AECOM

Report

Defence Construction Canada

The Collection of Landfill Monitoring Data at the CAM-2 Gladman Point Site – 2008 Final Report

AECOM

Defence Construction Canada

The Collection of Landfill Monitoring Data at the CAM-2 Gladman Point Site

Prepared by:

AECOM Canada Ltd.
300 – 300 Town Centre Boulevard, Markham, ON, Canada L3R 5Z6
T 905.477.8400 F 905.477.1456 www.aecom.com

Project Number:

107891 - 80297

Date:

January, 2009

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by Gartner Lee Limited doing business as AECOM ("AECOM") for the benefit of Defence Construction Canada ("Client") in accordance with the agreement between AECOM and Client (the "Agreement").

The information, data, recommendations and conclusions contained in the Report:

- **are subject to the budgetary, time and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations")**
- **represent AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports**
- **may be based on information provided to AECOM which has not been independently verified**
- **have not been updated**
- **must be read as a whole and sections thereof should not be read out of such context**
- **were prepared for the specific purposes described in the Report and the Agreement and must not be used for any other purpose whatsoever**

Unless expressly stated to the contrary in the Report or the Agreement, AECOM:

- **shall not be responsible for any events or circumstances that may have occurred since the date on which the Report was prepared or for any inaccuracies contained in information that was provided to AECOM**
- **makes no guarantees or warranties whatsoever, whether express or implied, with respect to the Report or any part thereof, other than that the Report represents AECOM's professional judgement as described above**
- **shall not be deemed to have represented that the Report or any part thereof is exhaustive or applicable to any specific use other than that described in the Report and the Agreement**

Except as required by law or otherwise agreed by AECOM and Client, the Report:

- **is to be treated as confidential**
- **may not be used or relied upon by third parties**

Except as described above, AECOM denies any liability in respect of the Report or parts thereof and shall not be responsible for any damages arising from use of the Report or parts thereof.

This Disclaimer is attached to and forms part of the Report.

AECOM
300 – 300 Town Centre Boulevard, Markham, ON, Canada L3R 5Z6
T 905.477.8400 F 905.477.1456 www.aecom.com

January 14, 2009 Project Number: 107891 - 80297

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

Dear Mr. Khazan:

Re: Report for the 2008 Collection of Landfill Monitoring Data at the CAM-2 Dew Line Site, Gladman Point, Nunavut

AECOM is pleased to submit eight hard copies of the 2008 Report on collection of Landfill Monitoring Data at the CAM-2 DEW Line Site at Gladman Point, Nunavut. This report documents the data collected from the site visit to the CAM-2 Site between August 18, and 20, 2008. In addition to the hard copy reports, also attached are three digital data discs to the report 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. These have been provided as an attachment to the main report and include and 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. These have been provided as attachments to the main report and include and index of the photo numbers and the locations; and,
- All field notes have been attaché to each specific landfill investigation report.

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

Visual inspections were completed at the Station Area Landfill, the West Landfills – North and South, the Non-hazardous Waste Landfill, and the DCC Tier II Soil Disposal Facility. Both the Station and West landfills appear stable and show no indication of slope movement or significantly degraded cover condition.

Thin tension cracks, typically on the order of 1mm to 5mm width, were observed around the crest and perimeter of both the Tier II and NHW landfills. In all instances, the cracks were roughly parallel to the toe of slope and in multiple locations there were several roughly parallel sets of cracks between the toe of slope and crest. The cracks were initially observed in 2007; and documented in detail to facilitate ongoing monitoring. Care was taken to compare the condition of the previously noted tension cracks (from 2007 inspection photos) with those observed in 2008 and to also look for new cracks. In general, the tension cracks appeared essentially unchanged from 2007 with no indication of subsequent movement and no significant new cracks. Many of the previously noted cracks were partially obscured and difficult to locate in 2008 due to being infilled with fine sediments. The landfill slopes appear to be stable and are not in imminent danger of large-scale movement.

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. No immediate action is warranted. Areas of observed tension cracks should continue to be monitored.

Soil samples were collected at two depths from test pits at the Station Area Landfill, the West Landfills – North and South, the Non-hazardous Waste Landfill, and the DCC Tier II Soil Disposal Facility. Sample results are located within each specific landfill report. It is recommended by AECOM that DCC compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

All eight (8) wells monitored in 2008 contained sufficient water to collect a sample for analysis. Sample results are located within each specific landfill report. It is recommended by AECOM that DCC compare the laboratory results to their internal DEW Line Site Guidelines to confirm whether the analytical results are in compliance.

Data from the four thermistors at the DCC Tier II Soil Disposal Facility 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 Canada Ltd.

(Original signed and stamped)

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

JAT/DCJ:pc
Attach.

Distribution List

# of Copies	Association / Company Name	PDF	Hard Copy
8	Defence Construction Canada	X	X
1	Kitnuna Projects Inc.	X	X
1	AECOM	X	X

Signature Page

Report Prepared By:

Original signed	Original signed
Jim Theriault, M.Sc.Eng., P.Eng.	Kenneth Boldt, B.Sc.

Report Reviewed By:

Original signed	Original signed and stamped
Karl Reimer, M.Sc., P.Eng.	Darrin Johnson, P.Eng

Table of Contents

Statement of Qualifications and Limitations
Letter of Transmittal
Distribution List

page

1. Introduction 1

2. Background 1

2.1 Project Objectives 3
2.2 2008 Monitoring Event 3

3. Landfill Monitoring 4

4. Quality Assurance/Quality Control 5

5. Conclusions 6

6. Limitations 7

List of Figures

Figure 2-1. DEW Line Clean Up Monitoring Plan – CAM-2 Gladman Point, NU 2
Figure A-1 Station Landfill ..... App A
Figure B-1 West Landfill – North ..... App B
Figure B-2 West Landfill – South ..... App B
Figure C-1 DCC Tier II Soil Disposal Facility ..... App C
Figure D-1 Non-hazardous Waste Landfill ..... App D

List of Tables

Table 1. Summary of Landfill Monitoring Requirements for 2008 3
Table 2. Blind Duplicates 5
Table A-1 Summary of 2008 Soil Analysis – Station Area Landfill ..... App A
Table B-1 Summary of 2008 Soil Analysis – West Landfill – North ..... App B
Table B-2 Summary of 2008 Soil Analysis – West Landfill – South ..... App B
Table C-1 Summary of 2008 Soil Analysis – Tier II Soil Disposal Facility ..... App C
Table C-2 Summary of 2008 Groundwater Analysis – Tier II Soil Disposal Facility ..... App C
Table D-1 Summary of 2008 Soil Analysis – Non-hazardous Waste Landfill ..... App D
Table D-2 Summary of 2008 Groundwater Analysis – Non-hazardous Waste Landfill ..... App D

List of Graphs

Graph C-1. Ground Temperature Profile – VT-1 ..... App C6
Graph C-2. Ground Temperature Profile – VT-2 ..... App C6
Graph C-3. Ground Temperature Profile – VT-3 ..... App C6
Graph C-4. Ground Temperature Profile – VT-4 ..... App C6

Appendices

A. Station Area Landfill
B. West Landfills – North and South
C. DCC Tier II Soil Disposal Facility
D. Non-hazardous Waste Landfill
E. Laboratory Reports
F. Quality Assurance/Quality Control

1. Introduction

The Department of National Defence (DND) in co-operation with Nunavut Tunngavik Incorporated (NTI) has developed a Landfill Monitoring Plan to address post closure monitoring requirements for the landfills at the DEW Line sites. Defence Construction Canada (DCC) is managing the clean-up monitoring programs on behalf of DND. Kitnuna Projects Inc. (Kitnuna) and AECOM, in a joint venture, were awarded the contract for the purposes of providing services for the collection of landfill monitoring data at the CAM-2 Gladman Point Site in the Nunavut Settlement Area for 2008. This report provides the procedures and results of monitoring completed in 2008.

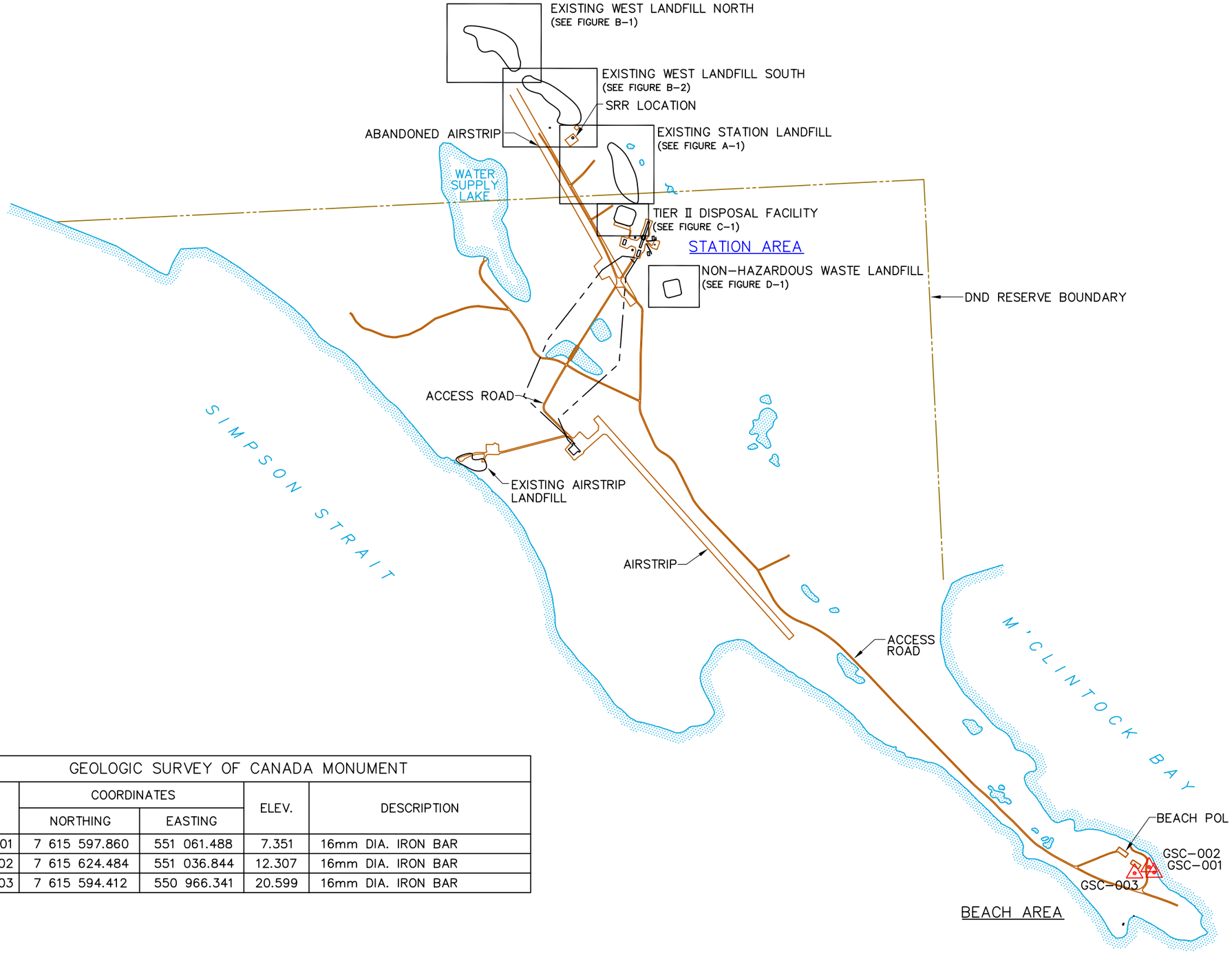
2. Background

The CAM-2 Gladman Point DEW Line site is located on the south side of King William Island, at 68º 40' north latitude and 97º 49' west longitude. The site is located approximately 75 kilometres west of Gjoa Haven and 300 kilometres east of Cambridge Bay.

CAM-2 was converted to a Short Range Radar (SRR) site in the early 1990s. The environmental cleanup and demolition of facilities not required for the operation of the SRR site commenced in 2003 and was completed during the summer of 2005. The cleanup includes the closure and remediation of four existing landfills as well as the construction of a landfill for the disposal of non-hazardous wastes generated from demolition, and collection of site debris. A DCC Tier II soil disposal facility has been constructed at this site. These landfills, as shown on the overall site plan, Figure 2-1 include:

1. Station Area Landfill;
2. West Landfill – North;
3. West Landfill – South;
4. Airstrip Landfill (completely excavated, no monitoring required);
5. DCC Tier II Soil Disposal Facility; and
6. Non-Hazardous Waste Landfill.

Access to the landfills was gained through on-site roads by way of ATV. The baseline monitoring of the landfills commenced in 2006. AECOM understands that monitoring is to occur every year until 2008, after which, monitoring frequency at this site will decrease.



GEOLOGIC SURVEY OF CANADA MONUMENT				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
GSC-001	7 615 597.860	551 061.488	7.351	16mm DIA. IRON BAR
GSC-002	7 615 624.484	551 036.844	12.307	16mm DIA. IRON BAR
GSC-003	7 615 594.412	550 966.341	20.599	16mm DIA. IRON BAR

Legend

GSC-002 GEOLOGIC SURVEY OF CANADA MONUMENT

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD01.dwg
supplied by Defence Construction Canada

0 100 200 400 600 800 m
1 : 20,000
UTM Zone 14W, NAD83

File Name: C2-RD01.dwg
Reviewed by: JAT
Date Issued: December, 2008
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

2008 CAM-2 DEW Line Monitoring Program
Cam-2 Gladman Point
Nunavut Territory

DEW Line Clean Up Monitoring Plan

AECOM

Figure 2-1
Version 2

Path: N:\Projects\2008\80297\2008WorkInProgress\Documents\80297-2_CAM-2-FINAL-Report\ACAD_Files\C2-RD01 Plotted on: December 17, 2008

2.1 Project Objectives

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

2.2 2008 Monitoring Event

Between August 18, and 20, 2008 field data collection was conducted at the CAM-2 DEW Line site. The monitoring event consisted of visual inspections of all landfill locations, as well as soil and groundwater sampling, and thermal monitoring. The landfill monitoring requirements as outlined in the Terms of Reference (TOR) are displayed in Table 1 below.

Table 1. Summary of Landfill Monitoring Requirements for 2008

Landfill Designation	Visual Inspection	Soil Sampling	Groundwater Sampling	Thermal Monitoring
YEAR 2008				
CAM-2 Gladman Point				
Station Area Landfill	✓	✓		
West Landfill – North	✓	✓		
West Landfill – South	✓	✓		
DCC Tier II Disposal Facility	✓	✓	✓	✓
Non-hazardous Waste Facility	✓	✓	✓	

The weather on August 18th was sunny with a light breeze and cool (5 to 7ºC). On August 19th the weather was cold (~2ºC) partly cloudy with strong winds. Conditions deteriorated through the day of the 19th to include overcast skies, rain, and a dropping temperature. The winds increased dramatically through the day. Overnight there was snowfall and extremely high winds. The weather on August 20th was cold (-3 to -1ºC), overcast with some sunny periods, and windy. Stronger winds and rain were experienced later in the day on the 20th.

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 D.

Soil sampling was conducted at the Station Area Landfill, the West Landfills – North and South, the Non-hazardous Waste 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 (PCBs) analyzed for Total Aroclors, Total Petroleum Hydrocarbons (TPHs) 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 through D.

