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Report

Defence Construction Canada

The Collection of Landfill Monitoring Data at the PIN-3 Lady Franklin Point Site – 2008

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The Collection of Landfill Monitoring Data at the PIN-3 Lady Franklin Point Site – 2008

Prepared by:

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Project Number:

107891 / 80297-3

Date:

January, 2009

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January 7, 2009 Project Number: 107891 / 80297-3

Mr. Kourosh Khazan
Contract Co-ordinator
Defence Construction Canada
Constitution Square, Suite 1720
350 Albert Street
Ottawa, ON K1A 0K3

Dear Mr. Khazan:

Re: Report for the 2008 Collection of Landfill Monitoring Data at the PIN-3 Dew Line Site, Lady Franklin Point, Nunavut

Gartner Lee Limited doing business as AECOM (AECOM) is pleased to submit eight hard copies of the 2008 Report on Collection of Landfill Monitoring Data at the PIN-3 DEW Line Site at Lady Franklin Point, Nunavut. This report documents the data collected from the site visit to the PIN-3 Site between August 15, and 16, 2008. In addition to the hard copy reports, three digital data discs are attached which contain:

- all numeric data files including analytical results, thermistor data and associated graphs, submitted in MS Excel 2003;
- all text files submitted in MS Word 2003;
- all drawings submitted in AutoCAD Version 2008;
- all photographic records of the soil samples collected at each landfill. Inclusive of an index of the photo numbers and the locations;
- 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. Inclusive of an index of the photo numbers and the locations; and,
- all field notes have been attached to each specific landfill investigation report.

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

Visual inspections were completed at the following landfills: Main Landfill, NWS Landfill, South Landfill, North Landfill, Non-hazardous Waste Landfill, and the DCC Tier II Soil Disposal Facility. In all cases, the condition of the landfills appeared substantially unchanged from the 2007 inspection. From the visual analysis during the site visit, there does not appear to be any significant erosion or cover issues that require immediate attention or that would be expected to lead to degraded cover performance in the near term.

Soil samples were collected at two depths from test pits at the Main Landfill and the DCC Tier II Soil Disposal Facility. Sample results are provided in each landfill report. AECOM recommends that DCC compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

Six (6) of the eight (8) wells monitored in 2008 contained sufficient water to collect a sample for analysis. Monitoring wells MW-9 and MW-10 were not sampled at the Tier II Soil Disposal Facility due to insufficient water for sample collection. Additionally, MW-7, located at the Main Landfill contained sufficient water for inorganic elements analysis only. Sample results are contained in each specific landfill report. AECOM recommends that DCC compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

All thermistor data were downloaded successfully. Data loggers were reset in accordance with the instructions provided by DCC.

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

Sincerely,
AECOM

(original signed and stamped)

Darrin C. Johnson, P.Eng.
Darrin.Johnson@aecom.com

DCJ:pc
Attach.

Signature Page

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1	AECOM		

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	J.Theriault	Oct. 28, 2008	Draft for Review.
2	DCC	Nov. 17, 2008	Review Comments.
3	J.Theriault	Jan. 09, 2009	Final Report.

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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 Distant Early Warning (DEW) Line sites. Defence Construction Canada (DCC) is managing the clean-up monitoring programs on behalf of DND. Kitnuna Projects Inc. (Kitnuna) and Gartner Lee Limited doing business as AECOM (AECOM), in a joint venture, were awarded the contract for the purposes of providing services for the collection of landfill monitoring data at the PIN-3 Lady Franklin Point 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.

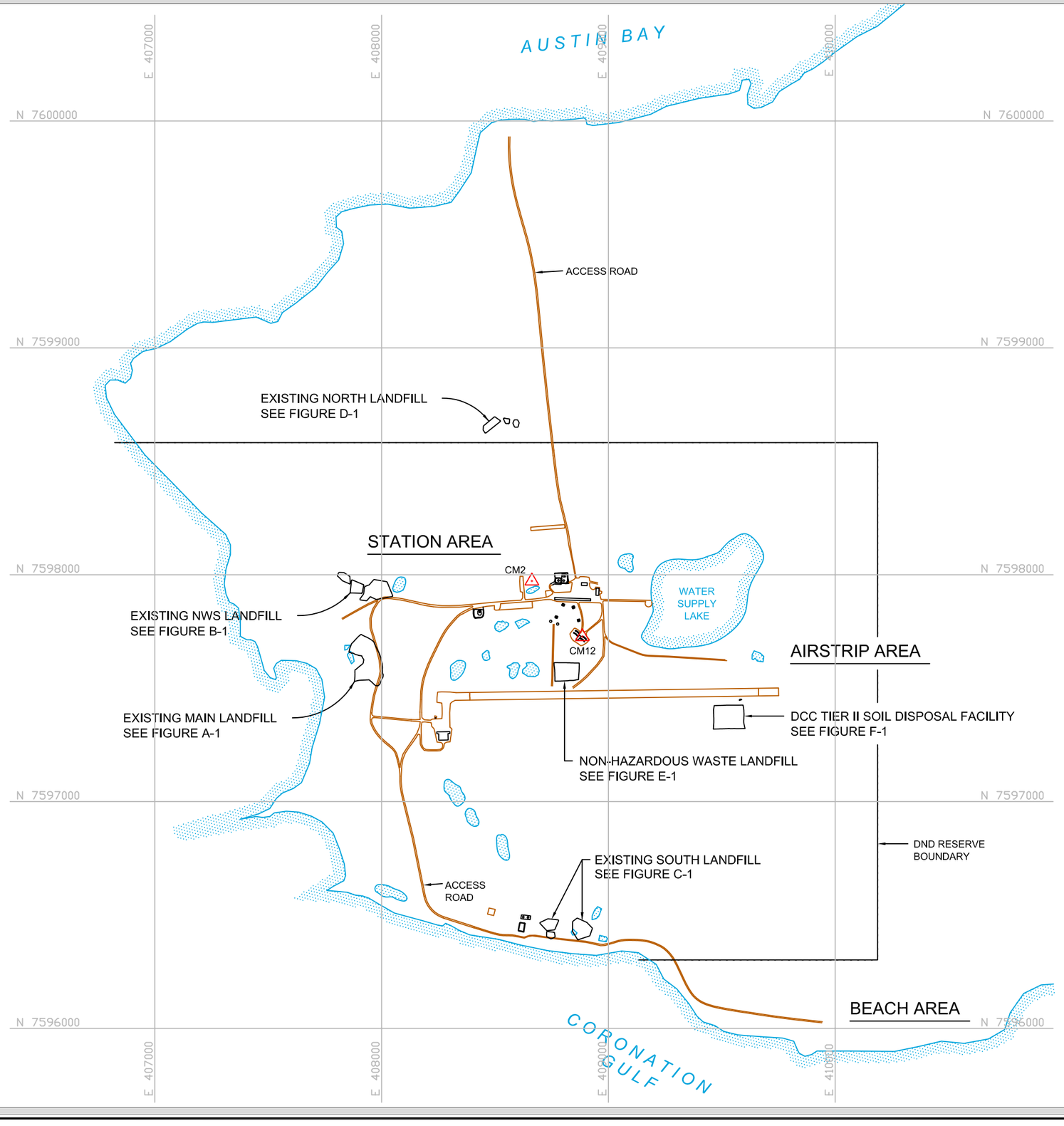
2. Background

The PIN-3 Lady Franklin Point DEW Line Site is located on the Southwestern side of Victoria Island at 68^{o} 28' North and 113 ^{o} 13' West in Nunavut Territory. PIN-3 is located approximately 325 km west of Cambridge Bay and 115 km northeast of Kugluktuk.

PIN-3 was converted to a Long Range Radar (LRR) site in the early 1990's. Demolition and remediation of the components not required for operation of the LRR commenced in 2002 and was completed in 2004. As part of the cleanup, five landfills were decommissioned, a non-hazardous landfill was constructed for demolition debris, and a soil disposal facility for the containment of contaminated soil was constructed. Currently a total of 6 landfills exist at the PIN-3 site:

- Main Landfill;
- NWS Landfill;
- South Landfill – East and West;
- North Landfill;
- Non-Hazardous Waste Landfill; and
- 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.



Legend

CM2 SURVEY CONTROL MONUMENT

WATERBODY

Map Sources / Notes:
Source drawing from UMA: P3-RD01.dwg

0 100 200 400 600 800 m

1 : 20,000
UTM Zone 12W, NAD83

File Name:	80297_By1_01_MonitoringPlan(P3-RD01).DWG		
Reviewed by:	JAT	Prepared by:	KAB
Date Issued:	December, 2008	Project Number:	80297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

Dew Line Clean Up Monitoring Plan

AECOM

Figure 2-1
Version 1

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_01_MonitoringPlan(P3-RD01).DWG

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

On August 15, and 16, 2008 field data collection was conducted at the PIN-3 DEW Line site. The monitoring event consisted of visual inspections of all landfill locations, collection of soil and groundwater samples, as well as 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				
PIN-3 Lady Franklin Point				
Main Landfill	✓	✓	✓	✓
NWS Landfill	✓			
South Landfill – East	✓			
South Landfill – West	✓			
North Landfill	✓			
DCC Tier II Disposal Facility	✓	✓	✓	✓
Nan-hazardous Waste Landfill	✓			

The weather on August 15th was partly cloudy and 6ºC with light winds. On August 16th the weather was overcast with periods of rain and 2ºC.

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 F.

Soil sampling was conducted at the Main Landfill and the DCC Tier II Soil Disposal Facility for 2008. Generally, soil samples were collected at depths of approximately 0.1m and approximately 0.4-0.5m, although there were some variations in sample depths dependent on 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 A and F.

Where possible, groundwater elevations were measured using an interface meter at each observation well at the Main Landfill and the DCC Tier II Soil Disposal Facility. 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 sample collection, 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 PCBs, TPH (F1 – F3), and inorganic elements. Both purging and collection of water samples were conducted using a peristaltic pump for low flow extraction (q ~ 0.1 L/min) 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 A and F. The well sampling records are appended to the relevant sections in Appendices A and F.

Thermal Monitoring was conducted at the Main Landfill and the DCC Tier II Soil Disposal Facility in 2008. The data was downloaded from the system using the Lakewoods Systems Ltd. Software *Prolog*. The information downloaded is further discussed in the individual landfill reports presented in Appendices A and F.

3. Landfill Monitoring

As requested by DCC, Gartner Lee 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 Main Landfill;
- Appendix B NWS Landfill;
- Appendix C South Landfills – East and West;
- Appendix D North Landfill;
- Appendix E Non-hazardous Waste Landfill; and,
- Appendix F DCC Tier II Soil Disposal Facility.

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.

4. Quality Assurance/Quality Control

To maintain quality assurance/quality control during sampling, blind duplicates for both soil and groundwater were collected with a frequency of approximately one in ten samples collected. Tables used for the calculation of Relative Standard Deviation (RSD) are located in Appendix G.

All duplicate samples were submitted to both ALS Environmental and Cantest Ltd. for analysis. As well, a duplicate soil sample was 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
P3-MW-13	P3-MW-8	MW-8	-	Water	Tier II
P3-MW-13B	P3-MW-8B	MW-8	0.5	Soil	Tier II

The blind duplicate soil samples were analyzed for fourteen (14) parameters. The laboratory results from each of the duplicates were compared to calculate a RSD for each parameter. Of the fourteen (14) RSD values calculated, x returned a value of “n/a” due to one or more concentration being below the detection limit.

5. Conclusions

From the visual analysis during the site visit, there does not appear to be any significant erosion or cover issues that require immediate attention or that would be expected to lead to degraded cover performance in the near term. The condition of the inspected landfills is substantially unchanged from that observed during the 2006 and 2007 inspections. The effectiveness of a visual inspection relies in large part on the ability to detect relative changes in the surface contours and elevations. The existing relatively rough final grade of several of the landfill covers (Tier II in particular) does not lend itself to effective visual inspection as construction irregularities mask all but large and obvious changes.

No as-built survey records are available for the PIN-3 landfills.

6. Limitations

This report has been prepared as an assessment of the environmental condition of the subject site located at near Lady Franklin Point, 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.

The assessment of environmental conditions and possible hazards at this site has been made using the results of chemical analysis of soil/sediment and groundwater from a limited number of locations. The site conditions between sampling locations have been inferred based on conditions observed at sampling locations. Subsurface conditions may vary from those encountered at the sample locations.

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.

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 either 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.

If you should have any questions regarding this report, please contact us at your convenience.

Appendix A

Main Landfill - Attachments

A1 – Site Condition/Visual Inspection Records
A2 – Geotechnical Inspection Photographic Records
A3 – Monitoring Photographic Records
A4 – Monitoring Well Sampling Records
A5 – Thermistor Maintenance Records
A6 – Thermistor Graphs
A7 – Field Notes

1. Main Landfill

1.1 Landfill Summary

The main landfill is located approximately 800m west of the main station area and encompasses an area of approximately 61,000m^2. The average thickness of the landfill is approximately 1.5m. The landfill configuration and sample locations are shown on Figure A-1. Prior to the remedial work in 2004, DCC had previously classified this site as a moderate to high potential environmental risk. The remedial work for this landfill included the installation of a synthetic liner anchored into the permafrost along the toe of the landfill and regrading, with the placement of additional granular fill material sufficient to promote permafrost aggradation through the landfill contents. The cover of the landfill has no vegetation. The surface consists of a veneer of pebbles and cobbles overlying the silty sand and gravel cover.

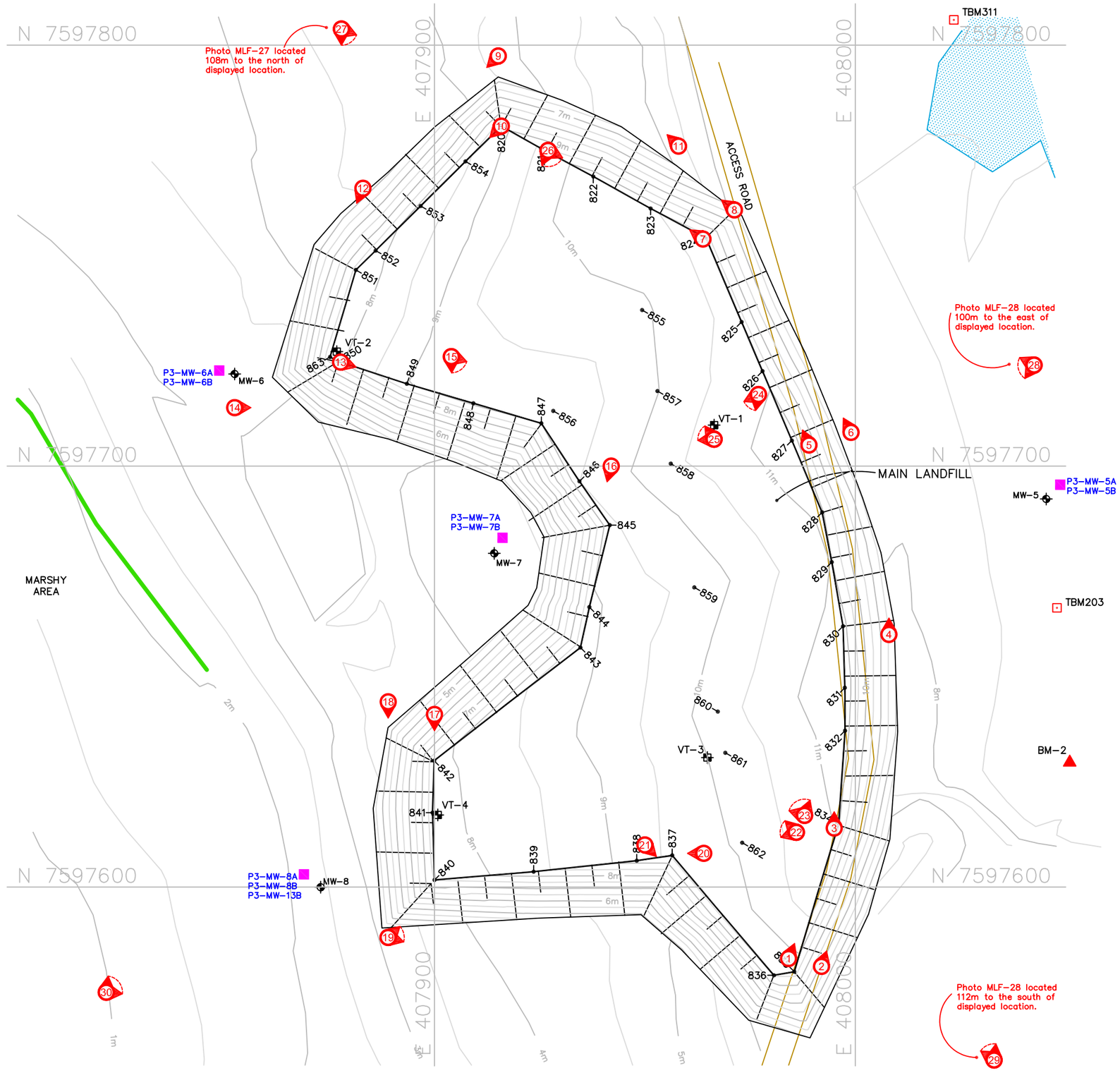
For 2008, the monitoring requirements for the Main Landfill included visual inspection, soil sampling, groundwater sampling, and thermal monitoring.

1.2 Visual Monitoring

Based on the 2008 visual inspection, the Main Landfill appears to be in good condition overall. The condition is substantially unchanged from last year and there are no indications of degraded performance. There are no visible indications of frost action or significant differential settlement. Several areas of minor rutting and surficial erosion, likely remnants from heavy equipment traffic during construction, were observed during the previous two inspections (2006 and 2007). In all cases the minor erosional features appear to have stabilized and self-armoured to effectively mitigate against further degradation.

As noted in the 2006 and 2007 inspections, the top surface of the landfill appears to have several areas of broad depression; specifically in the areas around thermistors VT-1 and VT-3 (refer to Photographs 23, 25 and 26). There is no as-built survey information available for this landfill; therefore it is not possible to compare the current surface contours with the original shaping of the landfill. There is no indication of significant differential settlement or problematic foundation conditions associated with these broad depressions. These depressions should continue to be monitored to confirm that they are not associated with problematic foundation conditions.

The overall performance of the landfill is considered acceptable. The noted areas of broad depression should continue to be monitored.



Legend

- TBM203 — TEMPORARY BENCHMARK
- BM-2 — PERMANENT BENCHMARK
- MW-5 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 820 — COORDINATE POINT
- P3-MW-5A / P3-MW-5B — MONITORING SAMPLE LOCATION
- 18 — PHOTOGRAPH LOCATION
- STANDING WATER
- MARSHY

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: P3-RD02.dwg

0 5 10 20 30 40 m
1 : 1000
UTM Zone 12W, NAD83

File Name: 80297_By1_A1_MainLandfill(P3-RD02).DWG
Reviewed by: JAT — Prepared by: KAB
Date Issued: December, 2008 — Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

Main Landfill

AECOM

Figure A-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\20080\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_A1_

1.3 Soil Sampling

Soil samples were collected at the designated locations of MW-5, MW-6, MW-7 and MW-8. The sampling locations are shown on Figure A-1. At each location, where possible, two samples were collected at approximately 0.1m below ground and between 0.4-0.5m below ground. The test pit at MW 7 was excavated to a depth of 0.15 m before refusal (bedrock), and sample P3-MW-7B was collected at this depth. A photograph of the test pit at each location sampled is shown in Appendix A3.

AECOM did not identify any hydrocarbon odours, staining, or free product, at any of the sampling locations at the Main Landfill. No detectable concentrations of TPH (C6-34) were observed in the soil samples collected from the Main Landfill. The laboratory results indicate no detectable levels of PCB in any soil samples collected from the Main Landfill. Low levels of copper, nickel, cobalt, lead, zinc and chromium were detected in the various soil samples from the Main Landfill; however AECOM does not consider any of the results to be of significance. It is recommended that these results be evaluated in the context of the DEW Line Landfill Monitoring Plan.

Analytical results and depths of samples are provided in Table A-1 and the laboratory certificate is provided in Appendix G.

Table A-1. PIN-3 Lady Franklin Point, Summary of 2008 Soil Analysis - Main Landfill

Sample Ident.	Sample Location	Depth	Copper Cu	Nickel Ni	Cobalt Co	Cadmium Cd	Lead Pb	Zinc Zn	Chromium Cr	Arsenic As	Mercury Hg	PCB Total Aroclors	F1 C6-C10	F2 C10-C16	F3 C16-C34	TPH 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 Samples																
P3-MW-5A	MW-5	0.1	7	<5.0	3	<0.50	3.8	5.8	6	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-5B	MW-5	0.5	4.7	-	2.2	<0.50	2.5	5.9	5.4	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																
P3-MW-6A	MW-6	0.1	6.2	<5.0	2.3	<0.50	<2.0	5.4	5.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-6B	MW-6	0.5	10	6.3	3.8	<0.50	<2.0	7.9	7.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-7A	MW-7	0.1	10.3	<5.0	2.1	<0.50	2.1	5.3	5.1	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-7B	MW-7	0.15	12.1	<5.0	2.5	<0.50	2.5	7.5	6.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-8A	MW-8	0.1	2.9	<5.0	<2.0	<0.50	<2.0	3	2.5	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-8B	MW-8	0.5	5.5	<5.0	<2.0	<0.50	<2.0	4.2	4.1	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-13B *	MW-8	0.5	3.6	<5.0	<2.0	<0.50	<2.0	3.9	3.3	<5.0	<0.050	<0.050	<10	<30	<50	ND

***** *Denotes duplicate sample. (Further information located in Table 2 of main report)*

Note: mg/kg = ug/g

TPH = The sum of F1, F2, and F3 as per the TOR

ND = No detectable concentrations observed

1.4 Groundwater Sampling

Measurement of depth to groundwater and documentation of monitoring well conditions were recorded for monitoring wells MW-5, MW-6, MW-7 and MW-8. The monitoring well development records are provided in Appendix A4. Generally the monitoring wells appeared to be in good condition during AECOM's site visit.

Wells were purged and groundwater samples were collected at a maximum flow rate of 100mL/min using a peristaltic pump, and disposable LDPE tubing at each well. Monitoring of field parameters during purging included pH, conductivity, temperature, and turbidity. The groundwater samples were not filtered and not preserved as per the Terms of Reference, and were analyzed for total concentration of inorganic elements, TPH (C6-C32) and PCB. Sufficient water was available from wells MW-5, MW-6 and MW-8. Monitoring well MW-7 contained sufficient water to provide a sample for inorganic metals analysis only. The groundwater pH measured in MW-6 and MW-7 exceeded pH 10 which is consistent with results from previous years (2005-2007). Additionally, MW-7 had an extremely low recharge rate, which raises concerns as to the future production of the monitoring well in the context of a sampling program.

The laboratory results revealed no detectable levels of TPH (C6-C32) or PCB and only very low concentrations of copper, nickel, cobalt, zinc, and chromium, but none of the detectable levels are considered to be of significance. It is recommended that these results be evaluated in the context of the DEW Line Landfill Monitoring Plan.

The results are presented in Table A-2 and the laboratory certificate is provided in Appendix G.

Table A-2. PIN-3 Lady Franklin Point, Summary of 2008 Groundwater Analysis - Main Landfill

Sample Identification	Location	Groundwater Elevation (masl)	Copper Cu (mg/L)	Nickel Ni (mg/L)	Cobalt Co (mg/L)	Cadmium Cd (mg/L)	Lead Pb (mg/L)	Zinc Zn (mg/L)	Chromium Cr (mg/L)	Arsenic As (mg/L)	Mercury Hg (mg/L)	PCB Total Aroclors (mg/L)	F1 C6-C10 (mg/L)	F2 C10-C16 (mg/L)	F3 C16-C32 (mg/L)	TPH C10-32 (mg/L)
Upgradient Samples																
P3-MW-5	MW-5	7.8	0.0039	0.0112	0.00171	<0.000050	<0.0010	0.0089	<0.00050	<0.0010	<0.00020	<0.0010	<0.10			<2.0
Downgradient Samples																
P3-MW-6	MW-6	2.55	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	0.0357	0.0135	<0.0050	<0.00020	<0.0010	<0.10			<1.0
P3-MW-7 **	MW-7	2.28	<0.010	<0.050	<0.0050	<0.00050	<0.010	<0.0050	0.0055	<0.010	<0.00020	-	-			-
P3-MW-8	MW-8	2.06	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	0.0173	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0
P3-MW-13 *	MW-8	2.06	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	<0.0050	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0

** Denotes duplicate sample. (Further information located in Table 2 of main report)*

** MW-7 containted sufficient water volume for metals analysis only.

Note: mg/L approx. equals mg/kg (varies with solution density)

Lab analysis for TPH included carbon range C10 to C32. F1 (carbon range C6 to C10) was additionally analyzed to meet TOR requirements.

1.5 Thermal Monitoring

The manual readings taken from each thermistor from the Main Landfill are provided in the completed Maintenance Records located in Appendix A5. Selected data has been plotted into graphs for each thermistor which are provided as Graphs A-1 through A-4 located in Appendix A6.

Data were downloaded from all thermistor data-loggers, and the data-loggers were reset in accordance with instructions provided by DCC. Batteries were not replaced as instructed by DCC. The observed battery levels for data-loggers VT-1 and VT-3 were lower than levels observed at other thermistor locations, and in comparison to levels observed in previous years. The battery levels can be found in the Maintenance Record for each thermistor in Appendix A5, and should be evaluated by DCC as to whether any action is required. The batteries were last replaced in 2007.

The next scheduled inspection of the thermistors at the Main Landfill and download of the data is not until 2011.

