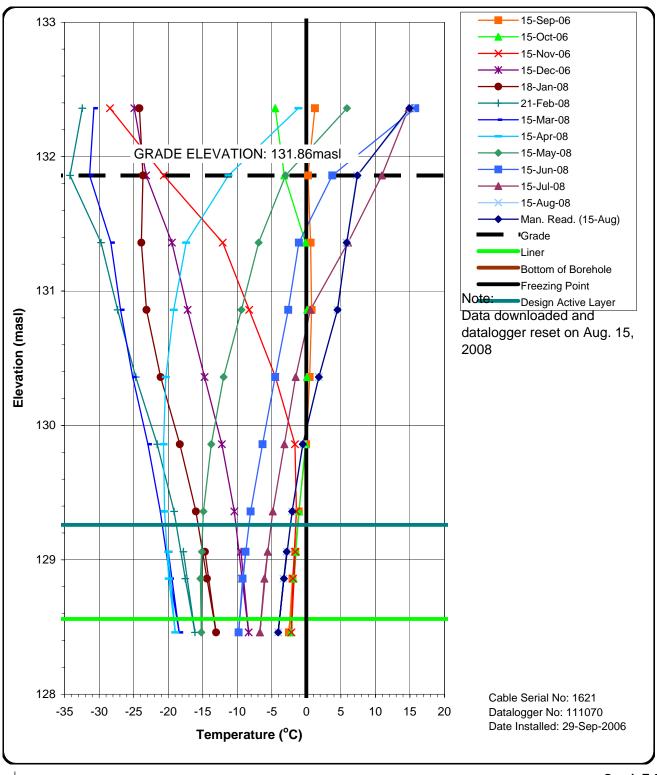
**E6 – Thermistor Graphs** 



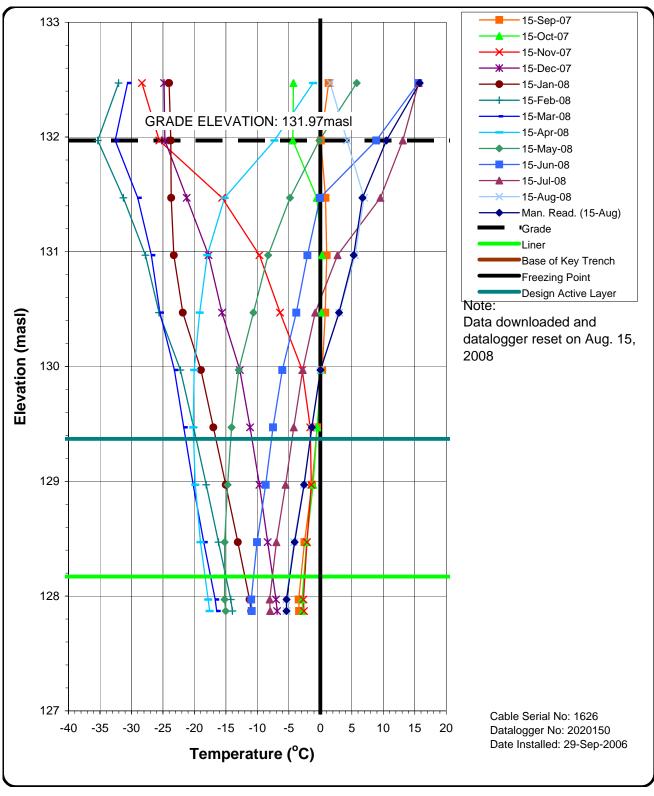
Graph E-1 Ground Temperature Profile Lower Site Landfill Vertical GTC VT-9



Graph E-2
Ground Temperature Profile
Lower Site Landfill
Vertical GTC VT-10



Graph E-3 Ground Temperature Profile Lower Site Landfill Vertical GTC VT-11



Graph E-4
Ground Temperature Profile
Lower Site Landfill
Vertical GTC VT-12

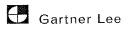
E7 – Field Notes	E7 -	Fie	ble	No	tes
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ELSL CINT. (PAGE 3) ELSI PHOTO LOC. 7 (WP. 49) - NORTH SLOPE NEAR THORMSTONS - PHOTO 97 (CACING SUNTHWIST) - SUPAGE FROM LOVER HALF OF SLOPE, NO STAINING - 5 ome Word Small, occasional TREES OF GRASS/VEG. EUL PHOTO LOC. 8 ( WP 4) -NURTH CRUST NEAR THERMISTORS FACING CAST -PHOTO 9B -NO TENTION CRACKS OBSERVED ELSU 111000 LUC. 9/ WP 49) - PHOTO . 99 (FACING SE TO SLUPE) ELSE PHOTO LOCI 10 (LAP 50) - NORTH SLOPE AT NORTH WEST ENO -PHOTOS / DOTT ACING SOUTHURIT) - MINDR EROSION OF FINES BUT COARS PROCKFILZ IS SEF-ARMOURING - NO SHOPAGE OR CRACKS OBSERVED

			•												_
ELST CONS (NAGE 4)			1 .0		1					-					_
	,					14									+
EZSC PHOTO LOC. 11 (WP 51)			1			į.				4	72				+
- NO RTHWOT COUST						134	. 7								-
- PHOTO 102 (RAUNG CAST ALONG CUTT)													-		-
- PHOTO 103 (FACING SONTH)					92 1			į	ra T	12	(6)				+
- PHOTO MY (FACING WEST ALOUB						1			-		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				+
-NO TINITIN CARCKS OBSERVED							1								1
-NO TENTION CRACKS OBSERVED								- 12							1
															1
ELSL PHOPO LOC. 12 (WP 52)			7			1,1				500				11,	_
- CRUST AND TOP AT SOMEWHY								A				- 2-			1
CORNEY					•	y.			41.8						
-PHOTO /PS (FACING (MST)		1.4					4			100		· ve			1
- NO CRACKING OR SITTYONION?						N									1
DESTURAÇÃO						,				,35					
ELSL PHOTO LOC. (2(WP 53)				1		- 17	4		1		1 05				
- WEST SLOPE AND RIP-RAPPED						evi West						24			
brainage offer AT TOU		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		Y.	- *	1 .							-		
-PHOLO IDG (FACING NE)			-	\$4 S		· ·				2					
- NO EROSPON ON SLOPE OF						: %			75		3,				
/N DITCH		-													