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

Thermal Monitoring was conducted at 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 Appendix C.

3. Landfill Monitoring

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

Appendix A Station Area Landfill;
Appendix B West Landfills – North and South;
Appendix C DCC Tier II Soil Disposal Facility; and,
Appendix D Non-hazardous Waste Landfill.

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

4. Quality Assurance/Quality Control

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

Four (4) blind duplicate soil sample and one (1) blind duplicate groundwater sample were collected for submission. All duplicate samples were submitted to both ALS Environmental and Cantest Ltd. for analysis. As well, duplicate soil samples were sent to the Environmental Services Group for archival purposes. The soil and water samples submitted and the corresponding sample locations are documented in Table 2.

Table 2. Blind Duplicates

Sample Identification	Duplicate of Sample	Sample Location	Depth (m)	Matrix (soil/water)	Landfill
C2-MW-9A	C2-MW-2A	MW-2	0.1	Soil	Tier II
C2-MW-10A	C2-MW-5A	MW-5	0.1	Soil	Non-haz
C2-15A	C2-6A	C2-6	0.1	Soil	West LF-North
C2-16A	C2-1A	C2-1	0.1	Soil	Station LF
C2-MW-9	C2-MW-6	MW-6	-	Water	Non-haz

Each set of blind duplicate soil samples were analyzed for fourteen (14) parameters yielding a total of 56 sets of numbers to be calculated for relative standard deviation (RSD). Of the 56 RSD values calculated, 42 returned a value of “n/a” due to one or more concentration being below the detection limit. Eleven (11) results returned an acceptable value of below 20% for inorganic elements. Three (3) results returned an unacceptable RSD value.

The blind duplicate samples collected at a depth of 0.1m and located at MW-5 at the Non-hazardous Waste Landfill returned an RSD value of 20% for zinc. The detected levels of zinc in the samples are close to the detection limit and therefore a higher RSD value is expected. The blind duplicate samples collected at a depth of 0.1m and located at C2-6 at the West Landfill - North returned an RSD value of 28% for zinc. The detected levels of zinc in the samples are close to the detection limit and therefore a higher RSD value is expected. For both the duplicates collected at MW-5 and C2-6, the detected results are below 6.0mg/kg whereas the Ontario site condition standard for zinc in soil in a potable groundwater condition is 600mg/kg. The results are not considered by AECOM to be of significance.

Each blind duplicate water sample was analyzed for eleven (11) parameters. All the RSD values calculated for each parameter returned a result of “n/a” due to one or more concentration being below the detection limit. None of the results which provided detectable levels for an individual sample and parameter were considered by AECOM to be of significance.

5. Conclusions

Visual inspections were conducted at the following landfills: Tier II, Non Hazardous Waste (NHW), Station and West. Both the Station and West landfills appear stable and show no indication of slope movement or significantly degraded cover condition. Thin tension cracks, typically on the order of 1mm to 5mm width, were observed around the crest and perimeter of both the Tier II and NHW landfills. In all instances, the cracks were roughly parallel to the toe of slope and in multiple locations there were several roughly parallel sets of cracks between the toe of slope and crest. The tension cracks were initially observed during the 2007 inspection and documented in detail to facilitate ongoing monitoring. The areas of previously identified tension cracks were carefully examined during the 2008 inspection and were found to have stabilized and, in many instances, become largely obscured by subsequent infilling with fine soil particles. This suggests negligible subsequent slope movement. The areas of observed tension cracks at the Tier II and NWH landfills should continue to be monitored for changes or indication of slope movement.

The landfill slopes appear to be stable and are not in imminent danger of large-scale movement. From the visual inspection 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. No immediate action is warranted.

Soil samples were collected at the each of the four remaining landfills at the CAM-2 site in 2008 as required by the TOR. Minor concentrations of detectable hydrocarbons were noted in two of the test pits located at the Tier II Soil Disposal Facility. PCB were not detected in any soil samples collected in 2008, and any detectable levels of inorganic elements are not considered to be of significance by AECOM.

In 2008, groundwater samples were collected from all the wells located at the Main Landfill, however MW-7 had only sufficient water for inorganic elements analysis. Groundwater samples were also collected from two of the four wells at the Tier II Soil Disposal Facility in 2008. There does not appear to be any significant issues with groundwater quality.

6. Limitations

This report has been prepared as an assessment of the environmental condition of the subject site located at near Gladman 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.

Appendix A

Station Area Landfill

- A1 – Site Condition/Visual Inspection Records
- A2 – Geotechnical Inspection Photographic Records
- A3 – Monitoring Photographic Records
- A4 – Field Notes

1. Station Area Non-hazardous Landfill

1.1 Landfill Summary

The Station Area Landfill is located approximately 100m northwest of the main station area, 300m north of where the module train was located, and 400m off the abandoned airstrip. The landfill encompasses an area of approximately 10,000m^2. The depth of landfill debris is approximately 1.0 to 2.0m. The landfill configuration and sample locations are shown on Figure A-1. The landfill surface is fairly irregular with numerous slope breaks and small mounds. The toe of the landfill is vegetated and the surrounding area at the base of the landfill is lush tundra. Based on the evaluation of the landfill as a source of contamination, potential pathways, and receptors, the Station Area Landfill was classified as low potential environmental risk. The remedial work for this landfill included regrading and the placement of additional granular fill material to remove contaminant transport pathways. The long term monitoring plan consists of visual monitoring and the periodic collection of soil samples.

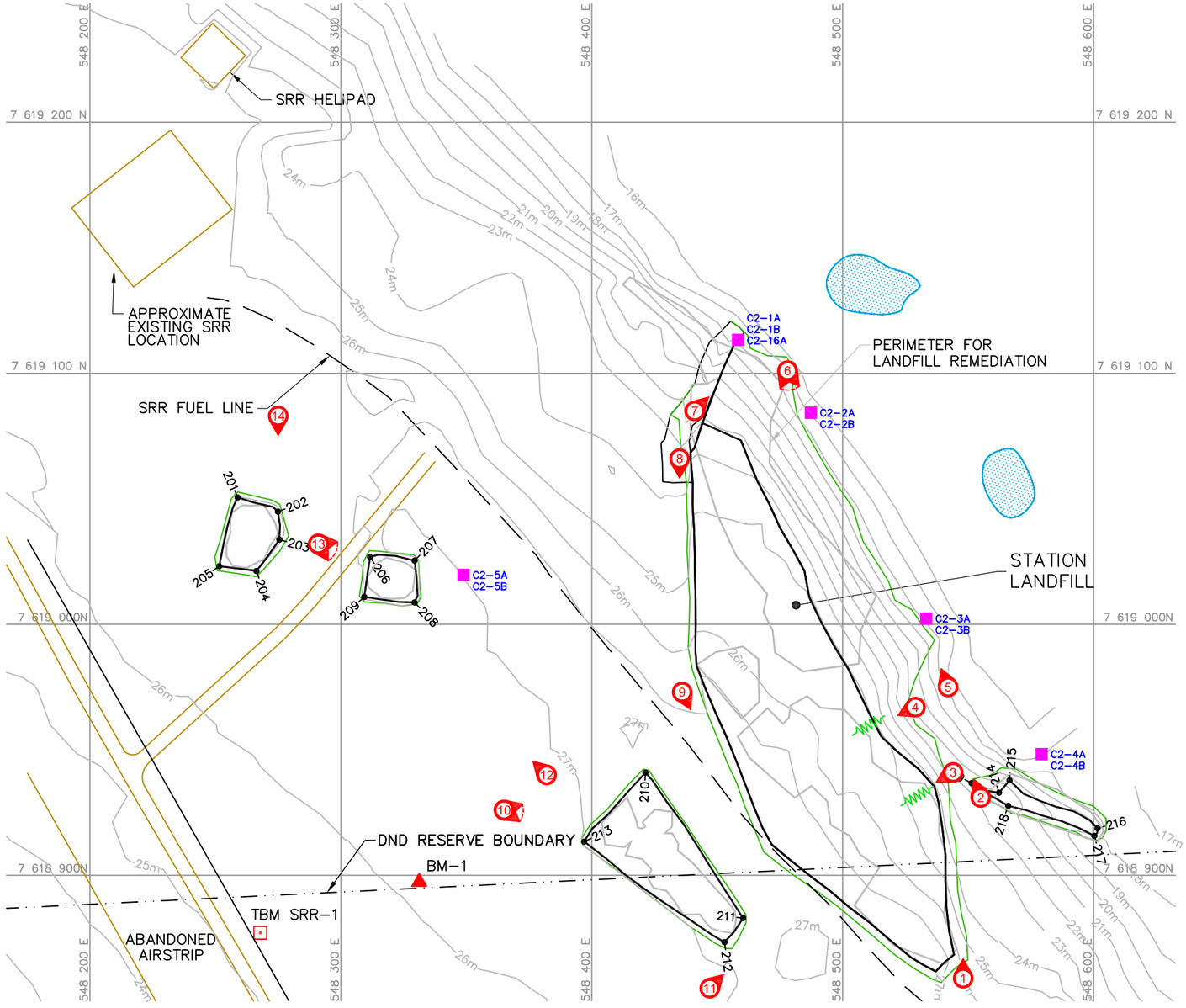
For 2008, the monitoring requirements for the Station Area Landfill included visual inspection and soil sampling.

1.2 Visual Monitoring

A visual inspection of the Station Area Landfill was completed on August 19, 2008. Based on the visual inspection, the Station Area Landfill appears to be in good condition and continues to function as designed. The condition of the Station Area Landfill appears substantially unchanged from the description provided from last year's inspection.

Minor surficial erosion, which appears to be associated with surface runoff, was noted at several locations along the eastern slope of the granular cover (refer to Photos 3 and 4). These areas of minor surficial erosion were first documented in 2006 (inspection by EBA) and re-evaluated in 2007 at the time of last years inspection. The granular cover in the areas of observed surficial erosion appears to be self armouring with limited potential for significant further degradation. None of the areas of observed surficial erosion appear to warrant remediation at this time.

In general, the granular landfill cover shows no evidence of problematic or degraded conditions. Overall performance of the landfill is considered acceptable.



PERMANENT BENCHMARK				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM-1	7 618 897.363	548 331.191	26.595	25mm DIA. STEEL PIPE
SRR-1	7 618 877.108	548 267.873	24.975	16mm DIA. IRON BAR

15 Located at the NE corner of the crest of the Tier II Soil Disposal Facility

Legend

- TBM4 — TEMPORARY BENCHMARK
- BM-1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- C2-5A / C2-5B — MONITORING SOIL SAMPLE LOCATION
- 7 — PHOTOGRAPH LOCATION
- SURFICIAL EROSION (NTS)

COORDINATE POINTS (AS-BUILT) STATION LANDFILL AREA REGRADING		
NO.	NORTHING	EASTING
201	7 619 050.5	548 258.8
202	7 619 044.9	548 274.9
203	7 619 033.7	548 275.5
204	7 619 021.2	548 266.3
205	7 619 023.1	548 251.5
206	7 619 026.7	548 311.6
207	7 619 025.4	548 329.4
208	7 619 008.7	548 329.3
209	7 619 010.9	548 309.3
210	7 618 940.9	548 421.4
211	7 618 883.0	548 460.3
212	7 618 873.4	548 452.9
213	7 618 913.4	548 397.0
214	7 618 932.9	548 562.3
215	7 618 937.8	548 566.5
216	7 618 918.8	548 601.5
217	7 618 915.8	548 600.3
218	7 618 927.7	548 565.9
219	7 618 936.8	548 551.3

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD02.dwg

0 10 20 40 60 80 m
1 : 2000
UTM Zone 14W, NAD83

File Name: C2-RD02.dwg
Reviewed by: JAT
Date Issued: December, 2008
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

2008 DEW Line Monitoring Program
CAM-2 Gladman Point
Nunavut Territory

STATION LANDFILL

AECOM

Figure A-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-2_CAM-2-FINAL-Report\ACAD_Files\C2-RD02.dwg

1.3 Soil Sampling

Soil samples were collected at the designated locations of C2-1, C2-2, C2-3, C2-4, and C2-5. 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 pits at C2-1, C2-2, and C2-4 were excavated to a depth of 0.2m before the water table was reached. Samples C2-1B, C2-2B, and C2-4B were 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 Station Area Landfill. Detectable concentrations of TPH (C6-34) were identified in the soil sample collected from location C2-2 however AECOM does not consider the detected concentration to be of significance. The laboratory results indicate no detectable levels of PCB in any soil samples collected from the Station Area Landfill. Low levels of copper, Nickel, cobalt, lead, zinc and chromium were detected in the various soil samples from the Station Area Landfill, however none of the results are considered to be of significance. It is recommended by AECOM 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 E.

Table A-1. CAM-2 Gladman Point, Summary of 2008 Soil Analysis - Station Area 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
	Location Id.	Northing	Easting	(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																		
C2-5A	C2-5	7619020	548349	0.1	3.7	<5.0	<2.0	<0.50	2.5	3.8	2.3	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-5B	C2-5	7619020	548349	0.5	4.8	<5.0	<2.0	<0.50	6.1	6.8	5.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																		
C2-1A	C2-1	7619113	548458	0.1	4.2	<5.0	<2.0	<0.50	4.4	6.9	5.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-1B	C2-1	7619113	548458	0.2	4.1	<5.0	<2.0	<0.50	4.7	6.6	6.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-16A *	C2-1	7619113	548458	0.1	3.3	<5.0	<2.0	<0.50	4.2	5.9	5.3	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-2A	C2-2	7619084	548487	0.1	11.6	6.1	2.3	<0.50	4.5	9.1	6.7	<5.0	<0.050	<0.070	<10	<30	136	136
C2-2B	C2-2	7619084	548487	0.2	2.5	<5.0	<2.0	<0.50	<2.0	3	2.3	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-3A	C2-3	7619002	548533	0.1	1.2	<5.0	<2.0	<0.50	2.2	3.1	2.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-3B	C2-3	7619002	548533	0.4	1.8	<5.0	<2.0	<0.50	2.4	3	2.5	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-4A	C2-4	7618948	548579	0.1	1.1	<5.0	<2.0	<0.50	<2.0	3.8	2.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-4B	C2-4	7618948	548579	0.2	1.9	<5.0	<2.0	<0.50	2.3	3.7	3.6	<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

A1 –Site Condition/Visual Inspection Records

(appendix ti pgs)

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	CAM-2 Gladman Point
LANDFILL/AREA DESIGNATION:	Station Area Landfill
DATE OF INSPECTION:	August 19, 2008
DATE OF PREVIOUS INSPECTION:	August 25, 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	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	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Erosion	Yes	See Figure A-1	a) 20 b) 30	a) 0.05 - 0.20 b) 0.10 - 0.25	a) 0.03 to 0.06 b) 0.10 to 0.25	Occasional (<1%)	Minor surficial erosion.	Photos 3, 4 (a, b respectively)	Minor surficial erosion, self-armouring. Not problematic. Acceptable.
Frost Action	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Presence/ Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Features of Note.	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Additional Photos	Yes	Refer to Figure A-1	N/A	N/A	N/A	N/A	Additional Photos	Photos 1, 2 and 5 thru 16	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

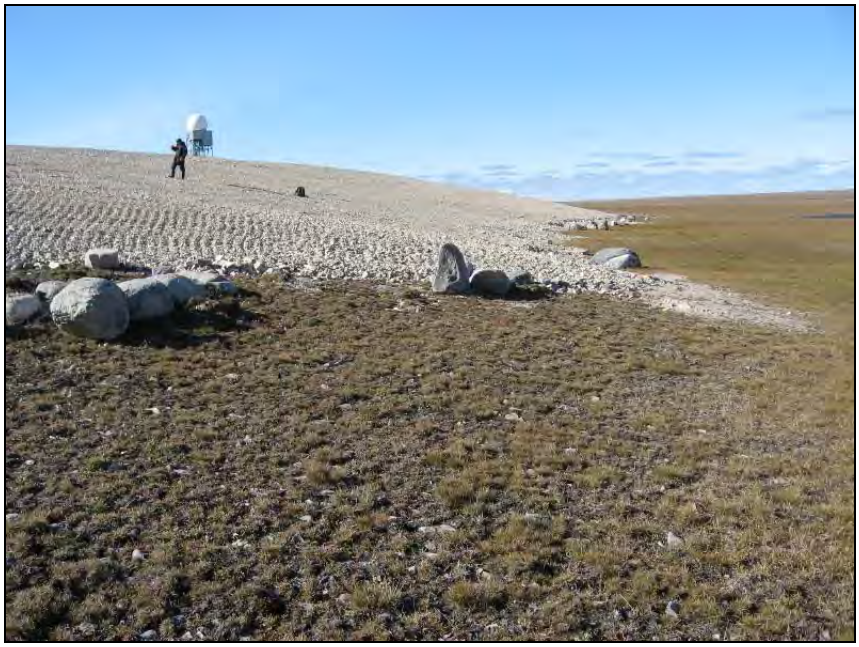
(appendix ti pgs)

Photograph STA-1. Looking N from SE corner of main (larger eastern) landfill cell.