A1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	Main Landfill
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 21, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

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

Checklist Item	Present Yes/No	Location	Dimensions (m)			Extent (% of Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	Yes	Landfill cap areas around VT-1 and VT-2	50m	50m	0.2 to 0.5 (est.)	5	Minor depressions	23, 25 and 26	Monitor, should be surveyed, Acceptable
Erosion	No	See comments					Minor rutting, equipment tracks (now completely self armoured)		Areas identified during previous inspections (2006 and 2007) have self armoured and stabilized.
Frost Action	Acceptable								
Animal Burrows	No								
Vegetation	No								
Staining	Sparse								
Vegetation Stress	No								
Seepage Points	No								
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	No								
Other Features of Note.	Yes						VT-1, VT-2, VT-3, VT-4, MW-5, MW-6, MW-7 and MW-8		All Instrumentation remains functional. Locks were replaced in 2008.
Additional Photos	No						Additional photos	Photos 1-22, 24, 27-30	General photos for documentation, no features of note

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

A2 – Geotechnical Inspection Photographic Records

Photograph MLF-1. Looking N from SE corner. Backpack for scale along crest. ↑

Photograph MLF-2. Looking N from centre slope at the SE corner. MW-5 visible in distance. ↑

Photograph MLF-3. Looking N along east crest. ↑

Photograph MLF-4. Looking N along E slope toe. Backpack and scale adjacent to MW-5. ↑

Photograph MLF-5. Looking N along E crest, looking to NE corner.

Photograph MLF-6. Looking N from d/s toe to NE corner.

Photograph MLF-7. Looking NW along crest from NE corner. ↑

Photograph MLF-8. Looking NW along toe from NE corner. ↑

Photograph MLF-9. Looking SW from NW corner (5m N of toe). Everything looks stable. Backpack in same location as MLF-10 ↑

Photograph MLF-10. Looking SW along crest from NW crest. VT-2 visible in the distance.↑

Photograph MLF-11. Looking NW from mid-slope N side MLF. Backpack at sharply defined corner. ↑

Photograph MLF-12. Looking SSW from NW landfill. Both MW-6 and VT-2 visible. (MW-6 being sampled). ↑

Photograph MLF-13. Looking ESE along crest from next to VT-2.

Photograph MLF-14. Looking E from about 8m S of MW-6.

Photograph MLF-15. Panoramic looking ESE to SE from crest to curved slope. Hangar and VT-3 visible in the background. Slope and crest appear stable and well armoured. ↑

Photograph MLF-16. Looking S. VT-4 visible in the distance. ↑

Photograph MLF-17. Looking S along crest to SW corner. VT-4 visible. ↑

Photograph MLF-18. Looking S along toe to SW corner. MW-8 visible in right of frame. ↑

Photograph MLF-19. Panoramic looking E from toe of SW corner. ↑

Photograph MLF-20. Looking W to SW corner (VT-4 to right). ↑

Photograph MLF-21. Looking SE to SE corner and access ramp. Hangar visible in the background. ↑

Photograph MLF-22. Looking W to VT-4 from near SE corner. ↑

Photograph MLF-23. Panoramic looking NNW to N. VT-3 visible near, and VT-1 to right in distance. Backpack is near centre of depression. ↑

Photograph MLF-24. Panoramic looking SSW to VT-3 and VT-4 from about 9m E of VT-1 ↑

Photograph MLF-25. Panoramic looking NW from 2m S of VT-1. Backpack in centre of area of generalized depression. Appears unchanged from previous two inspections. ↑

Photograph MLF-26. Looking S from N end near crest. VT-1 near and VT-3 far. Backpack near centre of area of generalized depression. ↑

Photograph MLF-27. Looking SSE from about 150m NNW of NW corner.

Photograph MLF-28. Looking WSW to E side of landfill. MW-5 visible central frame.

Photograph MLF-29. Looking NW to SE corner of landfill and access ramp.

Photograph MLF-30. Looking NE to NW corner. MW-8 being sampled.

A3 – Monitoring Photographic Records

Photograph 1. Monitoring well MW-5. Sample P3-MW-5 collected. ↑

Photograph 2. Test pit at MW-5. Samples P3-MW-5A and P3-MW-5B collected. ↑

Photograph 3. Monitoring well MW-6. Sample P3-MW-6 collected. ↑

Photograph 4. Test pit at MW-6. Samples P3-MW-6A and P3-MW-6B collected. ↑

Photograph 5. Monitoring well MW-7. Sample P3-MW-7 collected from flow-through cell. Well ran dry during purge. No appreciable recharge. ↑

Photograph 6. Test pit at MW-7. Samples P3-MW-7A and P3-MW-7B collected. Bedrock at 0.15m ↑

Photograph 7. Monitoring well MW-8. Samples P3-MW-8 and P3-MW-13 (Duplicate) collected. ↑

Photograph 8. Test pit at MW-8. Samples P3-MW-8A, P3-MW-8B, and P3-MW-13B (Duplicate) collected. ↑

Photograph 9. Vertical thermistor VT-1. ↑

Photograph 10. Vertical thermistor VT-2. ↑

Photograph 11. Vertical thermistor VT-3. ↑

Photograph 12. Vertical thermistor VT-4. ↑

A4 – Monitoring Well Sampling Records

2008 Monitoring Well Sampling Log (MW #5)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-5
Facility:	Main Landfill

Known Data	
Depth of installation* (m):	3.90
Length of screened section (m):	3.33
Depth to top of screen* (m):	0.57

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.77
Well height above ground (m):	0.48	Depth to bottom (m):	3.17
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	1.40	Evidence of sludge:	-
Well volume of water (L):	2.75	Evidence of freezing/siltation:	Y
Static water level* (m):	1.29		
Length of screen collecting water (m):	1.40		

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 10:05	3	4.5	7.01	1720	5.3	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-15, 2008 10:15	Date and Time Collected:	Aug-15, 2008 10:25
Sample Number - Water:	P3-MW-5	Sample Number - Soil:	P3-MW-5A
			P3-MW-5B
Sample Containers:	4 x 1L Amber Glass	Sample Containers:	4 x 250mL Glass
	2 x VOC vials		
	1 x 250mL Plastic		
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	Clear, colourless	Soil Description:	Sand & gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

*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

AECOM

2008 Monitoring Well Sampling Log (MW #6)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-6
Facility:	Main Landfill

Known Data	
Depth of installation* (m):	4.73
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.53

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.52
Well height above ground (m):	0.58	Depth to bottom (m):	3.82
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	2.30	Evidence of sludge:	-
Well volume of water (L):	4.52	Evidence of freezing/siltation:	-
Static water level* (m):	0.94		
Length of screen collecting water (m):	2.30		

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 11:30	4	4.8	10.2	2230	81.0	Clear, colourless, some cloudy flakes

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-15, 2008 11:40	Date and Time Collected:	Aug-15, 2008 11:50
Sample Number - Water:	P3-MW-6	Sample Number - Soil:	P3-MW-6A
			P3-MW-6B
Sample Containers:	4 x 1L Amber Glass	Sample Containers:	4 x 250mL Glass
	2 x VOC vials		
	1 x 250mL Plastic		
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	Clear, colourless, some flakes	Soil Description:	Sand with some gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

*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

AECOM

2008 Monitoring Well Sampling Log (MW #7)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-7
Facility:	Main Landfill

Known Data	
Depth of installation* (m):	4.80
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.60

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	2.38
Well height above ground (m):	0.33	Depth to bottom (m):	3.13
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.75	Evidence of sludge:	-
Well volume of water (L):	1.47	Evidence of freezing/siltation:	-
Static water level* (m):	2.05		
Length of screen collecting water (m):	0.75		

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Well purged dry

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 12:00	1.5	4.1	11.66	1250	30	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-15, 2008 21:30	Date and Time Collected:	Aug-15, 2008 21:40
Sample Number - Water:	P3-MW-7	Sample Number - Soil:	P3-MW-7A
***A sample was collected for metals	Well ran dry, no appreciable		P3-MW-7B
analysis only. This was collected from the	recharge to collect full		
flow-through cell.***	sample		
Sample Containers:	1 x 250mL Plastic	Sample Containers:	4 x 250mL Glass
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	clear, colourless	Soil Description:	Sand, some gravel, some clay. Bedrock at ~15cm
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

*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

AECOM

2008 Monitoring Well Sampling Log (MW #8)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-8
Facility:	Main Landfill

Known Data	
Depth of installation* (m):	4.75
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.55

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.02
Well height above ground (m):	0.60	Depth to bottom (m):	2.88
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	1.86	Evidence of sludge:	-
Well volume of water (L):	3.65	Evidence of freezing/siltation:	-
Static water level* (m):	0.42		
Length of screen collecting water (m):	1.73		

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 12:50	4	3.3	6.87	2760	16	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-15, 2008 13:00	Date and Time Collected:	Aug-15, 2008 13:10
Sample Number - Water:	P3-MW-8	Sample Number - Soil:	P3-MW-8A
	P3-MW-13 (Dup.)		P3-MW-8B
			P3-MW-13B (Dup.)
Sample Containers:	12 x 1L Amber Glass	Sample Containers:	8 x 250mL Glass
	4 x VOC vials		
	3 x 250mL Plastic		
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	Clear, colourless	Soil Description:	Sand with some gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

*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

AECOM

A5 – Thermistor Maintenance Records

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Main Landfill**		
Thermistor Number:	**VT1**		Inclination		**Vertical**		
Install Date:	**5-Sep-04**		First Date Event		**23-Aug-07**	Last Date Event	**15-Aug-08**
Coordinates and Elevation		N	**9681.35**	E	**9291.581**	Elev	**10.714**
Length of Cable (m)	**7.8**	Cable Lead Above Ground (m)	**2.6**	Nodal Points	**11**		
Datalogger Serial #	**108043**			Cable Serial Number			**1607**

Code PIN-3VT1

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐

Battery Installation Date **23-Aug-07**

Battery Levels Main **10.00 V** Aux **9.94 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10780**	**8.4**
2	**12130**	**5.9**
3	**13430**	**3.9**
4	**14740**	**1.7**
5	**16220**	**0.1**
6	**17040**	**-0.8**
7	**18660**	**-2.6**
8	**19930**	**-3.8**

Bead	ohms	Temp. (ºC)
9	**20990**	**-4.9**
10	**22380**	**-6.1**
11	**22950**	**-6.4**

Observations and Proposed Maintenance

Battery levels appear low even though the batteries were replaced in 2007.

AECOM

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Main Landfill**		
Thermistor Number:	**VT2**		Inclination		**Vertical**		
Install Date:	**5-Sep-04**		First Date Event		**23-Aug-07**	Last Date Event	**15-Aug-08**
Coordinates and Elevation		N	**9698.82**	E	**9209.988**	Elev	**7.92**
Length of Cable (m)	**9.5**		Cable Lead Above Ground (m)	**4.9**	Nodal Points	**14**	
Datalogger Serial #	**111103**				Cable Serial Number		**1608**

Code PIN-3VT2

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐

Battery Installation Date **23-Aug-07**

Battery Levels Main **11.34 V** Aux **13.26 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10240**	**9.5**
2	**10220**	**9.4**
3	**10150**	**9.5**
4	**9180**	**11.7**
5	**10180**	**9.5**
6	**11900**	**6.3**
7	**13030**	**4.4**
8	**14610**	**2.2**

Bead	ohms	Temp. (ºC)
9	**16260**	**0.0**
10	**16950**	**-0.8**
11	**17700**	**-1.6**
12	**18510**	**-2.4**
13	**19150**	**-3.1**
14	**19900**	**-3.8**

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Main Landfill**		
Thermistor Number:	**VT3**		Inclination		**Vertical**		
Install Date:	**5-Sep-04**		First Date Event		**23-Aug-07**	Last Date Event	**15-Aug-08**
Coordinates and Elevation		N	**9602.44**	E	**9298.113**	Elev	**10.014**
Length of Cable (m)	**7.8**		Cable Lead Above Ground (m)	**2.7**	Nodal Points	**11**	
Datalogger Serial #	**111108**				Cable Serial Number		**1609**

Code PIN-3VT3

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐

Battery Installation Date **23-Aug-07**

Battery Levels Main **8.84 V** Aux **6.57 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10850**	**8.2**
2	**12260**	**5.7**
3	**13580**	**3.7**
4	**15030**	**1.6**
5	**16490**	**-0.1**
6	**17420**	**-1.2**
7	**19090**	**-3.0**
8	**20230**	**-4.1**

Bead	ohms	Temp. (ºC)
9	**21590**	**-5.3**
10	**22640**	**-6.3**
11	**23260**	**-6.7**

Observations and Proposed Maintenance

Battery levels appear low even though the batteries were replaced in 2007.

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Main Landfill**		
Thermistor Number:	**VT4**		Inclination		**Vertical**		
Install Date:	**5-Sep-04**		First Date Event		**23-Aug-07**	Last Date Event	**15-Aug-08**
Coordinates and Elevation		N	**9588.91**	E	**9233.938**	Elev	**7.82**
Length of Cable (m)	**8.2**		Cable Lead Above Ground (m)	**3.7**	Nodal Points	**12**	
Datalogger Serial #	**108093**				Cable Serial Number		**1610**

Code PIN-3VT4

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐

Battery Installation Date **23-Aug-07**

Battery Levels Main **11.34 V** Aux **13.38 V**

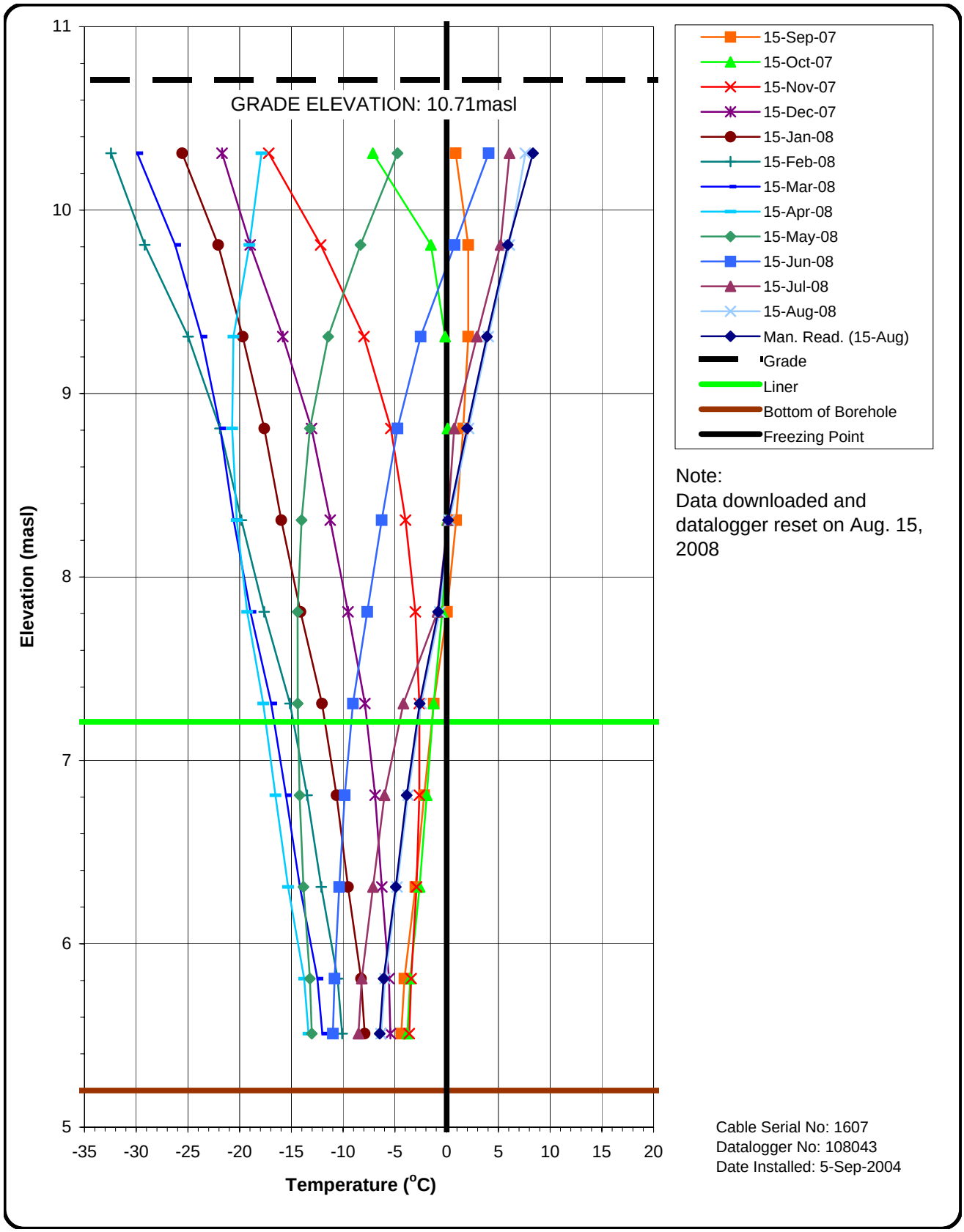
Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10540**	**8.9**
2	**10040**	**9.9**
3	**10610**	**8.6**
4	**12330**	**5.6**
5	**13360**	**4.0**
6	**14730**	**2.0**
7	**16030**	**0.4**
8	**16990**	**-0.7**

Bead	ohms	Temp. (ºC)
9	**17740**	**-1.7**
10	**18760**	**-2.6**
11	**19600**	**-3.5**
12	**19920**	**-3.8**

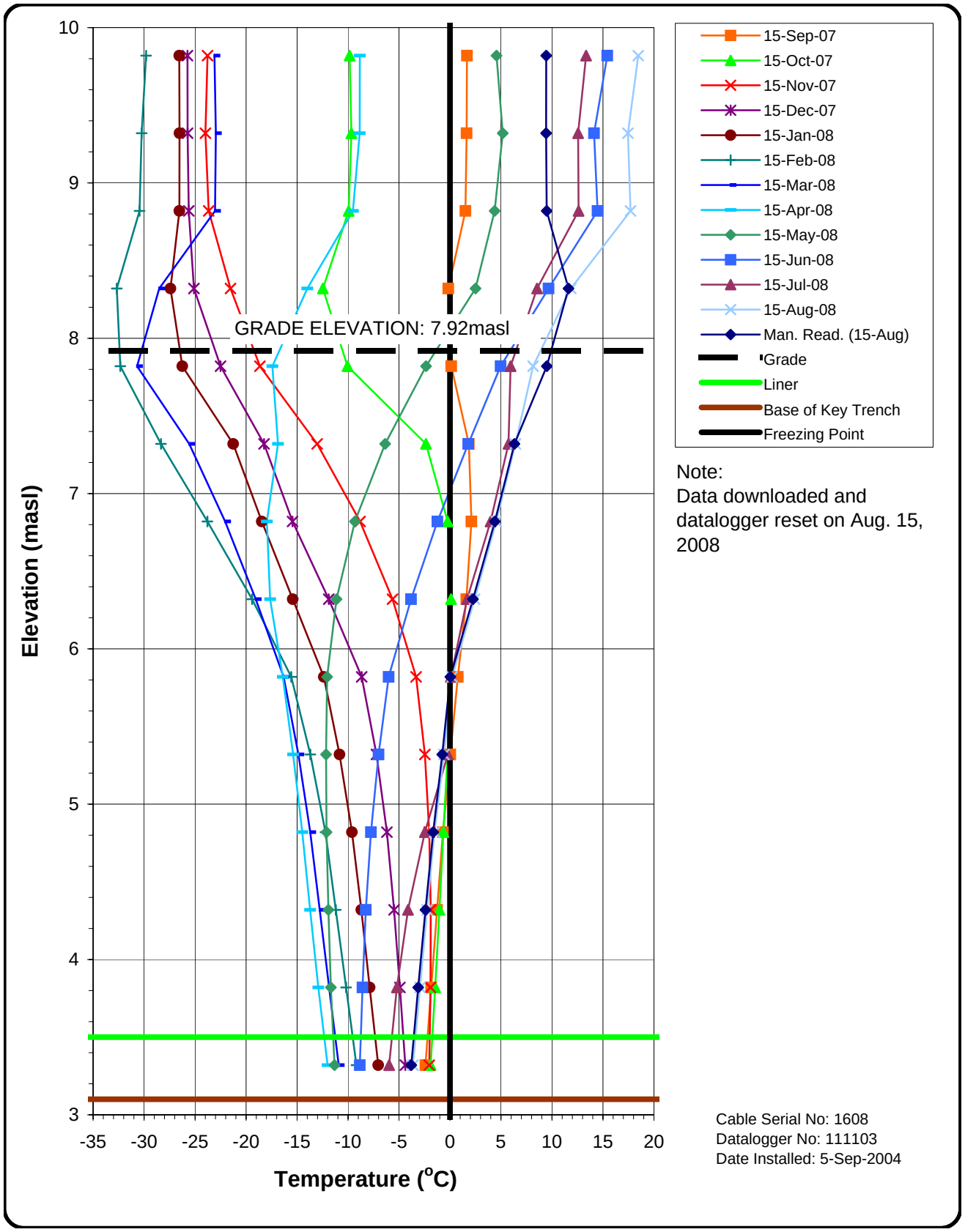
Observations and Proposed Maintenance

A6 – Thermistor Graphs



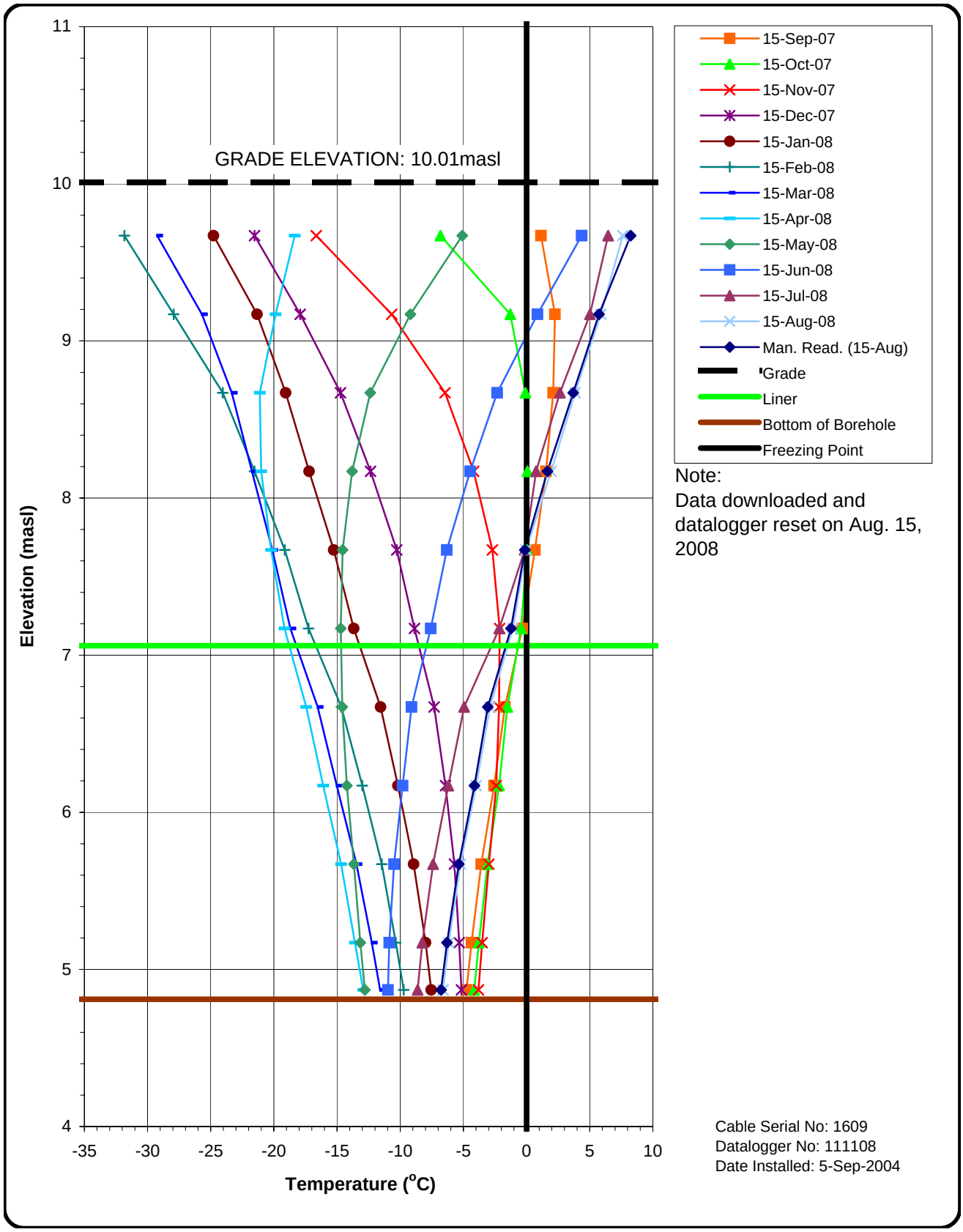
AECOM

Graph A-1
Ground Temperature Profile
Main Landfill
Vertical GTC VT-1



AECOM

Graph A-2
Ground Temperature Profile
Main Landfill
Vertical GTC VT-2

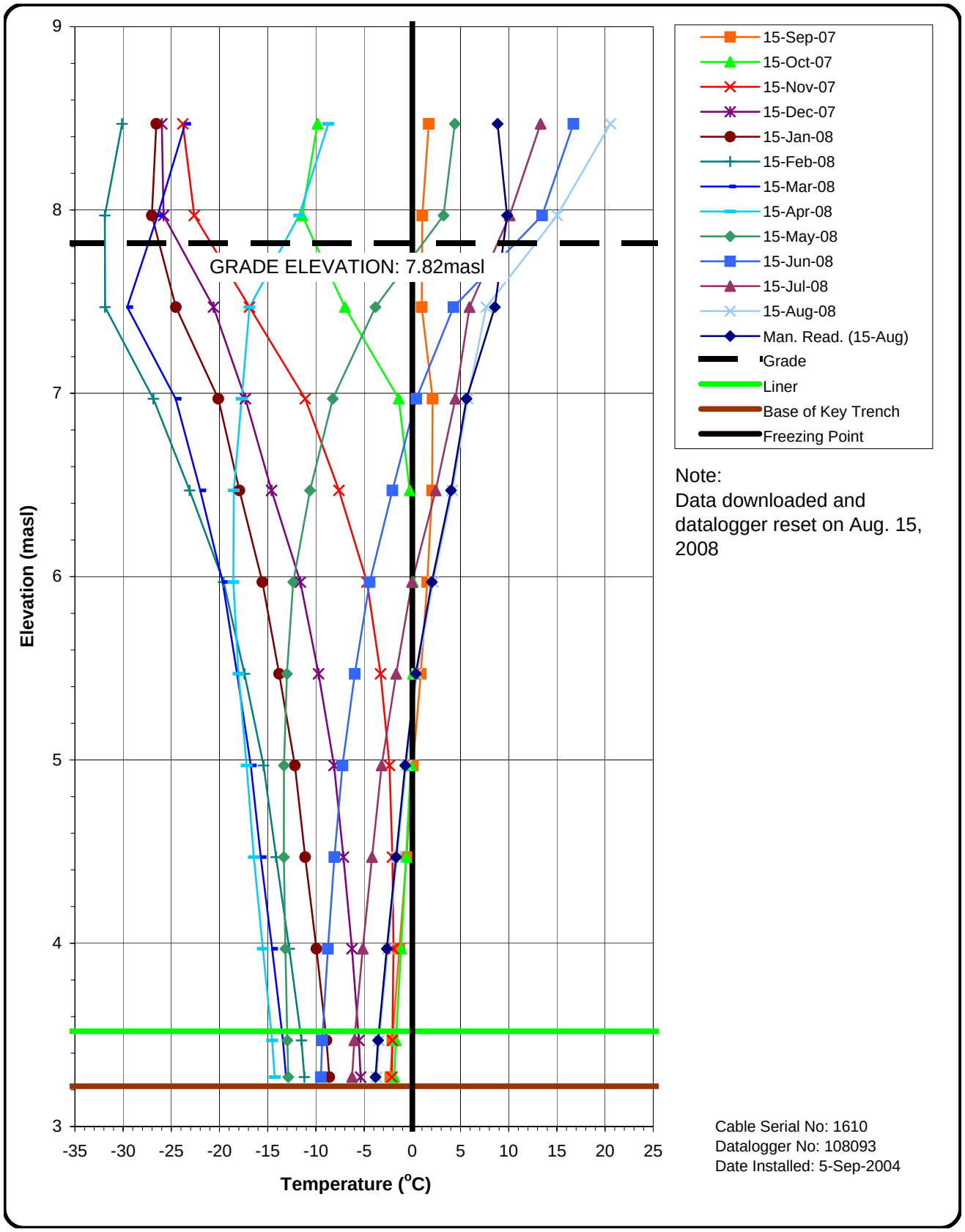


Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Cable Serial No: 1609
Datalogger No: 111108
Date Installed: 5-Sep-2004