## 2008 Monitoring Well Sampling Log (MW #

ř.	Site name:	CAM-4				
	Date of sampling event:	406 14-1	6/1008	<u> </u>		
	Names of samplers:	TPB				
	Monitoring well ID:	MW-76	ر د			
	Facility:	COWER S	ITE			
		7 700	Known D	ata		
	Depth of installation* (m):	3.43				
	of screened section (m):	2,05				
Dep	pth to top of screen* (m):	0.30				
			Manage	Data		
	Candition of walk	6000	Measured		Procedure/Equipment:	WITERPAL METER
	Condition of well:	INTERPACE	METER		h to water surface (m):	2.37 Myos
7./340 10/2014	Procedure/Equipment: height above ground (m):	INITED TO	1 30	O66.	Depth to bottom (m):	Z193m5Tor.
66 W Well h	Diameter of well (m):	211	. (. Marie 2)		roduct thickness (mm):	Co
	Diameter of well (III).	Santa Para				partition and the second
	Calculations				Notes	
	Depth of water (m):	2.37			Evidence of sludge:	grant Verring States
`	Well volume of water (L):	1.12		Eviden	ice of freezing/siltation:	# Sing Processing & Section of Processing Con-
	Static water level* (m):	_ , , , ,				
Length of scr	reen collecting water (m):	1.97				
		T IN COURT OF THE PARTY OF THE		ng Information		
	Equipment:	PERUSTAC	tic pul	MP .		
		1	<u> </u>	Candustivity (vClom)	Turbidity (NTU)	Description of Water
Date & Time	Volume Removed (L)	Temperature (°C)	) pH	Conductivity (µS/cm)		C4 C
	1.50	416	6.67	A 201	4.4	Commercial Commercial
5-A608	1, 8	11 1 12	~ ~ I	0.396	/ / /	WIO
5-A608		) A I R		U. Hb	Soil Sampling	UCO
5-A608	Water Samplin Date & Time Collected:					15-ACG-08
	Water Samplin	15-A00	08		Soil Sampling	15-AC6-08
	Water Samplin Date & Time Collected:	15-A00	୍ଦ୍ର ଓଡ଼ି >		Soil Sampling ate and Time Collected: Sample Number - Soil:	15-AC6-08 MW 215, NUW-20-35,
	Water Samplin Date & Time Collected: Sample Number - Water:	15-A00 MW-20	্ ০ ও ১ ১১	Da	Soil Sampling ate and Time Collected: Sample Number - Soil:	15-AC6-08 MW 275 NUW-20-35
	Water Samplin  Date & Time Collected:  Sample Number - Water:	15-A00 MW-20 MW-20	্ ০ ও ১ ১১	Da	Soil Sampling ate and Time Collected: Sample Number - Soil:	15-AC6-08 MW 275 NUW-20-35
	Water Samplin Date & Time Collected: Sample Number - Water:	15-A00- MW-20 MW-20	08 > X		Soil Sampling ate and Time Collected: Sample Number - Soil:	15-AC6-08
	Water Samplin  Date & Time Collected:  Sample Number - Water:	15-A00- MW-ZO MW-ZO MW-ZO	OS > Xs	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil:	15-AC6-08 MW 275 NUV-20-35
	Water Samplin  Date & Time Collected:  Sample Number - Water:	15-A00- MW-ZO MW-ZO MW-ZO	OS > Xs	Refusile 3	Soil Sampling ste and Time Collected: Sample Number - Soil:  Oracle Sample Containers:	15-AC6-08 MW 275 NUV-20-35
	Water Samplin  Date & Time Collected:  Sample Number - Water:	15-A00- MW-ZO MW-ZO MW-ZO MW-ZO MOCS G FOUNL AN 2 1000ML AN	OS > Xs	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil:	15-ACG-08 MW 215, NW-20-36 MLG-200-36 W/250ML C RESAMILE = Z/250ML CR Z/250ML CR
	Water Samplin  Date & Time Collected:  Sample Number - Water:  Our Containers:  Procedure/Equipment:	15-A00- MW-Z0 MW-Z0 MW-Z0 MW-Z0 G FOUNLAN Z 1000-ML AN P. P. 129	OS > Xs	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil:  Orrect Sample Containers:	15-AC6-08 MW 215 MW-20-36 ML-200-36 ML-200-36 ML-200-36 ML-200-CC RESAMILE = Z/250mL CC Z/250mL CC TROWEL
	Water Samplin  Date & Time Collected:  Sample Number - Water:  Ou O	15-A00- MW-Z0 MW-Z0 MW-Z0 MW-Z0 G FOUNLAN Z 1000-ML AN P. P. 129	OS > XS	Refusile 3	Soil Sampling ste and Time Collected: Sample Number - Soil:  Oracle Sample Containers:	15-AC6-08 MW 215, NUW-20-36, MU - 200-36 W/250MC C PET SAMME = Z/250MC CE Z/250MC CE
	Water Samplin  Date & Time Collected:  Sample Number - Water:  Our Containers:  Procedure/Equipment:	15-A00- MW-ZC MW-Z	OS > XS	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil:  Orrect Sample Containers:	15-AC6-08 MW 215 MW-20-36 ML-200-36 ML-200-36 ML-200-36 ML-200-CC RESAMILE = Z/250mL CC Z/250mL CC TROWEL
	Water Samplin  Date & Time Collected:  Sample Number - Water:  Our Containers:  Procedure/Equipment:	15-A(0) MW-ZC MW-ZC MW-ZC MW-ZC GROWNLAN 2 1000MLAN P. P. 129 C+C N/O	OS > XS	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil:  Orrect Sample Containers:	15-ACG-08 MW 215, NW-200-36 MLG-200-36 MLG-200-36 MC SAMICE = 2/250mc CR 2/250mc CR TROWER SHAMI SITE NOTEL
	Water Samplin  Date & Time Collected:  Sample Number - Water:  Sample Containers:  Procedure/Equipment:  Water Description:	15-A00- MW-ZC MW-ZC MW-ZC MW-ZC MW-ZC G FOUNL AN P. P. 129 CHC N/O	OS > XS	Refusile 3	Soil Sampling ate and Time Collected: Sample Number - Soil: Sample Containers: Procedure/Equipment: Soil Description:	15-ACG-08 MW 215, NW-200-36 MLG-200-36 MLG-200-36 MC SAMICE = 2/250mc CR 2/250mc CR TROWER SHAMI SITE NOTEL



<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

## 2008 Monitoring Well Sampling Log (MW # 17)

	Site name:	CAM - 1	t			
	Date of sampling event:	AUG 14-	6/200	රි		
	Names of samplers:	TPB				
	Monitoring well ID:	1 Mars 17				
	Facility:	LOWER				
			Known E	Data		
D	epth of installation* (m):	3.82				
	of screened section (m):	7.03				
Dep	th to top of screen* (m):	0.83			1	
				<u> </u>		
	0 111 ( 11		Measured		Dragoduro/Equipment:	INTEXETE UK
	Condition of well:	6000	112-758		Procedure/Equipment:	1.48 asTOP
122 ***	Procedure/Equipment:	INDUKE	76100	Dept	h to water surface (m):	4
Well h	eight above ground (m):	0.74		Erca n	Depth to bottom (m): roduct thickness (mm):	Z120 050
	Diameter of well (m):			riee pr	oduct trickness (min).	Section Control
	•					
	Calculations		<u> </u>		Notes	
	Depth of water (m):	1 60			Evidence of sludge:	Contract to the property of the state of the
	Vell volume of water (L):	3,00		Eviden	ce of freezing/siltation:	
· · · · · · · · · · · · · · · · · · ·	Static water level* (m):	W 0.1	-4			
Length of scre	een collecting water (m):	0.63	<u> </u>			
20.19.1.01.00.				ng Information		
	Equipment:	PEUSTAL				
	· · · · · · · · · · · · · · · · · · ·	7,7	6.16)			
Date & Time	Volume Removed (L)	Temperature (°C)	1 36	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
15-AU6-08	3.56	5,41	HALY	0.54	27,9	C1C 110
	Water Samplin	g	1		Soil Sampling	
-	Date & Time Collected:	15-AUG-	08	Da	ite and Time Collected:	16-406-08
(	Sample Number - Water:	MW-17			Sample Number - Soil:	
						MW-17-15
						MW-17-40
	Sample Containers:		Arther!		Sample Containers:	2/250mL
		2 000 0	ILES			Clear
	•					RECSAMILE
	Procedure/Equipment:	PERLISTAL CHC	TIL		Procedure/Equipment:	TROVEL
	Water Description:	010			Soil Description:	BROWN SANDY SILT
	,	40			•	SAN'N SICT
		710				
Sampling Equipmen	t Decontamination (Y/N):	1		Sampling Equipment I	Decontamination (Y/N):	Y
	Number Washes:	sector			Number Washes:	2
	Number Rinses:				Number Rinses:	3

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

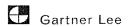
## 2008 Monitoring Well Sampling Log (MW #人名)