Photograph STA-2. Looking NNW along E toe of main landfill cell.

Photograph STA-3. Looking upslope to area of minor surficial erosion. Condition is essentially uncharged from last year. Granular cover is self-armouring. ↑

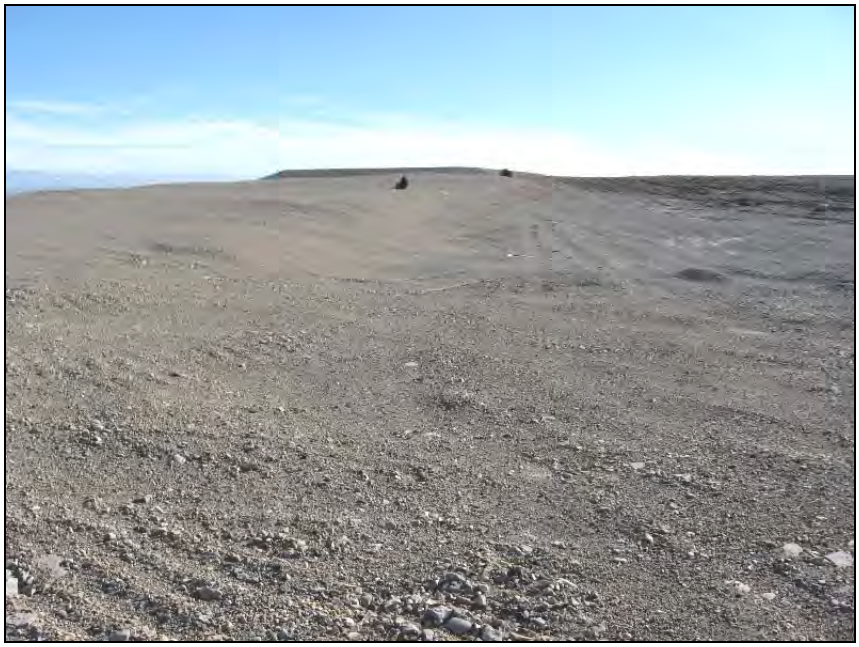
Photograph STA-4. Looking upslope to area of minor surficial erosion. Condition is essentially unchanged from last year. Granular cover is self-armouring. ↑



Photograph STA-5. Looking NNW along E slope of landfill looking to the NE corner of the main landfill cell. ↑

Photograph STA-6. Looking SSE along E slope. Slope appears stable. ↑

Photograph STA-7. Looking NE to NE toe of main landfill cell. Granular cover appears stable No features of note.

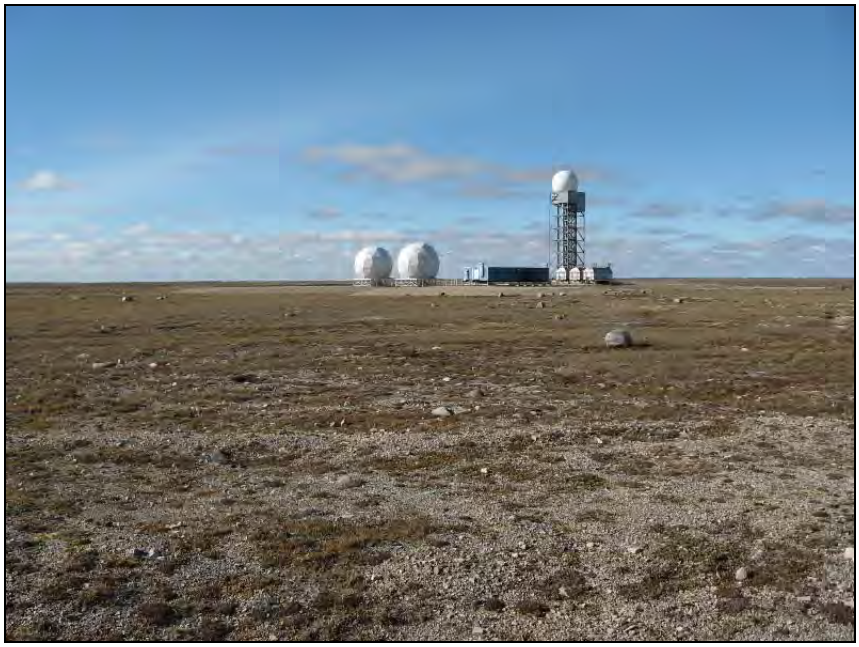


Photograph STA-8. Looking S from the NW corner of the main landfill cell along W side.

Photograph STA-9. Looking SSE along W side of the main cell of the Station landfill to the SW corner. Minor relief. Granular cover appears stable. ↑

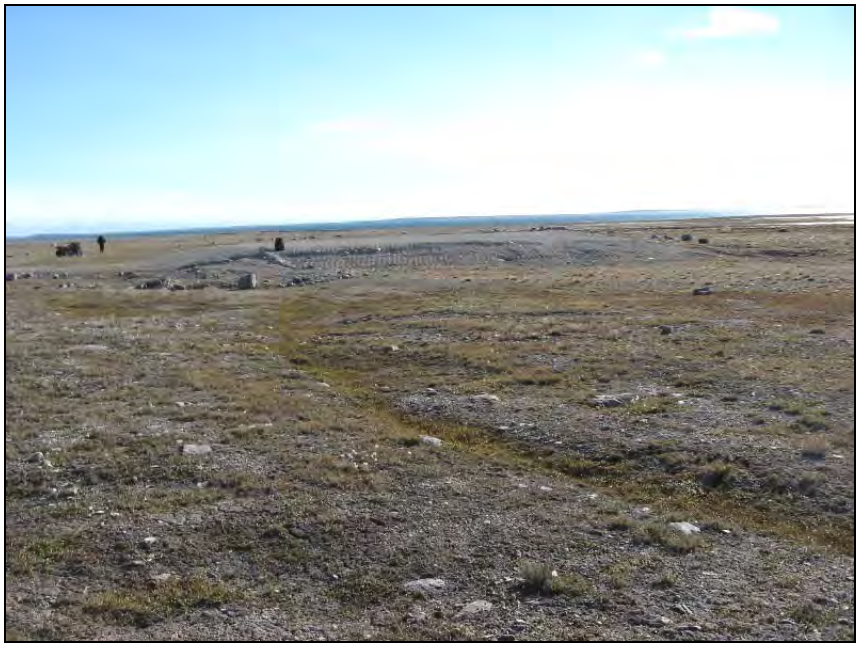
Photograph STA-10. Looking E to NW corner of the small SW cell of the Station Landfill. Granular cover appears stable. Honda parked adjacent to main cell on the extreme left of the photo. Tier II landfill (NE corner) visible in the background. ↑

Photograph STA-11. Looking NE to the SW corner of small SW cell. Main Station Landfill cell is visible in the background. ↑

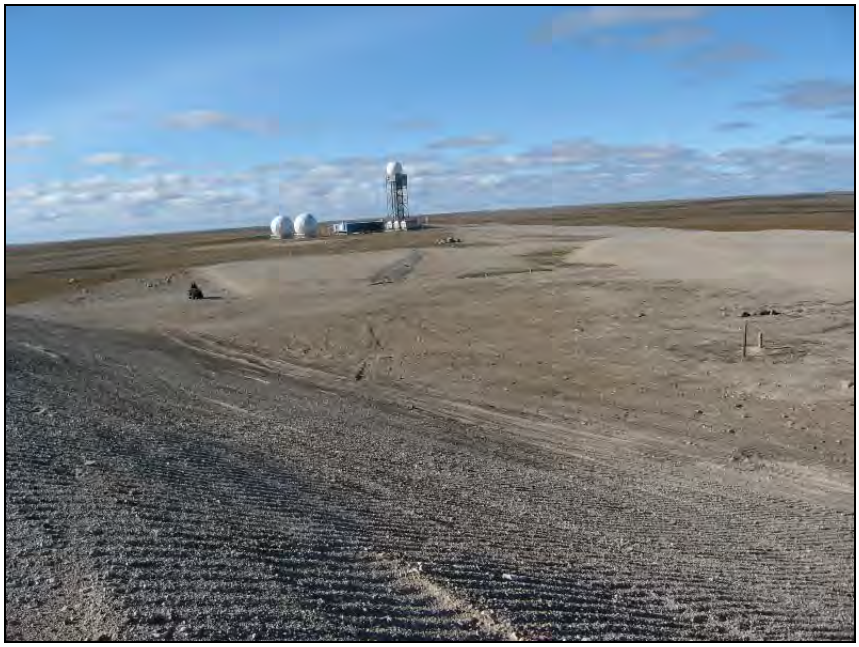


Photograph STA-12. Looking NW to the two small cells NW of the main Station Landfill cell. No features of note upon detailed inspection. ↑

Photograph STA-13. Looking SE to the NW corner of the SE most of the two small landfill cells. Granular cover appears stable. No features of note. ↑



Photograph STA-14. Looking S to the NE corner of the NW most of the 2 small cells. Granular cover appears stable. No features of note. ↑



Photograph STA-15. Looking NNW from top of Tier II to the 3 cells to the west of the main Station Landfill cell. Standing on crest at NE corner of Tier II. ↑

Photograph STA-16. Panoramic of the main Station Landfill cell looking N from the NE crest of the Tier II Landfill. ↑

A3 – Monitoring Photographic Records

Photograph 1. Test pit at C2-1. Samples C2-1A, C2-1B, and C2-16A (Duplicate) collected. Water table 0.20m.↑

Photograph 2. Test pit at C2-2. Samples C2-2A and C2-2B collected. Water table at 0.20m.↑

Photograph 3. Test pit at C2-3. Samples C2-3A and C2-3B collected. Water table at 0.40m.↑

Photograph 4. Test pit at C2-4. Samples C2-4A and C2-4B collected. Water table at 0.10m.↑

Photograph 5. Test pit at C2-5. Samples C2-5A and C2-5B collected.↑

A4 –Field Notes

(appendix ti pgs)

WLFS 10 (103-~~0038~~ 0037) 548169 7619381
Looking W along north side of 4th cell. Ponded water but NO side of seepage

WLFS 11 (103-0038, 0039) 548188 7619380
Looking S along east side of 4th cell From NE corner

WLFS 12 (103-0040) 548255 7619332
Looking S along east side of 4th cell to SE corner
- radar tower in background

WLFS 13 (103-0041) 548275 7619263
Looking W to SE corner of 4th (south) cell. Drainage swale visible, but no erosion protection

WLFS 14 (103-0042) 548153 7619256
Look NNW from SW corner of south cell

After lunch wind has picked up to about 35+ knots
- tents had to be reinforced as the wind was almost flattening the small tents

STATION LANDFILL
- initial visual inspection indicated that conditions are essentially unchanged from last year
- I will repeat the same photo sequence from last year and add the three small landfills to the west which were not photographed last year

Sta-1 (103-0043) 548548 7618859
Looking N from SE corner of landfill

Sta-2 (103-0044) 548555 7618931
Looking NNW along eastern toe of landfill

Sta-3 (103-0045) 548544 7618941
Looking upslope to area of minor surficial erosion. Photographed last year

Sta-4 (103-0046) 548529 7618967
Looking upslope to area of minor surficial erosion

Sta-5 (103-0047) 548542 7618975
Looking NNW along eastern slope of landfill looking to the NE corner

Sta 6 (103-0048, 0049) 548478 7619101
Looking SSE along eastern slope

Sta 7 (103-0050) 548441 7619085
Looking NE to NE toe

Sta 8 (103-0051) 548435 7619066
Looking S along west side of LF from NW corner

Photo Timber Wolf track

Sta 9 (103-0053) 548436 7618973
Looking SSE along west side of Station LF to the SW corner

Sta 10 (103-0054, 0055) 548565 7618926
Looking E to NW corner, no problems
Hawks beside main LF and Tier I in background

Sta 11 (103-0056) 548448 7618855
Looking NE to SW corner of SW cell with Main Station LF in background

Sta 12 (103-0057) 548382 7618940
Looking NW to the two small cells NW of the Main LF
- no features of note upon detailed inspection

Station LF 13 (103-0058, 0059) 548291 7619032
Looking to the NW corner of the SE most of the two small cells

Sta 14 (103-0060) 548275 7619083
Looking S to the NE corner of the NW most of the 2 small cells

WINDS @ 50 knots. Tents bowed over, almost snapping poles

Sta 15 (103-0061) 548518 7618812
Looking NW from top of Tier II to 3 cells to the west of the Main cell
- standing on crest at NE corner of Tier II

Sta 16 (103-0062, 0063) 548521 7618810
Panoramic of Station LF
Looking N from the NE crest of the Tier II LF

TOO WINDY TO CONTINUE
BACKPACK PARTIALLY FILLED WITH ROCK AND STILL ROLLING IN WIND
HAD TO CHASE FIELD BOOK 100m when the wind ripped it from my hand
- Heading back to camp to make sure tents are still standing

I will start making some notes for Tier II in preparation for inspection
- visual inspection yesterday confirmed that conditions are essentially unchanged from last year and cracks have not worsened.