AECOM

Graph A-3
Ground Temperature Profile
Main Landfill
Vertical GTC VT-3



Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Cable Serial No: 1610
Datalogger No: 108093
Date Installed: 5-Sep-2004

AECOM

Graph A-4
Ground Temperature Profile
Main Landfill
Vertical GTC VT-4

A7 – Field Notes

Aug 15 PIN-3 overcast, 6°C

Late start getting organized
- starting @ Main LF
- initial walkover (9:30am) indicated no obvious problems

Starting inspection in SE corner and proceeding CC around landfill (100-0001)
Photo ① General photo of Comp viewed from East side crest of Main LF

Photo Convention → each photo will have two codes ① Landfill inspection code e.g. LF-1
② Camera raw photo code e.g. 100-0001
Each LF photo will have UTM & direction viewed

Photo Inspection Record
MLF-1 (100-0002) 407983 7597583
Looking N from SE corner Backpack for scale along crest

MLF-2 (100-0003) 407986 7597584
Looking N from centre slope, SE corner MW-5 visible in distance (Ken, Joe & Susie)

MLF-3 (100-0004) 407995 7597614
Looking N along east crest

MLF-4 (100-0005) 408008 7597660
Looking N along eastern slope toe
Backpack and scale adjacent to MW-5

MLF-5 (100-0006) 407989 7597705
Look North along east crest looking to NE corner

MLF-6 (100-0007) 407999 7597708
Looking N from d/s toe to NE corner

MLF-7 (100-0008) 407990 7597761
Looking NW from NE corner crest along crest

MLF-8 (100-0009) 407978 7597763
Looking NE along toe from NE corner

Aug 15/2008

Had to retake photo out of sequence (taken twice)

18 0012
MLF-~~9~~ (100-~~0015~~) 407958 7597776
Looking NW from midslope north side MLF
- backpack at sharply defined corner

9 0010
MLF-~~10~~ (100-~~0012~~) 407924 7597804
Looking SW from NW toe (5m N of toe)
- everything looks stable, backpack same location as MLF-10

MLF-10 (100-0011) 407922 7597791
Looking SW along crest from NW crest
VT-2 visible in distance

One photo possibly missing from initial sequence (nothing critical) Will be certain of numbering going forward

MLF-12 (100-0013) Looking SSW from NW landfill 407883 7597766
both MW-6 & VT visible (MW-6 being sampled

MLF-13 (100-0014) 407874 7597783
Looking ESE along crest next to

MLF-14 (100-0015) 407861 7597730
Looking E from about 8m S of MW-6

MLF-15 (100-0016, 0017) 407904 7597726
Panoramic looking ESE to SE from crest to curved slope
- hangar and VT-3 visible in the background
- everything appears stable and well armoured

MLF-16 (100-0018) 407942 7597700 Looking S
VT-4 visible in the distance

MLF-17 (100-0019) 407900 7597641
Looking S along crest to SW corner VT-4 visible

MLF-18 (100-0020) 407889 7597644
Looking S along toe to SW corner
MW-8 visible in right of frame

MLF-19 (100-0021, 0022) 407888 7597596
Panoramic looking E from toe of SW corner

Aug 15/2008

MLF-20 (100-0023) 0407961 ~~0407~~ 7597608 ~~759~~
Looking W to SW corner (VT-4 to right)
* previous panoramic did not have scale object

MLF-21 (100-0024) 407950 7597610
Looking SE to SE corner and entrance ramp
- hangar in the background

* Now moving on to top of landfill
(100-0025,0026)
MLF 22 Looking W to VT-4 from
near SE corner 407986 7597613

MLF-23 (100-0027, 0028) Panoramic Looking NNW to N
VT-3 visible near and VT-1 to right in distance
- backpack is near central depression

MLF-24 (100-0029, 0030) Panoramic looking SSW to VT-3 and VT-4
407977 7597717 from about 9m E of VT-1

MLF-25 (100-0031) +0032 Panoramic Looking NW from VT-1 (2m S)
407968 7597713

MLF-26 (100-0033, 0034) 407927 7597775
Looking S from north end near crest
VT-1 near and VT-3 far

* Panoramics of entire LF

MLF-27 (100-0035, 0036) Looking SSE from
NNW of NW corner 407955 7597912

MLF 28 (100-0037, 0038) Looking WSW to
East side MW- visible central frame
408143 7597724

MLF-29 (100-0039, 0040) Looking NW to
SE corner of landfill and access ramp
408033 7597447

MLF-30 (100-0041, 0042) Looking NE to NW corner
407822 7597575 MW-8 being sampled

Wrapping up ≈ 1 pm and walking
back to camp with Lou

Aug 15/08

PIN-3

Samplers - KB, Susie Kocha (SK)
Weather - Sunny w clouds, 8°C, breeze

MAIN LANDFILL

MW-5 - collected water
P3-MW-5 4x 1L Amber Glass
2x VOC vial
1x 250 mL Plastic
Photo 1 - well MW-5
Soil sample
P3-MW-5A - surface
P3-MW-5B - Depth
Photo 2 - test pit

MW-6 Water Sample
P3-MW-6 4x 1L Amber Glass (AG)
2x VOC Vial
1x 250 mL Plastic
Photo 3 - well MW-6
Soil Sample
P3-MW-6A - Surface
P3-MW-6B - Depth
Photo 4 - test Pit

Aug 15

MW-7
No water Sample, well purged dry and had a ≤ slow recharge rate
Photo 5 - Well MW-7
Soil Sampling
P3-MW-7A Surface
P3-MW-7B Depth
Photo 6 - Test Pit

MW-8
Water Sample collected
P3-MW-8 4x 1L AG
2x VOC Vial
1x 250 Plastic
P3-MW-13 (Dup) 8x 1L AG
2x VOC
2x 250 Plastic
Photo 8 - Well MW-8
Soil Sample collected
P3-MW-8A Surface
P3-MW-8B Depth
P3-MW-13B Depth (Dup)
Photo 7 - test pit

Aug 15 3:30 PM

~~MW-9~~ TIER II

MW-9

No water sample, well frozen
Photo 9 - Well MW-9
Soil Sample collected
P3-MW-9A Surface
P3-MW-9B Depth
Photo 10 - test pit

MW-10

No water sample, well appears to be broken. Filter sand in well. bottom at 1m 59cm
Photo 11 - Well MW-10
Soil Sample collected
P3-MW-10A Surface
P3-MW-10B Depth
Photo 12 - Test pit

Aug 15

MW-11

Water Sample collected
P3-MW-11 4x 1L AG
2 x VOC Vial
1 x 250mL Plastic
Photo 13 - MW-11
Soil sample Collected
P3-MW-11A Surface
P3-MW-11B Depth
Photo 14 - Test pit.

MW-12

Water Sample Collected
P3-MW-12 4x 1L AG
2 x VOC Vial
1 x 250mL Plastic
Photo 15 - MW-12
Soil Sample Collected
P3-MW-12A Surface
P3-MW-12B Depth
Photo 16 - Test pit

Aug 15

VT-6

Data downloaded, manual readings taken
Photo 17 of VT-6

VT-5

Data downloaded, manual readings taken
Photo 18 of VT-5

VT-7

Data downloaded, manual readings taken
Photo 19 of VT-7

VT-8

Data downloaded, manual readings taken
Photo 20 of VT-8

VT-2

Data downloaded, man. readings taken
Photo 21 of VT-2

VT-1

Data d/L, man. readings taken
Photo 22 of VT-1

Aug 15

VT-3

Data d/L, man. readings taken
Photo 23 of VT-3

VT-4

Data d/L, man. readings taken
Photo 24 of VT-4

2008 Monitoring Well Sampling Log (MW # 5)

Site name:	PIN-3
Date of sampling event:	Aug 15 9:45 AM
Names of samplers:	KB SK
Monitoring well ID:	MW-5
Facility:	Main Landfill

Known Data

Depth of installation* (m):	3.90
Length of screened section (m):	3.33
Depth to top of screen* (m):	0.57

Measured Data

Condition of well:	GOOD	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	~~Interface Meter~~ M.Tape	Depth to water surface (m):	1.77
Well height above ground (m):	0.48	Depth to bottom (m):	3.17
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	1.30	Evidence of sludge:	—
Well volume of water (L):	2.63	Evidence of freezing/siltation:	YES
Static water level* (m):	0.29		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Horiba, Peris. Pump, LDPE Tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug 15, 10:05	3.0	4.5	7.01	1720	5.3	Clear

Water Sampling		Soil Sampling	
Date & Time Collected:	10:15	Date and Time Collected:	10:25
Sample Number - Water:	P3-MW-5	Sample Number - Soil:	P3-MW-5A P3-MW-5B
Sample Containers:	4x 1L Amber Glass 2x VOC vial 1x 250mL Plastic	Sample Containers:	4x 250mL AG
Procedure/Equipment:	Peristaltic LDPE	Procedure/Equipment:	Metal trowel
Water Description:	Clear	Soil Description:	Sand & Gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 6)

Site name:	PIN-3
Date of sampling event:	Aug 15
Names of samplers:	KB, SK
Monitoring well ID:	MW-6
Facility:	Main Landfill

Known Data

Depth of installation* (m):	4.73
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.53

Measured Data

Condition of well:	GOOD	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	M. Tape	Depth to water surface (m):	1.52
Well height above ground (m):	0.58	Depth to bottom (m):	3.82
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		**Notes**	
Depth of water (m):	2.30	Evidence of sludge:	—
Well volume of water (L):	4.52	Evidence of freezing/siltation:	—
Static water level* (m):	~~1.52~~ 0.94		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Peri. Pump, Horiba U-22 w/ f/t cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug15 11:30	4.0 L	~~4.8~~	10.2	2230	81.0	clear some cloudy flakes

Water Sampling		**Soil Sampling**	
Date & Time Collected:	11:40	Date and Time Collected:	11:50
Sample Number - Water:	P3-MW-6	Sample Number - Soil:	P3-MW-6A
			P3-MW-6B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL AG
	2x VOC Vial		
	1 x 250 mL Plastic		
Procedure/Equipment:	Peris. Pump LDPE	Procedure/Equipment:	Metal Scoop
Water Description:	Clear Colourless some flakes	Soil Description:	Sand w some Gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 7)

Site name:	PIN-3
Date of sampling event:	Aug 15
Names of samplers:	KB SK
Monitoring well ID:	MW-7
Facility:	Main LF

Known Data

Depth of installation* (m):	4.80
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.60

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	Tape	Depth to water surface (m):	2.38
Well height above ground (m):	0.33	Depth to bottom (m):	3.13
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.75	Evidence of sludge:	—
Well volume of water (L):	1.5	Evidence of freezing/siltation:	—
Static water level* (m):	2.05		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Per. Pump, Horiba w f/c cell, LDPE tubing

Well Purged Dry

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug 15 12:00	1.5	4.1	11.66	1250	30.0	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	—	Date and Time Collected:	12:10
Sample Number - Water:	~~P3-MW-7~~	Sample Number - Soil:	P3-MW-7A
a sample for metals analysis only was collected from the f/c cell P3-MW-7	No Sample		P3-MW-7B
	Well did not recharge		
Sample Containers:		Sample Containers:	4x 250mL AG
	1x 250mL Plastic		
Procedure/Equipment:	Per. Pump LDPE Tubing	Procedure/Equipment:	metal trowel
Water Description:	clear colourless	Soil Description:	Sand some Gravel some clay Bedrock @ 0.15cm
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 8)

Site name:	PIN-3
Date of sampling event:	Aug 15
Names of samplers:	KB SK
Monitoring well ID:	MW-8
Facility:	Main Landfill

Known Data

Depth of installation* (m):	4.75
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.55

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	M. Tape	Depth to water surface (m):	1.02
Well height above ground (m):	0.60	Depth to bottom (m):	2.88
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		**Notes**	
Depth of water (m):	1.86	Evidence of sludge:	-
Well volume of water (L):	~3.5	Evidence of freezing/siltation:	-
Static water level* (m):	0.42		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Per. Pump, Horiba w f/t cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
12:50	4.0	3.3	6.87	2760	16.0	clear colourless

Water Sampling		**Soil Sampling**	
Date & Time Collected:	~~12:~~ 1:00	Date and Time Collected:	1:10
Sample Number - Water:	P3-MW-8	Sample Number - Soil:	P3-MW-8A
	P3-MW-13 Dup		P3-MW-8B
	~~12x1L AG~~		P3-MW-13B
Sample Containers:	12x1L AG	Sample Containers:	8 x 250mL Glass
	4x VOC Vial		
	3x 250 mL Plastic		
Procedure/Equipment:	Peris. Pump LDPE	Procedure/Equipment:	metal Trowel
Water Description:	Clear colourless	Soil Description:	Sand w some Gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Main Landfill**			
Thermistor Number:	**VT1**		Inclination	**Vertical**			
Install Date:	**5-Sep-04**		First Date Event	8/23/07	Last Date Event	8/15/08	
Coordinates and Elevation		N	**9681.35**	E	**9291.581**	Elev	**10.714**
Length of Cable (m)	**7.8**	Cable Lead Above Ground (m)	**2.6**	Nodal Points	**11**		
Datalogger Serial #	**108043**			Cable Serial Number			**1607**

Code PIN-3VT1

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐

Battery Installation Date

Battery Levels Main 10.00 Aux 9.94

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.78	
2	12.13	
3	13.43	
4	14.74	
5	16.22	
6	17.04	
7	18.66	
8	19.93	

Bead	ohms	Temp. (°C)
9	20.99	
10	22.38	
11	22.95	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Main Landfill**			
Thermistor Number:	**VT2**		Inclination	**Vertical**			
Install Date:	**5-Sep-04**		First Date Event	8/23/07		Last Date Event	8/15/08
Coordinates and Elevation		N	**9698.82**	E	**9209.988**	Elev	**7.92**
Length of Cable (m)	**9.5**	Cable Lead Above Ground (m)	**4.9**	Nodal Points	**14**		
Datalogger Serial #	**111103**			Cable Serial Number			**1608**

Code PIN-3VT2

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☒ ~~15 & 16 not reading on comp~~
Battery Installation Date		
Battery Levels	Main 11.34	Aux 13.26

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.24	
2	10.22	
3	10.15	
4	9.18	
5	10.18	
6	11.90	
7	13.03	
8	14.61	

Bead	ohms	Temp. (°C)
9	16.26	
10	16.95	
11	17.70	
12	18.51	
13	19.15	
14	19.90	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Main Landfill**			
Thermistor Number:	**VT3**		Inclination	**Vertical**			
Install Date:	**5-Sep-04**		First Date Event	8/23/07		Last Date Event	8/15/08
Coordinates and Elevation		N	**9602.44**	E	**9298.113**	Elev	**10.014**
Length of Cable (m)	**7.8**	Cable Lead Above Ground (m)	**2.7**	Nodal Points	**11**		
Datalogger Serial #	**111108**			Cable Serial Number			**1609**

Code PIN-3VT3

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐
Battery Installation Date		
Battery Levels	Main 8.84	Aux 6.57 V

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.85	
2	12.76	
3	13.58	
4	15.03	
5	16.49	
6	17.42	
7	19.09	
8	20.23	

Bead	ohms	Temp. (°C)
9	21.59	
10	22.64	
11	23.26	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Main Landfill**			
Thermistor Number:	**VT4**		Inclination	**Vertical**			
Install Date:	**5-Sep-04**		First Date Event	8/23/07		Last Date Event	8/15/08
Coordinates and Elevation		N	**9588.91**	E	**9233.938**	Elev	**7.82**
Length of Cable (m)	**8.2**	Cable Lead Above Ground (m)	**3.7**	Nodal Points	**12**		
Datalogger Serial #	**108093**			Cable Serial Number			**1610**

Code PIN-3VT4

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☑	☐
Battery Installation Date		
Battery Levels	Main 11.34	Aux 13,38

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.54	
2	10.04	
3	10.61	
4	12.33	
5	13.36	
6	14.73	
7	16,03	
8	16.99	

Bead	ohms	Temp. (°C)
9	17.74	
10	18,76	
11	19.60	
12	19.92	

Observations and Proposed Maintenance

Appendix B

NWS Landfill - Attachments

B1 – Site Condition/Visual Inspection Records
B2 – Geotechnical Inspection Photographic Records
B3 – Field Notes

1. NWS Landfill

1.1 Landfill Summary

The NWS Landfill is located approximately 700 m west of the main station buildings and occupies an area of approximately 42,000 m^2 with a thickness of approximately 0.5m. The NWS Landfill was previously used as a waste burn pit during the operation of the site. The landfill configuration is provided on Figure B-1. Prior to the remedial work in 2004, DCC had classified the landfill as a moderate potential environmental risk. Remediation of the landfill included the excavation of surface contaminated soils, and regrading with the placement of additional granular fill. The landfill cover comprises three distinct cells which are herein referred to as the East, Central and West Cell. There is no monitoring instrumentation installed at this location.

For 2008, the monitoring requirements for the NWS Landfill included visual inspection only.

1.2 Visual Monitoring

Based on the visual inspection, the NWS Landfill area appears to be in good condition and continues to function as designed. The overall condition is substantially unchanged from the time of last year's inspection. There is no evidence of problematic or degraded conditions.

Minor rutting that was observed last year, which was presumed to be a remnant of construction equipment traffic is completely self-armoured and stable. The area of ponded water adjacent to the southeast corner of the central lobe appears substantially unchanged from last year. A slight increase in the apparent volume of ponded water is consistent with the relative increase in precipitation experienced by the site in the weeks prior to the visual inspection. The ponded water is clear and there is no clear evidence that the ponded water is seepage related. The presence of ponded water at this location is not considered problematic.

The overall performance of the landfill is considered acceptable. There is no as-built survey data available for this landfill.

1.3 Soil Sampling

Soil sampling was not scheduled for the 2008 monitoring year. The next soil sampling event will be 2011.

N 7598100
N 7598050
N 7598000
N 7597950
N 7597900
E 407800
E 407850
E 407900
E 407950
E 408000
E 408050
E 408100

NWS LANDFILL
TBM308
TBM213
TBM309
TBM4
TBM310
BM–1
ACCESS ROAD

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

6m 7m 8m 9m 10m 11m

Legend

- TBM4 — TEMPORARY BENCHMARK
- BM–1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- 18 — PHOTOGRAPH LOCATION
- 10 — CLOSE-UP PHOTOGRAPH LOCATION
- PONDING
- STANDING WATER

Map Sources / Notes:
Source drawing from UMA: P3-RD03.dwg

N
W E
S

0 5 10 20 30 40 m

1 : 1000
UTM Zone 12W, NAD83

File Name: 80297_By1_B1_NWSLandfill(P3-RD03).DWG
Reviewed by: JAT — Prepared by: KAB
Date Issued: December, 2008 — Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

NWS Landfill

AECOM

Figure B-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_B1_NWSLandfill(P3-RD03).DWG

B1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	NWS Landfill
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 22, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

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

Checklist Item	Present	Location	Dimensions (m)			Extent (% of Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
	Yes/No		Length	Width	Depth				
Settlement	No								
Erosion	No								Self-armoring ruts, not erosion. Acceptable.
Frost Action	No								
Animal Burrows	No								
Vegetation	Sparse								Acceptable
Staining	No								
Vegetation Stress	No								
Seepage Points	No								
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	None								
Other Features of Note.	Yes	8 m SE of SE corner of the central landfill cell.	4	5	0.2	minor	Ponded water and loose fill	Photograph 8	Possible construction artifact. No clear evidence of seepage. Similar to last year. Acceptable
Additional Photos	Yes						General photos	Photographs 1-7, 9-18	General photos for documentation, no features of note

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

B2 – Geotechnical Inspection Photographic Records

Photograph NWS-1. Looking WNW to SE corner of East cell. ↑

Photograph NWS-2. Looking N from SE corner of East cell. ↑

Photograph NWS-3. Looking W along N toe of East cell from NE corner. ↑

Photograph NWS-4. Looking SW along W side of East cell from N central crest of landfill. ↑

Photograph NWS-5. Looking S to SE corner of East cell. NW corner of Main LF visible in the background. Note ponded water and algae. ↑

Photograph NWS-6. Looking ENE from about 25m SW of SW corner of East cell. The indentation in the south slope is directly behind the backpack. ↑

Photograph NWS-7. Looking W to the indentation along the S side of the East cell. ↑

Photograph NWS-8. Looking N to ponded water along W side of East cell, SE of the SE corner of the Central cell. Note algal growth. ↑

Photograph NWS-9. Looking N along E side of Central cell from the SE corner. Perimeter of landfill is hard to delineate as the entire area is gravel covered. ↑

Photograph NWS-10. Looking NW to NW corner of the the Central cell from 4m E of the NE corner. ↑

Photograph NWS-11. Looking S from NW corner of the Central cell to the SW corner. Main LF visible in the background. ↑

Photograph NWS-12. Looking E from SW corner of the central cell. Backpack at SE corner of Central cell. ↑

Photograph NWS-13. Looking N from SE corner of West cell. Note large distinctive rocks to right of frame. ↑

Photograph NWS-14. Looking NE from central east side of the West cell. Gravelly toe getting away from poorly defined crest. Very minimal relief. ↑

Photograph NWS-15. Looking W from NE limit of cover to what appears to be NE crest. Landfill limits are poorly defined due to the continuous gravel cover in the area around the landfill cells. ↑

Photograph NWS-16. Looking WSW to NW corner of West cell from approximate NE "crest" of West cell. ↑

Photograph NWS-17. Looking S to SW corner of West cell from NW corner. Stable interface with organics. Main LF and hangar visible in the background. ↑

Photograph NWS-18. Looking E along S toe from the SW corner of the Western cell to SE corner of West cell. ↑

B3 – Field Notes

SLF 23 (100-0070) 408736 7596510
Looking West along north end of north lobe
- abundant green/yellow/orange pink algae in puddle adjacent to backpack

408703
SLF24 (100-0071) 7596515
Close-up of algae (desc. above)

SLF-25 (100-0072) 408700 7596515
Looking W to NW corner of North Lobe
- ponded water along most of toe

SLF-26 (100-0073) 408656 7596507
Looking SE ~~elon~~ from 15m NW of NW corner along west side of North Lobe
- South lobe visible in background

SLF-27 (100-0074) 4086663 7596467
Looking east to east ~~tot~~ cell
- north lobe (south toe) and south lobe (north toe) both in picture
- taken from ≈ 25m W of NW corner of South lobe

NWS Landfill 5:55pm starting at east cell

NWS-1 (100-0075, 0076) 408081 7597960
Looking WNW to SE corner of East Cell

NWS-2 (100-0077) 408062 7597967
Looking N from SE corner of East Cell

NWS-3 (100-0078) 408048 7598024
Looking W along N toe of East Cell from NE corner

NWS-4 (100-0079) 407989 7598024
Looking SSW along west side of East Cell from the NW corner

NWS-5 (100-0080) 407945 7598008
Looking S to SW corner of East Cell
NW corner of Main LF visible in background
- Note ponded water and algae

NWS-6 (100-0081, 0082) 407913 7597939
Looking ENE from about 25m SW of SW corner of East Cell - the byte is behind the backpack

NWS-7 (100-0083) 407993 7597957
Looking west to "byte" along south side of East Cell

NWS-8 (100-0084) 407936 7597977
Looking N to ponded water along west side of East Cell, SE of the SE corner of the Central Cell. Note algal growth.