	0.11	( x A) - 11					1
	Site name:	CAM-4	r 10.00	<u>a</u>			ł
	Date of sampling event:	AUG 14-1	6/200	<u>''O</u>			
	Names of samplers:	TFB					-
	Manitaria a vall ID	MW-	16	***************************************			
	Monitoring well ID:		18		•		-
· ·	Facility:	LOWER					
		···		7-4-			
0	, , , , , , , , , , , , , , , , , , , ,	7 00	Known I	Jata			
	epth of installation* (m):	3.80 2.03					
	of screened section (m):						
<u> </u>	th to top of screen* (m):	0.81					İ
			M	I Data			
	Condition of		Measured		Drooduro/Faviore	LATER FAR TAR VETER	
	Condition of well: Procedure/Equipment:	GOOD	NETTER			INTERFACTMETER	
347-213			NOION_	Dept	th to water surface (m):	7 =	
vvell h	eight above ground (m):	0.57		P	Depth to bottom (m):	~ 50	
	Diameter of well (m):	7"		ree p	roduct thickness (mm):	Aprilia escriptura promoto planetes la processión de servido.	
	Calculations				Notes		
	Depth of water (m):	(1) 1 -1			Evidence of sludge:	V	
\/	Vell volume of water (L):	3.00		Evidon	nce of freezing/siltation:		
	Static water level* (m):			Eviden	ice of freezing/sittation.		
l anoth of core		0.16					
Length of scre	een collecting water (m):	Dovolonm	ont/Durgi	ng Information			
	Equipment:	PELLES TAL					
	Equipment.	1 PESC/174C	1 (80 1	Ur ()			
Date & Time	Volume Removed (L)	Temperature (°C)	рН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	
			5,82		24.5	C+C	
15-AU608	3.5	5.12	7,00	9223	86	Fight Cherrie	1
	Water Samplin	ia	<u> </u>		Soil Sampling		· Och
:	Date & Time Collected:	- A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<del>.8</del>	Da	ite and Time Collected:	15-414.08	
	Sample Number - Water:			<b></b>	Sample Number - Soil:	» / / / W	
		**(0)				ML)-18-15	
						My - 18 - 30	
						10(4) 10 /0	
	Sample Containers:	3 5Wm	Arrys		Sample Containers:	2/20ML	
		2 000	1,00			Cloor	
						TOC SAMPLE	
	Procedure/Equipment:	DEN OTAL T	71		Procedure/Equipment:	TROJEL	
		Avno	- Lander .			, ,	
	Water Description:	PERISTACT PUMP CAC SIGNATURE			Soil Description:	BROWN	
		Links Loin'	(in l		22 2000	BROWN SANDY SICT	
		Signio od	0-1			- A v. a manual.	
Sampling Fauinment	Decontamination (Y/N):	y v	-	Sampling Faulpment [	Decontamination (Y/N):	V	
	Number Washes:	7			Number Washes:	Ź	
	Number Rinses:	7_			Number Rinses:	7_	
	140111001 1411303.	Lucier		1	,,		i

<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

## 2008 Monitoring Well Sampling Log (MW # 9)

Site name						
Date of sampling event	A06-14-	16-200	99			
Names of samplers	TEB					
Monitoring well ID						
Facility	LOWER					
			F			
		Known I	Data			
Depth of installation* (m)	3.83					
Length of screened section (m)	2.03					
Depth to top of screen* (m)	0.84					
	ļ	Measured	Data			
Condition of well				Procedure/Equipment:	INTERFACE METER	-
Procedure/Equipment		ierek	Dept	th to water surface (m):	0.78 MJW	
Well height above ground (m)				Depth to bottom (m):	2,10 450	
Diameter of well (m)	: Z"		Free p	roduct thickness (mm):		
Calculations		, ,		Notes	<u></u>	
Depth of water (m)	: 0.78 W	4TO/		Evidence of sludge:	. and the state of	
Well volume of water (L)	7.70			ice of freezing/siltation:	ectroscip <sub>ellococ</sub> .	
Static water level* (m)		TIM.	0.13			
Length of screen collecting water (m)						
		ent/Purgi	ng Information			
Equipment	Beiler					
Date & Time Volume Removed (L	Temperature (°C)	pН	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water	
15-AU608 3,2L	7.30	5.55	0.645	260	SUBHT Chemical o	dev
Water Sampli	ng			Soil Sampling		ĺ
Date & Time Collected	1 100	28	Da	ite and Time Collected:	15-AUG-08	j
Sample Number - Water	n.	1		Sample Number - Soil:	mw-19-70	
·		9				
					MV-19-50	
Sample Containers	: 3 Fort	Aures		Sample Containers:	2/250m	
,	Z VUCS				Clar	
		···			PORSAMPLE	
Procedure/Equipmen	hand			Procedure/Equipment:	TOWEL	ĺ
	BAILDE					
Water Description	:030	1		Soil Description:	BROUN	
· ·	Clemic	M			CAN'TI SICT	İ
	Sight Clemic	x delv			~38 31 · ·	
Sampling Equipment Decontamination (Y/N			Sampling Equipment I	Decontamination (Y/N):	1	
Number Washes	<del>                                     </del>			Number Washes:	Z	1
Number Rinses		ν		Number Rinses:	1	1



<sup>\*</sup>From ground surface. Unless this is stated, all measurments are assumed to be from the top of the casing.

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	- CHROX	ounder ri	2401 Nan
	CACIA	TION 7 SOUNCE	r works
	-NO N	AN, MAX OR	DIGITAL INPUT
1	VT-12 7	DONNINADER	AT /2:15PM
	CHANNEL	Temp (FROM COMPUTER	(FROM MUNIMETER)
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	3	6.7 °C	1.14 V
	4	5.3°C	1.100
	5	2.97%	1.03V
	6	0,020	
	7	1374	0,900
	8	-7.58%	0.86V
	9	-4.08.0	Δ.
	10	-5.36°C	
	11	-5.37°C	0.78V

- VT-12 BAMBRU	1/12/1468
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# **Appendix F**

**Laboratory Reports** 

#### **Analysis Report**

Analysis of Soil, Water Samples **REPORT ON:** 

REPORTED TO: Gartner Lee Limited

Suite 300

300 Town Centre Boulevard

Markham, ON L3R 5Z6

Att'n: Tim Boc

**CHAIN OF CUSTODY: PROJECT NAME:** 

2118991 CAM-4

PROJECT NUMBER: P.O. NUMBER:

80-297 6076

**NUMBER OF SAMPLES: 5** REPORT DATE: August 28, 2008

**GROUP NUMBER: 90819109** DATE SUBMITTED: August 19, 2008

SAMPLE TYPE: Soil, Water

NOTE: Results contained in this report refer only to the testing of samples as submitted. Other

information is available on request.

#### **TEST METHODS:**

CCME Petroleum Hydrocarbons in Soil - analysis was performed using Canadian Council of Ministers of the Environment (CCME) "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil" approved December 2000. The method involves extraction of the different hydrocarbon fractions and analysis by gas chromatography with flame ionization detection (GC/FID).

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) was analyzed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method (2001). Analysis involves methanol extraction and quantitation using GasChromatography with Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (benzene, toluene, ethylbenzene, and ortho, meta and para-xylenes) subtracted (e.g. corrected). These BTEX compounds analyzed by GCMS may be included in this report on request by the customer.

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method (2001). Analysis involves methanol extraction and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (Benzene, Toluene, Ethylbenzene, and Total Xylenes) subtracted (e.g. corrected). These BTEX compounds may be included in this report on request by the customer.

(Continued)

CANTEST LTD

Ånna∕Becalska, PhD Tràce Metals Coordinator Page 1 of 15

Gartner Lee Limited

**REPORT DATE:** 

August 28, 2008

**GROUP NUMBER: 90819109** 



Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F2,F3 and F4 Fractions) - The F2 to F4 Fractions (nC10 to nC50) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method (2001). Analysis involves extraction with50:50 hexane:acetone, silica-gel cleanup and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID).

**Moisture in Soil** - analysis was performed gravimetrically by heating a separate sample portion at 105 C and measuring the weight loss.

pH in Soil or Solid - analysis was performed based on procedures described in the "Manual on Soil Sampling and Methods of Analysis" (1993) published by the Canadian Society of Soil Science. The test was performed using a deionized water leach with measurement by pH meter.

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

Mercury in Water - analysis was performed using procedures based on U. S. EPA Method 245.7, oxidative digestion using bromination, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

**Metals in Water** - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

**Polychlorinated Biphenyls** - analysis was performed using procedures based upon U.S. EPA Methods 608/8080, involving extraction, clean-up steps, and analysis using GC/ECD. Arochlors 1242, 1248, 1254 and 1260 were included.

**Total Extractable Hydrocarbons (TEH)** - analysis was performed using procedures based on USEPA Method 8015 and BC MOELP Environmental Laboratory Manual (1994) Method X366, involving dichloromethane extraction and analysis using GC/FID. Components in the C10 to C30 range are included, using an alkane standard for quantitation. The report states if silica gel cleanup was used.

Silver in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Arsenic in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Cadmium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

**Molybdenum in Soil** - analysis was performed using an acid digestion followed by determination using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

(Continued)

Gartner Lee Limited

**REPORT DATE:** 

August 28, 2008

**GROUP NUMBER: 90819109** 



Strong Acid Leachable Metals in Soil - analysis was performed using B.C. MOELP Method "Strong Acid Leachable Metals in Soil, Version 1.0". The method involves drying the sample at 60 C, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP) or by specific techniques as described.

Selenium in Soil - analysis was using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Thallium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Total Petroleum Hydrocarbons - analysis was performed using procedures based on Alberta Environment Site Investigation requirements, involving summation of the total volatile (purgeable) and semi-volatile (extractable) hydrocarbons.