CAM-2 -2°C Aug 20/2008 13

Extreme winds and cold prevented us from completing more inspections last night
- call to Peter Armstrong informed us that bad weather was moving in and that we had to prepare for a rough(er) ride
- extreme winds and snow overnight
- light dusting of snow in the morning is rapidly disappearing with the wind

Wind has eased to about 25 to 30 knots and temp rising to around -1°C
We are still on track a 2pm pick-up, weather permitting

T2-1 (104-0002 0001) 548557 7618829
Panoramic of North side of LF looking W from about 30 NE of NE corner
Pen frozen → switching to pencil

T2-2 (104-0003) 548542 7618819
Looking WNW along toe of slope from NE toe

Aug 19

MW-7 water

CZ-MW-7 4x1L AG
2x VOC vial
1x 250mL Plastic

Photo 18 - MW-7
Soil
CZ-MW-7A Shallow
CZ-MW-7B Depth
Photo 19 - Test pit

MW-8 water

CZ-MW-8 4x1L AG
2x VOC Vial
1x 250mL Plastic

Photo 20 - MW-8
Soil
CZ-MW-8A Surface
CZ-MW-8B Depth
water table @ 20cm
Photo 21 - Test pit

Aug 20

Station Landfill

CZ-1 N 7619113
E 548458
CZ-1A Surface
CZ-1B Depth
Soil - S&G muddy
w/t @ 20cm
Photo 22
CZ-16A Duplicate

CZ-2 N 7619084
E 548487
CZ-2A Surface
CZ-2B Depth
Soil - organic peat @ surface
S&G @ depth w/t @ 20cm
Photo 23

CZ-3 N 7619002
E 548533
CZ-3A Surface
CZ-3B Depth
Soil - S&G w/t @ 40cm

Photo 24

Aug 20

C2-4 N 7618948
E 548579

C2-4A Surface
C2-4B Depth
Soil- organic peat @ surface
S & G below w/t @ 10cm
Photo 25

C2-5 N 7619020
E 548349

C2-5A Surface
C2-5B Depth
Soil- S & G

Photo 26

West Landfill-South

C2-11 N 7619432
E 548122

C2-11A Surface
C2-11B Depth
Soil- S & G under org. peat

Photo 27

Aug 20

C2-12 N 7619366
E 548209

C2-12A Surface
C2-12B Depth
Soil- org. peat w sand & Gravel underneath
Photo 28

C2-13 N 7619318
E 548263

C2-13A Surface
C2-13B Depth
Soil- sand & gravel under peat
Photo 29

C2-14 N 7619264
E 548141

C2-14A Surface
C2-14B Depth
Soil- S & G

Photo 30

Appendix B

West Landfills – North and South

- B1 – Site Condition/Visual Inspection Records
- B2 – Geotechnical Inspection Photographic Records
- B3 – Monitoring Photographic Records
- B4 – Field Notes

1. West Landfill – North and South

1.1 Landfill Summary

The West Landfill – North is located one kilometre northwest of the decommissioned module train and consists of seven lobes of buried debris over an area of 13,400m^2. The depth of the landfill is about 1.0 to 1.5 metres. Based on the evaluation of the landfill as a source of contamination, potential pathways, and receptors, the West Landfill - North was classified as low potential environmental risk. The remediation for this landfill included regrading with the placement of additional granular fill and excavation of the contaminated soil. The landfill configuration and sample locations are shown on Figure B-1. The long term monitoring plan consists of visual monitoring, and the periodic collection of soil samples.

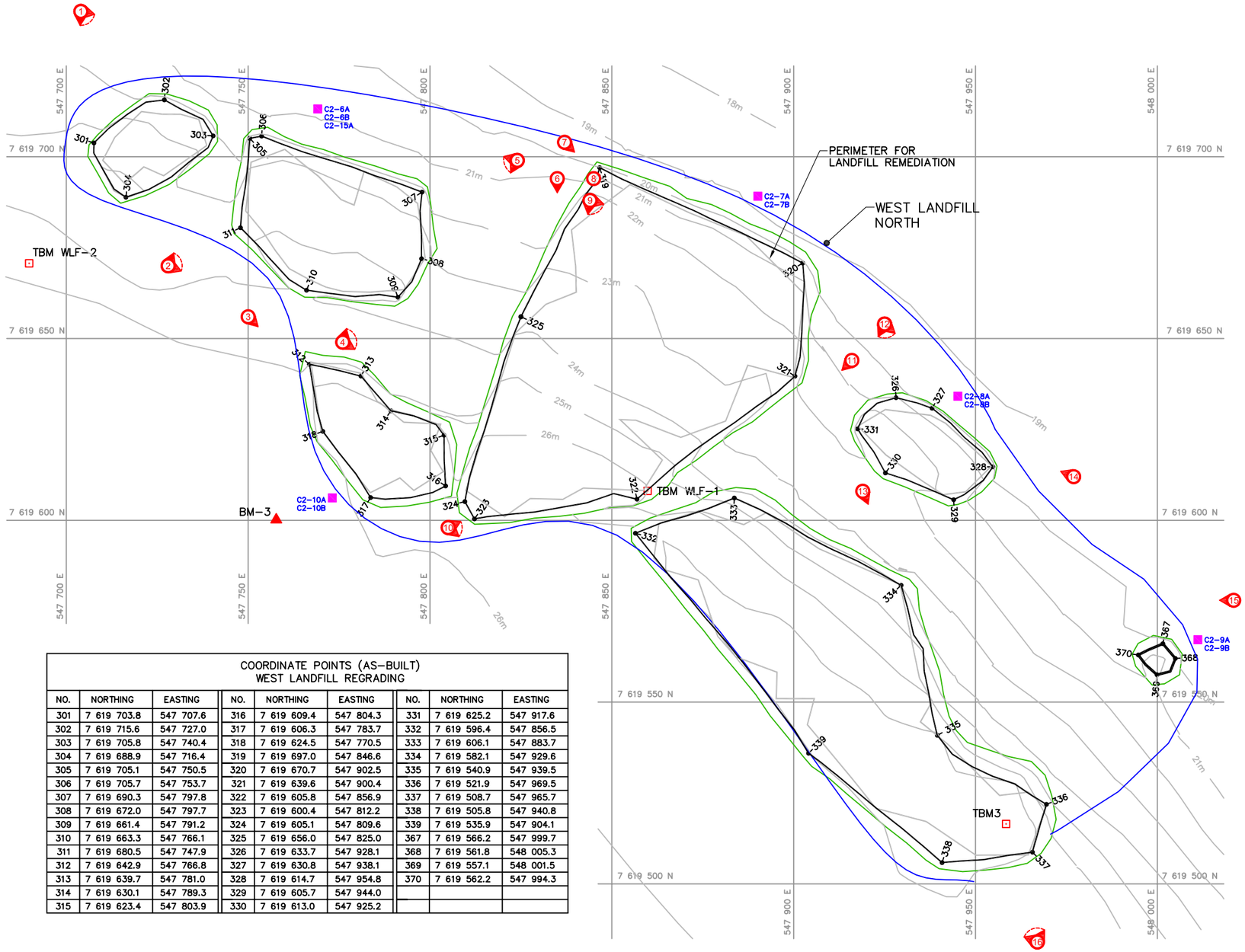
The West Landfill – South is located adjacent to the SRR facilities. The main lobe of this landfill is 8,300m^2, however three additional lobes (West Landfill – Central) are located to the northwest for a total area of 10,900m^2. Both areas have been linked for purposes of monitoring. Based on the evaluation of the landfill as a source of contamination, potential pathways, and receptors, the West Landfill – South (and – Central) was classified as low potential environmental risk. The landfill configuration and sample locations are shown on Figure B-2. The long term monitoring plan consists of visual monitoring and the periodic collection of soil samples.

For 2008, the monitoring requirements for the West Landfills included visual inspection and soil sampling.

1.2 Visual Monitoring

A visual inspection of the West Landfill was conducted on August 19, 2008. Based on the visual inspection, both the West Landfill North and West Landfill South appear to be in good condition and consistent with the condition depicted in the photographic documentation from last years inspection. The granular covers showed no visible signs of problematic settlement or erosion. There are a few shallow erosion rills on the slopes along the margins of the landfill. However, the cover is relatively coarse and therefore stable.

The site inspection record for the landfill is appended as an attachment to this section. Overall performance of the landfill is considered acceptable.



COORDINATE POINTS (AS-BUILT) WEST LANDFILL REGRADING								
NO.	NORTHING	EASTING	NO.	NORTHING	EASTING	NO.	NORTHING	EASTING
301	7 619 703.8	547 707.6	316	7 619 609.4	547 804.3	331	7 619 625.2	547 917.6
302	7 619 715.6	547 727.0	317	7 619 606.3	547 783.7	332	7 619 596.4	547 856.5
303	7 619 705.8	547 740.4	318	7 619 624.5	547 770.5	333	7 619 606.1	547 883.7
304	7 619 688.9	547 716.4	319	7 619 697.0	547 846.6	334	7 619 582.1	547 929.6
305	7 619 705.1	547 750.5	320	7 619 670.7	547 902.5	335	7 619 540.9	547 939.5
306	7 619 705.7	547 753.7	321	7 619 639.6	547 900.4	336	7 619 521.9	547 969.5
307	7 619 690.3	547 797.8	322	7 619 605.8	547 856.9	337	7 619 508.7	547 965.7
308	7 619 672.0	547 797.7	323	7 619 600.4	547 812.2	338	7 619 505.8	547 940.8
309	7 619 661.4	547 791.2	324	7 619 605.1	547 809.6	339	7 619 535.9	547 904.1
310	7 619 663.3	547 766.1	325	7 619 656.0	547 825.0	367	7 619 566.2	547 999.7
311	7 619 680.5	547 747.9	326	7 619 633.7	547 928.1	368	7 619 561.8	548 005.3
312	7 619 642.9	547 766.8	327	7 619 630.8	547 938.1	369	7 619 557.1	548 001.5
313	7 619 639.7	547 781.0	328	7 619 614.7	547 954.8	370	7 619 562.2	547 994.3
314	7 619 630.1	547 789.3	329	7 619 605.7	547 944.0			
315	7 619 623.4	547 803.9	330	7 619 613.0	547 925.2			

PERMANENT BENCHMARK				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM-3	7 619 600.143	547 757.734	25.763	25mm DIA. STEEL PIPE
TBM3	7 619 516.488	547 958.417	27.318	CARRIAGE BOLT
WLF-1	7 619 608.092	547 859.834	25.563	16mm DIA. IRON BAR
WLF-2	7 619 670.688	547 689.789	24.878	16mm DIA. IRON BAR

Legend

- TBM4 — TEMPORARY BENCHMARK
- BM-1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- C2-9A / C2-9B — MONITORING SOIL SAMPLE LOCATION
- 5 — PHOTOGRAPH LOCATION

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD03.dwg

N / W / E / S

0 12,5 25 37,5 50 m

1 : 1250
UTM Zone 14W, NAD83

File Name: C2-RD03.dwg
Reviewed by: JAT
Date Issued: December, 2008
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

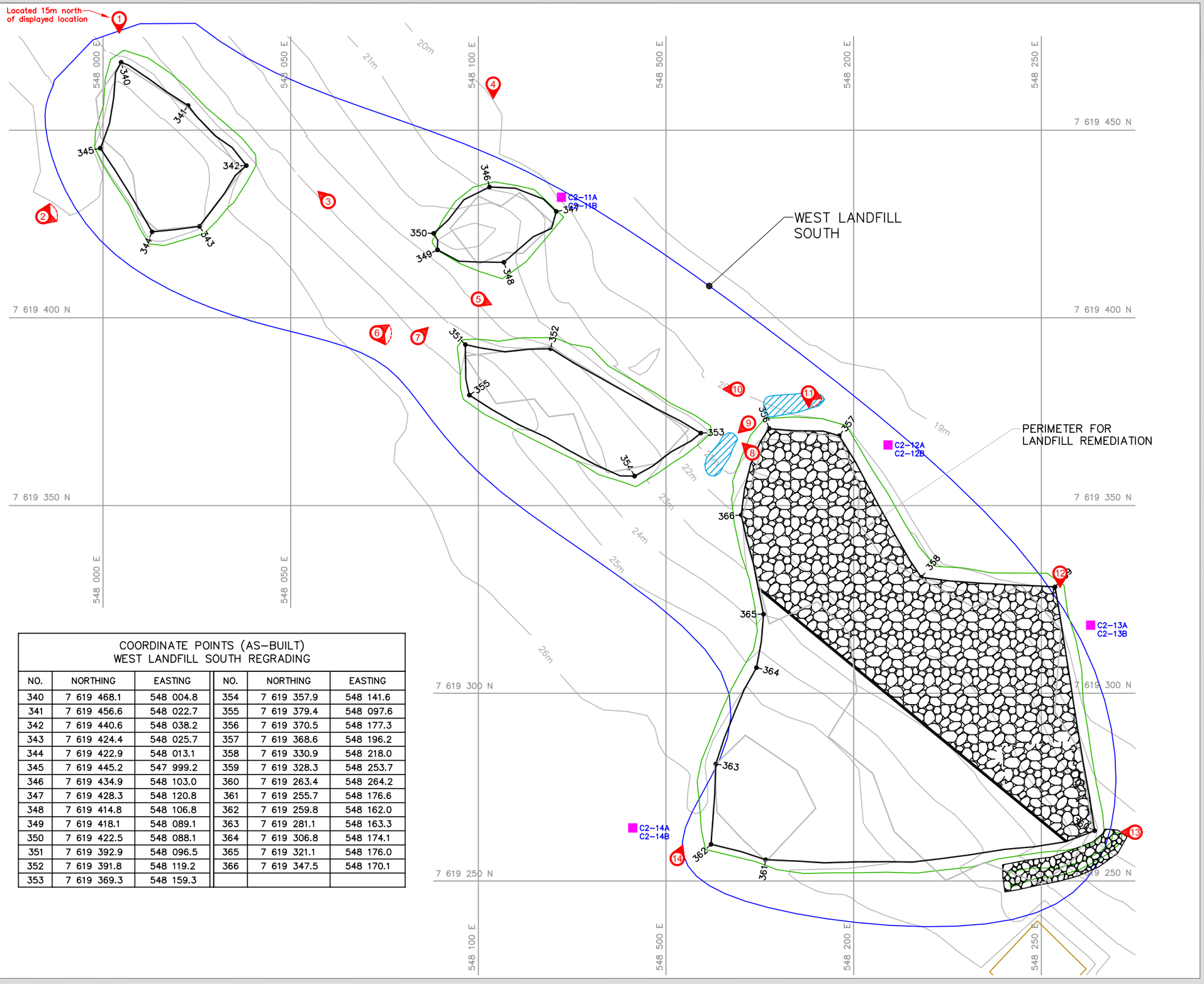
2008 DEW Line Monitoring Program
CAM-2 Gladman Point
Nunavut Territory

WEST LANDFILL - NORTH

AECOM

Figure B-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\20080802971\2008\WorkInProgress\Documents\802972_CAM-2-FINAL-Report\ACAD_Files\(C2-RD03.dwg



COORDINATE POINTS (AS-BUILT)
WEST LANDFILL SOUTH REGRADING

NO.	NORTHING	EASTING	NO.	NORTHING	EASTING
340	7 619 468.1	548 004.8	354	7 619 357.9	548 141.6
341	7 619 456.6	548 022.7	355	7 619 379.4	548 097.6
342	7 619 440.6	548 038.2	356	7 619 370.5	548 177.3
343	7 619 424.4	548 025.7	357	7 619 368.6	548 196.2
344	7 619 422.9	548 013.1	358	7 619 330.9	548 218.0
345	7 619 445.2	547 999.2	359	7 619 328.3	548 253.7
346	7 619 434.9	548 103.0	360	7 619 263.4	548 264.2
347	7 619 428.3	548 120.8	361	7 619 255.7	548 176.6
348	7 619 414.8	548 106.8	362	7 619 259.8	548 162.0
349	7 619 418.1	548 089.1	363	7 619 281.1	548 163.3
350	7 619 422.5	548 088.1	364	7 619 306.8	548 174.1
351	7 619 392.9	548 096.5	365	7 619 321.1	548 176.0
352	7 619 391.8	548 119.2	366	7 619 347.5	548 170.1
353	7 619 369.3	548 159.3			

Legend

- TBM4 — TEMPORARY BENCHMARK
- BM-1 — PERMANENT BENCHMARK
- 101 — COORDINATE POINT
- C2-12A / C2-12B — MONITORING SOIL SAMPLE LOCATION
- 2 — PHOTOGRAPH LOCATION
- PONDED WATER

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD04.dwg

0 5 10 20 30 40 m
1 : 1000
UTM Zone 14W, NAD83

File Name: C2-RD04.dwg
Reviewed by: JAT
Date Issued: January, 2009
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

2008 DEW Line Monitoring Program
CAM-2 Gladman Point
Nunavut Territory

WEST LANDFILL - SOUTH

AECOM

Figure B-2
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\2008\80297\2008\WorkInProgress\Documents\80297-2_CAM-2-FINAL-Report\ACAD_Files\C2-RD04.dwg

1.3 Soil Sampling

Soil samples were collected at the designated locations of C2-6, C2-7, C2-8, C2-9, and C2-10 at the West Landfill – North and C2-11, C2-12, C2-13, and C2-14 at the West Landfill South. The sampling locations are shown on Figures B-1 and B-2. Two samples were collected at each location at approximately 0.1m below ground and between 0.4-0.5m below ground. A photograph of the test pit at each location sampled is shown in Appendix B3.