NWS-9 (100-0085) 407927 7597982
Looking N along east side Central Cell from SE corner. Perimeter of landfill is hard to delineate → entire area is gravel covered

NWS-10 (100-0086) ~~408~~ 407937 7598010
Looking NW to NW corner of Central Cell from 4m east of NE corner

NWS-11 (100-0087) 407890 7598045
Looking S from NW corner of Central Cell to the SW corner
Main LF visible in background

NWS-12 (100-0088) 407882 7597990
Looking east from SW corner of central cell
Backpack at SE corner

NWS-13 (100-0089) 407875 7598032
Looking N from SE corner of West Cell
- note large distinctive rocks to right of frame

NWS-14 (100-0090) 407874 7598054
Looking NE from central east of West Cell
→ gravelly toe getting away from poorly defined crest → very minimal relief

NWS-15 (100-0091) 407874 7598077
Looking W from Neastern limit of cover to what appears to be NE crest

NWS-16 (100-0092) 407852 7598072
Looking W to N west corner of West cell from approx. NE "crest" of West Cell

NWS-17 (100-0093) 407827 7598064
Looking S to SW corner of West Cell from NW corner, stable interface w organics
Main LF and hangar visible in background

NWS-18 (100-0094) 407831 7598042
Looking east along south toe to SE corner of West Cell

Finished - no issues 7:10 pm
Going for dinner

Starting
North LF @8:45pm

NLF-1 (100-0095) 408648 7598679
Looking N along east side of East Cell from 20m S of SE corner

NLF-2 (100-0096) 408654 7598714
Looking West to NE corner of East Cell
- central Cell visible in background

NLF-3 (100-0097) 408622 7598719
Looking South to NW corner of East Cell
→ backpack fallen over at SW corner
→ radar balls visible in background

NLF

~~NWS~~-4 (100-0098) 408621 7598680
Looking NE to SE corner and south side of East Cell

North LF 5 (100-0099, 0100) 408612 7598688
Looking WNW to NNW to SE corner of Central Cell
- stable & unchanged from previous two inspections

North LF 6 (100-0101) 408617 7598727
Looking W along North toe of Central Cell from about 20m east of NE corner

North LF 7 (100-0102) 408581 7598729
Looking south from NW corner to SW corner of central cell

North LF 8 (100-0103) 408556 7598746
Looking W along north toe of West Cell from 20m east of NE corner

Appendix C

South Landfills – East and West - Attachments

C1 – Site Condition/Visual Inspection Records
C2 – Geotechnical Inspection Photographic Records
C3 – Field Notes

1. South Landfill – East and West

1.1 Landfill Summary

The South Landfill consists of an eastern and western portion and is located approximately 1.5km south of the main facilities area. The area of the south shore landfill has an area of approximately 40,000 m^2 with an estimated depth of 1.0m. The location of the landfill is shown on Figure C-1.

The original landfills consisted of 4 "lobes" – 3 lobes north of the access road and 1 lobe south of the access road. Based on a previously completed evaluation, the landfills north of the access road have been classified as a low to moderate potential environmental risk and the lobe south of the access road was classified as a moderate potential environmental risk. The lobes north of the access road were remediated by regrading and placing additional granular fill overtop. The lobe south of the access road was completely excavated. No evidence of contaminated soil was detected after remediation.

The landfill waste has been classified (by DCC) as low to moderate environmental risk and the approved granular cover was not designed to prevent infiltration. For 2008, the monitoring requirements for the South Landfills – East and West included visual inspection only.

1.2 Visual Monitoring

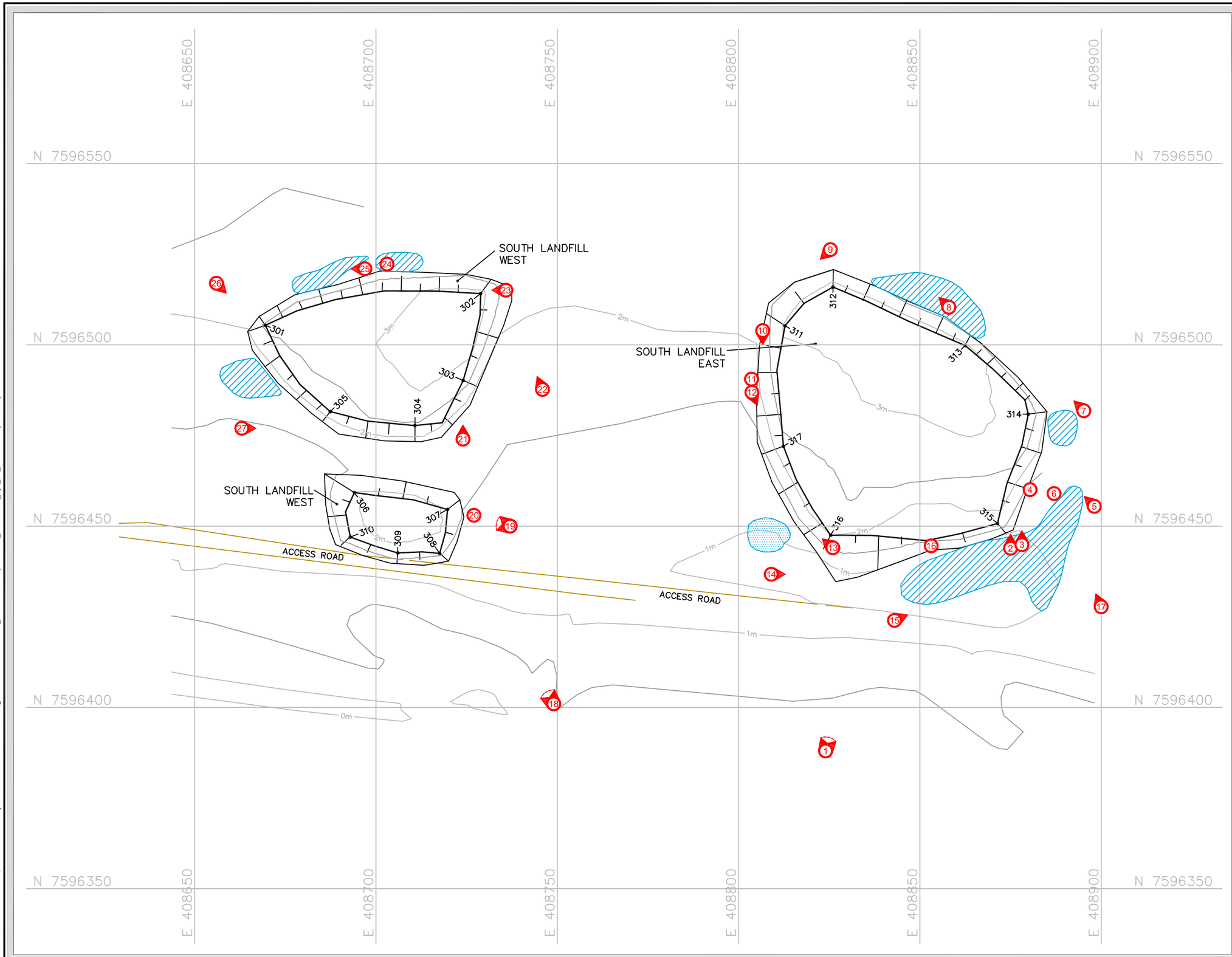
Based on the visual inspection, the south landfills appear to be in reasonably good condition and the physical condition appears essentially unchanged since the time of last year's inspection. The granular covers over the three lobes of the landfill showed no visible signs of problematic settlement or erosion. The landfill profiles are very low, on the order to 2 to 4 meters above the natural topography and the granular covers slope gently onto the adjacent marshy terrain. There are a few erosion rills on the slopes along the margins of the landfill. However, the cover is relatively coarse and therefore stable.

The water level in the surrounding muskeg is higher than observed in 2006 and 2007, reflecting the increased precipitation in the months prior to the 2008 visual inspection. The Eastern Cell and the north lobe of the Western Cell have water ponded along the perimeter toe (refer to Photographs 2, 3, 7, 8, 10, 12, 13, 14, 15, 17, 23, 25, 26). Similar to the previous two inspections (2006 and 2007), several areas of known or suspected seeps were also observed along the perimeter toe of the East landfill cell. Areas of possible seepage were specifically noted adjacent to the northeast, southwest and southeast portions of the East landfill cell (refer to Photographs 3, 4, 7, 11, 16) and along the eastern perimeter of both lobes of the West Cell (refer to Photographs 19, 20, 22, 24 and 25). The areas of ponded water around the perimeter of the landfill cover appears to be a result of a high water level in the surrounded muskeg terrain which accumulates in construction-related disturbances (e.g. areas of displaced muskeg). Algal blooms were observed in many areas of previously noted staining and/or suspected seepage (refer to photos 4, 10, 11, 19, 20, 23). Additionally, much of the ponded water, both within the surrounding muskeg and adjacent to the landfill cover was observed to have a "rainbow sheen".

The site inspection record for the landfill is appended as an attachment to this section. There is no as-built documentation for the existing landfill configuration. Overall performance of the landfill is considered acceptable. The water quality of the ponded water and in the areas of suspected seepage was not sampled, as directed by DCC.

1.3 Soil Sampling

Soil sampling was not scheduled for the 2008 monitoring year. The next soil sampling event will be 2011.



Legend

- 301 — COORDINATE POINT
- 8 — PHOTOGRAPH LOCATION
- 10 — CLOSE-UP PHOTOGRAPH LOCATION
- PONDING
- STANDING WATER

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: P3-RD04.dwg

0 5 10 20 30 40 m
1 : 1000
UTM Zone 12W, NAD83

File Name: 80297_By1_C1_SouthLandfill(P3-RD04).DWG
Reviewed by: JAT
Prepared by: KAB
Date Issued: December, 2008
Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

South Landfill

AECOM

Figure C-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_C1_SouthLandfill(P3-RD04).DWG

C1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	South Landfill - East and West
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 21, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

Feature	Severity Rating	Extent
Settlement	Not Observable	None
Erosion	Acceptable	Occasional
Frost Action	Not Observable	None
Animal Burrows	Not Observable	None
Vegetation	Not Observable	None
Staining	Acceptable	Occasional
Vegetation Stress	Acceptable	Occasional
Seepage Points	Acceptable	Occasional
Debris Exposed	Acceptable	Isolated
Instrumentation	Not Present	None
Overall Landfill Performance	**Acceptable**	

Checklist Item	Present Yes/No	Location	Dimensions (m)			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	No								
Erosion	Yes	Perimeter of both cells - see photo log				< 2	Numerous ruts/depressions from equipment traffic around perimeter of landfill cells	Photographs 11, 12, 13, 14, 25, 26	Granular fill is self-armouring. Landfill cover is stable. Rutting around perimeter contributes to ponding of water adjacent to landfill cells.
Frost Action	No								
Animal Burrows	No								
Vegetation	No								
Staining	Yes	Perimeter of both cells - see photo log				< 1	Rust coloured staining, intermittent ponding water. Many areas of previously observed staining show abundant algae growth	Photographs 2, 4, 6, 7, 8, 15, 16, 20, 22, 24	Rust colour staining, possible seepage. High water level around perimeter has covered many previously observed areas of straining / suspected seepage.
Vegetation Stress	No								
Seepage Points	Yes	Southeast corner of East Cell	1	1	surficial	point	Trickle of seepage flowing to rust stained ponded water	Photograph 16	Only one flowing point observed (slow trickle). High water level around perimeter of East Cell (relative to previous inspections).
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	No								
Other Features of Note.	No								
Additional Photos	Yes						Additional Photos	Photographs 1, 3, 5, 9, 10, 17, 18, 19, 21, 24, 27	General photos for documentation, no features of note

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

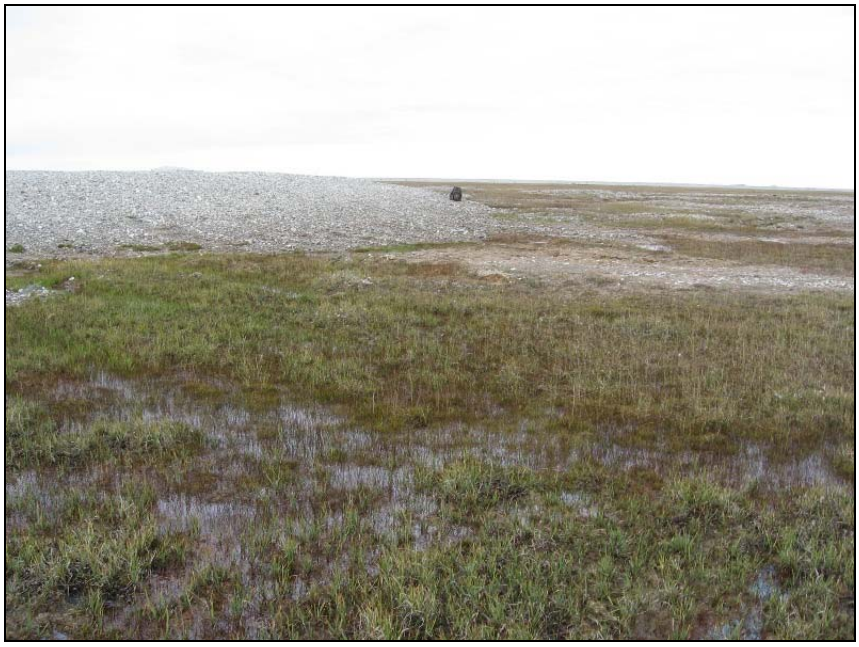
C2 – Geotechnical Inspection Photographic Records

Photograph SLF-1. Panoramic looking N to the East Cell from near shoreline. ↑

Photograph SLF-2. Looking N from SE corner of the East Cell. Note the high water table and large puddles. ↑

Photograph SLF-3. Looking N from SE corner of the East Cell to area of significant ponding. Similar photo to last year for comparison. Note high water level. ↑

Photograph SLF-4. Close-up of green algae growing along toe in area of staining. ↑



Photograph SLF-5. Looking NW to NE corner of South LF - East. Almost all ponded water to E of East cell has a "rainbow sheen". ↑

Photograph SLF-6. Close-up of typical "rainbow sheen". ↑

Photograph SLF-7. Looking NW from 10m E of NE corner (East cell). ↑

Photograph SLF-8. Looking NW along the northern perimeter of the East Cell. ↑

Photograph SLF-9. Looking SW from NW corner of the East Cell. ↑

Photograph SLF-10. Looking S along W side of East cell. Abundant algae growth in ponded water adjacent to backpack. ↑

Photograph SLF-11. Algal growth close-up along W side of East cell. ↑

Photograph SLF-12. Looking SSE to SW corner of landfill. Abundant ponded water. ↑

Photograph SLF-13. Looking NNW to ponded water along SW corner. Note hangar in background. ↑

Photograph SLF-14. Looking E to SW corner of East cell from 15m W of corner. ↑

Photograph SLF-15. Looking ENE along south toe of East cell to the SE corner. Note large pond of water compared to previous two years. ↑

Photograph SLF-16. Close-up of seepage point along the southern perimeter of the East Cell. Same point photographed last 2 years. ↑

Photograph SLF-17. Looking NNW to area of known seepage adjacent to the SE corner of East Cell of the South Landfill. ↑

Photograph SLF-18. Panoramic of West cell Looking NW from about 40m SE of SE corner of South cell. ↑

Photograph SLF-19. Looking W to E side of the south lobe of the West Cell. Note algal growth (bright green) at toe. ↑

Photograph SLF-20. Close-up of algal growth along toe of eastern perimeter of the southern lobe of the West Cell. ↑

Photograph SLF-21. Looking N along E side of main (northern) lobe of the West Cell. ↑

Photograph SLF-22. Looking NNW to the NE corner of the North cell. Hangar in background. Staining unchanged from last year. ↑

Photograph SLF-23. Looking W along N end of Western cell. Abundant green/yellow/orange/pink algae in puddle adjacent to backpack. ↑

Photograph SLF-24. Close-up of algae described in SLF-23. ↑

Photograph SLF-25. Looking W to the NW corner of North cell. Ponded water along most of toe. ↑

Photograph SLF-26. Looking SE from 15m NW of NW corner along W side of North cell. South lobe visible in background. ↑

Photograph SLF-27. Looking E to East cell. Taken from ~25m W of NW corner of the South Landfill West southern lobe. Northern and southern portions of the West Cell are visible in the foreground. ↑

C3 – Field Notes

80297 PIN-3

Friday Aug 15/2008

Partly cloudy, 8°C

2:50 After lunch

Photos 0043 & 0044 Muskox

SOUTH LANDFILL (≈ 2:55 pm)

-East Lobe

SLF 1 (100-0045, 0046) 408824 7596388

Panoramic looking N from shoreline

SLF-E 2 (100-0047) 408875 7596431

Looking N from SE corner

-note high water table and large puddles

SLF-3 (100-0048) 408876 7596430

Looking North from SE corner to significant ponding (Similar photo to last year for comparison - note high water level

SLF-4 (100-0049) Close-up 408881 7596450

Close-up of green algae grow along toe in area of staining

SLF-5 (100-0050) Looking NW to NE corner of South LF East 408893 7596441 Almost all ponded water to east of east cell has a "rainbow sheen"

Overcast 4°C

SLF-6 (100-0051) 408887 7596459

Close-up of typical "rainbow sheen"

SLF-7 (100-0052) 408892 7596465

Looking NW from 10m east of NE corner (East Lobe)

* Oily sheen observed on standing water in wetland areas away from landfill as well

SLF-8 (100-0053) 408858 7596494

Looking NW -> backpack at North end corner

SLF-9 (100-0054) 408827 7596514

Looking SW from North corner

SLF-10 (100-0055) 408806 7596497

Looking S along west side of east cell

- abundant algae growth in ponded water adjacent to backpack

SLF-11 (100-0056) 408805 7596460

Algal growth close-up along west side of east cell

SLF 12 (100-0057) Looking SSE to SW corner of landfill
408805 7596459
- abundant ponded water

SLF 13 (100-0058) 408824 7596431
Looking NNW to ponded water along SW corner
-note hanger in background

SLF 14 (100-0059) 408809 7596424
Looking E to SW corner of East cell from 15m west of corner

SLF 15 (100-0060) 408843 7596424
Looking ENE along south toe of east cell to the SE corner. Note large pond of water compared to past two years.

SLF 16 (100-0061) Close-up of seepage point 408852 7596433
-same point photographed last 2 yrs

SLF 17 (100-0062) 408874 7596412
Looking NNW to area of known seepage in SE corner of landfill

Moving on to West Cell (North and South)

SLF 18 (100-0063, 0064) 408749 7596401
Looking NW to panoramic of West Cell from about 40m SE of SE corner of south cell
-hanger in the background

SLF 19 (100-0065, 0066) 0408737 7596440
Looking west to east side of south lobe
- note algal growth (bright green) at toe

SLF 20 (100-0067) 408727 7596443
Close-up of algal growth along toe of south lobe (east side)

SLF 21 (100-0068) 408724 7596464
Looking N along east side of North Lobe

SLF 22 (100-0069) 408724 7596464
Looking NNW to NE corner of north lobe
-hanger in background
-staining unchanged from last year

SLF 23 (100-0070) 408736 7596510
Looking West along north end of north lobe
- abundant green/yellow/orange pink algae in puddle adjacent to backpack

408703
SLF24 (100-0071) 7596515
Close-up of algae (desc. above)

SLF-25 (100-0072) 408700 7596515
Looking W to NW corner of North Lobe
- ponded water along most of toe

SLF-26 (100-0073) 408656 7596507
Looking SE ~~elon~~ from 15m NW of NW corner along west side of North Lobe
- South lobe visible in background

SLF-27 (100-0074) 4086663 7596467
Looking east to east ~~tot~~ cell
- north lobe (south toe) and south lobe (north toe) both in picture
- taken from ≈ 25m W of NW corner of South lobe

NWS Landfill 5:55pm starting at east cell

NWS-1 (100-0075, 0076) 408081 7597960
Looking WNW to SE corner of East Cell

NWS-2 (100-0077) 408062 7597967
Looking N from SE corner of East Cell

NWS-3 (100-0078) 408048 7598024
Looking W along N toe of East Cell from NE corner

NWS-4 (100-0079) 407989 7598024
Looking SSW along west side of East Cell from the NW corner

NWS-5 (100-0080) 407945 7598008
Looking S to SW corner of East Cell
NW corner of Main LF visible in background
- Note ponded water and algae

NWS-6 (100-0081, 0082) 407913 7597939
Looking ENE from about 25m SW of SW corner of East Cell - the byte is behind the backpack

Appendix D

North Landfill - Attachments

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

1. North Landfill

1.1 Landfill Summary

The North landfill is located approximately 650m northwest of the main facilities. The buried material at the landfill exists in three lobes with an estimated combined area of 28,000m^2 and an estimated depth of 1.0m. The three lobes are herein referred to as the East Cell, Centre Cell and the West Cell. The location of the landfill is shown on Figure D-1. Prior to remediation, DCC has classified this landfill as a low potential environmental risk. Remediation of this landfill included re-grading with the placement of additional granular fill. There is no monitoring instrumentation installed at this location.

For 2008, the monitoring requirements for the North Landfill included visual inspection only.

1.2 Visual Monitoring

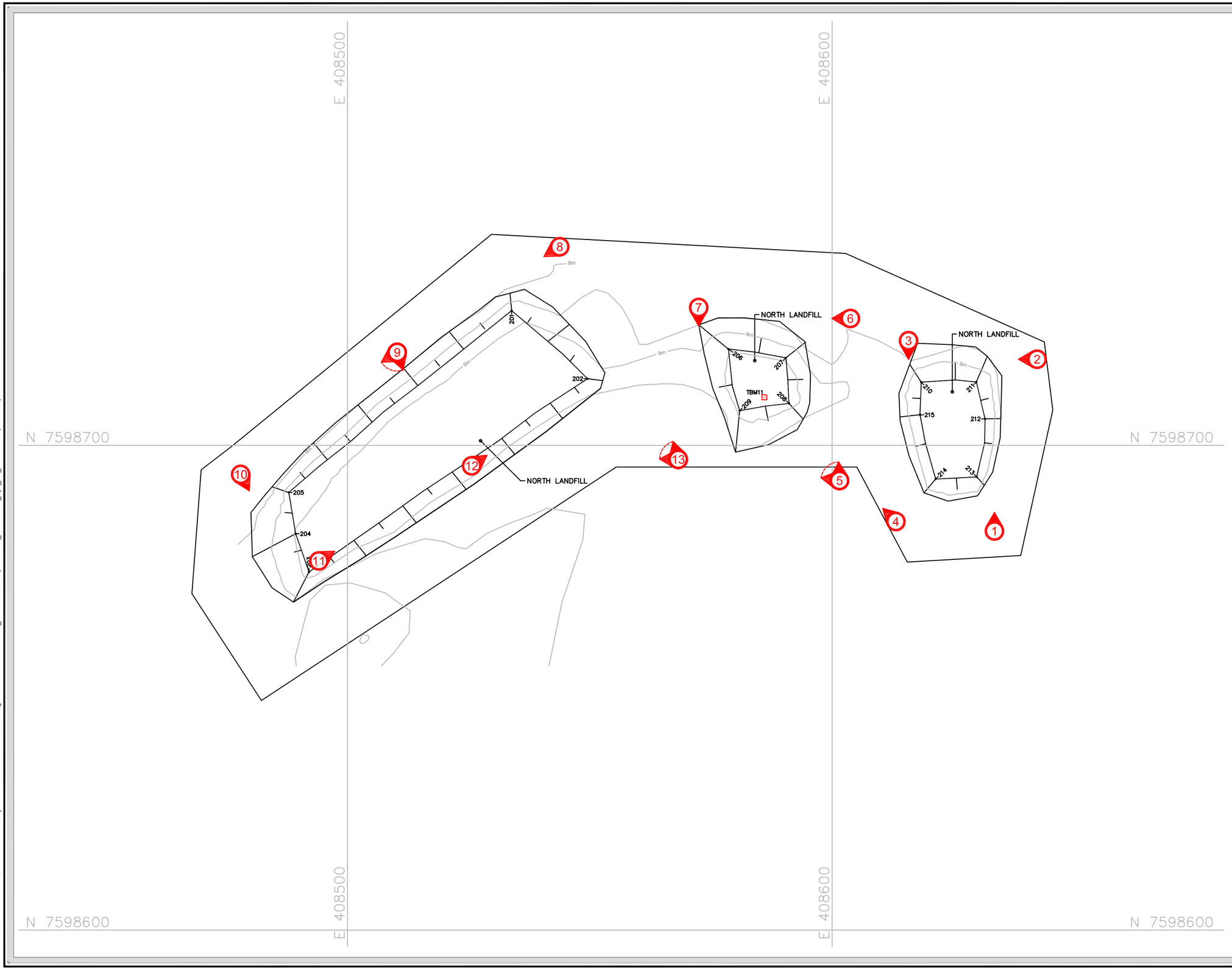
Based on the visual inspection, the North Landfill area appears to be in good condition and continues to function as designed. The condition of the North Landfill appears substantially unchanged from the time of last year's inspection. The granular cover over all three cells is relatively low profile (i.e., a couple of meters above natural topography at most) and the side slopes are shallow. The granular cover appears to show no evidence of problematic or degraded conditions. Bedrock is at or near surface throughout the area.

Minor rutting, which appears to be associated with equipment traffic, was observed at several locations. None of the ruts appear to warrant remediation at this time and show no evidence of recent degradation or risk of further degradation.

The overall performance of the landfill is considered acceptable. There is no as-built survey data available for this landfill. The site inspection record and photographic documentation for the landfill is appended as an attachment to this section.

1.3 Soil Sampling

Soil sampling was not scheduled for the 2008 monitoring year. The next soil sampling event will be 2011.