#### **TEST RESULTS:**

(See following pages)

**REPORTED TO:** Gartner Lee Limited

**REPORT DATE:** August 28, 2008

**GROUP NUMBER:** 90819109



#### **Conventional Parameters in Water**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Hardness (Total) CaCO3
MW-20	Aug 15/08	808190321	112
MW-15	Aug 16/08		342

mg/L = milligrams per liter

**REPORTED TO:** Gartner Lee Limited

**REPORT DATE:** August 28, 2008

**GROUP NUMBER:** 90819109



#### Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW-20	MW-15		
SAMPLE PREPARATION:  DATE SAMPLED:  CANTEST ID:		TOTAL	TOTAL		
		Aug 15/08	Aug 15/08 Aug 16/08		UNITS
		808190321	808190325	DETECTION	011110
Aluminum	Al	0.2	0.042	0.005	mg/L
Antimony	Sb	0.089	<	0.001	mg/L
Arsenic	As	<	0.001	0.001	mg/L
Barium	Ва	0.003	0.095	0.001	mg/L
Beryllium	Be	<	<	0.001	mg/L
Bismuth	Bi	<	<	0.001	mg/L
Boron	В	0.08	0.19	0.05	mg/L
Cadmium	Cd	<	<	0.0002	mg/L
Calcium	Ca	37	112	0.05	mg/L
Chromium	Cr	<	<	0.001	mg/L
Cobalt	Co	<	0.002	0.001	mg/L
Copper	Cu	0.003	0.001	0.001	mg/L
Iron	Fe	0.18	1.44	0.05	mg/L
Lead	Pb	<	<	0.001	mg/L
Lithium	Li	0.004	0.001	0.001	mg/L
Magnesium	Mg	4.79	15	0.05	mg/L
Manganese	Mn	0.031	2.34	0.001	mg/L
Mercury	Hg	<	<	0.02	$\mu$ g/L
Molybdenum	Мо	0.0043	0.002	0.0005	mg/L
Nickel	Ni	<	0.007	0.001	mg/L
Phosphorus	P	<	<	0.15	mg/L
Potassium	K	4.5	9.2	0.1	mg/L
Selenium	Se	<	0.002	0.001	mg/L
Silicon	Si	2.2	3.9	0.25	mg/L
Silver	Ag	<	<	0.00025	mg/L
Sodium	Na	20.5	40.2	0.05	mg/L
Strontium	Sr	0.046	0.26	0.001	mg/L
Tellurium	Te	<	<	0.001	mg/L
Thallium	TI	<	<	0.0001	mg/L
Thorium	Th	<	<	0.0005	mg/L
Tin	Sn	<	<	0.001	mg/L

(Continued on next page)

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109



### **Metals Analysis in Water**

CLIENT SAMPLE IDENTIFICATION	:	MW-20	MW-15		
SAMPLE PREPARA	ATION:	TOTAL	TOTAL		
DATE SAMPLED:		Aug 15/08	Aug 16/08	DETECTION	UNITS
CANTEST ID:		808190321	808190325	LIMIT	ONTO
Titanium	Ti	0.009	0.002	0.001	mg/L
Uranium	U	0.061	0.036	0.0005	mg/L
Vanadium	V	<	0.002	0.001	mg/L
Zinc	Zn	0.022	0.32	0.005	mg/L
Zirconium	Zr	<	<	0.01	mg/L

mg/L = milligrams per liter < = Less than detection limit

 $\mu$ g/L = micrograms per liter

**REPORTED TO:** Gartner Lee Limited

**REPORT DATE:** August 28, 2008

**GROUP NUMBER:** 90819109



### **Total Extractable Hydrocarbons in Water**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	TEH
MW-20	Aug 15/08	808190321	1300
MW-15	Aug 16/08	808190325	5400
DETECTION LIMIT			100
UNITS			μg/L

 $\mu$ g/L = micrograms per liter

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109



### Polychlorinated Biphenyls in Water

CLIENT SAMPLE IDENTIFICATION:	MW-20	MW-15	
DATE SAMPLED:	Aug 15/08	Aug 16/08	DETECTION
CANTEST ID:	808190321	808190325	LIMIT
Arochlor 1242	<	<	0.1
Arochlor 1248	<	<	0.1
Arochlor 1254	<	<	0.1
Arochlor 1260	<	<	0.1
Total PCB	<	<	0.4
Surrogate Recovery			
2,2',4,4',6,6'-hexabromobiphenyl	85	100	_

Results expressed as micrograms per liter ( $\mu g/L$ ) Surrogate recoveries expressed as percent (%)

<sup>&</sup>lt; = Less than detection limit

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109



#### **Conventional Parameters in Soil**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	рН
MW-14-A-30	Aug 14/08	808190310	15.1	7.1
BMW-3-40		808190315	11.0	6.6
MW-20-35	Aug 15/08	808190318	5.0	7.2
DETECTION LIMIT			0.1	0.1
UNITS			%	pH units

<sup>% =</sup> percent

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109



#### Polychlorinated Biphenyls in Soil

CLIENT SAMPLE IDENTIFICATION:	MW-14-A-30	BMW-3-40	MW-20-35	
DATE SAMPLED:	Aug 14/08	Aug 14/08	Aug 15/08	DETECTION
CANTEST ID:	808190310	808190315	808190318	LIMIT
Arochlor 1242	<	<	<	0.03
Arochlor 1248	<	<	<	0.03
Arochlor 1254	<	<	<	0.03
Arochlor 1260	<	<	<	0.03
Total PCB	<	<	<	0.03
Surrogate Recovery				
2,2',4,4',6,6'-hexabromobiphenyl	89	63	89	-

Results expressed as micrograms per gram, on a dry weight basis. ( $\mu g/g$ ) Surrogate recoveries expressed as percent (%)

<sup>&</sup>lt; = Less than detection limit

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109

### **Total Petroleum Hydrocarbons in Soil**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Total Petroleum Hydrocarbons
MW-14-A-30	Aug 14/08	808190310	<
BMW-3-40	Aug 14/08	808190315	<
MW-20-35	Aug 15/08	808190318	<
DETECTION LIMIT			20
UNITS			μg/g

 $\mu g/g =$  micrograms per gram, on a dry weight basis. < = Less than detection limit

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER: 90819109** 



#### **CCME Petroleum Hydrocarbons in Soil**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F1 (C6-C10) uncorrected	F1 minus BTEX (C6-C10)
MW-14-A-30	Aug 14/08	808190310	<	<
BMW-3-40		808190315	<	<
MW-20-35	Aug 15/08	808190318	<	<
DETECTION LIMIT			5	5
UNITS			µg/g	μg/g

 $\mu g/g = \text{micrograms}$  per gram, on a dry weight basis. < = Less than detection limit

Gartner Lee Limited

**REPORT DATE:** 

August 28, 2008

**GROUP NUMBER:** 90819109



#### **CCME Petroleum Hydrocarbons in Soil**

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F2 (C10-C16) uncorrected	F3 (C16-C34) uncorrected
MW-14-A-30	Aug 14/08	808190310	<	<
BMW-3-40		808190315	<	<
MW-20-35	Aug 15/08	808190318	<	<
DETECTION LIMIT			5	5
UNITS			μg/g	μg/g

 $\mu g/g =$  micrograms per gram, on a dry weight basis. < = Less than detection limit

Gartner Lee Limited

REPORT DATE:

August 28, 2008

**GROUP NUMBER:** 90819109



#### Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		MW-14-A-30	BMW-3-40	MW-20-35	
DATE SAMPLED:		Aug 14/08	Aug 14/08	Aug 15/08	DETECTION
CANTEST ID:		808190310	808190315	808190318	LIMIT
Antimony	Sb	<	<	<	0.1
Arsenic	As	2.4	2.3	1.2	0.1
Barium	Ba	68	81	27	1 1
Beryllium	Be	<	<	<	1
Cadmium	Cd	<	<	<	0.2
Chromium	Cr	28	30	17	2
Cobalt	Co	7	8	4	1
Copper	Cu	11	12	8	1
Lead	Pb	8.4	8.3	10.4	0.2
Mercury	Hg	0.01	0.01	0.01	0.01
Molybdenum	Mo	0.4	0.5	0.4	0.1
Nickel	Ni	14	16	9	2
Selenium	Se	<	0.2	0.2	0.2
Silver	Ag	<	<	<	0.1
Thallium	TI	0.2	0.3	0.1	0.1
Tin	Sn	<	<	<	5
Vanadium	٧	33	36	23	1 1
Zinc	Zn	38	46	25	1
Aluminum	Al	12200	13400	6460	10
Boron	В	2	2	1	1
Calcium	Ca	2320	2260	1790	1
Iron	Fe	17700	19800	11200	2
Magnesium	Mg	5530	6180	3370	1
Manganese	Mn	190	246	115	1
Phosphorus	Р	807	728	623	20
Potassium	K	3520	4000	1500	10
Sodium	Na	116	103	62	5
Strontium	Sr	7	8	4	1
Titanium	Ti	1030	1140	533	1
Zirconium	Zr	4	5	2	1