AECOM did not identify any hydrocarbon odours, staining, or free product, at any of the sampling locations at the West Landfill. No detectable concentrations of TPH (C6-34) were identified in the soil samples collected from the West Landfill. The laboratory results indicate no detectable levels of PCB in any soil samples collected from the West Landfill. Low levels of copper, Nickel, cobalt, lead, zinc and chromium were detected in the various soil samples from the West Landfill, however none of the results are considered by AECOM to be of significance. It is recommended by AECOM 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 B-1 for the West Landfill – North and in Table B-2 for the West Landfill – South. The laboratory certificate is provided in Appendix E.

Table B-1. CAM-2 Gladman Point, Summary of 2008 Soil Analysis - West Landfill - North

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
	Location Id.	Northing	Easting	(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																		
C2-10A	C2-10	7619606	547773	0.1	2.7	<5.0	<2.0	<0.50	3.4	6.9	4	<5.0	<0.050	<0.050	<10	<30	52	52
C2-10B	C2-10	7619606	547773	0.5	2.6	<5.0	<2.0	<0.50	3.2	6.2	3.5	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																		
C2-6A	C2-6	7619713	547769	0.1	1.0	<5.0	<2.0	<0.50	<2.0	3.5	<2.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-6B	C2-6	7619713	547769	0.5	1.4	<5.0	<2.0	<0.50	<2.0	2.7	2.7	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-15A *	C2-6	7619713	547769	0.1	1.1	<5.0	<2.0	<0.50	<2.0	2.9	2.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-7A	C2-7	7619689	547890	0.1	9.4	<5.0	<2.0	<0.50	7.6	12.2	10.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-7B	C2-7	7619689	547890	0.5	2.1	<5.0	<2.0	<0.50	2.2	4.3	3.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-8A	C2-8	7619634	547945	0.1	6.3	<5.0	<2.0	<0.50	2.5	4.5	3.7	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-8B	C2-8	7619634	547945	0.5	2.4	-	<2.0	<0.50	<2.0	3.6	3.1	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-9A	C2-9	7619567	548011	0.1	<1.0	<5.0	<2.0	<0.50	<2.0	2.9	<2.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-9B	C2-9	7619567	548011	0.5	1.7	<5.0	<2.0	<0.50	2.6	4.8	4.5	<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

Table B-2. CAM-2 Gladman Point, Summary of 2008 Soil Analysis - West Landfill - South

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
	Location Id.	Northing	Easting	(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																		
C2-14A	C2-14	7619264	548141	0.1	1.6	<5.0	<2.0	<0.50	2	4.1	3.7	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-14B	C2-14	7619264	548141	0.5	1.4	<5.0	<2.0	<0.50	2.1	3.1	2.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																		
C2-11A	C2-11	7619432	548122	0.1	<1.0	<5.0	<2.0	<0.50	<2.0	2.4	2.6	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-11B	C2-11	7619432	548122	0.5	8.1	7.6	3.7	<0.50	9.1	18.4	13.1	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-12A	C2-12	7619366	548209	0.1	1.4	<5.0	<2.0	<0.50	<2.0	5.6	2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-12B	C2-12	7619366	548209	0.5	3.3	<5.0	<2.0	<0.50	2.7	6.9	4.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-13A	C2-13	7619318	548263	0.1	1.9	<5.0	<2.0	<0.50	<2.0	7.3	2.6	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-13B	C2-13	7619318	548263	0.5	<1.0	<5.0	<2.0	<0.50	<2.0	3.3	2.6	<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

B1 – Site Condition/Visual Inspection Records

(appendix ti pgs)

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	CAM-2 Gladman Point
LANDFILL/AREA DESIGNATION:	West Landfill - North and South
DATE OF INSPECTION:	August 19, 2008
DATE OF PREVIOUS INSPECTION:	August 26, 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	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Erosion	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Frost Action	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Presence/ Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Features of Note.	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Additional Photos	Yes	Refer to Figures B-1 and B-2	N/A	N/A	N/A	N/A	Inspection photos	Photos WLFN 1 thru 16 and WLFS 1 thru 14	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

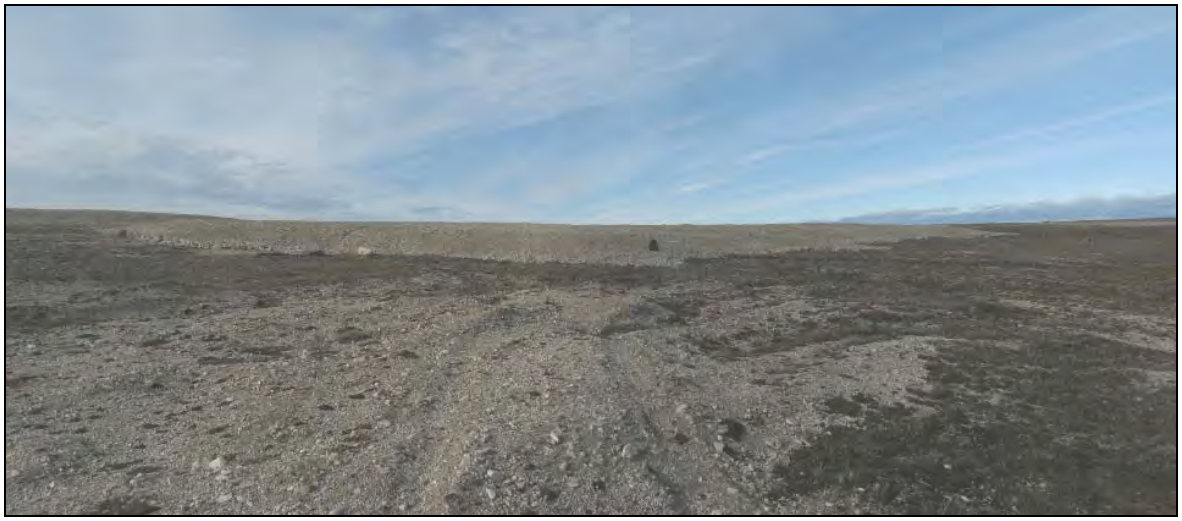
(appendix ti pgs)

Photograph WLFN-1. Looking SW to NE corner of northern most landfill cell. Granular cover appears stable. No features of note. ↑

Photograph WLFN-2. Looking E to NW corner of 2nd lobe from N. Backpack is near the SW corner for scale. No features of note. ↑

Photograph WLFN-3. Looking SE along the northern side of the 3rd cell from the N. Backpack is on the NW corner of the cell. Radar ball tower is visible in the background. ↑

Photograph WLFN-4. Looking SE to the large central landfill cell from near north end of 3rd cell. The south side of the the 2nd cell from N is visible on left side of the photo. ↑



Photograph WLFN-5. Looking W to NE corner of the 2nd cell. Standing near the NW corner of the large central landfill cell. ↑

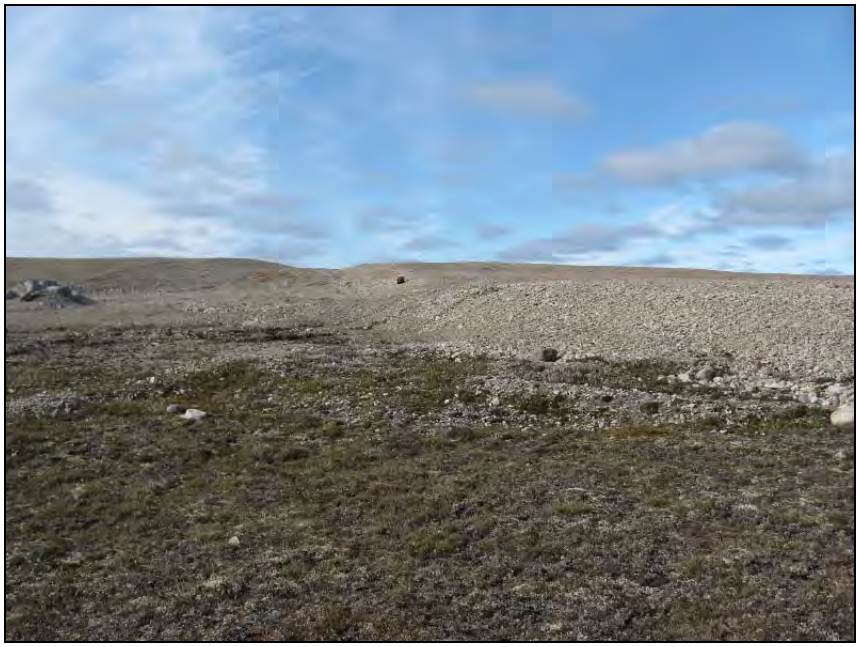
Photograph WLFN-6. Looking SSW along the W side of the large central landfill cell. Granular cover appears stable. 3rd cell is visible at the right side of the frame. ↑

Photograph WLFN-7. Looking SE along N toe of the large central cell from NW corner. Granular cover and toe area appear stable. No problematic conditions observed. ↑

Photograph WLFN-8. Close-up of minor cracking along N corner of central cell. Crack observed to be about 4m long and 1 to 3mm wide. Several other similar type minor cracks observed for next 25m (discontinuous, partially in-filled). Trivial feature, not documented in detail. ↑

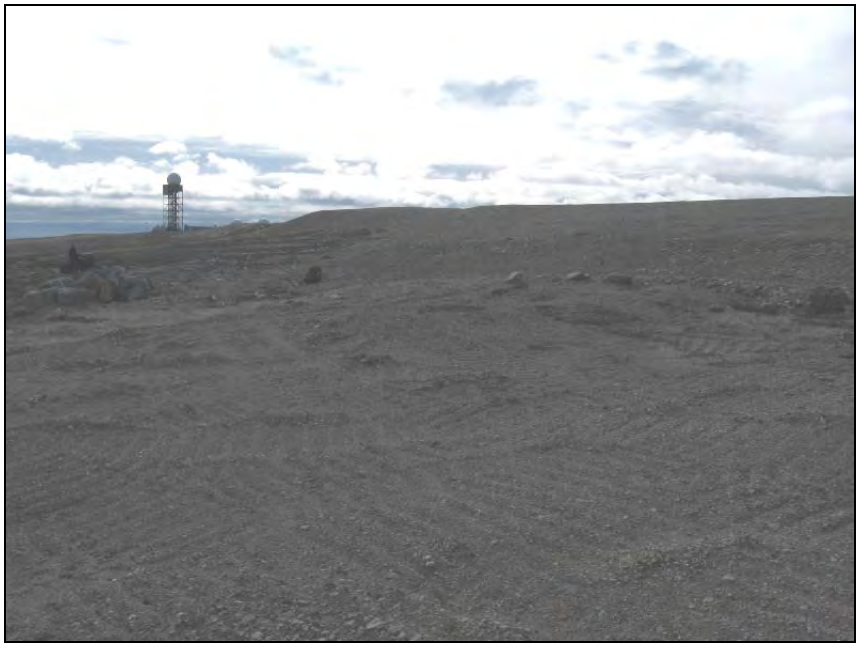
Photograph WLFN-9. Panoramic along top of the large central cell. Looking SE from N corner. No features of note.↑

Photograph WLFN-10. Looking SE from SW corner of large central cell. Looking to NW corner of long SW cell. ATV in background. No features of note. ↑

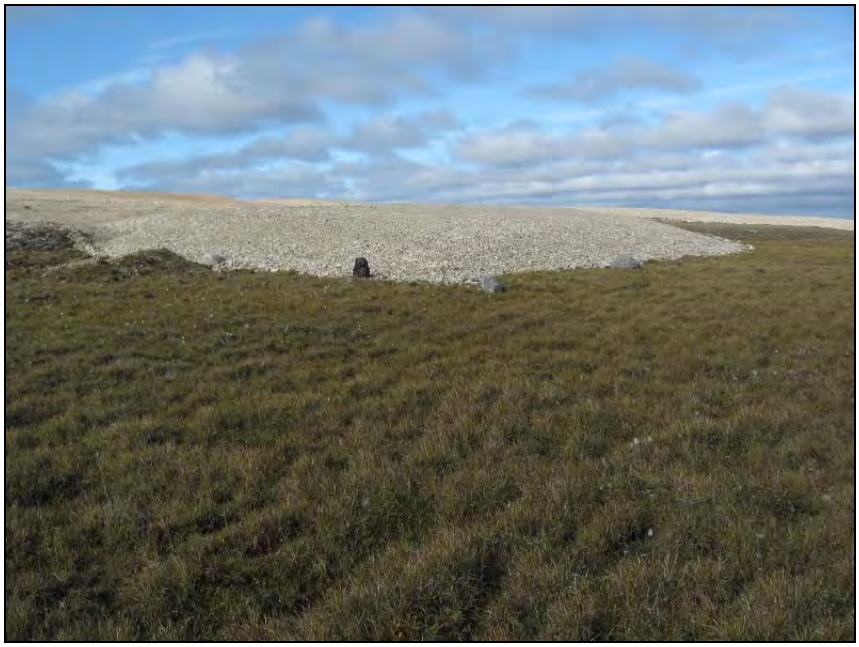


Photograph WLFN-11. Looking SW along S side of central cell from E corner. Long SW cell visible in left of frame. ↑