Legend

TBM11 — TEMPORARY BENCHMARK

201 — COORDINATE POINT

5 — PHOTOGRAPH LOCATION

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: P3-RD05.dwg

0 5 10 20 30 m

1 : 750
UTM Zone 12W, NAD83

File Name: 80297_By1_D1_NorthLandfill(P3-RD05).DWG
Reviewed by: JAT — Prepared by: KAB
Date Issued: December, 2008 — Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

North Landfill

AECOM

Figure D-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_D1_NorthLandfill(P3-RD05).DWG

D1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	North Landfill
DATE OF INSPECTION:	August 15, 2008
DATE OF PREVIOUS INSPECTION:	August 21, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

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

Checklist Item	Present Yes/No	Location	Dimensions (m)			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	No								Not observed
Erosion	No								
Frost Action	No								
Animal Burrows	No								
Vegetation	Sparse								Acceptable
Staining	No								
Vegetation Stress	No								No vegetation
Seepage Points	No								
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	No								No monitoring instrumentation
Other Features of Note.	No								
Additional Photos	Yes						General Photographic Record	Photos 1 thru 13	No features of note in the general photographic record

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

D2 – Geotechnical Inspection Photographic Records

Photograph NLF-1. Looking N along E side of East cell from 20m S of SE corner. ↑

Photograph NLF-2. Looking W to NE corner of East cell. Central cell visible in background. ↑

Photograph NLF-3. Looking S to NW corner of East cell. Backpack fallen over at SW corner. Radar balls visible in background. ↑

Photograph NLF-4. Looking NE to SE corner and S side of East cell. ↑

Photograph NLF-5. Looking WNW to NNW to SE corner of Central cell. Stable and unchanged from previous two inspections. ↑

Photograph NLF-6. Looking W along N toe of Central cell from about 20m E of NE corner. ↑

Photograph NLF-7. Looking S from NW corner to SE corner of central cell. ↑

Photograph NLF-8. Looking WSW along N toe of West cell from 20m E of NE corner. ↑

Photograph NLF-9. Panoramic looking WSW to NW corner along Central N side of West cell. ↑

Photograph NLF-10. Looking SSE along W side of West cell from 15 m N of NW corner. Warehouse visible in distance. ↑

Photograph NLF-11. Looking ENE along S side of West cell from SW corner. ↑

Photograph NLF-12. Looking ENE to the SE corner of West cell from central portion of S "crest". ↑

Photograph NLF-13. Looking NW to the SE corner of West cell. Panoramic showing eastern profile. ↑

D3 – Field Notes

NWS-18 (100-0094) 407831 7598042
Looking east along south toe to SE corner of West Cell

Finished - no issues 7:10 pm
Going for dinner

Starting
North LF @8:45pm

NLF-1 (100-0095) 408648 7598679
Looking N along east side of East Cell from 20m S of SE corner

NLF-2 (100-0096) 408654 7598714
Looking West to NE corner of East Cell
- central Cell visible in background

NLF-3 (100-0097) 408622 7598719
Looking South to NW corner of East Cell
→ backpack fallen over at SW corner
→ radar balls visible in background

NLF

~~NWS~~-4 (100-0098) 408621 7598680
Looking NE to SE corner and south side of East Cell

North LF 5 (100-0099, 0100) 408612 7598688
Looking WNW to NNW to SE corner of Central Cell
- stable & unchanged from previous two inspections

North LF 6 (100-0101) 408617 7598727
Looking W along North toe of Central Cell from about 20m east of NE corner

North LF 7 (100-0102) 408581 7598729
Looking south from NW corner to SW corner of central cell

North LF 8 (100-0103) 408556 7598746
Looking W along north toe of West Cell from 20m east of NE corner

North LF 9 (100-0104 -0105) 408516 7598720
Looking WSW to NW corner along central north side of West Cell (Panoramic)

North LF 10 (100-0106) 408482 7598695
Looking S along West side of West Cell from 15m N of NW corner
-> warehouse visible in distance

North LF-11 (100-0107) 408495 7598669
Looking E along south side of West Cell from SW corner

North LF-12 (100-0108) 408529 7598690
Looking E to SE corner of West Cell from central portion of south "crest"

North LF 13 (100-0109, 0110) 408581 7598692
Looking NW to SE corner of West Cell
- panoramic showing eastern profile

Wrapping up around 10pm, still work to do to get files in order and prep for departure tomorrow

Saturday Aug 16

Rain overnight, overcast, drizzle, 5°C

Continuing inspection (visual) of landfills
- Non Haz plus Tier II remain

Calling in weather @ 8:00am and first plane scheduled for 10:00am
Photo of Susie 001-0001

7:45 am starting Non Haz

Non-Haz 1 (101-0002 0003) 408901 7597653
Panoramic looking SW to NE corner

Non-Haz 2 (101-0004) 408876 7597637
Looking W along North toe from NE corner
MW-14 visible along right side of picture

Non-Haz 3 (101-0005) 408866 7597627
Looking W along N crest from NE corner
2m NE of NE crest

Appendix E

Non-hazardous Waste Landfill - Attachments

E1 – Site Condition/Visual Inspection Records
E2 – Geotechnical Inspection Photographic Records
E3 – Field Notes

1. Non-hazardous Waste Landfill

1.1 Landfill Summary

The Non-Hazardous Waste Landfill is located north of the airstrip, approximately 800m from the main station facilities and covers an area of approximately 5,000m^2 and an estimated depth of 2m. The landfill configuration is shown on Figure E-1.

The design of this landfill includes perimeter berms, and placement of a granular fill cover over the material. The material in the landfill consists of DCC Tier I and Type A hydrocarbon (lubricating oil and greases) contaminated soil. Four groundwater monitoring wells were installed at the landfill perimeter.

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

1.2 Visual Monitoring

Based on the visual inspection, the Non-Hazardous Waste Landfill area appears to be in good condition. There are no visible signs of frost action or differential settlement. The condition of the side slopes and landfill cap appears substantially unchanged from the time of the 2007 inspection and show no evidence of problematic or degraded conditions. Minor rutting, which appears to be associated with equipment traffic, was noted at several locations (refer to Photographs NonHaz-3 and NonHaz-5). The granular cover material is self armouring (i.e., not susceptible to ongoing erosion by surface runoff). None of the ruts appear to warrant remediation at this time and show no evidence of recent degradation.

Damp, organic rich soil was observed adjacent to the toe of the landfill at several locations along the toe of the west and north slopes (refer to Photographs NonHaz-3 and NonHaz-7) where the landfill encroaches onto muskeg. There was no indication of seepage, slope instability or slope movement at any of these locations. The moist soil conditions are most likely associated with recent precipitation and a high water table.

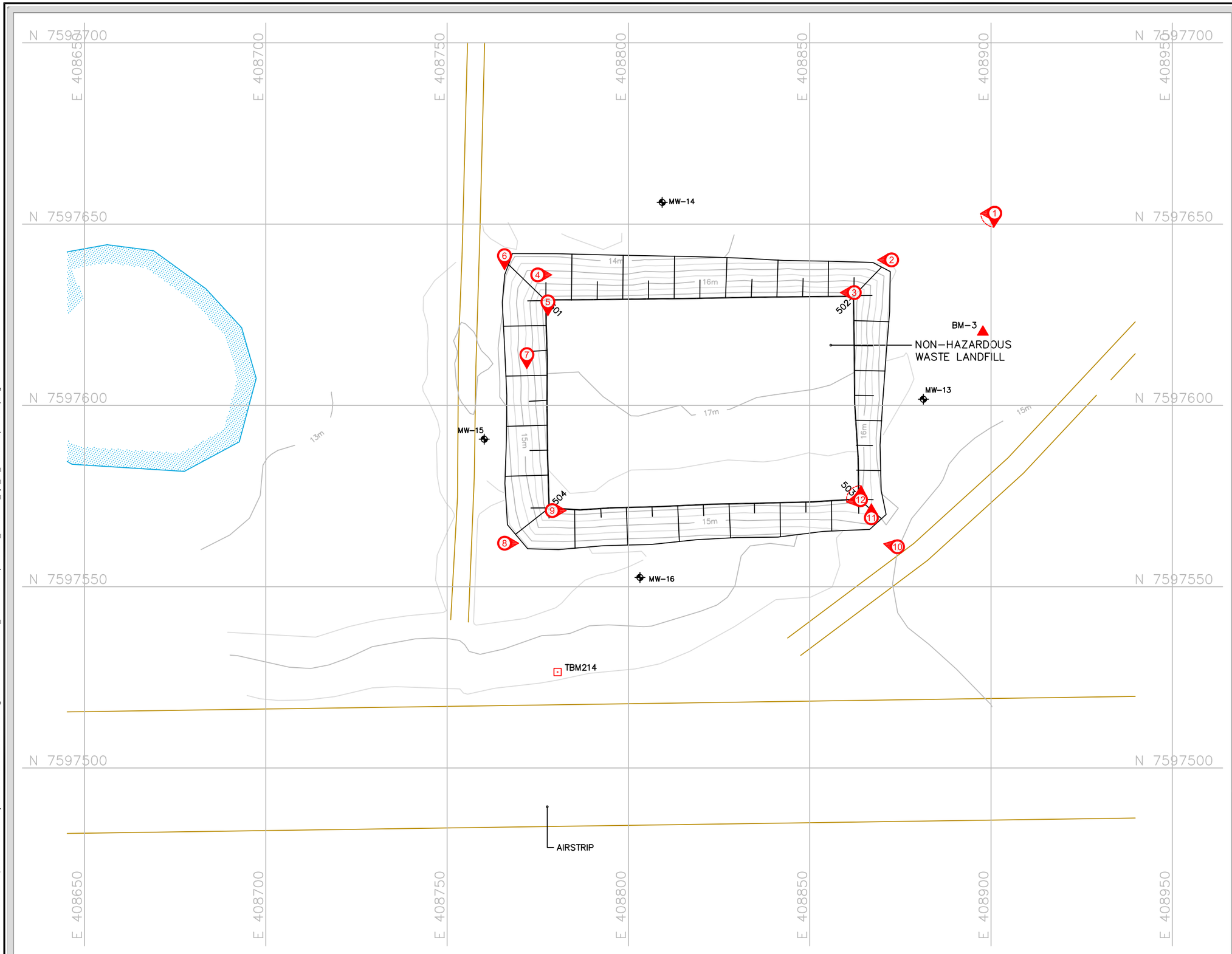
The overall performance of the landfill is considered acceptable. There is no as-built survey available for this landfill.

1.3 Soil Sampling

Soil sampling was not scheduled for the 2008 monitoring year. The next soil sampling event will be 2011.

1.4 Groundwater Sampling

Groundwater sampling was not scheduled for the 2008 monitoring year. The next groundwater sampling event will be 2011.



Legend

- TBM214 — TEMPORARY BENCHMARK
- BM-3 — PERMANENT BENCHMARK
- MW-13 — MONITORING WELL LOCATION
- 501 — COORDINATE POINT
- 9 — PHOTOGRAPH LOCATION
- STANDING WATER

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: P3-RD07.dwg

0 5 10 20 30 40 m
1 : 1000
UTM Zone 12W, NAD83

File Name: 80297_By1_E1_NonHazard(P3-RD07).dwg
Reviewed by: JAT
Prepared by: KAB
Date Issued: December, 2008
Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

Non-Hazardous Waste Landfill

AECOM

Figure E-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-Report\ACAD_Files\80297_By1_E1_NonHazard(P3-RD07).dwg

E1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	Non-hazardous Waste Landfill
DATE OF INSPECTION:	August 16, 2008
DATE OF PREVIOUS INSPECTION:	August 22, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

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

Checklist Item	Present Yes/No	Location	Dimensions (m)			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	No								Not Observed
Erosion	No								Self-armouring minor ruts from traffic, not erosion
Frost Action	No								
Animal Burrows	No								
Vegetation	No								
Staining	No								
Vegetation Stress	No								
Seepage Points	No								
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	Yes	Refer to plan map							4 MWs, no visible problems
Other Features of Note.	No								
Additional Photos	Yes						General Photographic Record	Photos 1 thru 12	No features of note in the general photographic record

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

E2 – Geotechnical Inspection Photographic Records

Photograph NonHaz-1. Panoramic looking SW to NE corner. ↑

Photograph NonHaz-2. Looking W along N toe from NE corner. MW-14 visible along right side of picture. ↑

Photograph NonHaz-3. Looking W along N crest from NE corner. 2m NE of NE crest. ↑

Photograph NonHaz-4. Looking E from midslope along NW corner. ↑

Photograph NonHaz-5. Looking S along crest from NW corner. ↑

Photograph NonHaz-6. Looking S along toe from NW corner. ↑

Photograph NonHaz-7. Looking S along W toe from about 1/3 south of the NW corner. MW-15 visible to the right. ↑

Photograph NonHaz-8. Looking E along S toe from near SW corner. MW-16 visible in frame. ↑

Photograph NonHaz-9. Looking E along crest from SW corner. Note final granular capping layer does not extend all the way to original granular side slope (i.e. ends abruptly, does not grade uniformly). ↑

Photograph NonHaz-10. Looking WNW along S toe from about 10m SE of SE corner (near beginning of access ramp). ↑

Photograph NonHaz-11. Looking N towards camp from midslope on the SE corner. ↑

Photograph NonHaz-12. Panoramic from SE corner scanning L to R starting near SW corner. ↑

E3 – Field Notes

North LF 9 (100-0104 -0105) 408516 7598720
Looking WSW to NW corner along central north side of West Cell (Panoramic)

North LF 10 (100-0106) 408482 7598695
Looking S along West side of West Cell from 15m N of NW corner
-> warehouse visible in distance

North LF-11 (100-0107) 408495 7598669
Looking E along south side of West Cell from SW corner

North LF-12 (100-0108) 408529 7598690
Looking E to SE corner of West Cell from central portion of south "crest"

North LF 13 (100-0109, 0110) 408581 7598692
Looking NW to SE corner of West Cell
- panoramic showing eastern profile

Wrapping up around 10pm, still work to do to get files in order and prep for departure tomorrow

Saturday Aug 16

Rain overnight, overcast, drizzle, 5°C

Continuing inspection (visual) of landfills
- Non Haz plus Tier II remain

Calling in weather @ 8:00am and first plane scheduled for 10:00am
Photo of Susie 001-0001

7:45 am starting Non Haz

Non-Haz 1 (101-0002 0003) 408901 7597653
Panoramic looking SW to NE corner

Non-Haz 2 (101-0004) 408876 7597637
Looking W along North toe from NE corner
MW-14 visible along right side of picture

Non-Haz 3 (101-0005) 408866 7597627
Looking W along N crest from NE corner
2m NE of NE crest

Non Haz 4 (101-0006) 408775 7597636
Looking east ~~from~~ along North face from midslope from NW corner ~~458~~

Non Haz 5 (101-0007) 408780 7597633
Looking South along crest from NW corner

Non Haz 6 (101-0008) 408771 7597643
Looking South along toe from NW corner

Non Haz 7 (101-0009) 408772 7597614
Looking S along west toe from abaut 1/3 south
MW-15 visible MW just visible

Non Haz 8 (101-0010) 408762 7597562
Looking east along south toe from near SW corner
- MW-16 visible in frame

Non-Haz 9 (101-0011) 408779 7597571
Looking East along crest from SW corner
-note final granular cap does not extend all the way to original slope

Non Haz 10 (101-0012) 408869 7597561
Looking westNW along south toe from about 10m SE of SE corner (near beginning of access ramp

Non Haz 11 (101-0013) 408867 7597569
Looking north towards camp from midslope on the SE corner

Non Haz 12 (101-0014, 0015) 408864 7597574
Panoramic from SE corner SCANNING L to R starting near SW corner

Heavy rain → finished inspection
Packing up camp for first flight and preparing for Tier II inspection after first flight leaves

Appendix F

Tier II Soil Disposal Facility - Attachments

F1 – Site Condition/Visual Inspection Records
F2 – Geotechnical Inspection Photographic Records
F3 – Monitoring Photographic Records
F4 – Monitoring Well Sampling Records
F5 – Thermistor Maintenance Records
F6 – Thermistor Graphs
F7 – Field Notes

1. Tier II Soil Disposal Facility

1.1 Landfill Summary

The Tier II Disposal Facility is located south of the eastern portion of the airstrip and encompasses an area of approximately 16,250m^2. This landfill was constructed to contain contaminated soils. The landfill configuration is shown on Figure F-1.

The landfill has a double containment system that consists of a liner and the placement of granular fill overtop of the landfill to promote permafrost aggradation through the landfill contents. The liner was placed across the bottom of the landfill, along the berms and over the top of the landfill contents, thus fully encapsulating them.

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

1.2 Visual Monitoring

Based on the visual inspection, the Tier II Soil Disposal Facility appears to be in good condition overall. The effectiveness of a visual inspection relies in large part on the ability to detect relative changes in the surface contours and elevations. Relative changes are most easily detected when surfaces and crest lines start out flat, and straight. In general, the final grade of the granular cover is quite rough and disrupted by a large number of ruts from vehicular traffic. The existing rough grade does not lend itself to effective visual inspection as construction irregularities mask all but large and obvious changes.

There are no obvious indications of problematic frost action or significant differential settlement; however, it must be stressed that the ability to detect such conditions through visual inspection is impeded by the extensive rutting and irregular final grade on the granular cap.

The condition of the side slopes and landfill cap appear consistent with the site photos available from the original 2005 inspection, and appears unchanged since Gartner Lee began visual inspections in 2006 and 2007. There is no evidence of problematic or degraded conditions. As noted previously (2006 and 2007), minor to fairly significant (e.g., 5m x 1m x 0.4m) rutting and surface irregularities, which appears to be associated with equipment traffic and a poor final grading during construction, were observed at several locations (refer to Photographs 2, 4, 13, 21). None of the ruts or depressions warrant remediation at this time as the granular cover is coarse and self-armouring. There is no evidence of recent degradation or conditions that would be expected to deteriorate in the short-term.

Damp, organic-rich soil was observed adjacent to the toe of the landfill at several locations (refer to Photographs 11 and 19) where the landfill encroaches onto muskeg, specifically along the toe of the south slope of the landfill. There was no indication of seepage, slope instability or slope movement at any of these locations. The moist soil conditions are most likely associated with recent precipitation and a high water table.

There is no as-built survey available for this landfill, and therefore it is not possible to compare the current surface contours with the original shaping of the landfill cap. While the overall performance of the landfill is considered acceptable, the noted ruts and minor depressions should continue to be monitored to confirm that they are not associated with problematic subsurface conditions.

E 409400
E 409450
E 409500
E 409550
E 409600
E 409650
N 7597450
N 7597400
N 7597350
N 7597300
N 7597250
AIRSTRIP
TBM216
BM–5
MW–9
P3–MW–9A
P3–MW–9B
VT–5
VT–6
VT–7
VT–8
911
15m
16m
17m
18m
TIER II DISPOSAL FACILITY
MW–10
P3–MW–10A
P3–MW–10B
MW–11
P3–MW–11A
P3–MW–11B
MW–12
P3–MW–12A
P3–MW–12B

Legend

- TBM216 — TEMPORARY BENCHMARK
- BM–5 — PERMANENT BENCHMARK
- MW–12 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 911 — COORDINATE POINT
- P3–MW–9A / P3–MW–9B — MONITORING SAMPLE LOCATION
- 2 — PHOTOGRAPH LOCATION
- 10 — CLOSE-UP PHOTOGRAPH LOCATION
- SETTLEMENT (NTS)
- EROSION (NTS)

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: P3-RD06.dwg

N
W E
S

0 5 10 20 30 40 m

1 : 1000
UTM Zone 12W, NAD83

File Name: 80297_By1_F1_SoilDisposal(P3-RD06).dwg
Reviewed by: JAT
Prepared by: KAB
Date Issued: December, 2008
Project Number: 80-297

Defence Construction Canada

2008 PIN-3 DEW Line Monitoring Program
PIN-3 Lady Franklin Point
Nunavut Territory

Tier II Soil Disposal Facility

AECOM

Figure F-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-3_PIN-3-FINAL-ReportVACAD_Files\80297_By1_F1_SoilDisposal(P3-RD06).dwg

1.3 Soil Sampling

Soil samples were collected at the designated locations of MW-9, MW-10, MW-11 and MW-12. The sampling locations are shown on Figure F-1. At each location, wherever possible, two samples were collected at approximately 0.1m below ground and between 0.4-0.5m below ground. The photographs of each test pit for each location sampled are shown in Appendix F3.

GLL did not observe any staining or free product during the sampling event. There were no odours documented during the sampling event at the DCC Tier II Soil Facility.

The laboratory analyses detected low concentrations of TPH (C6-34) in the test pits from soil sample locations MW-10 and MW-12. The concentrations noted are not considered by AECOM to be of significance. There were no detectable levels of PCB identified in the soil samples collected at the Tier II Soil Disposal Facility. Detectable levels of copper, nickel, cobalt, lead, zinc, chromium and mercury were returned by the laboratories; however, none of the concentrations are considered by AECOM to be of significance. It is recommended that these results be evaluated in the context of the DEW Line Landfill Monitoring Plan.

The analytical results and depths of samples are provided in Table F-1 and the laboratory certificate is provided in Appendix G.

Table F-1. PIN-3 Lady Franklin Point, Summary of 2008 Soil Analysis - Tier II Soil Disposal Facility

Sample Ident.	Sample Location	Depth	Copper Cu	Nickel Ni	Cobalt Co	Cadmium Cd	Lead Pb	Zinc Zn	Chromium Cr	Arsenic As	Mercury Hg	PCB Total Aroclors	F1 C6-C10	F2 C10-C16	F3 C16-C34	TPH 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 Samples																
P3-MW-9A	MW-9	0.1	8.4	<5.0	2.5	<0.50	3.2	4.7	6.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-9B	MW-9	0.5	10	<5.0	2.7	<0.50	3.8	5.3	5.4	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																
P3-MW-10A	MW-10	0.1	20.5	5.4	2.1	<0.50	11.7	13	4.7	<5.0	<0.050	<0.050	<10	<30	57	57
P3-MW-10B	MW-10	0.5	8.4	<5.0	2.2	<0.50	<2.0	4.2	4.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-11A	MW-11	0.1	4.7	<5.0	<2.0	<0.50	<2.0	4.2	3.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-11B	MW-11	0.5	5	<5.0	<2.0	<0.50	<2.0	5.1	4	<5.0	<0.050	<0.050	<10	<30	<50	ND
P3-MW-12A	MW-12	0.1	41.9	7.5	3.1	<0.50	22.4	18.9	5.3	<5.0	0.052	<0.090	<10	<30	77	77
P3-MW-12B	MW-12	0.5	16.2	<5.0	3.1	<0.50	2.6	6.5	7.5	<5.0	<0.050	<0.050	<10	<30	<50	ND

***** *Denotes duplicate sample. (Further information located in Table 2 of main report)*

Note: mg/kg = ug/g

TPH = The sum of F1, F2, and F3 as per the TOR

ND = No detectable concentrations observed

1.4 Groundwater Sampling

Measurement of depth to groundwater and documentation of monitor well conditions were recorded for monitoring wells MW-9, MW-10, MW-11 and MW-12. The monitoring well development records are provided in Appendix F4. Generally the observation wells appeared to be in good condition during AECOM's site visit.

Wells were purged and groundwater samples were collected at a maximum flow rate of 100mL/min using a peristaltic pump, and disposable LDPE tubing at each well. Monitoring of field parameters during purging included pH, conductivity, temperature, and turbidity. The groundwater samples were not filtered and not preserved as per the Terms of Reference, and were analyzed for total concentration of inorganic elements, TPH (C6-C32) and PCB.

Monitoring wells MW-9 and MW-10 had insufficient volumes of water to permit groundwater sampling, therefore, no groundwater samples were submitted to the laboratory for analyses. MW-9 appeared to be frozen at a depth of 1.97m below surface. MW-10 was blocked very near to surface at 0.87m below grade. The blocked portion of the borehole appeared to consist of filter sand. Monitoring wells MW-11 and MW-12 contained sufficient water for sampling.

The laboratory results revealed no detectable levels of TPH (C6-C32) or PCB and only very low concentrations of copper, and zinc. Neither of the detectable levels are considered by AECOM to be of significance. It is recommended that these results be evaluated in the context of the DEW Line Landfill Monitoring Plan.

The results are presented in Table F-2 and the laboratory certificate is provided in Appendix G.

Table F-2. PIN-3 Lady Franklin Point, Summary of 2008 Groundwater Analysis - Tier II Soil Disposal Facility

Sample Identification	Location	Groundwater Elevation (masl)	Copper Cu (mg/L)	Nickel Ni (mg/L)	Cobalt Co (mg/L)	Cadmium Cd (mg/L)	Lead Pb (mg/L)	Zinc Zn (mg/L)	Chromium Cr (mg/L)	Arsenic As (mg/L)	Mercury Hg (mg/L)	PCB Total Aroclors (mg/L)	F1 C6-C10 (mg/L)	F2 C10-C16 (mg/L)	F3 C16-C32 (mg/L)	TPH C10-32 (mg/L)
Upgradient Samples																
no sample	MW-9	-	-	-	-	-	-	-	-	-	-	-	-			-
Downgradient Samples																
no sample	MW-10	-	-	-	-	-	-	-	-	-	-	-	-			-
P3-MW-11	MW-11	9.23	0.0056	<0.025	<0.0025	<0.00025	<0.0050	0.0295	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0
P3-MW-12	MW-12	9.44	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	<0.0050	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0

***** *Denotes duplicate sample. (Further information located in Table 2 of main report)*

Note: mg/L approx. equals mg/kg (varies with solution density)

Lab analysis for TPH included carbon range C10 to C32. F1 (carbon range C6 to C10) was additionally analyzed to meet TOR requirements.

1.5 Thermal Monitoring

The manual readings taken from each thermistor from the Tier II Soil Disposal Facility are provided in the completed Maintenance Records located in Appendix F5. Selected data has been plotted into graphs for each thermistor and are provided in Graphs F-1 through F-4 located in Appendix F6.

Data were downloaded from all thermistors, and the data-loggers were reset in accordance with instructions provided by DCC. Batteries were not replaced as instructed by DCC. The set screw for the grounding cable for data-loggers VT-5 and VT-7 were found to be missing and stripped respectively. There is risk that these data-loggers are no longer properly grounded. It is recommended that DCC evaluate whether action is required. The observed battery levels for data-loggers VT-6 and VT-7 were lower than levels observed at other thermistor locations, and in comparison to levels observed in previous years. The battery levels can be found in the Maintenance Record for each thermistor in Appendix F5, and should be evaluated by DCC as to whether there is any required action. The batteries were last replaced in 2007.

The next scheduled inspection of the thermistors at the Main Landfill and download of the data is not until 2011.