Results expressed as micrograms per gram, on a dry weight basis. ( $\mu g/g$ ) < = Less than detection limit

Gartner Lee Limited

**REPORT DATE:** 

August 28, 2008

**GROUP NUMBER: 90819109** 



#### **CCME Petroleum Hydrocarbons in Soil**

CLIENT SAMPLE IDENTIFICATION:	MW-14-A-30	BMW-3-40	MW-20-35	
DATE SAMPLED:	Aug 14/08	Aug 14/08	Aug 15/08	DETECTION
CANTEST ID:	808190310	808190315	808190318	LIMIT
Benzene	<	<	<	0.005
Ethylbenzene	<	<	<	0.018
Toluene	<	<	<	0.02
Total Xylenes	<	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. ( $\mu g/g$ )

<sup>&</sup>lt; = Less than detection limit







#### **Environmental Division**

**Certificate of Analysis** 

GARTNER LEE LTD. **ATTN:** KEN BOLDT

300 TOWN CENTRE BOULVARD

SUITE 300

MARKHAM ON L3R 5Z6

Reported On: 04-SEP-08 04:52 PM

Date Received: 19-AUG-08

Lab Work Order #: L671383

Project P.O. #: KSL-00627 Job Reference: 80297

Legal Site Desc:

CofC Numbers: C065198

Other Information:

Comments: Please note that Polychlorinated Biphenyl detection limits have been increased for some of the samples due to the analytical

interferences encountered during the analysis.

MATASHA MARKOVIC-MIROVIC Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

### ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description	L671383-1	L671383-2	L671383-3	L671383-4	L671383-5
	Sampled Date Sampled Time	16-AUG-08	16-AUG-08	16-AUG-08	16-AUG-08	16-AUG-08
	Client ID	BMW-3	MW-15	MW-150	MW-14A	MW-16
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	191	335	338	304	157
Total Metals	Arsenic (As)-Total (mg/L)	0.0023	0.0020	0.0020	0.00067	0.00076
	Cadmium (Cd)-Total (mg/L)	0.000061	<0.00034	<0.000034	0.000067	0.000082
	Chromium (Cr)-Total (mg/L)	0.0437	0.0024	<0.0030	0.0100	0.0025
	Cobalt (Co)-Total (mg/L)	0.00817	0.00216	0.00208	0.00135	0.00210
	Copper (Cu)-Total (mg/L)	0.0155	<0.0020	<0.0020	0.0146	0.0040
	Lead (Pb)-Total (mg/L)	0.0091	<0.0010	<0.0010	0.00112	0.00056
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Nickel (Ni)-Total (mg/L)	0.0180	0.0065	0.0063	0.0001	0.0120
	Zinc (Zn)-Total (mg/L)	0.0513	0.250	0.239	2.41	0.0120
Hydrocarbons	F1 (C6-C10) (mg/L)	<0.10	0.250	0.233	<0.10	2.23
	F2 (C10-C16) (mg/L)	<0.30	5.98	5.15	<0.30	76.7
	F3 (C16-C34) (mg/L)	<0.30	1.65	1.40	0.33	8.01
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

	Sample ID Description	L671383-6	L671383-7	L671383-8	L671383-9
	Sampled Date Sampled Time	16-AUG-08	16-AUG-08	16-AUG-08	16-AUG-08
	Client ID	MW-8	MW-9	MW-13	MW-12
Grouping	Analyte				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	1380	202	140	186
Total Metals	Arsenic (As)-Total (mg/L)	<0.0025	<0.0025	0.00216	0.0051
	Cadmium (Cd)-Total (mg/L)	0.000170	<0.000085	0.000176	0.000135
	Chromium (Cr)-Total (mg/L)	<0.0050	0.0183	0.0205	0.0540
	Cobalt (Co)-Total (mg/L)	0.0031	<0.0015	0.00978	0.0156
	Copper (Cu)-Total (mg/L)	0.0228	0.0071	0.0288	0.0433
	Lead (Pb)-Total (mg/L)	<0.0025	<0.0025	0.00725	0.0158
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020
	Nickel (Ni)-Total (mg/L)	0.0268	0.0079	0.0257	0.0418
	Zinc (Zn)-Total (mg/L)	0.0391	0.0382	0.0809	0.208
Hydrocarbons	F1 (C6-C10) (mg/L)	2.89	<0.10	<0.10	<0.10
	F2 (C10-C16) (mg/L)	8.17	0.44	<0.30	1.26
	F3 (C16-C34) (mg/L)	1.84	0.63	1.11	2.02
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0011	<0.0012

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

L671383 CONTD.... PAGE 4 of 5 04-SEP-08 16:45

EPA SW-846, METHOD 8260

### **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

F1-PT-FID-VA Water CCME F1 By P&T with GCFID

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

F2-F3-SF-FID-VA Water Extractable Hydrocanbons in water GCFID CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

**HG-TOT-CCME-CVAFS-** Water Total Mercury in Water by CVAFS (CCME) EPA 245.7

VA
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-CCME-ICP-VA Water Total Metals in Water by ICPOES (CCME) EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA Water Total Metals in Water by ICPMS (CCME) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

PCB-SF-ECD-VA Water PCB by Extraction with GCECD EPA 3510/8082 Liq-Liq GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

L671383 CONTD.... PAGE 5 of 5

### **Reference Information**

#### Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

#### GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

# ALS Laboratory Group ANALYTICAL CHEMISTRY & TESTING SERVICES



### CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM CANADA TOLL FREE 1-800-668-9878

coc#C065198

**Environmental Division** 

www.alsenviro.com

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### **Environmental Division**

**Certificate of Analysis** 

GARTNER LEE LTD. **ATTN:** KEN BOLDT

300 TOWN CENTRE BOULVARD

SUITE 300

MARKHAM ON L3R 5Z6

Reported On: 01-OCT-08 11:49 AM

Revision: 7

Lab Work Order #: L671792 Date Received: 19-AUG-08

Project P.O. #: KSL-00627 Job Reference: GU80-297

Legal Site Desc:

**CofC Numbers:** C065196, C065204, C065206, C065207

Other Information:

Comments: Please note that Revision 7 replaces and supersedes all previous revisions. The Hydrocarbons F2 (C10-16) and F3 (C16-C32)

results have been changed for the sample identified as BMW-3-40.

The detection limits for some metals analysis have been increased due to high levels of metals in the samples or interferences

encountered during analysis.