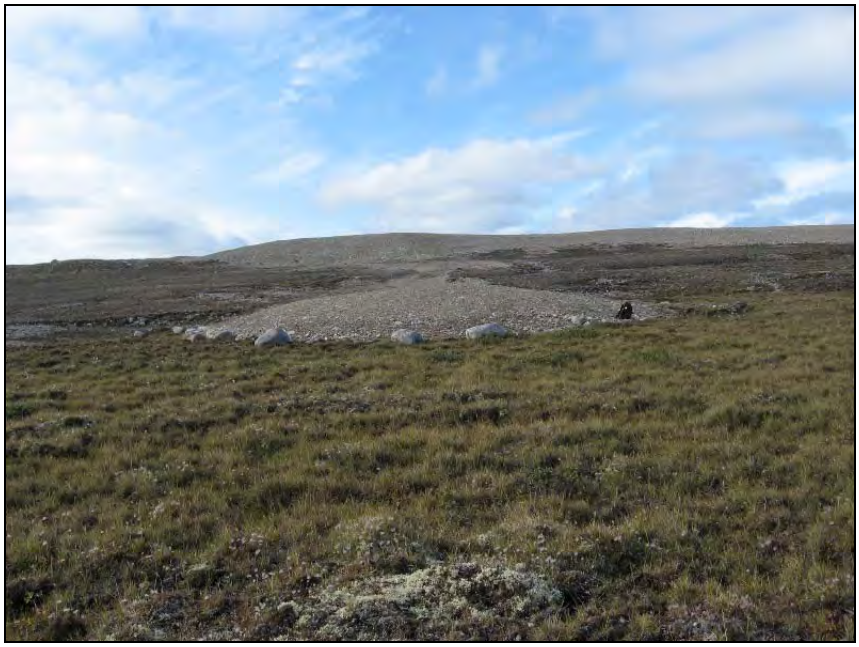
Photograph WLFN-12. Looking S to small eastern cell. Granular cover appears stable. Smallest SE cell visible in background. ↑



Photograph WLFN-13. Looking SSE along east side of long SW cell from near small E cell. ↑



Photograph WLFN-14. Looking WNW to SE corner of small E cell. Granular cover appears stable. No features of note. ↑



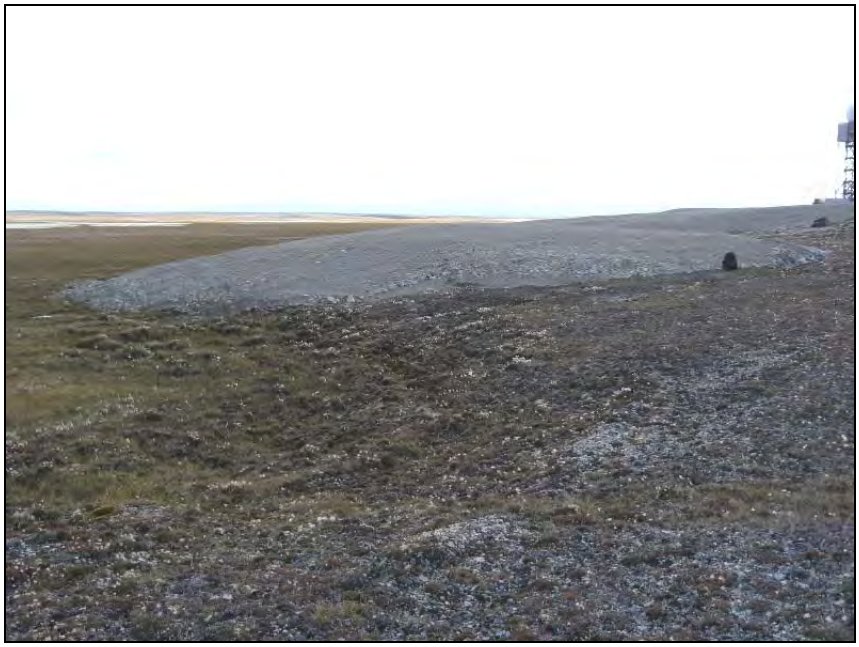
Photograph WLFN-15. Looking W to smallest SE cell. Granular cover appears stable. Long SW landfill cell visible in background. ↑

Photograph WLFN-16. Looking N to the S end of the long SW cell. Note elevations difference to SE cell. ↑

Photograph WLFS-1. Looking S to N end of N cell. ↑

Photograph WLFS-2. Looking E to W side of N cell. ↑

Photograph WLFS-3. Looking NW along E side of N cell. ↑



Photograph WLFS-4. Looking S to N side of 2nd cell on the E side. Granular cover appears stable. No features of note. ↑

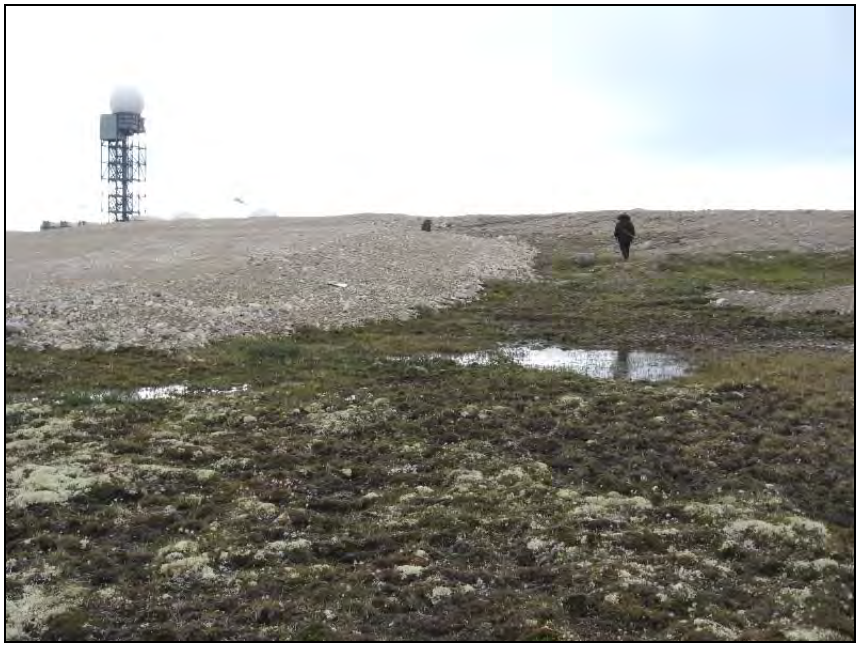
Photograph WLFS-5. Looking ESE along NE side of 3rd cell. No features of note. Granular cover appears stable. ↑

Photograph WLFS-6. Looking E to NW corner of 3rd cell. Largest (southern most) landfill cell visible in the background. ↑

Photograph WLFS-7. Looking NE to 2nd cell from near NW corner of 3rd cell. ↑

Photograph WLFS-8. Looking NW along east side of 3rd cell from NE corner of large S cell. Granular cover appears stable. ↑

Photograph WLFS-9. Looking WSW along S side of 3rd cell. No features of note. ↑



Photograph WLFS-10. Looking W along N side of 4th cell. Ponded water appears to be associated with recent precipitation events. No staining or clear indications of seepage. ↑

Photograph WLFS-11. Looking S along E side of largest, most southerly landfill cell. Viewed from NE corner. ↑

Photograph WLFS-12. Looking S along E side of large southern cell to the SE corner. Radar tower in background. ↑

Photograph WLFS-13. Looking W to SE corner of large southern landfill cell. Drainage swale is visible, however it does not appear to be protected by erosion protection. ↑

Photograph WLFS-14. Looking NNE from SW corner of the south cell. ↑

B3 – Monitoring Photographic Records

(appendix ti pgs)

Photograph 1. Test pit at C2-6. Samples C2-6A, C2-6B, and C2-15A (Duplicate) collected.

Photograph 2. Test pit at C2-7. Samples C2-7A and C2-7B collected. Water table at 0.30m.

Photograph 3. Test pit at C2-8. Samples C2-8A and C2-8B collected. Water table at 0.25m.

Photograph 4. Test pit at C2-9. Samples C2-9A and C2-9B collected. Water table at 0.25m.

Photograph 5. Test pit at C2-10. Samples C2-10A and C2-10B collected. ↑

B4 – Field Notes

(appendix ti pgs)

Sunny 2°C

Monday Aug 18/08

Flight from Cambridge Bay was cancelled yesterday due to weather

- everyone was on standby all day but the flight was finally called of around 6:30 pm
- flight delayed this morning until 10:30am due to weather -> fog and snow in Gjoa Haven
- Jim, Ken and Tom first into camp, landing around 12:30 pm
- Camp was pretty much set up by the time that Joe & Susie arrived @ 4pm
- we are now very pushed for time if we are to maintain original flight schedule
- we will go out tonight and get started @ West Landfill while we still have the light

7pm by the time we arrived at West LF North - the shadows were too long for good photos so I just did a walkover inspection of the West 4; Station LF and Tier II (north and west sides)

No problematic conditions observed. Essentially unchanged from last year. Movement of Tier II slopes appears to have stabilized/stopped

Partly cloudy 2°C

Aug 19

Starting off with West LF North
- I will add a few new photos from last years collection to capture more views

WLF-N 1 (103-0001, 0002) 547704 7619740
Looking SW to NE corner of northernmost cell

WLF-N 2 (103-0003, 0004) 547728 7619670
Looking ~~W~~ to NW corner of 2nd lobe from north

WLF-N 3 (103-0005) 547750 7619656
Looking SE to North point and along E side of 3rd cell from the north
Radar ball tower visible in background

WLF-N 4 (103-0006, 0007) 547776 7619649
Looking SE to central cell from near north end of 3rd cell
- South end of 2nd cell from north visible in foreground

WLF-N 5 (103-0008, 0009) 547824 7619699
Looking W to NE corner along N side of second cell

WLF-6 (103-0010) 547835 7619694
Looking S along W side of central cell. Third cell visible right side frame

WLF-7 (103-0011) 547837 7619704
Looking SE along northern toe of central cell from NW corner

Photo quality photo deleted - shutter part closed

WLF-8 (103-0013) 547845 7619694
Close-up of minor cracking along N corner of central cell ≈ 4m long, 1 to 3mm width
- several other similar type minor cracks observed for next 25m, discontinuous, partially infilled
- trivial feature, not documented in detail

WLF-9 (103-0014, 0015) 547844 7619688
Panoramic top central cell looking SE from N corner

WLF-N-10 (103-0016, 0017) 547805 7619598
Looking SE from SW corner of central cell looking to NW corner of long SW cell. ATV in background

WLF-N 11 (103-0018) 547916 7619644
Looking SW along S side of central cell from E corner. Long SW cell visible in left of frame

WLF-N 12 (103, 0019, 0020) 547925 7619654
Looking S to small eastern cell. Smallest SE cell visible in background

WLF-N 13 (103-0021) 547919 7619608
Looking S along east side of long SW cell from ~~not~~ near small east cell

2°C, wind 30 km/hr

WLF-N 14 (103-0022) 547977 7619612
Looking WNW to SE corner of small East cell

WLF-N 15 (103-0023) 548021 7619578
Looking W to smallest SE cell
- Long SW LF cell visible in background

WLF-N 16 (103-0024, 0025) 547967 7619484
Looking N to S end of long SW LF
- note elevation difference to SE cell

Moving on to West LF South

WLF S 1 (103-0026) 547973 7619479
Looking S to N end of north cell

WLF S 2 (103-0027, 0028) 547984 7619427
Looking E to W side of N cell

WLF S 3 (103-0029) 548060 7619431
Looking NW along east side of north cell

WLF-S 4 (103-0030) 548072 7619441
Looking S to north side of 2nd cell on east side

WLF-S 5 (103-0031) 548100 7619405
Looking ESE along NE side of third cell

WLF-S 6 (103-0032, 0033) 548073 7619396
Look E to NW corner of third cell
- Large cell visible in the background

WLF-S 7 (103-0034) 548084 7619383
Looking NE to 2nd cell from near NW corner of 3rd cell

WLF S 8 (103-0035) 548173 7619364
Looking NW along east side third cell from NE corner of large south cell

WLF S 9 (103-0036) 548172 7619372
Looking WSW along S side of 3rd cell

WLFS 10 (103-~~0038~~ 0037) 548169 7619381
Looking W along north side of 4th cell. Ponded water but NO side of seepage

WLFS 11 (103-0038, 0039) 548188 7619380
Looking S along east side of 4th cell From NE corner

WLFS 12 (103-0040) 548255 7619332
Looking S along east side of 4th cell to SE corner
- radar tower in background

WLFS 13 (103-0041) 548275 7619263
Looking W to SE corner of 4th (south) cell. Drainage swale visible, but no erosion protection

WLFS 14 (103-0042) 548153 7619256
Look NNW from SW corner of south cell

After lunch wind has picked up to about 35+ knots
- tents had to be reinforced as the wind was almost flattening the small tents

STATION LANDFILL
- initial visual inspection indicated that conditions are essentially unchanged from last year
- I will repeat the same photo sequence from last year and add the three small landfills to the west which were not photographed last year

Sta-1 (103-0043) 548548 7618859
Looking N from SE corner of landfill

Sta-2 (103-0044) 548555 7618931
Looking NNW along eastern toe of landfill

Sta-3 (103-0045) 548544 7618941
Looking upslope to area of minor surficial erosion. Photographed last year

Aug 18

CAM-2

Weather: Sunny, light breeze, Cool
Samplers: Susie Kouba, Ken Bolelt

West Landfill - North

C2-10 N 7619606
E 547773
C2-10A surface soil - sand & Gravel
C2-10B Depth - lots of rocks
Photo 1 - Test pit.

C2-6 N 7619713
E 547769
Soil sandy w some Gravel
C2-6A Surface
C2-15A Surface Dup
C2-6B Depth
Photo 2 - Test pit

C2-7 N 7619689
E 547890
Soil - organic peat and clay underneath
C2-7A Surface
C2-7B Depth
Photo 3 - Test pit

Aug 18

C2-8 N 7619634
E 547945

C2-8A Surface
C2-8B Depth
Soil - organic peat w clay w some sand & Gravel below
Photo 4 - Test pit

C2-9 N 7619567
E 548041
C2-9A Surface
C2-9B Depth
Soil - organic peat with sand & gravel and clay underneath
Photo 5 - Test pit

Aug 19

Tier II
~~MW-1~~

Weather: windy, cold, sunny w clouds
Samplers: KB, SK

MW-1 water collected
C2-MW-1 4x 1L AG
2x VOC Vial
1x 250mL Plastic
Photo 6 - MW-1
Soil sample
C2-MW-1A Surface
C2-MW-1B Depth
Photo 7 - Test pit

MW-2 water collected
C2-MW-2 4x 1L AG
2x VOC Vial
1x 250ml Plastic
Photo 8 - MW-2
Soil collected
C2-MW-2A Surface
C2-MW-2B Depth
Photo 9 - Test pit.

C2-MW-9A Surface Dup

Aug 20

C2-4 N 7618948
E 548579

C2-4A Surface
C2-4B Depth
Soil- organic peat @ surface
S & G below w/t @ 10cm
Photo 25

C2-5 N 7619020
E 548349

C2-5A Surface
C2-5B Depth
Soil- S & G

Photo 26

West Landfill-South

C2-11 N 7619432
E 548122

C2-11A Surface
C2-11B Depth
Soil- S & G under org. peat

Photo 27

Aug 20

C2-12 N 7619366
E 548209

C2-12A Surface
C2-12B Depth
Soil- org. peat w sand & Gravel underneath
Photo 28

C2-13 N 7619318
E 548263

C2-13A Surface
C2-13B Depth
Soil- sand & gravel under peat
Photo 29

C2-14 N 7619264
E 548141

C2-14A Surface
C2-14B Depth
Soil- S & G

Photo 30

Appendix C

Tier II Soil Disposal Facility

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

1. Tier II Soil Disposal Facility

1.1 Landfill Summary

A DCC Tier II Soil Disposal Facility has been constructed at the Gladman Point site for the disposal of Tier II soil excavated during the clean-up. The Facility is located at the northwest corner of the former station area, and about 50m south of the Station Area Landfill. The design of this landfill included a double containment system consisting of a liner system and the placement of sufficient surface fill to promote freezing of landfill contents. The liner was placed over the bottom of the landfill, over the perimeter berms, and then over top of the landfill contents. Thermistor strings were installed within the landfill and monitoring wells were installed around the landfill perimeter. The landfill configuration and sample locations are shown on Figure C-1. The long term monitoring plan consists of visual monitoring, collection of soil and groundwater samples, and monitoring of subsurface ground temperatures in the berms and in the main body of the disposal facility.