F1 – Site Condition/Visual Inspection Records

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	PIN-3 Lady Franklin Point
LANDFILL/AREA DESIGNATION:	DCC Tier II Soil Disposal Facility
DATE OF INSPECTION:	August 16, 2008
DATE OF PREVIOUS INSPECTION:	August 22, 2007
INSPECTED BY:	Jim Theriault
REPORT PREPARED BY:	Jim Theriault

The preparer represents to the best of the preparer's knowledge, the following statements and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed

Preliminary Stability Assessment

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

Checklist Item	Present Yes/No	Location	Dimensions (m)			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	Yes	Multiple locations along crest, slopes and top cover	Variable 1 to 5	Variable 0.5 to 1.0	Variable 0.1 to 0.4	Approx. 2 to 5	Appears to be construction remnants - rutting and poor final grade	Photographs 2, 3, 4, 7, 13, 14, 15, 21	Poor final construction grade masks post- construction settlement. Cover and slopes appear stable and unchanged from
Erosion	Yes	See above					Rutting and irregular final grade from original construction.	See above	Above noted ruts are self-armouring and not susceptible to further erosion.
Frost Action	No								Coarse granular cover is not frost susceptible.
Animal Burrows	No								
Vegetation	Sparse								
Staining	No								
Vegetation Stress	No								
Seepage Points	No								
Debris Exposed	No								
Presence/ Condition of Monitoring Instruments	Good	Refer to Plan Map					VT-5, VT-6, VT-7 and VT-8 MW-9, MW-10, MW-11 and MW-12		Sampled and monitored in 2008
Other Features of Note.	No								
Additional Photos	Yes	Refer to Plan Map					General photos for documentation.	Photos 1, 5, 6, 8 - 12, 16 - 20, 22, 23	General photos for documentation, no features of note

Performance/Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: - Debris exposed in erosion channels or areas of differential settlement. - Liner exposed. - Slope failure.

Extent	Description
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

F2 – Geotechnical Inspection Photographic Records

Photograph T2-1. Looking SE to NE corner from about 25m NE of NE corner. ↑

Photograph T2-2. Looking W from NE corner along toe of N slope. Condition of slope appears unchanged from previous two inspections (2006 and 2007); however, inconsistent finished grade (undulations and vehicle ruts) makes it difficult to discern differential settlement. ↑

Photograph T2-3. Looking W along crest from NE corner of landfill. VT-6 visible in frame. A depression (0.5mx 4mx6m) centred about 4m NE of VT-6 appears unchanged from previous inspection. ↑

Photograph T2-4. Looking W along crest of N face from adjacent to VT-6. Looking to VT-5. A large zone of depression (approx. 10m x 10m and up to 0.5m deep) centred about 12m north of VT-5 appears unchanged from previous inspection. No indications of slope movement. ↑

Photograph T2-5. Looking W from mid-slope along N face. Backpack is located near eastern limit of the above noted zone of depression. Zone of depression appears unchanged since previous inspection; however, no as-built survey is available for comparison. ↑

Photograph T2-6. Looking SW from toe of slope to area of depression adjacent to VT-5. ↑

Photograph T2-.7 Looking S along downstream toe of W slope from about 20m N of NW toe. Broad zones of depression are visible which is consistent with poor construction finish. There is no evidence of slope instability. ↑

Photograph T2-8. Looking S along crest from NW corner. ↑

Photograph T2-9. Looking S along W crest from about midway towards S slope. No features of note. ↑

Photograph T2-10. Looking S along W slope from about midslope. No features of note. Slope appears stable. ↑

Photograph T2-11. Looking NE to SW corner of the landfill. MW-10 visible in the foreground. ↑

Photograph T2-12. Looking E along S slope from partway up slope near SW corner. MW-11 visible in distance to the south of the toe of slope. Slope has relatively gentle grade and abuts into organic layer. No indications of slope instability. ↑

Photograph T2-13. Looking E from SW crest of the LF. VT-7 in foreground, VT-8 further away. Deep rutting (up to 0.5m deep x 1m wide x 5 m long) appears to be a construction remnant. The rut is self armouring and not susceptible to further erosion. ↑

Photograph T2-14. Close-up of deep rut along crest of SW corner. Unchanged from previous two inspections. ↑

Photograph T2-15. Close-up of deep rut adjacent to VT-7. Unchanged from previous two inspections. The rut is self armouring and not susceptible to further erosion. No indications of slope instability. ↑

Photograph T2-16. Looking E along crest to VT-8 from adjacent to VT-7. No features of note. ↑

Photograph T2-17. Looking E from mid-slope of the S slope. VT-8 visible along crest. No features of note. ↑

Photograph T2-18. Looking W along S slope from about mid-slope near SE corner. VT-8 (near) and VT-7 (distant) visible along crest. Minor surface irregularities and undulations are visible (consistent with irregular construction finish); however, the slope appears stable. ↑

Photograph T2-19. Looking N along E slope from adjacent to MW-12. Slope appears stable. ↑

Photograph T2-20. Looking N along E crest from about SE corner. Significant vehicle ruts and inconsistent construction finish in the area. Slope appears stable and the surface irregularities are self armouring and not susceptible to further erosion. ↑

Photograph T2-21. Close-up of ruts, looking NE from crest of E slope, about 25 m N of SE corner of landfill. ↑

Photograph T2-22. Panoramic, L to R, looking SW from NE corner. VT-6 visible along right side of photo. No clear indications of problematic conditions (i.e., slope movement or significant differential settlement). The irregular surface (poor construction finish) masks minor changes. Condition of the landfill cover should continue to be monitored. ↑

Photograph T2-23. Panoramic, L to R, looking SE from NW corner. Note gentle undulation and inconsistent construction finish. ↑

F3 – Monitoring Photographic Records

Photograph 1. Monitoring well MW-9. Well frozen at 1.97m. No water for sampling. ↑

Photograph 2. Test pit at MW-9. Samples P3-MW-9A and P3-MW-9B collected. ↑

Photograph 3. Test pit at MW-10 – Samples P3-MW-10A and P3-MW-10B collected. NOTE: photo of MW-10 was inadvertently deleted and is unrecoverable, however the well appeared unchanged from 2007 upon inspection. ↑

Photograph 4. Monitoring well MW-11. Sample P3-MW-11 collected. ↑

Photograph 5. Test pit at MW-11. Samples P3-MW-11A and P3-MW-11B collected. ↑

Photograph 6. Monitoring well MW-12. Sample P3-MW-12 collected. ↑

Photograph 7. Test pit at MW-12. Samples P3-MW-12A and P3-MW-12B collected. ↑

Photograph 8. Vertical thermistor VT-5. ↑

Photograph9. Vertical thermistor VT-6. ↑

Photograph 10. Vertical thermistor VT-7. ↑

Photograph 11. Vertical thermistor VT-8. ↑

F4 – Monitoring Well Sampling Records

2008 Monitoring Well Sampling Log (MW #9)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-9
Facility:	Tier II Soil Disposal Facility

Known Data

Depth of installation* (m):	4.93
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.73

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	-
Well height above ground (m):	0.44	Depth to bottom (m):	1.97
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		**Notes**	
Depth of water (m):	-	Evidence of sludge:	-
Well volume of water (L):	-	Evidence of freezing/siltation:	Y
Static water level* (m):	-	Well frozen at 1.97m. No water for sample.	
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment: -

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
-	-	-	-	-	-	-

Water Sampling		**Soil Sampling**	
Date & Time Collected:	-	Date and Time Collected:	Aug-15, 2008 15:30
Sample Number - Water:		Sample Number - Soil:	P3-MW-9A
			P3-MW-9B
Sample Containers:		Sample Containers:	4 x 250mL Glass
Procedure/Equipment:		Procedure/Equipment:	SS Trowel
Water Description:		Soil Description:	Dark brown sand & gravel
Sampling Equipment Decontamination (Y/N):		Sampling Equipment Decontamination (Y/N):	Y
Number Washes:		Number Washes:	1
Number Rinses:		Number Rinses:	1

*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

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2008 Monitoring Well Sampling Log (MW #10)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-10
Facility:	Tier II Soil Disposal Facility

Known Data

Depth of installation* (m):	4.60
Length of screened section (m):	2.99
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good at surface	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	-
Well height above ground (m):	0.72	Depth to bottom (m):	1.59
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	-	Evidence of sludge:	-
Well volume of water (L):	-	Evidence of freezing/siltation:	Filter sand
Static water level* (m):	-	Filter sand at 1.59m depth. Well suspected to be broken.	
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment:	-

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
-	-	-	-	-	-	-

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	Aug-15, 2008 16:00
Sample Number - Water:		Sample Number - Soil:	P3-MW-10A
			P3-MW-10B
Sample Containers:		Sample Containers:	4 x 250mL Glass
Procedure/Equipment:		Procedure/Equipment:	SS Trowel
Water Description:		Soil Description:	organic peat at surface sand with gravel at depth
Sampling Equipment Decontamination (Y/N):		Sampling Equipment Decontamination (Y/N):	Y
Number Washes:		Number Washes:	1
Number Rinses:		Number Rinses:	1

*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

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2008 Monitoring Well Sampling Log (MW #11)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-11
Facility:	Tier II Soil Disposal Facility

Known Data

Depth of installation* (m):	4.83
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.74

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.42
Well height above ground (m):	0.41	Depth to bottom (m):	1.84
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.42
Well volume of water (L):	0.82
Static water level* (m):	1.01
Length of screen collecting water (m):	0.42

Notes

Evidence of sludge:	-
Evidence of freezing/siltation:	-

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 16:30	1.25	3.5	7.04	4320	80	slightly brown, cleared with purging

Water Sampling

Date & Time Collected:	Aug-15, 2008 16:40
Sample Number - Water:	P3-MW-11
Sample Containers:	4 x 1L Amber Glass
	2 x VOC vial
	1 x 250mL Plastic
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing
Water Description:	clear, colourless
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

Soil Sampling

Date and Time Collected:	Aug-15, 2008 16:50
Sample Number - Soil:	P3-MW-11A
	P3-MW-11B
Sample Containers:	4 x 250mL Glass
Procedure/Equipment:	SS Trowel
Soil Description:	Sand and gravel
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

*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

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2008 Monitoring Well Sampling Log (MW #12)

Site name:	PIN-3
Date of sampling event:	15-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-12
Facility:	Tier II Soil Disposal Facility

Known Data

Depth of installation* (m):	4.70
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.56

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.52
Well height above ground (m):	0.63	Depth to bottom (m):	2.09
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.57
Well volume of water (L):	1.12
Static water level* (m):	0.89
Length of screen collecting water (m):	0.57

Notes

Evidence of sludge:	-
Evidence of freezing/siltation:	-

Development/Purging Information

Equipment: Peristaltic pump, Horiba U-22 with flow-through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
Aug-15, 2008 17:05	1.5	3.3	6.99	3570	100	Clear, colourless

Water Sampling

Date & Time Collected:	Aug-15, 2008 17:15
Sample Number - Water:	P3-MW-12
Sample Containers:	4 x 1L Amber Glass
	2 x VOC vials
	1 x 250mL Plastic
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing
Water Description:	Clear, colourless
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

Soil Sampling

Date and Time Collected:	Aug-15, 2008 17:20
Sample Number - Soil:	P3-MW-12A
	P3-MW-12B
Sample Containers:	4 x 250mL Glass
Procedure/Equipment:	SS Trowel
Soil Description:	organic peat at surface sand and gravel at depth
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

*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

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F5 – Thermistor Maintenance Records

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT5**		Inclination		**Vertical**		
Install Date:	**9-Sep-03**		First Date Event		**23-Aug-07**	Last Date Event	**15-Aug-08**
Coordinates and Elevation		N **9430.72**		E **10848.42**		Elev	**18.5**
Length of Cable (m)	**11.5**	Cable Lead Above Ground (m)	**0**	Nodal Points	**16**		
Datalogger Serial #	**108066**			Cable Serial Number			**1611**

Code PIN-3VT5

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☐	☑ **Grounding cable has lost set screw**
Cable	☑	☐
Beads	☐	☑ **Beads 10 & 16 not working on datalogger, Bead 10 not reading manually**

Battery Installation Date **23-Aug-07**

Battery Levels Main **11.34 V** Aux **13.02 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10120**	**9.7**
2	**9740**	**10.5**
3	**9550**	**10.8**
4	**10650**	**8.6**
5	**12200**	**5.8**
6	**13650**	**3.6**
7	**15720**	**0.7**
8	**18130**	**-2.0**

Bead	ohms	Temp. (ºC)
9	**18850**	**-2.7**
10		
11	**20550**	**-4.3**
12	**21240**	**-5.0**
13	**21980**	**-5.6**
14	**22740**	**-6.3**
15	**23800**	**-7.2**
16	**24850**	**-7.9**

Observations and Proposed Maintenance

Replace set screw for grounding cable during next site visit.

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT6**		Inclination		**Vertical**		
Install Date:	**8-Sep-03**		First Date Event		**23-Aug-07**	Last Date Event	**16-Aug-08**
Coordinates and Elevation		N	**9431.74**	E	**10888.36**	Elev	**18.5**
Length of Cable (m)	**11.5**	Cable Lead Above Ground (m)	**4.5**	Nodal Points	**16**		
Datalogger Serial #	**111096**			Cable Serial Number			**1612**

Code PIN-3VT6

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	**Bead 16 not working on datalogger**

Battery Installation Date **23-Aug-07**

Battery Levels Main **9.46 V** Aux **9.12 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)	Bead	ohms	Temp. (ºC)
1	**9140**	**11.8**	9	**18520**	**-2.4**
2	**9050**	**12.2**	10	**19320**	**-3.2**
3	**8460**	**13.5**	11	**20220**	**-4.1**
4	**10150**	**9.6**	12	**21140**	**-4.9**
5	**12250**	**5.7**	13	**21900**	**-5.6**
6	**13630**	**3.5**	14	**22610**	**-6.2**
7	**15800**	**0.7**	15	**23840**	**-7.2**
8	**17800**	**-1.6**	16	**24690**	**-7.9**

Observations and Proposed Maintenance

Battery levels appear low even though the batteries were replaced in 2007.

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	**VT7**		Inclination	**Vertical**			
Install Date:	**10-Sep-03**		First Date Event	**23-Aug-07**	Last Date Event		**17-Aug-08**
Coordinates and Elevation	N	**9373.65**	E	**10849.85**	Elev		**17.4**
Length of Cable (m)	**10.5**	Cable Lead Above Ground (m)	**0**	Nodal Points	**16**		
Datalogger Serial #	**111099**			Cable Serial Number			**1613**

Code PIN-3VT7

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☐	☑	**Set screw for grounding cable stripped**
Cable	☑	☐	
Beads	☐	☑	**Bead 16 not working on datalogger**

Battery Installation Date **23-Aug-07**

Battery Levels Main **9.73 V** Aux **9.73 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)	Bead	ohms	Temp. (ºC)
1	**9750**	**10.4**	9	**19320**	**-3.2**
2	**9810**	**10.4**	10	**20210**	**-4.0**
3	**11680**	**6.7**	11	**21010**	**-4.8**
4	**13010**	**4.5**	12	**21760**	**-5.5**
5	**14470**	**2.4**	13	**22430**	**-6.0**
6	**16800**	**-0.5**	14	**23020**	**-6.5**
7	**17720**	**-1.5**	15	**23480**	**-6.9**
8	**18400**	**-2.3**	16	**23660**	**-7.2**

Observations and Proposed Maintenance

Replace set screw for grounding cable during next site visit.
Battery levels appear low even though the batteries were replaced in 2007.

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**15-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	**VT8**		Inclination	**Vertical**			
Install Date:	**9-Sep-03**		First Date Event	**23-Aug-07**	Last Date Event		**18-Aug-08**
Coordinates and Elevation	N	**9374.48**	E	**10889.74**	Elev		**17.4**
Length of Cable (m)	**10.5**	Cable Lead Above Ground (m)	**3.5**	Nodal Points	**16**		
Datalogger Serial #	**111091**			Cable Serial Number			**1614**

Code PIN-3VT8

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	**Bead 16 not working on datalogger**

Battery Installation Date **23-Aug-07**

Battery Levels Main **11.34 V** Aux **13.26 V**

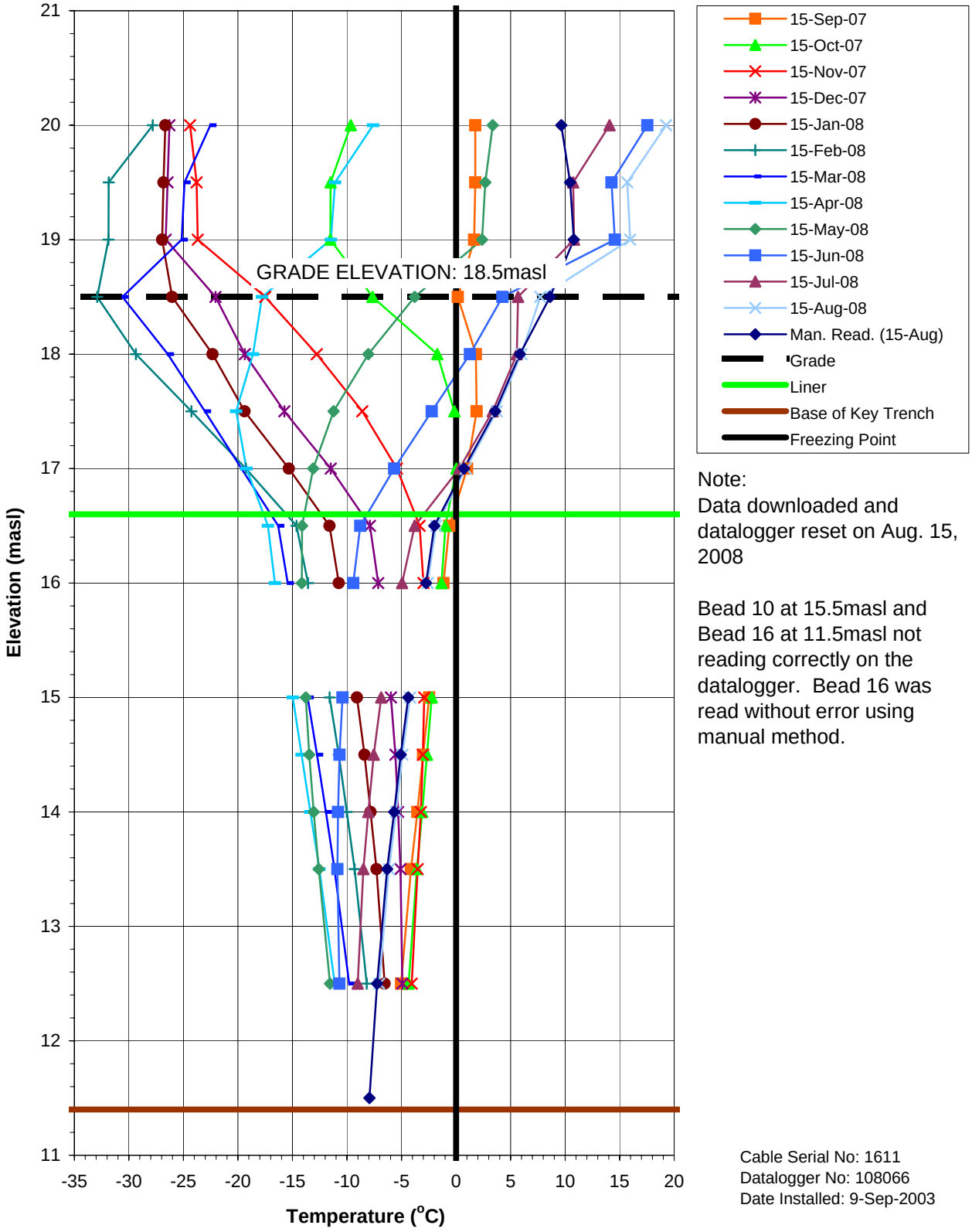
Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**9840**	**10.2**
2	**10110**	**9.7**
3	**11790**	**6.5**
4	**13010**	**4.4**
5	**14780**	**2.0**
6	**17140**	**-0.9**
7	**18060**	**-1.9**
8	**18790**	**-2.7**

Bead	ohms	Temp. (ºC)
9	**19630**	**-3.5**
10	**20500**	**-4.3**
11	**21380**	**-5.1**
12	**22270**	**-5.9**
13	**22990**	**-6.5**
14	**23500**	**-6.9**
15	**23980**	**-7.3**
16	**24400**	**-7.6**

Observations and Proposed Maintenance

F6 – Thermistor Graphs



Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Bead 10 at 15.5masl and Bead 16 at 11.5masl not reading correctly on the datalogger. Bead 16 was read without error using manual method.

Cable Serial No: 1611
Datalogger No: 108066
Date Installed: 9-Sep-2003

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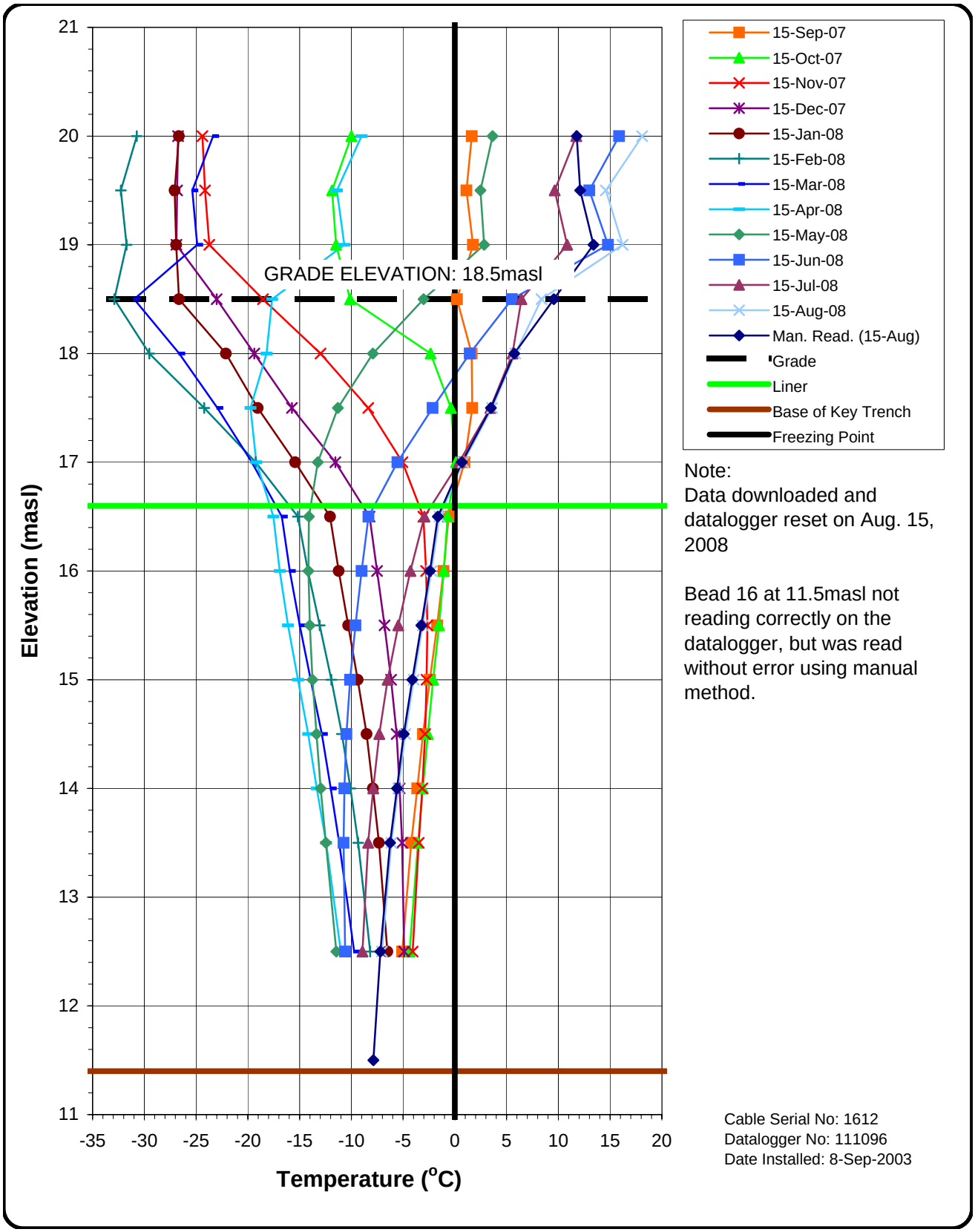
Graph F-1
Ground Temperature Profile
Tier II Soil Disposal Facility
Vertical GTC VT-5



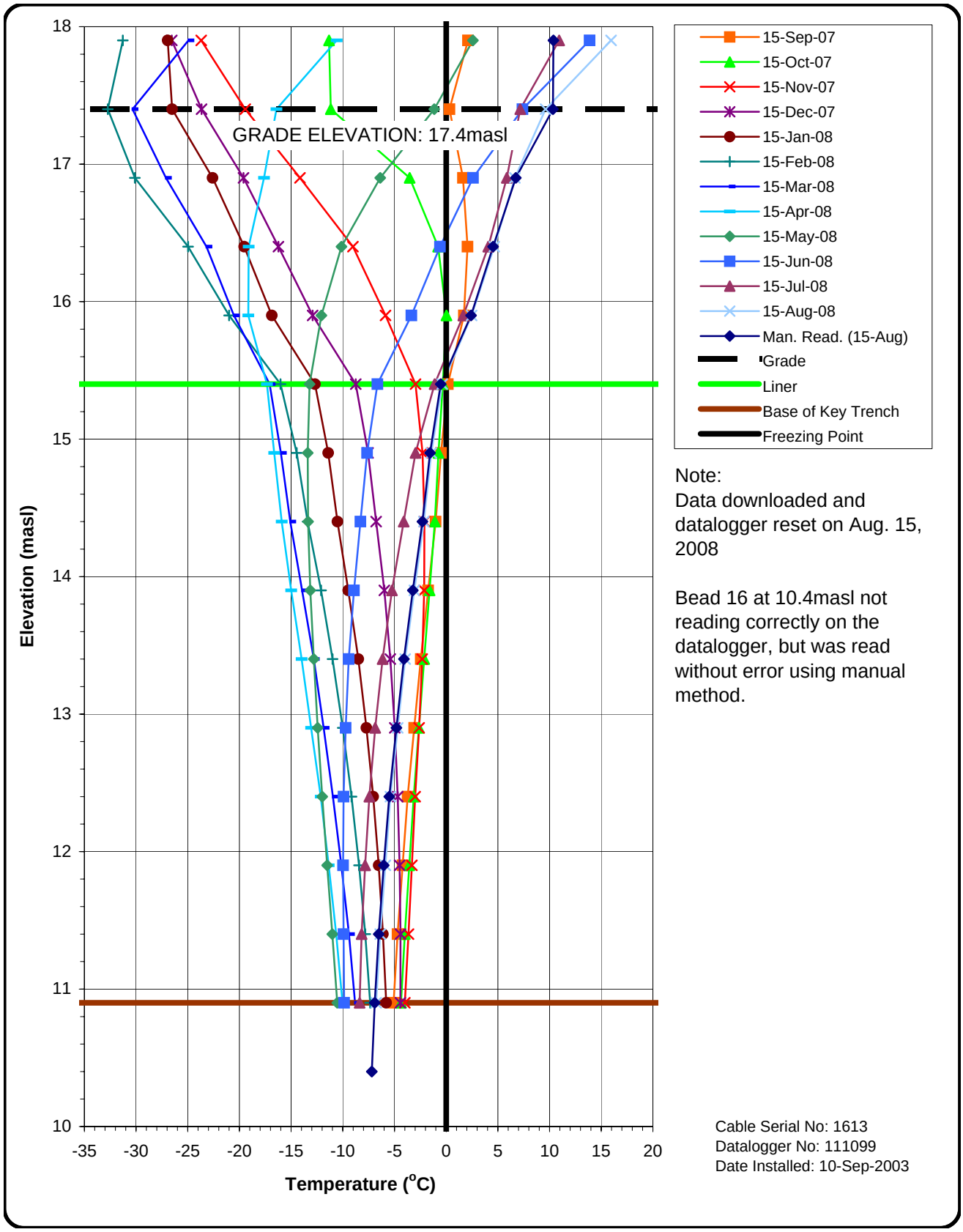
Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Bead 16 at 11.5masl not reading correctly on the datalogger, but was read without error using manual method.