MATASHA MARKOVIC-MIROVIC

Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

	Sample ID Description	L671792-1	L671792-2	L671792-3	L671792-4	L671792-5
	Sampled Date Sampled Time Client ID	14-AUG-08 BMW-3-15	14-AUG-08 MW-5-10	14-AUG-08 MW-5-25	14-AUG-08 MW-8-10	14-AUG-08 MW-8-20
Grouping	Analyte	DIVIVY-3-13	10100-3-10	IVIVV-3-23	10100-0-10	IVIVV-8-20
SOIL	,					
Physical Tests	% Moisture (%)	20.3	11.0	12.1	8.40	7.89
i ilysiodi resis	pH (pH)	5.96	6.99	6.93	6.93	7.01
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
Wictais	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	31.8	18.3	19.0	19.8	22.5
	Cobalt (Co) (mg/kg)	8.5	6.6	6.3	6.8	6.4
	Copper (Cu) (mg/kg)	13.9	11.5	11.6	11.9	11.9
	Lead (Pb) (mg/kg)	9.3	6.6	6.8	7.9	13.5
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	0.0051	<0.0050	0.0066
	Nickel (Ni) (mg/kg)	15.7	9.4	9.0	10.6	10.6
	Zinc (Zn) (mg/kg)	44.0	33.0	33.5	40.5	38.6
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	296
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	121
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
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	Sample ID Description	L671792-6	L671792-7	L671792-8	L671792-9	L671792-10
	Sampled Date Sampled Time Client ID	14-AUG-08 BMW-3-40	14-AUG-08 BMW-30-40	14-AUG-08 MW-9-15	14-AUG-08 MW-9-25	14-AUG-08 MW-10-15
Grouping	Analyte	DIVIVV-3-40	DIVIVV-30-40	10100-9-15	10100-9-25	WW-10-15
SOIL						
Physical Tests	% Moisture (%)	18.3	21.7	8.83	9.95	8.09
i ilysicai resis	pH (pH)	6.45	6.60	7.29	7.27	6.57
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
Wetais	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	35.0	28.4	18.1	16.6	22.3
	Cobalt (Co) (mg/kg)	9.0	7.1	6.4	6.2	5.0
	Copper (Cu) (mg/kg)	16.8	12.0	10.3	10.4	6.5
	Lead (Pb) (mg/kg)	10.9	8.0	11.6	9.7	5.6
	Mercury (Hg) (mg/kg)	0.0086	<0.0050	0.0070	0.0056	<0.0050
	Nickel (Ni) (mg/kg)	17.5	13.9	8.9	7.9	10.5
	Zinc (Zn) (mg/kg)	53.7	38.3	35.6	35.6	22.9
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	69	<50	<50
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
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	Sample ID Description	L671792-11	L671792-12	L671792-13	L671792-14	L671792-15
	Sampled Date Sampled Time	14-AUG-08	14-AUG-08	14-AUG-08	14-AUG-08	14-AUG-08
2	Client ID	MW-10-35	MW-11-10	MW-11-40	MW-12-15	MW-12-30
Grouping	Analyte					
SOIL						
Physical Tests	% Moisture (%)	12.2	8.75	8.65	9.59	10.8
	pH (pH)	6.48	6.68	6.75	6.82	6.92
Metals	Arsenic (As) (mg/kg)	93.6	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	24.8	27.7	22.6	17.0	15.4
	Cobalt (Co) (mg/kg)	9.0	7.0	6.5	3.6	3.8
	Copper (Cu) (mg/kg)	8.4	11.2	10.0	6.0	5.4
	Lead (Pb) (mg/kg)	6.2	19.1	8.1	4.9	4.9
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nickel (Ni) (mg/kg)	20.0	11.9	11.6	6.8	6.9
	Zinc (Zn) (mg/kg)	27.0	43.9	33.3	23.3	21.0
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	1230	1150	<50	<50
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050

	Sample ID Description	L671792-16	L671792-17	L671792-18	L671792-19	L671792-20
	Sampled Date Sampled Time	14-AUG-08	14-AUG-08	14-AUG-08	14-AUG-08	14-AUG-08
N !	Client ID	MW-13-15	MW-13-30	MW-14-A-15	MW-14-A-30	MW-140-A-30
Grouping	Analyte					
SOIL						
Physical Tests	% Moisture (%)	12.5	8.23	11.6	16.6	16.5
	pH (pH)	5.72	6.34	6.60	6.68	6.74
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	17.5	14.9	28.0	28.1	27.4
	Cobalt (Co) (mg/kg)	5.1	3.6	6.2	6.7	6.1
	Copper (Cu) (mg/kg)	7.1	3.5	11.0	12.1	11.8
	Lead (Pb) (mg/kg)	5.7	3.7	8.0	8.3	8.0
	Mercury (Hg) (mg/kg)	0.0117	<0.0050	<0.0050	<0.0050	<0.0050
	Nickel (Ni) (mg/kg)	8.6	6.6	13.3	14.2	13.9
	Zinc (Zn) (mg/kg)	31.4	17.2	33.2	35.8	33.8
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
•	F3 (C16-C34) (mg/kg)	76	<50	<50	<50	<50
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050

	Sample ID Description	L671792-21	L671792-22	L671792-23	L671792-24	L671792-25
	Sampled Date Sampled Time Client ID	14-AUG-08	14-AUG-08	14-AUG-08	14-AUG-08	15-AUG-08
Grouping	Analyte	MW-16-15	MW-16-40	MW-15-15	MW-15-25	MW-18-15
	Analyte					
SOIL	2(11)					
Physical Tests	% Moisture (%)	11.3	18.5	20.7	17.1	21.2
	pH (pH)	6.58	6.60	7.47	7.79	6.78
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	31.9	29.5	17.1	17.9	15.8
	Cobalt (Co) (mg/kg)	7.8	7.8	6.5	7.0	3.8
	Copper (Cu) (mg/kg)	14.2	12.3	9.8	11.2	9.5
	Lead (Pb) (mg/kg)	8.4	8.0	8.0	7.4	7.2
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	0.0120
	Nickel (Ni) (mg/kg)	16.0	15.2	9.4	9.3	8.0
	Zinc (Zn) (mg/kg)	43.1	39.3	41.3	43.9	31.4
Hydrocarbons	F2 (C10-C16) (mg/kg)	286	49	118	119	<30
	F3 (C16-C34) (mg/kg)	133	<50	235	302	<50
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	< 0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050

	Sample ID Description	L671792-26	L671792-27	L671792-28	L671792-29	L671792-30
	Sampled Date Sampled Time	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
>==::mim ar	Client ID	MW-18-30	MW-17-15	MW-17-40	MW-20-35	MW-20-15
Grouping	Analyte					
SOIL						
Physical Tests	% Moisture (%)	18.4	9.49	10.5	5.00	5.90
	pH (pH)	6.30	6.31	6.50	7.00	7.49
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Chromium (Cr) (mg/kg)	17.9	14.0	20.8	16.7	18.0
	Cobalt (Co) (mg/kg)	3.8	3.8	5.5	4.7	5.9
	Copper (Cu) (mg/kg)	10.1	6.6	13.9	10.0	12.3
	Lead (Pb) (mg/kg)	8.9	5.4	8.7	10.8	10.6
	Mercury (Hg) (mg/kg)	0.0085	<0.0050	0.0052	<0.0050	<0.0050
	Nickel (Ni) (mg/kg)	8.7	6.6	10.2	8.7	9.6
	Zinc (Zn) (mg/kg)	35.5	18.2	32.0	25.6	37.4
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
-	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050

	Sample ID Description	L671792-31	L671792-32	L671792-33	
	Sampled Date Sampled Time	15-AUG-08	15-AUG-08	15-AUG-08	
	Client ID	MW-200-35	MW-19-20	MW-19-50	
Grouping	Analyte				
SOIL					
Physical Tests	% Moisture (%)	5.29	10.3	10.4	
-	pH (pH)	7.52	6.30	6.29	
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0	<5.0	
	Cadmium (Cd) (mg/kg)	<0.50	<0.50	<0.50	
	Chromium (Cr) (mg/kg)	20.8	14.7	12.1	
	Cobalt (Co) (mg/kg)	5.0	3.9	3.9	
	Copper (Cu) (mg/kg)	10.8	7.4	7.1	
	Lead (Pb) (mg/kg)	10.7	6.4	7.8	
	Mercury (Hg) (mg/kg)	<0.0050	<0.0050	<0.0050	
	Nickel (Ni) (mg/kg)	10.3	7.2	6.6	
	Zinc (Zn) (mg/kg)	26.8	26.5	29.0	
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	
riyurocarbons	F3 (C16-C34) (mg/kg)	<50 <50	<50 <50	<50 <50	
Polychlorinated Biphenyls	F1 (C6-C10) (mg/kg) PCB-1016 (mg/kg)	<10 <0.050	<10 <0.050	<10 <0.050	
Diplicityis	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	
	Total Folychionnated Diphenyis (mg/kg)	<0.050	<0.050	<0.050	