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

1.2 Visual Monitoring

A visual inspection of the Tier II Landfill was completed on August 20, 2008. Based on the visual inspection, the Tier II Soil Disposal Facility appears to be in reasonably good condition overall. The condition of the landfill is substantially unchanged since 2007. Previously noted tension cracks and areas of minor surficial erosion (noted at the time of the 2007 inspection) appear to have stabilized and show no indication of further degradation.

The granular cover appears to be self armouring and resistant to erosion. Areas of previously observed minor surficial erosion, described as washing out of fine-grained material from the coarse granular matrix in the 2007 inspection report, appear to have stabilized and show no indication of further degradation. There are no erosional features that warrant remediation at this time.

Photos 1 thru 15 provide general overview documentation of the landfill slopes and upper surface. Photos 16 thru 30 document the observed tension cracks.

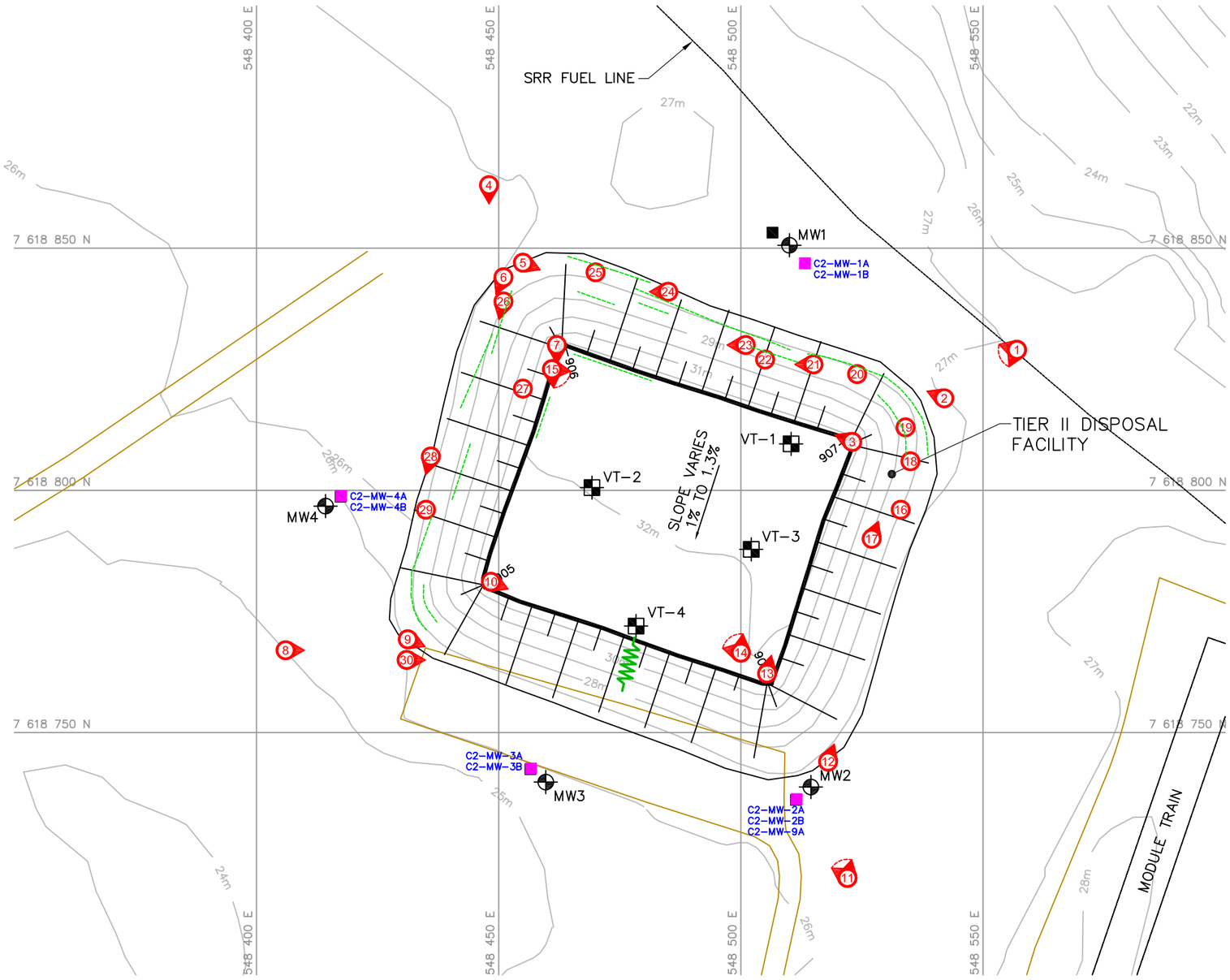
Numerous thin tension cracks, typically on the order of 1mm to 5mm width, were observed around the crest and perimeter of the north and west sides of the Tier II landfill. In all instances, the cracks were roughly parallel to the toe of slope and in multiple locations there were several roughly parallel sets of cracks between the toe of slope and crest. The tension cracks along the lower portion of the slope are essentially continuous, although portions of the crack were largely obscured by sediment infilling associated with fines washing out of the granular fill and being deposited in the cracks. Many of the tension cracks that were observed in 2007 appear to have been infilled with fines and could not be

located in 2008. The cracks that were observed showed clear signs of weathering (rounded sides, partial infilling) and no indications of recent movement.

Based on a visual assessment, the granular cover material appears to contain sufficient fines (i.e., >5% silt sized particles) to make it potentially frost susceptible. Given the gradation of the granular cover, it is anticipated that some of the observed tension cracks may be related to freeze/thaw processes. The orientation and spacing of the tension cracks suggests minor slope movement, however, the landfill slopes appear to be stable and do not appear to be in imminent danger of large-scale movement.

Given the relatively large number of hairline cracks that were observed in 2007, combined with the tendency of washed fines to obscure visual identification of the tension cracks over time, it would appear that the bulk of the tension cracks that were observed in 2007 were recent. However, the cracks that were observed in 2008 appear to be the weathered remnants of the earlier cracks with little indication of recent movement.

From the visual inspection 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. No immediate action is warranted. The tension cracks have been documented in detail to facilitate on-going monitoring. The overall preliminary stability assessment of the Tier II landfill is marginal.



Legend

- COORDINATE POINT (101)
- C2-MW-1A / C2-MW-1B — MONITORING SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- VERTICAL THERMISTOR LOCATION
- PHOTOGRAPH LOCATION (12)
- EROSION (NTS)
- TENSION CRACK (NTS)

COORDINATE POINTS (AS–BUILT) FINAL LANDFILL SURFACE

NO.	NORTHING	EASTING	ELEV.
905	7 618 780.0	548 447.2	31.6
906	7 618 829.9	548 463.7	32.3
907	7 618 810.7	548 522.1	32.4
908	7 618 760.1	548 506.3	31.9

COORDINATE POINTS (AS–BUILT) VERTICAL THERMISTORS

NO.	NORTHING	EASTING
VT–1	7 618 809.6	548 510.4
VT–2	7 618 800.6	548 469.3
VT–3	7 618 787.8	548 502.1
VT–4	7 618 772.0	548 478.4

COORDINATE POINTS (AS BUILT) MONITORING WELLS

NO.	NORTHING	EASTING	ELEV.
MW1	7 618 850.6	548 510.0	27.3
MW2	7 618 738.8	548 514.5	26.1
MW3	7 618 739.8	548 459.7	25.5
MW4	7 618 796.7	548 414.3	26.0

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD05.dwg

N
W E
S

0 5 10 20 30 40 m

1 : 1000
UTM Zone 14W, NAD83

File Name: C2-RD05.dwg
Reviewed by: JAT
Date Issued: January, 2009
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

2008 DEW Line Monitoring Program
CAM-2 Gladman Point
Nunavut Territory

TIER II SOIL DISPOSAL FACILITY

AECOM

Figure C-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\20080\80297\2008\WorkInProgress\Documents\80297-2_CAM-2-FINAL-ReportACAD_Files\C2-RD05.dwg

1.3 Soil Sampling

Soil samples were collected at the designated locations of MW-1, MW-2, MW-3 and MW-4. The sampling locations are shown on Figure C-1. Two samples were collected at each location at approximately 0.1m below ground and between 0.4-0.5m below ground. A photograph of the test pit at each location sampled is shown in Appendix C3.

AECOM did not identify any hydrocarbon odours, staining, or free product, at any of the sampling locations at the Tier II Soil Disposal Facility. No detectable concentrations of TPH (C6-34) were found in the soil samples collected from the Tier II Soil Disposal Facility. The laboratory results show a detectable level of PCB (0.125mg/kg) in the soil sample collected from the MW-1 location. AECOM does not consider the detected PCB level to be of significance; however it is recommended that it is evaluated in the context of the DEW Line Landfill Monitoring Plan. Low levels of copper, lead, zinc and chromium were detected in the various soil samples from the Tier II Soil Disposal Facility, however none of the results are considered 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 C-1 and the laboratory certificate is provided in Appendix E.

Table C-1. CAM-2 Gladman 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																
C2-MW-1A	MW-1	0.1	2.9	<5.0	<2.0	<0.50	4.7	6.8	3.8	<5.0	<0.050	0.125	<10	<30	<50	ND
C2-MW-1B	MW-1	0.5	2.8	<5.0	<2.0	<0.50	3.2	5.0	2.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																
C2-MW-2A	MW-2	0.1	2.3	<5.0	<2.0	<0.50	3.9	5.4	3.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-2B	MW-2	0.5	2.9	<5.0	<2.0	<0.50	2.8	4.1	3.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-9A *	MW-2	0.1	2.5	<5.0	<2.0	<0.50	10.3	6.0	4.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-3A	MW-3	0.1	8.2	<5.0	<2.0	<0.50	6.0	9.2	4.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-3B	MW-3	0.5	2.4	<5.0	<2.0	<0.50	5.3	3.6	2.8	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-4A	MW-4	0.1	4.0	<5.0	<2.0	<0.50	4.4	7.9	3.0	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-4B	MW-4	0.5	2.2	<5.0	<2.0	<0.50	2.6	5.2	4.6	<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

##.## Re-analyzed by laboratory to confirm result, may differ from result shown in laboratory report.

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

ND = No detectable concentrations observed

1.4 Groundwater Sampling

Groundwater depths and monitoring well conditions were documented for wells MW-1, MW-2, MW-3 and MW-4. The monitoring well development records are provided in Appendix C4. Generally the monitoring wells appeared to be in good condition during AECOM's site visit.

All of the wells at the Tier II Soil Disposal Facility contained sufficient water for sampling. Wells were purged and samples were collected at a maximum flow rate of 100mL/min using a peristaltic pump, and disposable LDPE tubing at each well. 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.

The laboratory results revealed no detectable levels of petroleum hydrocarbons (TPH) or PCB and only very low concentrations of cobalt, zinc, and chromium. AECOM does not consider any of the detectable levels 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 C-2 and the laboratory certificate is provided in Appendix E.

Table C-2. CAM-2 Gladman 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																
C2-MW-1	MW-1	25.93	<0.0050	<0.025	0.0068	<0.00025	<0.0050	10.9	<0.0025	<0.0050	<0.00020	<0.0010	<0.10			<1.0
Downgradient Samples																
C2-MW-2	MW-2	25.10	<0.010	<0.050	0.0086	<0.00050	<0.010	20.8	<0.0050	<0.010	<0.00020	<0.0010	<0.10			<1.0
C2-MW-3	MW-3	24.47	<0.010	<0.050	<0.0050	<0.00050	<0.010	0.816	<0.0050	<0.010	<0.00020	<0.0010	<0.10			<1.0
C2-MW-4	MW-4	24.55	<0.0050	<0.025	<0.0025	<0.00025	<0.0050	16.4	0.0031	<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 C5. Selected data has been plotted into graphs for each thermistor which are provided as Graphs C-1 through C-4 located in Appendix C6.

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 batteries were last replaced in 2007.

C1 – Site Condition/Visual Inspection Records

(appendix ti pgs)

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	CAM-2 Gladman Point
LANDFILL/AREA DESIGNATION:	DCC Tier II Soil Disposal Facility
DATE OF INSPECTION:	August 20, 2008
DATE OF PREVIOUS INSPECTION:	August 25, 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 Cracks	Marginal	Numerous
Overall Landfill Performance	**Marginal**	

Checklist Item	Present Yes/No	Location	Dimensions			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Erosion	No	N/A	N/A	N/A	N/A	None	N/A	N/A	Areas of minor surficial erosion that were noted last year were self armoring and are stable.
Frost Action	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Presence/ Condition of Monitoring Instruments	Good	Refer to Figure C1	N/A	N/A	N/A	N/A	MW1, MW2, MW3, MW4, VT-1, VT-2, VT-3, VT-4	Refer to Appendix C3	All Tier II wells and thermistors were monitored in 2008
Other Features of Note.	Yes	Tension cracks along entire north and west slopes and NE corner of east slope (along toe, mid-slope and crest)	Variable, 5m to 50m	Hairline to 10mm	unknown	< 10%	Numerous thin tension cracks running parallel to the landfill slopes. Cracks were first observed in 2007. No indication of subsequent movement	Photos 9 and 16 thru 30	Cracks are likely, in part, related to freeze/thaw desiccation and small scale slope movement. The cracks appear partially weathered and infilled with sediments, suggesting no recent movement. (Marginal)
Additional Photos	Yes	Refer to Figure C1	N/A	N/A	N/A	N/A	Additional photos	Photos 1 thru 8, 10 thru 15	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

(appendix ti pgs)

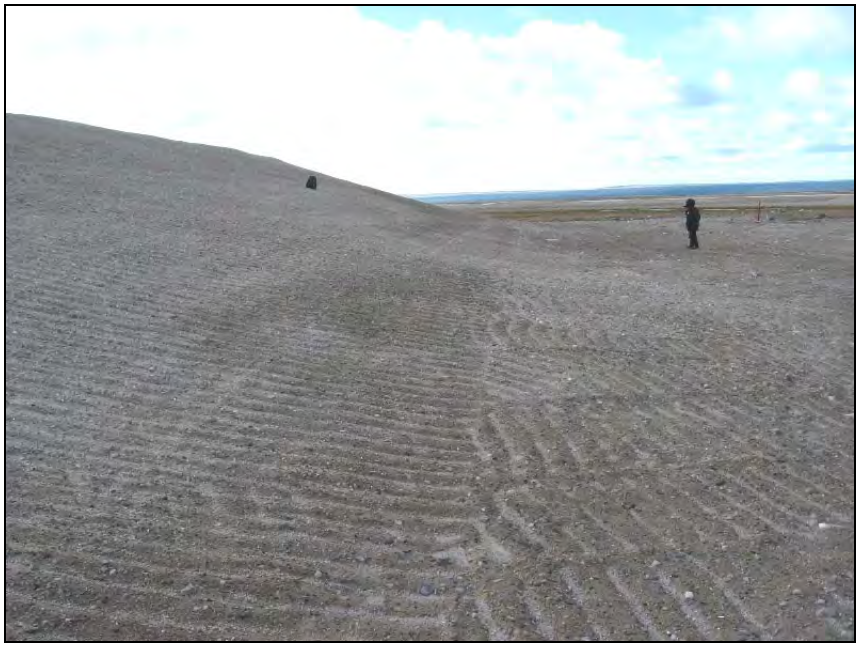
Photograph T2-1. Panoramic of N side of landfill looking SW from about 30m NE of NE corner.↑