Cable Serial No: 1612
Datalogger No: 111096
Date Installed: 8-Sep-2003

AECOM

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



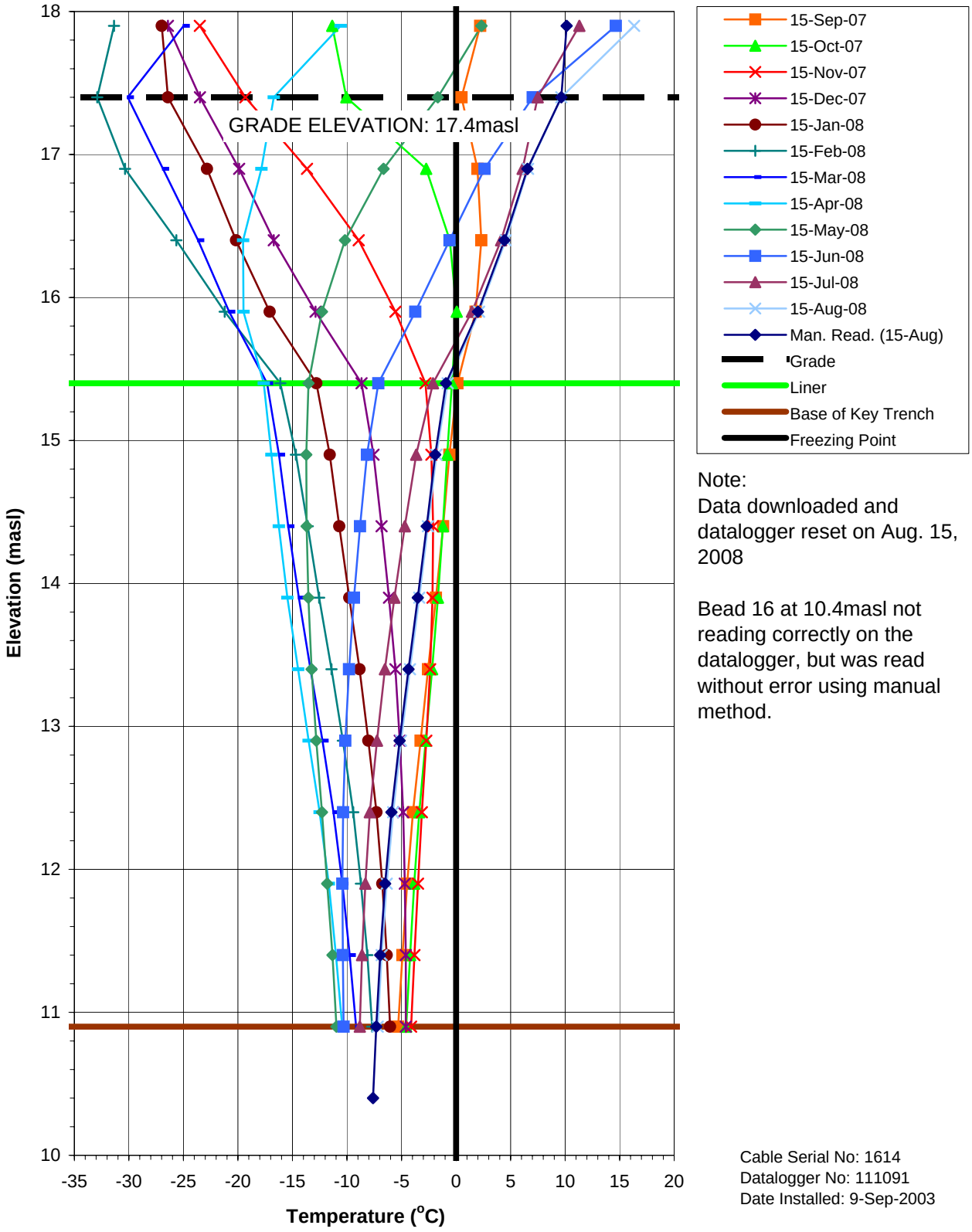
Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Bead 16 at 10.4masl not reading correctly on the datalogger, but was read without error using manual method.

Cable Serial No: 1613
Datalogger No: 111099
Date Installed: 10-Sep-2003

AECOM

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



Note:
Data downloaded and datalogger reset on Aug. 15, 2008

Bead 16 at 10.4masl not reading correctly on the datalogger, but was read without error using manual method.

Cable Serial No: 1614
Datalogger No: 111091
Date Installed: 9-Sep-2003

AECOM

Graph F-4
Ground Temperature Profile
Tier II Soil Disposal Facility
Vertical GTC VT-8

F7 – Field Notes

PIN-3 (Final Day, weather permitting)
Rain, cold
Aug 16/2008

Everyone is tearing down camp in hopes of plane coming in. First plane scheduled for 10am but strong headwind will delay

Preparing for Tier II inspection. Writing up partial notes in advance due to heavy rain
-> This is third year conducting the inspection and preliminary inspection yesterday did not note any changed conditions

T2-1 (101-0017 0018) 409613 7597444
Looking SW to NE corner from about 25m NE of the NE corner

T2-2 (101-~~0018~~ 0019) 409593 7597433
Looking west from NE corner along toe of north slope

T2-3 (101-~~0019~~ 0020) 409575 7597412
Looking west along crest from NE corner of landfill
- VT6 visible

T2-4 (101-0021) 409547 7597411
Looking west along crest of north face from adjacent to VT-6. Looking to VT-5

T2-5 (101-0022) 409547 7597418
Looking west from midslope along north face

T2-6 (101-0023) 409519 7597433
Looking SW from toe of slope to area of depression adjacent to VT-5

Aug 16, 2008 Drizzle, rain Heavy overcast

T2-7 (101-0024) 409461 7597446
Looking south along downstream toe of West slope from about 20m N of NW toe

T2-8 (101-0025) 409480 7597414
Looking south along crest from NW corner

T2-9 (101-0026) 409481 7597392
Looking south along western crest from about midway towards south slope

T2-10 (101-0027) 409469 7597391
Looking south along west slope from about midslope

T2-11 (101-0028, 0029) 409428 7597315
Looking NE to SW corner of the landfill. MW-10 visible in the foreground

T2-12 (101-0030) 409455 7597327
Looking east along south slope from partway up slope near SW corner MW-11 visible

T2-13 (101-0031) 409482 7597352
Looking east from SW crest of the LF VT-7 in near ground, VT-8 further on

T2-14 (101-0032) 409484 7597352
Close-up of deep rut along crest of SW corner

T2-15 (101-0033) 409508 7597350
Close-up of deep rut adjacent to ~~to~~ VT-7

T2-16 (101-0034) 409506 7597353
Looking east along crest to VT-8 from adjacent to VT-7

Aug 16, 2008

T2-17 (101-0035) 409507 7597341
Looking east from midslope of the southern slope VT-8 visible along crest

T2-18 (101-0036, 0037) 409577 7597336
looking west along south slope from about midslope ~~of~~ near SE corner

T2-19 (101-0038, 0039) 409594 7597309
Looking north along east slope from adjacent to MW-12
- slope appears stable

T2-20 (101-0040) 409570 7597348
Looking north along east crest from about SE corner

T2-21 (101-0041) 409569 7597372
Close-up of ruts, looking ~~North~~ NE ~~along~~ from crest of East slope, part way north

409569
T2-22 (101-0042, 0043, 0044) 7597404
Panoramic L→R looking ~~W~~ SW from NE corner

T2-23 (101-0045, 0046) 409483 7597410
Panoramic L→R looking SE from NW corner

Back to Camp to finish tear down
- heavy fog has rolled in and it looks doubtful for plane
- Lou Bedard (Nasituk) and Tom remain with me
- Plane arrives 2:45 pm (surprising given weather)
- Touch down Cambridge Bay ≈ 4:45 pm
- 5:45 pm by the time we unload
- Back @ bunkhouse for dinner
- Laundry and prep for tomorrow until ≈ 10:30 pm

Aug 15 3:30 PM

~~MW-9~~ TIER II

MW-9

No water sample, well frozen
Photo 9 - Well MW-9
Soil Sample collected
P3-MW-9A Surface
P3-MW-9B Depth
Photo 10 - test pit

MW-10

No water sample, well appears to be broken. Filter sand in well. bottom at 1m 59cm
Photo 11 - Well MW-10
Soil Sample collected
P3-MW-10A Surface
P3-MW-10B Depth
Photo 12 - Test pit

Aug 15

MW-11

Water Sample collected
P3-MW-11 4x 1L AG
2 x VOC Vial
1 x 250mL Plastic
Photo 13 - MW-11
Soil sample Collected
P3-MW-11A Surface
P3-MW-11B Depth
Photo 14 - Test pit.

MW-12

Water Sample Collected
P3-MW-12 4x 1L AG
2 x VOC Vial
1 x 250mL Plastic
Photo 15 - MW-12
Soil Sample Collected
P3-MW-12A Surface
P3-MW-12B Depth
Photo 16 - Test pit

Aug 15

VT-6

Data downloaded, manual readings taken
Photo 17 of VT-6

VT-5

Data downloaded, manual readings taken
Photo 18 of VT-5

VT-7

Data downloaded, manual readings taken
Photo 19 of VT-7

VT-8

Data downloaded, manual readings taken
Photo 20 of VT-8

VT-2

Data downloaded, man. readings taken
Photo 21 of VT-2

VT-1

Data d/L, man. readings taken
Photo 22 of VT-1

Aug 15

VT-3

Data d/L, man. readings taken
Photo 23 of VT-3

VT-4

Data d/L, man. readings taken
Photo 24 of VT-4

2008 Monitoring Well Sampling Log (MW # 9)

Site name:	PIN-3
Date of sampling event:	Aug 15
Names of samplers:	KB SK
Monitoring well ID:	MW-9
Facility:	TIER II

Known Data	
Depth of installation* (m):	4.93
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.73

Measured Data			
Condition of well:	Good @ surface	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Tape Measure	Depth to water surface (m):	—
Well height above ground (m):	0.44	Depth to bottom (m):	1.97
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	—	Evidence of sludge:	—
Well volume of water (L):	—	Evidence of freezing/siltation:	frozen
Static water level* (m):	—	Well frozen @ 1.97 m. No water for Sample.	
Length of screen collecting water (m):	—		

Development/Purging Information

Equipment: —

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
	—					

Water Sampling		Soil Sampling	
Date & Time Collected:		Date and Time Collected:	3:30 PM
Sample Number - Water:		Sample Number - Soil:	P3-MW-9A
			P3-MW-9B
Sample Containers:		Sample Containers:	4 x 250mL Glass
Procedure/Equipment:		Procedure/Equipment:	metal trowel
Water Description:		Soil Description:	Dark brown sand & Gravel
Sampling Equipment Decontamination (Y/N):		Sampling Equipment Decontamination (Y/N):	Y
Number Washes:		Number Washes:	1
Number Rinses:		Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 10)

Site name:	PIN-3
Date of sampling event:	Aug 15
Names of samplers:	KB SK
Monitoring well ID:	MW-10
Facility:	Tier II

Known Data

Depth of installation* (m):	4.60
Length of screened section (m):	2.99
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good @ surface	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Tape	Depth to water surface (m):	—
Well height above ground (m):	0.72	Depth to bottom (m):	1.59 m
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	—	Evidence of sludge:	—
Well volume of water (L):	—	Evidence of freezing/siltation:	filter sand
Static water level* (m):	—	filter sand @ 1.59 m depth. well suspected to be broken	
Length of screen collecting water (m):	—		

Development/Purging Information

Equipment:

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
/	/	/	/	/	/	/

Water Sampling		Soil Sampling	
Date & Time Collected:		Date and Time Collected:	4:00 PM
Sample Number - Water:		Sample Number - Soil:	P3-MW-10 A
			P3-MW-10 B
Sample Containers:		Sample Containers:	4 x 250 mL
			Glass
Procedure/Equipment:		Procedure/Equipment:	Metal trowel
Water Description:		Soil Description:	organic peat @ surface Sand in gravel @ depth
Sampling Equipment Decontamination (Y/N):		Sampling Equipment Decontamination (Y/N):	Y
Number Washes:		Number Washes:	1
Number Rinses:		Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 11)

Site name:	PIN - 3
Date of sampling event:	Aug 15
Names of samplers:	KB SK
Monitoring well ID:	MW - 11
Facility:	Tier II

Known Data

Depth of installation* (m):	4.83
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.74

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface
Procedure/Equipment:	Tape	Depth to water surface (m):	1.42
Well height above ground (m):	0.41	Depth to bottom (m):	1.84
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.42	Evidence of sludge:	—
Well volume of water (L):	0.85	Evidence of freezing/siltation:	—
Static water level* (m):	1.01		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Perist. Pump LDPE, Horiba + flow through

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
4:30	1.25	3.5	7.04	4320	80.0	slightly brown cleared w purge

Water Sampling		Soil Sampling	
Date & Time Collected:	4:40	Date and Time Collected:	4:50
Sample Number - Water:	P3-MW-11	Sample Number - Soil:	P3-MW-11A
			P3-MW-11B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL
	2x VOC		Glass
	1 x 250mL Plastic		
Procedure/Equipment:	Peri's LDPE	Procedure/Equipment:	Metal trowel
Water Description:	Clear colourless	Soil Description:	Sand & Gravel
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

2008 Monitoring Well Sampling Log (MW # 12)

Site name:	PIN-3
Date of sampling event:	AUG 15, 08
Names of samplers:	KB SK
Monitoring well ID:	MW-12
Facility:	Tier II

Known Data

Depth of installation* (m):	4.70
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.56

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface
Procedure/Equipment:	M. Tape	Depth to water surface (m):	1.52
Well height above ground (m):	0.63	Depth to bottom (m):	2.09
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.57	Evidence of sludge:	—
Well volume of water (L):	1.16	Evidence of freezing/siltation:	—
Static water level* (m):	0.89		
Length of screen collecting water (m):			

Development/Purging Information

Equipment: Peris. Pump, LDPE, Horiba + flow through

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
5:05 PM	1.5	3.3	6.99	3570	100	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	5:15 PM	Date and Time Collected:	5:20PM
Sample Number - Water:	P3-MW-12	Sample Number - Soil:	P3-MW-12A
			P3-MW-12B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL
	2x VOC		Glass
	1x 250mL Plastic		
Procedure/Equipment:		Procedure/Equipment:	metal trowel
Water Description:	Clear Colourless	Soil Description:	organic peat @ surface S&G @ depth
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1	Number Washes:	1
Number Rinses:	1	Number Rinses:	1

n/a=not applicable

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

Gartner Lee

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	**VT5**		Inclination	**Vertical**			
Install Date:	**9-Sep-03**		First Date Event	08/23/07	Last Date Event	08/15/08	
Coordinates and Elevation		N	**9430.72**	E	**10848.42**	Elev	**18.5**
Length of Cable (m)	**11.5**	Cable Lead Above Ground (m)	**0**	Nodal Points	**16**		
Datalogger Serial #	**108066**			Cable Serial Number			**1611**

Code PIN-3VT5

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☐	☑	Grounding cable has lost set screw
Cable	☑	☐	
Beads	☐	☑	10 & 16 not working on computer
Battery Installation Date			
Battery Levels	Main 11.34	Aux 13.02	

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.12	
2	9.774	
3	9.55	
4	10.65	
5	12.20	
6	13.65	
7	15.72	
8	18.13	

Bead	ohms	Temp. (°C)
9	18.85	
10	—	
11	20.55	
12	21.24	
13	21.98	
14	22.74	
15	23.80	
16	24.85	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT6**		Inclination		**Vertical**		
Install Date:	**8-Sep-03**		First Date Event			Last Date Event	
Coordinates and Elevation		N	**9431.74**	E	**10888.36**	Elev	**18.5**
Length of Cable (m)	**11.5**		Cable Lead Above Ground (m)	**4.5**	Nodal Points	**16**	
Datalogger Serial #	**111096**				Cable Serial Number		**1612**

Code PIN-3VT6

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☒	Bead 16 not working w computer
Battery Installation Date			
Battery Levels	Main 9.46 V	Aux 9.78 V	

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	9.14	
2	9.05	
3	8.46	
4	10.15	
5	12.25	
6	13.63	
7	15.80	
8	17.80	

Bead	ohms	Temp. (°C)
9	18.52	
10	14.32	
11	20.22	
12	21.14	
13	21.90	
14	22.61	
15	23.84	
16	24.69	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	PIN-3		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	VT7		Inclination	**Vertical**			
Install Date:	**10-Sep-03**		First Date Event	8/23/07		Last Date Event	8/15/08
Coordinates and Elevation		N	**9373.65**	E	**10849.85**	Elev	**17.4**
Length of Cable (m)	**10.5**	Cable Lead Above Ground (m)	**0**	Nodal Points	**16**		
Datalogger Serial #	**111099**			Cable Serial Number			**1613**

Code PIN-3VT7

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☐	☑	set screw for grounding cable stripped
Cable	☑	☐	
Beads	☐	☒	16 not reading on comp.
Battery Installation Date			
Battery Levels	Main	9.73 ✓	Aux 9.73 V

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	9.75	
2	9.81	
3	11.68	
4	13.01	
5	14.47	
6	16.80	
7	17.72	
8	18.40	

Bead	ohms	Temp. (°C)
9	19.32	
10	20.21	
11	21.01	
12	21.76	
13	22.43	
14	23.02	
15	23.48	
16	23.66	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 15
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**PIN-3**		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	**VT8**		Inclination	**Vertical**			
Install Date:	**9-Sep-03**		First Date Event	8/23/07		Last Date Event	8/15/08
Coordinates and Elevation		N	**9374.48**	E	**10889.74**	Elev	**17.4**
Length of Cable (m)	**10.5**	Cable Lead Above Ground (m)	**3.5**	Nodal Points	**16**		
Datalogger Serial #	**111091**			Cable Serial Number			**1614**

Code PIN-3VT8

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☒	16 not reading on comp.
Battery Installation Date			
Battery Levels	Main 11.34	Aux 13.26	

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	9.84	
2	10.11	
3	11.79	
4	13.01	
5	14.78	
6	17.14	
7	18.06	
8	18.79	

Bead	ohms	Temp. (°C)
9	19.63	
10	20.50	
11	21.38	
12	22.27	
13	22.99	
14	23.50	
15	23.98	
16	24.40	

Observations and Proposed Maintenance

Appendix G

Laboratory Reports - Attachments

List of Laboratory Reports

List of Laboratory Reports

Analysis Report

CANTEST

REPORT ON: Analysis of Soil, Water Samples

REPORTED TO: Gartner Lee Limited
Suite 300
300 Town Centre Boulevard
Markham, ON
L3R 5Z6

Att'n: Ken Boldt

CHAIN OF CUSTODY: 2118959
PROJECT NAME: KITIK05
PROJECT NUMBER: 80297
P.O. NUMBER: 6076

NUMBER OF SAMPLES: 7

REPORT DATE: September 4, 2008

DATE SUBMITTED: August 25, 2008

GROUP NUMBER: 90825112

SAMPLE TYPE: Water, Soil

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.

Anna Becalska, PhD
Trace Metals Coordinator

4606 Canada Way, Burnaby, BC V5G 1K5
Tel: 604 734 7276 Fax: 604 731 2386

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.

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).

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.

(Continued)

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).

Semi-Volatile Hydrocarbons - analysis was performed using procedures based on U.S. EPA Method 8015, involving dichloromethane extraction and analysis using GC/FID. Components in the C10 to C30 range are included, using an alkane standard for quantitation.

TEST RESULTS:

(See following pages)

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Hardness (Total) CaCO3
C2-MW-9	Aug 19/08	808250426	1120
P3-MW-13	Aug 19/08	808250446	1220
DETECTION LIMIT			10
UNITS			mg/L

mg/L = milligrams per liter

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		C2-MW-9	P3-MW-13	DETECTION LIMIT	UNITS
SAMPLE PREPARATION:		TOTAL	TOTAL		
DATE SAMPLED:		Aug 19/08	Aug 19/08		
CANTEST ID:		808250426	808250446		
Aluminum	Al	0.022	0.013	0.001	mg/L
Antimony	Sb	<	<	0.0002	mg/L
Arsenic	As	0.002	0.0006	0.0002	mg/L
Barium	Ba	0.039	0.011	0.0002	mg/L
Beryllium	Be	<	<	0.0002	mg/L
Bismuth	Bi	<	<	0.0002	mg/L
Boron	B	1.08	0.39	0.01	mg/L
Cadmium	Cd	<	<	0.00004	mg/L
Calcium	Ca	136	261	0.01	mg/L
Chromium	Cr	0.0003	<	0.0002	mg/L
Cobalt	Co	0.0009	0.0006	0.0002	mg/L
Copper	Cu	0.0033	0.0026	0.0002	mg/L
Iron	Fe	0.25	0.25	0.01	mg/L
Lead	Pb	<	<	0.0002	mg/L
Lithium	Li	0.068	0.014	0.0002	mg/L
Magnesium	Mg	188	136	0.5	mg/L
Manganese	Mn	0.067	0.019	0.0002	mg/L
Mercury	Hg	<	<	0.02	µg/L
Molybdenum	Mo	0.018	0.0021	0.0001	mg/L
Nickel	Ni	0.0036	0.015	0.0002	mg/L
Phosphorus	P	<	<	0.03	mg/L
Potassium	K	48.8	15.9	0.02	mg/L
Selenium	Se	<	0.0015	0.0002	mg/L
Silicon	Si	5.19	0.88	0.05	mg/L
Silver	Ag	<	<	0.00005	mg/L
Sodium	Na	1170	86	1	mg/L
Strontium	Sr	1.2	0.466	0.0002	mg/L
Tellurium	Te	<	<	0.0002	mg/L
Thallium	Tl	0.00003	0.00003	0.00002	mg/L
Thorium	Th	<	<	0.0001	mg/L
Tin	Sn	0.0003	<	0.0002	mg/L

(Continued on next page)

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		C2-MW-9	P3-MW-13	DETECTION LIMIT	UNITS
SAMPLE PREPARATION:		TOTAL	TOTAL		
DATE SAMPLED:		Aug 19/08	Aug 19/08		
CANTEST ID:		808250426	808250446		
Titanium	Ti	0.0013	0.0004	0.0002	mg/L
Uranium	U	0.0095	0.012	0.0001	mg/L
Vanadium	V	<	0.0003	0.0002	mg/L
Zinc	Zn	0.004	0.002	0.001	mg/L
Zirconium	Zr	<	<	0.002	mg/L

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

µg/L = micrograms per liter

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Polychlorinated Biphenyls in Water

CLIENT SAMPLE IDENTIFICATION:	C2-MW-9	P3-MW-13	
DATE SAMPLED:	Aug 19/08	Aug 19/08	DETECTION LIMIT
CANTEST ID:	808250426	808250446	
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	97	92	-

Results expressed as micrograms per liter (µg/L)
Surrogate recoveries expressed as percent (%)
< = Less than detection limit

Semi-Volatile Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Total Extractable Hydrocarbons
C2-MW-9	Aug 19/08	808250426	200
P3-MW-13	Aug 19/08	808250446	190
DETECTION LIMIT			100
UNITS			µg/L

µg/L = micrograms per liter

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	pH
C2-15A	Aug 18/08	808250447	15.2	7.8
C2-MW-9A	Aug 19/08	808250449	5.4	8.0
P3-MW-13B	Aug 15/08	808250450	16.1	7.3
C2-MW-10A	Aug 19/08	808250451	3.2	8.3
C2-16A	Aug 20/08	808250452	7.0	7.8
DETECTION LIMIT			0.1	0.1
UNITS			%	pH units

% = percent

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Polychlorinated Biphenyls in Soil

CLIENT SAMPLE IDENTIFICATION:	C2-15A	C2-MW-9A	P3-MW-13B	C2-MW-10A	
DATE SAMPLED:	Aug 18/08	Aug 19/08	Aug 15/08	Aug 19/08	DETECTION LIMIT
CANTEST ID:	808250447	808250449	808250450	808250451	
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	71	89	98	94	-