	Sample ID Description	L671792-34	L671792-35	L671792-36	L671792-37	L671792-38
	Sampled Date Sampled Time	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
O	Client ID	MW-5	MW-11	MW-200	MW-19	MW-17
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	418	458	109	150	128
Total Metals	Arsenic (As)-Total (mg/L)	<0.00050	0.0011	<0.00050	<0.00050	0.00062
	Cadmium (Cd)-Total (mg/L)	0.000039	<0.000034	0.000028	0.000210	0.000056
	Chromium (Cr)-Total (mg/L)	0.0051	<0.0020	<0.0010	0.0014	0.0014
	Cobalt (Co)-Total (mg/L)	0.00030	0.00146	<0.00030	0.00199	0.00285
	Copper (Cu)-Total (mg/L)	0.0043	<0.0020	0.0035	0.0033	0.0069
	Lead (Pb)-Total (mg/L)	0.00142	<0.0010	<0.00050	<0.00050	<0.00050
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Nickel (Ni)-Total (mg/L)	0.0086	0.0026	<0.0010	0.0041	0.0024
	Zinc (Zn)-Total (mg/L)	0.0366	<0.0050	<0.0050	0.0856	<0.0050
Hydrocarbons	F2 (C10-C16) (mg/L)	<0.30	<0.30	2.33	< 0.30	<0.30
	F3 (C16-C34) (mg/L)	0.33	0.47	<0.30	0.32	0.33
	F1 (C6-C10) (mg/L)	<0.10	<0.10	0.74	<0.10	<0.10
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

	Sample ID Description	L671792-39	L671792-40		
	Sampled Date Sampled Time Client ID	15-AUG-08	15-AUG-08		
Grouping	Analyte	MW-18	MW-20		
	, and yet				
WATER					
Physical Tests	Hardness (as CaCO3) (mg/L)	51.8	113		
Total Metals	Arsenic (As)-Total (mg/L)	<0.00050	<0.00050		
	Cadmium (Cd)-Total (mg/L)	0.000025	0.000024		
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010		
	Cobalt (Co)-Total (mg/L)	<0.00030	<0.00030		
	Copper (Cu)-Total (mg/L)	0.0023	0.0029		
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050		
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020		
	Nickel (Ni)-Total (mg/L)	0.0014	<0.0010		
	Zinc (Zn)-Total (mg/L)	0.0081	<0.0050		
Hydrocarbons	F2 (C10-C16) (mg/L)	<0.30	1.99		
	F3 (C16-C34) (mg/L)	<0.30	<0.30		
	F1 (C6-C10) (mg/L)	<0.10	0.75		
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010		
	PCB-1221 (mg/L)	<0.0010	<0.0010		
	PCB-1232 (mg/L)	<0.0010	<0.0010		
	PCB-1242 (mg/L)	<0.0010	<0.0010		
	PCB-1248 (mg/L)	<0.0010	<0.0010		
	PCB-1254 (mg/L)	<0.0010	<0.0010		
	PCB-1260 (mg/L)	<0.0010	<0.0010		
	PCB-1262 (mg/L)	<0.0010	<0.0010		
	PCB-1268 (mg/L)	<0.0010	<0.0010		
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010		
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### **Reference Information**

#### **Additional Comments for Sample Listed:**

Samplenum Matrix		Report Remarks	Sample Comments
Methods Listed (if	applicable):		
ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

F1-MET-PT-FID-VA

Soil

CCME by Purge and Trap with GCMS

EPA 8260B & 524.2

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID.

#### Notes:

- 1. F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.
- 2. Reported results are expressed as milligrams per dry kilogram.
- This method is validated for use.
- 4. Data from analysis of quality control samples is available upon request.

F1-PT-FID-VA

Water

CCME F1 By P&T with GCFID

**EPA SW-846, METHOD 8260** 

This analysis is based on the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10), the sample undergoes a purge and trap extraction prior to analysis by GC/FID.

F1 (C6-C10): Sum of all hydrocarbons that elute between nC6 and nC10.

F2-F3-SF-FID-VA

Water

Extractable Hydrocanbons in water GCFID

CWS (CCME)

Petroleum Hydrocarbons (F2-F3) in Water

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, published by the United States Environmental Protection Agency (EPA) and the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane prior to capillary column gas chromatography with flame ionization detection (GC/FID).

A silica gel cleanup procedure is applied before GC analysis, which is intended to selectively remove most naturally occurring organics.

F2F3-TUMB-H/A-FID-VA Soil

Petroleum Hydrocarbon by Tumbler GCFID

CCME

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C34 hydrocarbons (F2 & F3) a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds and is analyzed by on-column GC/FID.

#### Notes:

- 1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
- 2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
- 3. This method is validated for use.
- 4. Data from analysis of quality control samples is available upon request.
- 5. Reported results are expressed as milligrams per dry kilogram.

HARDNESS-CALC-VA

Water

Hardness

**APHA 2340B** 

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

**HG-CCME-CVAFS-VA** 

Soil

CVAFS Hg in Soil (CCME)

CCME

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

### **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

**HG-TOT-CCME-CVAFS-** Water

Total Mercury in Water by CVAFS (CCME)

EPA 245.7

VA
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-CSR-FULL-ICP-VA Soil

Metals in Soil by ICPOES (CSR SALM)

**BCMELP CSR SALM METHOD 8** 

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

**MET-CSR-MS-VA** 

Soil

Metals in Soil by ICPMS (CSR SALM)

BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasmamass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-TOT-CCME-ICP-VA Water

Total Metals in Water by ICPOES (CCME)

EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA Water

Total Metals in Water by ICPMS (CCME)

EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

**MOISTURE-VA** 

Soil

Moisture content

ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

**MOISTURE-VA** 

Soil

ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PCB-SE-ECD-VA

Soil

PCB by Extraction with GCECD

EPA 3630/8082 GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3500, 3620, 3630, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a solid-liquid extraction of a subsample of the sediment/soil using a mixture of hexane and acetone. Water is added to the extract and the resulting hexane extract undergoes one or more of the following clean-up procedures (if required): florisil clean-up, silica gel clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

### **Reference Information**

#### Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

PCB-SF-ECD-VA Water PCB by Extraction with GCECD EPA 3510/8082 Liq-Liq GCECD

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3510, 3620, 3660, 3665 & 8082, published by the United States Environmental Protection Agency (EPA). The procedure involves a liquid-liquid extraction of the entire water sample using dichloromethane. The extract is then solvent exchanged to hexane followed by one or more of the following clean-up procedures (if required): florisil clean-up, sulphur clean-up and/or sulphuric acid clean-up. The final extract is analysed by capillary column gas chromatography with electron capture detection (GC/ECD).

PH-1:2-VA Soil CSR pH by 1:2 Water Leach

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TL-CSR-MS-VA Soil ICPMS TI in Soil by CSR SALM

**BCMELP CSR SALM Method 8** 

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by either hotplate or block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma mass spectrometry (EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

#### GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

### ALS Laboratory Group



### CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

coc#C065196

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**Environmental Division** www.alsenviro.com REPORT TO: REPORT FORMAT / DISTRIBUTION SERVICE REQUESTED COMPANY: GARTHER LEE LIMITED STANDARD V OTHER REGULAR SERVICE (DEFAULT) KEN BOLDT PDF V EXCEL V CUSTOM CONTACT: FAX RUSH SERVICE (2-3 DAYS) ADDRESS: 300 TOWN CONTRE, SUITE 300 K bold to gartner le com EMAIL 1: PRIORITY SERVICE (1 DAY or ASAP) EMAIL 2: @ gartner let. com EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS PHONE: 905 472 BYD FAX: ANALYSIS REQUEST INVOICE TO: SAME AS REPORT ? YES NO INDICATE BOTTLES: FILTERED / PRESERVED (F/P) KITNUNA PROJECTS INC. COMPANY: CLIENT / PROJECT INFORMATION: JOB & U80 -297 POTOR ARMSTRONG CONTACT: CAMBRIDGE BAY NU PO /AFE: ADDRESS: Legal Site Description: PHONE: 367-983-750+X: PROJUCTS INC. KITHUNA QUOTE #: HAZARDOUS SAMPLER Lab Work Order # 6941792 (lab use only) (Initials): SAMPLE IDENTIFICATION Sample SAMPLE TYPE DATE TIME (This description will appear on the report) BMW -3-15 2 AUG JOIL MW-5-10 2 MW-5-25 MW-8-10 2 BMW -3-40 30000 BMW# -30 - 40 MW - 9 -SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS **GUIDELINES / REGULATIONS** CCME COME DETECTION LIMITS Coowers SHIPPED Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy. RELINQUISHED BY: DATE & TIME: RECEIVED BY: DATE & TIME: SAMPLE CONDITION (lab use only) DARRIN TOHRSON 16/08 TEMPERATURE SAMPLES RECEIVED IN GOOD CONDITION ? FES) NO RELINQUISHED BY: DATE & TIME: RECEIVED BY:

Cam Aug.19

# ALS Laboratory Group ANALYTICAL CHEMISTRY & TESTING SERVICES



## CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

coc#C065207

### **Environmental Division**

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www.alsenviro.com

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# ALS Laboratory Group ANALYTICAL CHEMISTRY & TESTING SERVICES



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# ALS Laboratory Group



### CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

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### **Environmental Division**

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CONTACT: PUTER ARMSTRANG	JOB#: BU	- 8D	-297	MEAN IS	100	MS	3	-	70	-	7:365		1	1 48		SS RS	
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PHONE: \$67 983-75800:	QUOTE #: C/b	ato	UNA F	NITELL	In/c.	+	U			No					JS	CONTAMINATED S OF CONTAINER	
Lab Work Order # (lab use only)		A CONTRACTOR	SAMPLER (Initials):			3	4	8					g to	6603	DOC	S S	
Sample SAMPLE IDENTIFICATION  # (This description will appear on the repo	DA DA	TE	TIME	SAMPL	E TYPE	METAL	HOY	De			Mine P			5.0	HAZARDOUS	HIGHLY CONTAMINATED ?	
MW-200-35		15/08		5014	/	7	1	./	-	10000		100	100		+	12	
mW-19-20	1 1000	1 100		Soil	AVENUE OF	1	1	7	JET 15	Q-090g	E04	FNAS	M SEA	DU NB	100	2	
1 1				SOIL	7 S. S. C. L	./	./	V		1	E PO		100	100	88	9	
mw-19-50						1	V	~		+		+	+		6	0	
MW -5				WAT	erc	V	V	/	-	55	BPA.	100	-		100	2	
WW-11	A	254	128 - 32		K TOWN	V	V	-	350			- 12	-			5	
WM-500					TO LA	V	V	/	7 13	7 50	100	334	177			5	
MW-19	· 2007年	(950)	1/2/End 1/4	300	1.870	V	V	/		1200	2 4	211	15/15	78 A		5	
MW-17	1 - GI - 27 (O 17	55%			21.0	/	V	V	320		46		120	1		5	
MW-18		liba.	SEE .	7.00		V	V	/		0	5.74	Prime.	45	4	\$7.	5	
MW-20	1		(Adjust	V	Liber	V	V	V	and Ex	1	141	35	4	Total .	14	5	
GUIDELINES / REGULATIONS			S	PECIAL I	NSTRU	CTIO	NS/	HAZ	ARDO	US D	ETAII	LS					
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Failure to complet												41	la lika		18	, á	
By the use of this form the user acknowled RELINQUISHED BY: DATE & TIME:	RECEIVED BY:	vitin the 1	erms and	DATE & TI		ecm	eu o	n tne							copy	1.	
DARRIN JOHNSON AUG. 16/08	J. C. C. T. WILL.							SAMPLE CONDITION (lab use only) TEMPERATURE SAMPLES RECEIVED IN GOOD CONDITION ? YES! NO									
RELINQUISHED BY: DATE & TIME:	RECEIVED BY:		aun	Aug		12	-1-	7/6	oc (If n	o provid	le details	s)	t.		Kto i		

# **Appendix G**

# **Quality Assurance/Quality Control**

- Table G1 Soil Sampling QA/QC Results
- Table G2 Water Sampling QA/QC Results

Table G-1. CAM-4 Kugaaruk, Soil Analysis - QA/QC

xx%

	Sample Ident.	Sample Location	Depth	Laboratory	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury					PCB Total
		Location												TPH C6-C34	C6-C10	C10-C16	C16-C34	Aroclors
			(m)		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
	BMW-3-40	BMW-3	0.40	ALS	16.8	17.5	9.0	< 0.50	10.9	53.7	35.0	<5.0	0.0086	0	<10	<30	<50	< 0.050
	BMW-30-40*	BMW-3	0.40	ALS	12.0	13.9	7.1	< 0.50	8.0	38.3	28.4	<5.0	<0.0050	0	<10	<30	<50	< 0.050
	BMW-3-40*	BMW-3	0.40	Cantest	12.0	16.0	8.0	<0.2	8.3	46.0	30.0	2.3	0.01	0	<5	<5	<5	< 0.030
Average					13.60	15.80	8.03	-	9.07	46.00	31.13	-	-	-		-	-	-
RSD					20%	11%	12%	-	18%	17%	11%	-	-	-	-	-	-	-
	MW-14-A-30	MW-14-A	0.30	ALS	12.1	14.2	6.7	< 0.50	8.3	35.8	28.1	<5.0	< 0.0050	0	<10	<30	<50	< 0.050
	MW-140-A-30*	MW-14-A	0.30	ALS	11.8	13.9	6.1	< 0.50	8.0	33.8	27.4	<5.0	< 0.0050	0	<10	<30	<50	< 0.050
	MW-14-A-30*	MW-14-A	0.30	Cantest	11.0	14.0	7.0	<0.2	8.4	38.0	28.0	2.4	0.01	0	<5	<5	<5	< 0.030
Average					11.63	14.03	6.60	-	8.23	35.87	27.83	-	-	-		-	-	-
RSD					5%	1%	7%	-	3%	6%	1%	-	-	-	-	-	-	-
	MW-20-35	MW-20	0.35	ALS	10.0	8.7	4.7	< 0.50	10.8	25.6	16.7	<5.0	< 0.0050	0	<10	<30	<50	< 0.050
	MW-200-35*	MW-20	0.35	ALS	10.8	10.3	5.0	< 0.50	10.7	26.8	20.8	<5.0	< 0.0050	0	<10	<30	<50	< 0.050
	MW-20-35*	MW-20	0.35	Cantest	8.0	9.0	4.0	<0.2	10.4	25.0	17.0	1.2	0.01	0	<5	<5	<5	< 0.030
Average					9.60	9.33	4.57	-	10.63	25.80	18.17	-	-	-		-	-	-
RSD					15%	9%	11%	-	2%	4%	13%	-	-	-	-	-	-	-

Notes: Relative Standard Deviation (RSDs) calculated by dividing the standard deviation of the comparitive set by the average.

\* Denotes duplicate sample

Exceeds QA/QC goal of 20% for inorganics or 30% for organics.

Table G-2. CAM-4 Kugaaruk, 2008 Groundwater Analysis - QA/QC

	Sample Ident.	Sample Location	Laboratory	Copper	Nickel	Cobalt	Cadmium	Lead	Zinc	Chromium	Arsenic	Mercury	Petr	oleum Hyd	Irocarbons		PCB Total Aroclors
		Location											TPH C6-C34	C6-C10	C10-C16	C16-C34	Arociors
				(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)
	MW-15	MW-15	ALS	<0.0020	0.0065	0.00216	< 0.00003	<0.0010	0.250	0.0024	0.002	<0.00002	7.98	0.35	5.98	1.65	< 0.0010
	MW-150*	MW-15	ALS	< 0.0020	0.0063	0.00208	< 0.00003	<0.0010	0.239	< 0.0030	0.002	< 0.00002	6.88	0.33	5.15	1.4	< 0.0010
	MW-15*	MW-15	Cantest	0.001	0.007	0.002	< 0.0002	<0.001	0.32	<0.001	<0.001	< 0.02			3.8	1.6	< 0.0004
Average				-	0.007	0.002	-	-	0.270	-	-	-	-	-	4.97667	1.55	-
RPD				-	5.5%	3.8%	-	-	16.3%	-	-	-	-	-	22.1%	8.5%	-
	MW-20	MW-20	ALS	0.0029	< 0.0010	< 0.00030	0.000024	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.00002	2.74	0.75	1.99	< 0.30	<0.0010
	MW-200*	MW-20	ALS	0.0035	< 0.0010	<0.00030	0.000028	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.00002	3.07	0.74	2.33	< 0.30	< 0.0010
	MW-20*	MW-20	Cantest	0.003	< 0.001	<0.001	< 0.0002	<0.001	0.022	< 0.001	< 0.001	< 0.02			1.2	<0.25	< 0.0004
Average				0.003	-	-	-	-	-	-	-	-	-	-	1.840	-	-
RPD				10.3%	-	-	-	-	-	-	-	-	-	-	31.5%	-	-

Notes:

Relative Standard Deviation (RSDs) calculated by dividing the standard deviation of the comparitive set by the average.

\* Denotes duplicate sample

xx%

Exceeds QA/QC goal of 20% for inorganics or 30% for organics.

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