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
Surrogate recoveries expressed as percent (%)
< = Less than detection limit

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Polychlorinated Biphenyls in Soil

CLIENT SAMPLE IDENTIFICATION:	C2-16A	
DATE SAMPLED:	Aug 20/08	DETECTION LIMIT
CANTEST ID:	808250452	
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	69	-

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
Surrogate recoveries expressed as percent (%)
< = Less than detection limit

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F1 (C6-C10) uncorrected	F1 minus BTEX (C6-C10)
C2-15A	Aug 18/08	808250447	<	<
C2-MW-9A	Aug 19/08	808250449	<	<
P3-MW-13B	Aug 15/08	808250450	<	<
C2-MW-10A	Aug 19/08	808250451	<	<
C2-16A	Aug 20/08	808250452	<	<
DETECTION LIMIT			5	5
UNITS			µg/g	µg/g

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

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F2 (C10-C16) uncorrected	F3 (C16-C34) uncorrected
C2-15A	Aug 18/08	808250447	<	<
C2-MW-9A	Aug 19/08	808250449	<	33
P3-MW-13B	Aug 15/08	808250450	<	<
C2-MW-10A	Aug 19/08	808250451	<	12
C2-16A	Aug 20/08	808250452	<	22
DETECTION LIMIT			5	5
UNITS			µg/g	µg/g

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

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		C2-15A	C2-MW-9A	P3-MW-13B	C2-MW-10A	
DATE SAMPLED:		Aug 18/08	Aug 19/08	Aug 15/08	Aug 19/08	DETECTION LIMIT
CANTEST ID:		808250447	808250449	808250450	808250451	
Antimony	Sb	<	<	<	<	0.1
Arsenic	As	0.5	0.9	0.6	0.8	0.1
Barium	Ba	4	8	15	6	1
Beryllium	Be	<	<	<	<	1
Cadmium	Cd	<	<	<	<	0.2
Chromium	Cr	2	3	3	2	2
Cobalt	Co	<	1	1	<	1
Copper	Cu	1	2	4	2	1
Lead	Pb	1.2	3.4	0.9	2.1	0.2
Mercury	Hg	<	<	<	<	0.01
Molybdenum	Mo	<	0.3	0.1	0.3	0.1
Nickel	Ni	<	2	3	<	2
Selenium	Se	<	0.3	<	0.3	0.2
Silver	Ag	<	<	<	<	0.1
Thallium	Tl	<	<	<	<	0.1
Tin	Sn	<	<	<	<	5
Vanadium	V	3	5	12	5	1
Zinc	Zn	5	7	6	5	1
Aluminum	Al	1130	1560	1670	1180	10
Boron	B	6	12	5	11	1
Calcium	Ca	15500	38600	21300	36500	1
Iron	Fe	1620	2540	3530	2000	2
Magnesium	Mg	12700	33000	18300	27600	1
Manganese	Mn	42	58	52	53	1
Phosphorus	P	197	226	171	184	20
Potassium	K	260	622	265	484	10
Sodium	Na	46	94	130	86	5
Strontium	Sr	6	14	8	15	1
Titanium	Ti	60	91	164	67	1
Zirconium	Zr	<	2	2	2	1

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

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		C2-16A	
DATE SAMPLED:		Aug 20/08	DETECTION LIMIT
CANTEST ID:		808250452	
Antimony	Sb	<	0.1
Arsenic	As	1.6	0.1
Barium	Ba	10	1
Beryllium	Be	<	1
Cadmium	Cd	<	0.2
Chromium	Cr	4	2
Cobalt	Co	2	1
Copper	Cu	3	1
Lead	Pb	4.1	0.2
Mercury	Hg	<	0.01
Molybdenum	Mo	0.4	0.1
Nickel	Ni	4	2
Selenium	Se	0.4	0.2
Silver	Ag	<	0.1
Thallium	Tl	<	0.1
Tin	Sn	<	5
Vanadium	V	7	1
Zinc	Zn	8	1
Aluminum	Al	2310	10
Boron	B	16	1
Calcium	Ca	61400	10
Iron	Fe	3980	2
Magnesium	Mg	37700	1
Manganese	Mn	89	1
Phosphorus	P	248	20
Potassium	K	853	10
Sodium	Na	263	5
Strontium	Sr	22	1
Titanium	Ti	129	1
Zirconium	Zr	2	1

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

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	C2-15A	C2-MW-9A	P3-MW-13B	C2-MW-10A	
DATE SAMPLED:	Aug 18/08	Aug 19/08	Aug 15/08	Aug 19/08	DETECTION LIMIT
CANTEST ID:	808250447	808250449	808250450	808250451	
Benzene	<	<	<	<	0.005
Ethylbenzene	<	<	<	<	0.018
Toluene	<	<	<	<	0.02
Total Xylenes	<	<	<	<	0.02

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

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	C2-16A	
DATE SAMPLED:	Aug 20/08	DETECTION LIMIT
CANTEST ID:	808250452	
Benzene	<	0.005
Ethylbenzene	<	0.018
Toluene	<	0.02
Total Xylenes	<	0.02

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

4 **CHAIN OF CUSTODY RECORD**

CANTEST

4606 Canada Way
Burnaby, B.C.
V5G 1K5

Tel: 604.734.7276
Fax: 604.731.2386
Toll Free: 800.665.8566

www.cantest.com

2118959

8xIAGS, 3xOM, 10xVOCS

Client Name: Gartner Lee Limited (GAR005)			Postal Code: L3R 5Z6
Street Address (including suite number): 300 - 300 Town Centre Blvd.			City: Markham
Telephone: 905-477-8400	Fax: 905-477-1456	E-Mail Address (Required for Electronic Reporting): kboldt@gartnerlee.com	
Contact Name: Ken Boldt		Sampler's Name: Ken Boldt	
Quotation Number: gar006 080708 vjo 01	Project Number: 80297	Project Name: KITIK05	P.O. Number

Page 1 of 1

RESULTS REQUESTED BY:

Day Month Year

(Surcharges May Apply)

Special Instructions: ☐ AutoFax ☐ AutoEmail

☐ Return Cooler ☐ Ship Sample Bottles (please specify)

Bill to: Kitnuna Projects Inc
PO Box 92, Cambridge Bay, NU
X0B 0C0
contact: Peter Armstrong
Ph: 867-983-7508

NO Dilution

Sample(s) are from a Drinking Water source servicing multiple households — Yes ☐

Group Number 90825112 (LAB USE ONLY)	Sample Identification	Date/Time Sampled (D/M/Y & 24hr clock)	Sample Type	Total Metals*	Dissolved Metals*	Field Filtered Metals*	Soil Metals*	pH	Conductivity	TSS	TDS	Alkalinity (total / spec.)	BOD	COD	Coliform, Total & E.coli	Coliform, Fecal	F Cl SO_4 NO_3	Nitrite	Oil & Grease (Total / Mineral)	Oil & Grease (Special Waste)	PCP (Tri, Tetra and Penta)	PCP (Mono and Di)	BETX/VPH	VOC	EPH (not PAH corrected)	PAH	LEPH/HEPH (PAH corrected)	PCB	Asbestos	TPA-A	CCME3RE			HOLD - DO NOT ANALYZE	Number of Containers
808250426	C2-MW-9	D: Aug 19 T:	water	X																								X		X					6
446	P3-MW-13	D: Aug 15 T:	water	X																								X		X					5
447	C2-15A	D: Aug 18 T:	Soil				X																					X			X				2
449	C2-MW-9A	D: Aug 19 T:	"				X																					X			X				2
450	P3-MW-13 B	D: Aug 15 T:	"				X																					X			X				2
451	C2-MW-10A	D: Aug 19 T:	"				X																					X			X				2
452	C2-16 A	D: Aug 20 T:	"				X																					X			X				2
		D: T:																																	
		D: T:																																	
		D: T:																																	

Relinquished by: Ken Boldt	Date Aug 21	Time	Received by:
Relinquished by:	Date	Time	Received by: [signature]
Method of Shipment: MB	Waybill No.:	Received for Lab by: KL	Date Aug 23 · Time 1030
Shipped by:	Shipment Condition:	Cooler opened by:	Date · Time

Total Number of Containers: 21

***Please indicate appropriate regulatory guidelines:**

WATER	SOIL
☐ CCME	☐ CCME
☐ BC-CSR	☐ BC-CSR
☒ Other (please specify) LVL-AWL	☒ Other (please specify) TMCRMS

FOR LABORATORY USE ONLY

Sample State at Receipt: ☐ Ambient ☒ Cold ☐ Frozen ☐ N/A Comments:

Temperature 11.3°C Custody Seal Intact? ☐ Yes ☐ No ☒ n/a Number of Coolers/Shipping Containers: 1

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 12-SEP-08 12:20 PM
Revision: 2

Lab Work Order #: **L673724** **Date Received:** **25-AUG-08**

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065108

Other Information:

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

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673724-1	L673724-2	L673724-3	L673724-4	L673724-5
	Description					
	Sampled Date	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
	Sampled Time					
	Client ID	P3-MW-5	P3-MW-6	P3-MW-8	P3-MW-11	P3-MW-12
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	392	411	1170	905	1740
Total Metals	Arsenic (As)-Total (mg/L)	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/L)	<0.000050	<0.00025	<0.00025	<0.00025	<0.00025
	Chromium (Cr)-Total (mg/L)	<0.00050	0.0135	<0.0025	<0.0025	<0.0025
	Cobalt (Co)-Total (mg/L)	0.00171	<0.0025	<0.0025	<0.0025	<0.0025
	Copper (Cu)-Total (mg/L)	0.0039	<0.0050	<0.0050	0.0056	<0.0050
	Lead (Pb)-Total (mg/L)	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Nickel (Ni)-Total (mg/L)	0.0112	<0.025	<0.025	<0.025	<0.025
	Zinc (Zn)-Total (mg/L)	0.0089	0.0357	0.0173	0.0295	<0.0050
Volatile Organic Compounds	Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Methyl t-butyl ether (MTBE) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Toluene (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Surrogate: 4-Bromofluorobenzene (SS) (%)	106	105	103	104	103
	Surrogate: Fluorobenzene (SS) (%)	97	98	102	105	103
Hydrocarbons	TPH10-32 (mg/L)	<2.0	<1.0	<1.0	<1.0	<1.0
	F1-BTEX (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	F1 (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	88	96	96	93	100
Polychlorinated Biphenyls	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673724-6				
	Description					
	Sampled Date	15-AUG-08				
	Sampled Time					
	Client ID	P3-MW-7				
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	217				
Total Metals	Arsenic (As)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.00050				
	Chromium (Cr)-Total (mg/L)	0.0055				
	Cobalt (Co)-Total (mg/L)	<0.0050				
	Copper (Cu)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.010				
	Mercury (Hg)-Total (mg/L)	<0.00020				
	Nickel (Ni)-Total (mg/L)	<0.050				
	Zinc (Zn)-Total (mg/L)	<0.0050				
Volatile Organic Compounds	Benzene (mg/L)					
	Ethylbenzene (mg/L)					
	Methyl t-butyl ether (MTBE) (mg/L)					
	Styrene (mg/L)					
	Toluene (mg/L)					
	ortho-Xylene (mg/L)					
	meta- & para-Xylene (mg/L)					
	Xylenes (mg/L)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: Fluorobenzene (SS) (%)					
Hydrocarbons	TPH10-32 (mg/L)					
	F1-BTEX (mg/L)					
	F1 (C6-C10) (mg/L)					
	Surrogate: 2,4-Dichlorotoluene (SS) (%)					
Polychlorinated Biphenyls	Total Polychlorinated Biphenyls (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
EPH-SF-SG-FID-VA	Water	EPH in Water with Silica gel by GCFID	BCMOE EPHsg GCFID

This analysis is carried out using British Columbia Ministry of Water, Land and Air Protection (BC WLAP) methods. Water samples are extracted and analyzed using the BC WLAP method "Extractable Petroleum Hydrocarbons in Water by GC/FID" (version 2.1, July 1999). This procedure involves extraction of the entire water sample with 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. The silica gel cleanup follows the BC WLAP method "Silica Gel Cleanup of Extractable Petroleum Hydrocarbons" (Draft, October 23, 2003). This analysis is sometimes also referred to as Total Petroleum Hydrocarbons.

F1-BTX-CALC-VA	Water	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

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. The F1-BTEX result is calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

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.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

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

HG-TOT-CSR-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CSR)	EPA 245.7

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-CSR-ICP-VA	Water	Total Metals in Water by ICPOES (CSR)	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-CSR-MS-VA	Water	Total Metals in Water by ICPMS (CSR)	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).

VOC7-PT-MS-VA	Water	BTEX by Purge Trap GCMS	EPA 8260b, BCMELP CSR Method

This procedure involves the purge and trap extraction of the sample prior to analysis for specific Volatile Organic Compounds (VOC) by capillary column gas chromatography with mass spectrometric detection (GC/MS). The VOC analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA). Note: For

Reference Information

Methods Listed (if applicable):

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

chlorinated waters certain conditions may cause the formation of trihalomethanes after sample collection. Appropriate chemical treatment of chlorinated waters will prevent trihalomethane formation in the samples. Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA	Water	CSR VOC7 by MeOH with DI GCMS	CALCULATION

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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 enviromental 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.

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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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COC # C065108

Page 1 of 1

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: Gartner Lee Ltd	STANDARD ✓ OTHER ____	✓ REGULAR SERVICE (DEFAULT)
CONTACT: Ken Boldt	PDF ____ EXCEL ✓ CUSTOM ____ FAX ____	RUSH SERVICE (2-3 DAYS)
ADDRESS: 300-300 Town Centre Blvd Markham, On, L3R5Z6	EMAIL 1: Kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
PHONE: 905 477 8400 FAX: 905 477 1456	EMAIL 2:	EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS
		ANALYSIS REQUEST
INVOICE TO: SAME AS REPORT ? YES / (NO)	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →	
COMPANY: Kitnuna Projects Inc	CLIENT / PROJECT INFORMATION:	
CONTACT: Peter Armstrong	JOB #: 80247	
ADDRESS: POBox 92 Cambridge Bay, Nu XOBOCO	PO /AFE:	
	Legal Site Description:	
PHONE: 867 983 7508 FAX: 867 983 7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673724	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS F1	Total PAH (C_{10}-C_{32})	Metals CSR plus	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	P3-MW-5	Aug 15		Water							7
	P3-MW-6	"		"							7
	P3-MW-8	"		"							7
	P3-MW-11	"		"							7
	P3-MW-12	"		"							7
	P3-MW-7	"		"			X				1

GUIDELINES / REGULATIONS	SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
	See Quote

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)	
Ken Boldt			Aug 25 10:00	TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	11°C	

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 15-SEP-08 02:13 PM
Revision: 3

Lab Work Order #: **L673728** **Date Received:** **25-AUG-08**

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065120, C065121

Other Information:

Comments: Please note: this revision of the report contains lower detection limits for Lead in soil for all samples.

The detection limits for some PCB parameters have been increased for the samples reported due to interferences encountered during analysis

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673728-1	L673728-2	L673728-3	L673728-4	L673728-5
	Description					
	Sampled Date	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
	Sampled Time					
	Client ID	P3-MW-5A	P3-MW-5B	P3-MW-6A	P3-MW-6B	P3-MW-7A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	2.46	2.93	2.59	2.67	2.91
	pH (pH)	8.19	8.30	8.09	8.06	8.10
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)	6.0	5.4	5.2	7.8	5.1
	Cobalt (Co) (mg/kg)	3.0	2.2	2.3	3.8	2.1
	Copper (Cu) (mg/kg)	7.0	4.7	6.2	10.0	10.3
	Lead (Pb) (mg/kg)	3.8	2.5	<2.0	<2.0	2.1
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Nickel (Ni) (mg/kg)	<5.0		<5.0	6.3	<5.0
	Zinc (Zn) (mg/kg)	5.8	5.9	5.4	7.9	5.3
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	86	100	101	97	94
	Surrogate: Fluorobenzene (SS) (%)	89	98	104	99	102
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	86	90	105	91	88
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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673728-6	L673728-7	L673728-8	L673728-9	L673728-10
	Description					
	Sampled Date	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
	Sampled Time					
	Client ID	P3-MW-7B	P3-MW-8A	P3-MW-8B	P3-MW-9A	P3-MW-9B
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	3.33	7.23	16.6	4.04	4.62
	pH (pH)	8.10	7.89	7.53	7.93	8.10
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)	6.8	2.5	4.1	6.8	5.4
	Cobalt (Co) (mg/kg)	2.5	<2.0	<2.0	2.5	2.7
	Copper (Cu) (mg/kg)	12.1	2.9	5.5	8.4	10.0
	Lead (Pb) (mg/kg)	2.5	<2.0	<2.0	3.2	3.8
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Nickel (Ni) (mg/kg)	<5.0	<5.0	<5.0	<5.0	<5.0
	Zinc (Zn) (mg/kg)	7.5	3.0	4.2	4.7	5.3
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	77	101	90	91	99
	Surrogate: Fluorobenzene (SS) (%)	103	101	97	106	107
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	<50	<50
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	65	98	88	89	115
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

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673728-11	L673728-12	L673728-13	L673728-14	L673728-15
	Description					
	Sampled Date	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08	15-AUG-08
	Sampled Time					
	Client ID	P3-MW-10A	P3-MW-10B	P3-MW-11A	P3-MW-11B	P3-MW-12A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	13.0	3.71	7.22	3.43	55.5
	pH (pH)	7.84	7.99	7.91	8.00	7.60
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)	4.7	4.8	3.8	4.0	5.3
	Cobalt (Co) (mg/kg)	2.1	2.2	<2.0	<2.0	3.1
	Copper (Cu) (mg/kg)	20.5	8.4	4.7	5.0	41.9
	Lead (Pb) (mg/kg)	11.7	<2.0	<2.0	<2.0	22.4
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	0.052
	Nickel (Ni) (mg/kg)	5.4	<5.0	<5.0	<5.0	7.5
	Zinc (Zn) (mg/kg)	13.0	4.2	4.2	5.1	18.9
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040	<0.040	<0.040	<0.040
	Ethylbenzene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Surrogate: 4-Bromofluorobenzene (SS) (%)	93	103	100	111	70
	Surrogate: Fluorobenzene (SS) (%)	103	102	101	107	71
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	57	<50	<50	<50	77
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	104	116	114	111	90
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.090

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673728-16	L673728-17			
	Description					
	Sampled Date	15-AUG-08	15-AUG-08			
	Sampled Time					
	Client ID	P3-MW-12B	P3-MW-13B			
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	4.82	18.3			
	pH (pH)	7.86	7.49			
Metals	Arsenic (As) (mg/kg)	<5.0	<5.0			
	Cadmium (Cd) (mg/kg)	<0.50	<0.50			
	Chromium (Cr) (mg/kg)	7.5	3.3			
	Cobalt (Co) (mg/kg)	3.1	<2.0			
	Copper (Cu) (mg/kg)	16.2	3.6			
	Lead (Pb) (mg/kg)	2.6	<2.0			
	Mercury (Hg) (mg/kg)	<0.050	<0.050			
	Nickel (Ni) (mg/kg)	<5.0	<5.0			
	Zinc (Zn) (mg/kg)	6.5	3.9			
Volatile Organic Compounds	Benzene (mg/kg)	<0.040	<0.040			
	Ethylbenzene (mg/kg)	<0.050	<0.050			
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20			
	Styrene (mg/kg)	<0.050	<0.050			
	Toluene (mg/kg)	<0.050	<0.050			
	ortho-Xylene (mg/kg)	<0.050	<0.050			
	meta- & para-Xylene (mg/kg)	<0.050	<0.050			
	Xylenes (mg/kg)	<0.10	<0.10			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	110	96			
	Surrogate: Fluorobenzene (SS) (%)	105	98			
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30			
	F3 (C16-C34) (mg/kg)	<50	<50			
	F1-BTEX (mg/kg)	<10	<10			
	F1 (C6-C10) (mg/kg)	<10	<10			
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	115	105			
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050			
	PCB-1221 (mg/kg)	<0.050	<0.050			
	PCB-1232 (mg/kg)	<0.050	<0.050			
	PCB-1242 (mg/kg)	<0.050	<0.050			
	PCB-1248 (mg/kg)	<0.050	<0.050			
	PCB-1254 (mg/kg)	<0.050	<0.050			
	PCB-1260 (mg/kg)	<0.050	<0.050			
	PCB-1262 (mg/kg)	<0.050	<0.050			
	PCB-1268 (mg/kg)	<0.050	<0.050			
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
F1-BTX-CALC-VA	Soil	F1-Total BTX	CCME CWS PHC TIER 1 (2001)

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) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

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.
3. This method is validated for use.
4. Data from analysis of quality control samples is available upon request.

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.

HG-CSR-CVAFS-VA	Soil	CVAFS Hg 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 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.

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 plasma -

Reference Information

Methods Listed (if applicable):

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

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.

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).

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.

VOC7-MET-PT-MS-VA Soil BTEX by MeOH with Purge and Trap GCMS EPA 8260B & 524.2

Volatile Organic Compounds (VOC) are extracted from sediment or soil with methanol, following a procedure from the British Columbia Ministry of Water Land and Air Protection (BCWLAP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999). Aliquots of the extract are analyzed by Purge and Trap by gas hromatography with mass spectrometric detection (GC/MS), using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260B, published by the United States Environmental Protection Agency (EPA). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation.

XYLENES-CALC-VA Soil CSR VOC7 by MeOH with DI GCMS EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** 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		

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 enviromental 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.

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Environmental Division

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ADDRESS: PO Box 92, Cambridge Bay, Nu X0B0C0	PO /AFE:	
	Legal Site Description:	
PHONE: 867 983-7508 FAX: 867-983-7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673728	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS F1	CWS F2 + F3	Metals	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	P3-MW-5A	Aug 15		Soil							2
	P3-MW-5B										2
	P3-MW-6A										2
	P3-MW-6B										2
	P3-MW-7A										2
	P3-MW-7B										2
	P3-MW-8A										2
	P3-MW-8B										1
	P3-MW-9A										2
	P3-MW-9B										2

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

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RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	SAMPLE CONDITION (lab use only)	
Ken Boldt		AL	Aug 25/08 12:45	TEMPERATURE: 9°C	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:		

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ADDRESS: 300-300 Town Centre Blvd	EMAIL 1: kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
Markham, Ont. L3R 5Z6	EMAIL 2:	EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS
PHONE: 905 477 8400 FAX: 905 477 1456		ANALYSIS REQUEST
INVOICE TO: SAME AS REPORT ? YES (NO)	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →	
COMPANY: Kitikmeot Projects Inc	CLIENT / PROJECT INFORMATION:	
CONTACT: Peter Armstrong	JOB #: 80297	
ADDRESS: PO Box 92, Cambridge Bay, Nu X0B 0C0	PO /AFE:	
	Legal Site Description:	
PHONE: 867-983-7508 FAX: 867-983-7501	QUOTE #: ALSEQ08-41	
Lab Work Order # (lab use only): L673728	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS F1	CWS F2 + F3	Metals	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	P3-MW-10A	Aug 15		Soil							2
	P3-MW-10B										2
	P3-MW-11A										2
	P3-MW-11B										2
	P3-MW-12A										2
	P3-MW-12B										2
	P3-MW-13B										2

GUIDELINES / REGULATIONS	SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
	See Quote

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
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RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
Ken Boldt		AR	Aug 25/08 12:49
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:

SAMPLE CONDITION (lab use only)	
TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
9°C	

Appendix H

Quality Assurance/Quality Control - Attachments

Table H1 – Soil Sampling QA/QC Results
Table H2 – Water Sampling QA/QC Results

Table H1. Soil QA/QC

Sample Ident.	Sample Location	Depth (m)	Laboratory	Copper Cu (mg/kg)	Nickel Ni (mg/kg)	Cobalt Co (mg/kg)	Cadmium Cd (mg/kg)	Lead Pb (mg/kg)	Zinc Zn (mg/kg)	Chromium Cr (mg/kg)	Arsenic As (mg/kg)	Mercury Hg (mg/kg)	PCB Total Aroclors (mg/kg)	F1 C6-C10 (mg/kg)	F2 C10-C16 (mg/kg)	F3 C16-C34 (mg/kg)	TPH C6-34 (mg/kg)
P3-MW-8B	MW-8	0.5	ALS	5.5	<5.0	<2.0	<0.50	<2.0	4.2	4.1	<5.0	<0.050	<0.050	<10	<30	<50	-
P3-MW-13B *	MW-8	0.5	ALS	3.6	<5.0	<2.0	<0.50	<2.0	3.9	3.3	<5.0	<0.050	<0.050	<10	<30	<50	-
P3-MW-13B *	MW-8	0.5	Cantest	4	3	1	< 0.2	0.9	6	3	0.6	< 0.01	< 0.03	< 5	< 5	< 5	-
Average				4.37	n/a	n/a	n/a	n/a	4.70	3.47	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD				23%	n/a	n/a	n/a	n/a	24%	16%	n/a	n/a	n/a	n/a	n/a	n/a	n/a

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

** Denotes duplicate sample*

n/a *Denotes RSD not calculable*

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

AECOM

Table H2. Water QA/QC

	Sample Ident.	Sample Location	Laboratory	Copper Cu (mg/L)	Nickel Ni (mg/L)	Cobalt Co (mg/L)	Cadmium Cd (mg/L)	Lead Pb (mg/L)	Zinc Zn (mg/L)	Chromium Cr (mg/L)	Arsenic As (mg/L)	Mercury Hg (mg/L)	PCB Total Aroclors (mg/L)	F1 C6-C10 (mg/L)	F2 C10-C16 (mg/L)	F3 C16-C34 (mg/L)	TPH C6-34 (mg/L)
	P3-MW-8	MW-8	ALS	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	0.0173	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0
	P3-MW-13 *	MW-8	ALS	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	<0.0050	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0
	P3-MW-13 *	MW-8	Cantest	0.0026	0.015	0.0006	< 0.00004	< 0.0002	0.002	< 0.0002	0.0006	< 0.00002	< 0.0004				0.19
Average				n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD				n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

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

** Denotes duplicate sample*

n/a *Denotes RSD not calculable*

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