Photograph T2-2. Looking WNW along toe of slope from NE toe. ↑

Photograph T2-3. Looking WNW along crest. Thermistor VT-1 is visible. ↑

Photograph T2-4. Looking S along west slope of LF from about 30m NW of NW corner. ↑

Photograph T2-5. Looking ESE along toe from NW corner of LF towards area where minor cracking was observed in 2007. The previously observed cracks (in foreground) are largely in-filled with sediments and show no indication of recent movement. ↑



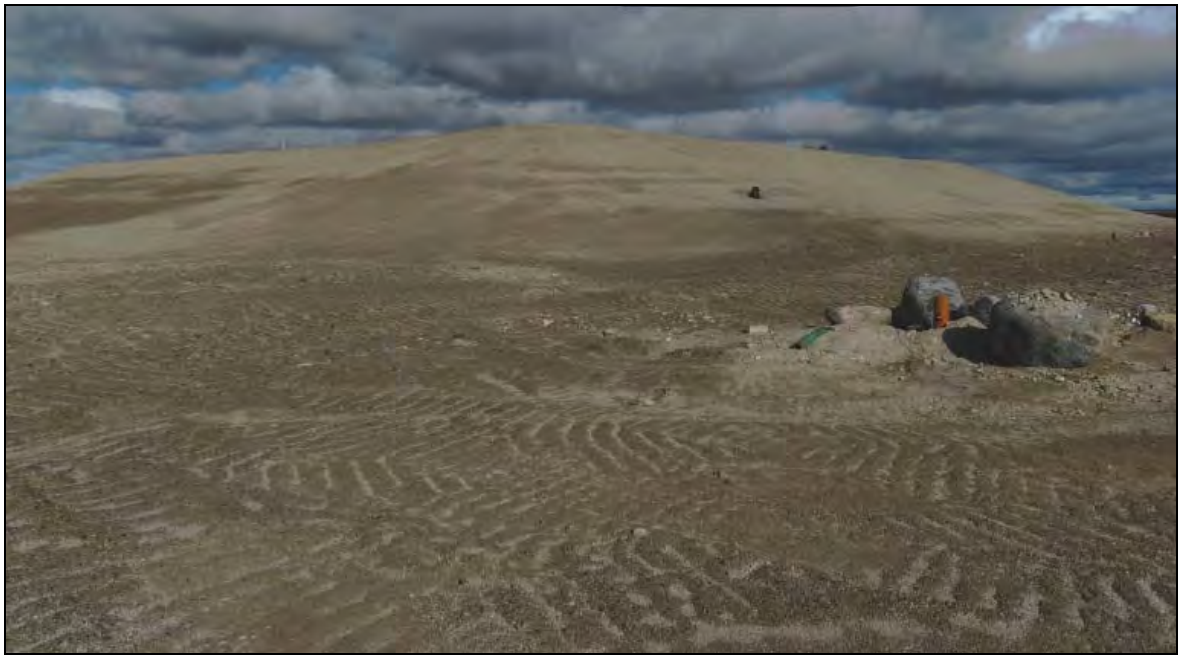
Photograph T2-6. Looking S along toe of W slope from NW corner. ↑

Photograph T2-7. Looking S along crest from NW corner. Minor cracks that were noted last year are barely visible and partially infilled. No sign of recent movement. ↑

Photograph T2-8. Looking E to SW corner from about 30m SW of SW corner. ↑

Photograph T2-9. Looking E along toe of S side from SE corner. 20m long tension crack (old) runs parallel to slope. ↑

Photograph T2-10. Looking E along crest from SW corner. ↑



Photograph T2-11. Looking NW to SE corner of landfill. MW2 visible in foreground. ↑

Photograph T2-12. Looking NNE along toe of E slope from SE corner. ↑

Photograph T2-13. Looking N along E crest from SE crest corner. ↑

Photograph T2-14. Looking NW from near SE corner. Panoramic showing about 2/3 of top surface of the landfill. Granular cover appears stable. ↑

Photograph T2-15. Looking ESE from NW corner. Panoramic showing upper surface of landfill. Granular cover appears stable with no indications of problematic conditions. ↑

Photograph T2-16. Start of fine crack that runs from 20m S of NE corner to about 20m W of NE corner. 1 to 4mm wide, parallel to toe, 5 m upslope from toe, portions in-filled. Crack was observed in 2007 and appears to have stabilized. No indications of recent movement or degraded condition. ↑

Photograph T2-17. Looking N to NE corner. Fine crack starts between glove and pen and progresses around corner to just downslope of backpack and continues at roughly same elevation for another 35m, splays up to 1 m offset. No indications of recent movement. ↑

Photograph T2-18. Close-up of same crack as in T2-17. This photo is representative of much of the length of the crack. ↑

Photograph T2-19. Close-up of crack, backpack in same location as photo T2-17. ↑

Photograph T2-20. Close-up of crack on N slope near NE toe. About 10m W of the NE corner of the landfill. Edges of the crack appear rounded (weathered) and portions of the crack are infilled with sediments. ↑

Photograph T2-21. Standing on crack looking west to the end of the crack (at backpack). The crack is largely in-filled with fine sediments and there is no sign of recent movement. ↑

Photograph T2-22. Close-up of previous crack between gloves shown in photo T2-21. ↑

Photograph T2-23. Looking W along N slope to old crack. 1 to 7mm wide, largely eroded/in-filled. Backpack at end (starts 5m E, ends 12m W). ↑

Photograph T2-24. Looking W to NW corner along toe and old eroded tension crack. Heavy rains and wind has essentially in-filled the other cracks that were observed last year. ↑

Photograph T2-25. Close-up of old crack noted in T2-24. No indications of recent movement. Slope appears stable. ↑

Photograph T2-26. Looking S from near NW corner along old crack. ↑

Photograph T2-27. Close-up of representative crack. This crack continues, splaying into two parallel cracks, 1m to 2m apart, and back again along entire toe of slope. Crack was observed in 2007 and shows no indication of recent movement. ↑

Photograph T2-28. Looking S along toe of W slope along old, partially in-filled crack. Crack passes between gloves and ends at backpack. ↑

Photograph T2-29. Close-up of crack between gloves. Partially infilled, no sign of recent movement. ↑

Photograph T2-30. Looking E along toe from SW corner. Old crack runs between gloves and ends at backpack. All other cracks in this area that were observed in 2007 were either completely in-filled or not observed. ↑

C3 – Monitoring Photographic Records

(appendix ti pgs)

Photograph 1. Monitoring well MW-1. Sample C2-MW-1 collected.

Photograph 2. Test pit at MW-1. Samples C2-MW-1A and C2-MW-1B collected.

Photograph 3. Monitoring well MW-2. Sample C2-MW-2 collected. ↑

Photograph 4. Test pit at MW-2. Samples C2-MW-2A, C2-MW-2B, and C2-MW-9A (Duplicate) collected. ↑

Photograph 5. Monitoring well MW-3. Sample C2-MW-3 collected.

Photograph 6. Test pit at MW-3. Samples C2-MW-3A and C2-MW-3B collected.

Photograph 7. Monitoring well MW-4. Sample C2-MW-4 collected.

Photograph 8. Test pit at MW-4. Samples C2-MW-4A and C2-MW-4B 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. ↑

C4 – Monitoring Well Sampling Records

(appendix ti pgs)

2008 Monitoring Well Sampling Log (MW #1)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-1
Facility:	Tier II Soil Disposal Facility

Known Data	
Depth of installation* (m):	3.50
Length of screened section (m):	1.87
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):	1.40
Well height above ground (m):	0.47	Depth to bottom (m):	2.10
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.70	Evidence of sludge:	-
Well volume of water (L):	1.37	Evidence of freezing/siltation:	-
Static water level* (m):	0.93		
Length of screen collecting water (m):	0.70		

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-19, 2008 09:20	1.5	2.7	6.91	2900	12.7	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-19, 2008 09:30	Date and Time Collected:	Aug-19, 2008 09:40
Sample Number - Water:	C2-MW-1	Sample Number - Soil:	C2-MW-1A
			C2-MW-1B
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

2008 Monitoring Well Sampling Log (MW #2)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-2
Facility:	Tier II Soil Disposal Facility

Known Data	
Depth of installation* (m):	3.50
Length of screened section (m):	1.85
Depth to top of screen* (m):	0.65

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.03
Well height above ground (m):	0.30	Depth to bottom (m):	1.67
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.64	Evidence of sludge:	-
Well volume of water (L):	1.26	Evidence of freezing/siltation:	-
Static water level* (m):	0.73		
Length of screen collecting water (m):	0.64		

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-19, 2008 10:05	1.5	2.81	6.88	5640	1.0	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-19, 2008 10:15	Date and Time Collected:	Aug-19, 2008 10:20
Sample Number - Water:	C2-MW-2	Sample Number - Soil:	C2-MW-2A
			C2-MW-2B
			C2-MW-9A (Duplicate)
Sample Containers:	4 x 1L Amber Glass	Sample Containers:	10 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

2008 Monitoring Well Sampling Log (MW #3)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-3
Facility:	Tier II Soil Disposal Facility

Known Data	
Depth of installation* (m):	3.60
Length of screened section (m):	2.00
Depth to top of screen* (m):	0.50

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.00
Well height above ground (m):	0.47	Depth to bottom (m):	1.85
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.85	Evidence of sludge:	-
Well volume of water (L):	1.67	Evidence of freezing/siltation:	-
Static water level* (m):	0.53		
Length of screen collecting water (m):	0.85		

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-19, 2008 11:00	1.75	3.1	11.96	2900	35	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-19, 2008 11:05	Date and Time Collected:	Aug-19, 2008 11:15
Sample Number - Water:	C2-MW-3	Sample Number - Soil:	C2-MW-3A
	Note: well ran dry several		C2-MW-3B
	times during sampling		
Sample Containers:	2 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, and colourless becoming cloudy, white/grey	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

2008 Monitoring Well Sampling Log (MW #4)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-4
Facility:	Tier II Soil Disposal Facility

Known Data	
Depth of installation* (m):	3.30
Length of screened section (m):	1.00
Depth to top of screen* (m):	0.40

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.47
Well height above ground (m):	0.75	Depth to bottom (m):	2.18
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.71	Evidence of sludge:	-
Well volume of water (L):	1.39	Evidence of freezing/siltation:	-
Static water level* (m):	0.72		
Length of screen collecting water (m):	0.71		

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-19, 2008 11:45	1.5	2.61	6.94	6040	15	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-19, 2008 11:55	Date and Time Collected:	Aug-19, 2008 12:05
Sample Number - Water:	C2-MW-4	Sample Number - Soil:	C2-MW-4A
			C2-MW-4B
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

C5 – Thermistor Maintenance Records

(appendix ti pgs)

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**20-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**CAM-2**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT1**		Inclination		**Vertical**		
Install Date:	**30-Aug-05**		First Date Event		**26-Aug-07**	Last Date Event	**20-Aug-08**
Coordinates and Elevation		N	**7618811**	E	**548508.81**	Elev	**32.48**
Length of Cable (m)	**11.9**		Cable Lead Above Ground (m)	**4.4**	Nodal Points	**16**	
Datalogger Serial #	**207019**				Cable Serial Number		**1690**

Code CAM-2VT1

Thermistor Inspection

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

Battery Installation Date **26-Aug-07**

Battery Levels Main **11.34 V** Aux **13.50 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**11900**	**6.3**
2	**11130**	**7.7**
3	**13180**	**4.2**
4	**12170**	**5.9**
5	**13110**	**4.3**
6	**14100**	**2.9**
7	**17620**	**-1.4**
8	**18870**	**-2.7**

Bead	ohms	Temp. (ºC)
9	**20120**	**-4.0**
10	**21150**	**-4.9**
11	**22110**	**-5.8**
12	**23070**	**-6.6**
13	**23950**	**-7.3**
14	**24820**	**-8.0**
15	**25730**	**-8.6**
16	**26330**	**-9.1**

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**20-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**CAM-2**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT2**		Inclination		**Vertical**		
Install Date:	**30-Aug-05**		First Date Event		**26-Aug-07**	Last Date Event	**20-Aug-08**
Coordinates and Elevation		N	**7618799**	E	**548474.24**	Elev	**32.072**
Length of Cable (m)	**9.9**		Cable Lead Above Ground (m)	**4.4**	Nodal Points	**11**	
Datalogger Serial #	**207107**				Cable Serial Number		**1691**

Code CAM-2VT2

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☐	☑ **Bead 12 not working on datalogger and not reading manually**

Battery Installation Date: **26-Aug-07**

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

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**13200**	**4.2**
2	**12670**	**5.1**
3	**12810**	**4.8**
4	**13770**	**3.4**
5	**16490**	**-0.1**
6	**17930**	**-1.7**
7	**19200**	**-3.0**
8	**20710**	**-4.5**

Bead	ohms	Temp. (ºC)
9	**22130**	**-5.7**
10	**23250**	**-6.7**
11	**24170**	**-7.4**

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**20-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**CAM-2**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT3**		Inclination		**Vertical**		
Install Date:	**30-Aug-05**		First Date Event		**26-Aug-07**	Last Date Event	**20-Aug-08**
Coordinates and Elevation		N	**7618792**	E	**548495.38**	Elev	**32.06**
Length of Cable (m)	**9.9**		Cable Lead Above Ground (m)	**4.4**	Nodal Points	**11**	
Datalogger Serial #	**5070039**				Cable Serial Number		**1692**

Code CAM-2VT3

Thermistor Inspection

	Good	Needs Maintenance
Casing	☑	☐
Cover	☑	☐
Data Logger	☑	☐
Cable	☑	☐
Beads	☐	☑ **Beads 10 & 12 not working on datalogger, beads 9 & 12 not reading manually**

Battery Installation Date **26-Aug-07**

Battery Levels Main **11.34 V** Aux **13.07 V**

Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**11870**	**6.4**
2	**12730**	**5.0**
3	**12660**	**5.1**
4	**13550**	**3.7**
5	**15940**	**0.5**
6	**17450**	**-1.2**
7	**18810**	**-2.7**
8	**20880**	**-4.7**

Bead	ohms	Temp. (ºC)
9		
10	**23350**	**-6.8**
11	**24240**	**-7.5**

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	**20-Aug-08**
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**CAM-2**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT4**		Inclination		**Vertical**		
Install Date:	**30-Aug-05**		First Date Event		**26-Aug-07**	Last Date Event	**20-Aug-08**
Coordinates and Elevation		N	**7618772**	E	**548479.02**	Elev	**31.89**
Length of Cable (m)	**11.9**		Cable Lead Above Ground (m)	**4.4**	Nodal Points	**16**	
Datalogger Serial #	**2020130**				Cable Serial Number		**1693**

Code CAM-2VT4

Thermistor Inspection

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

Battery Installation Date **26-Aug-07**

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

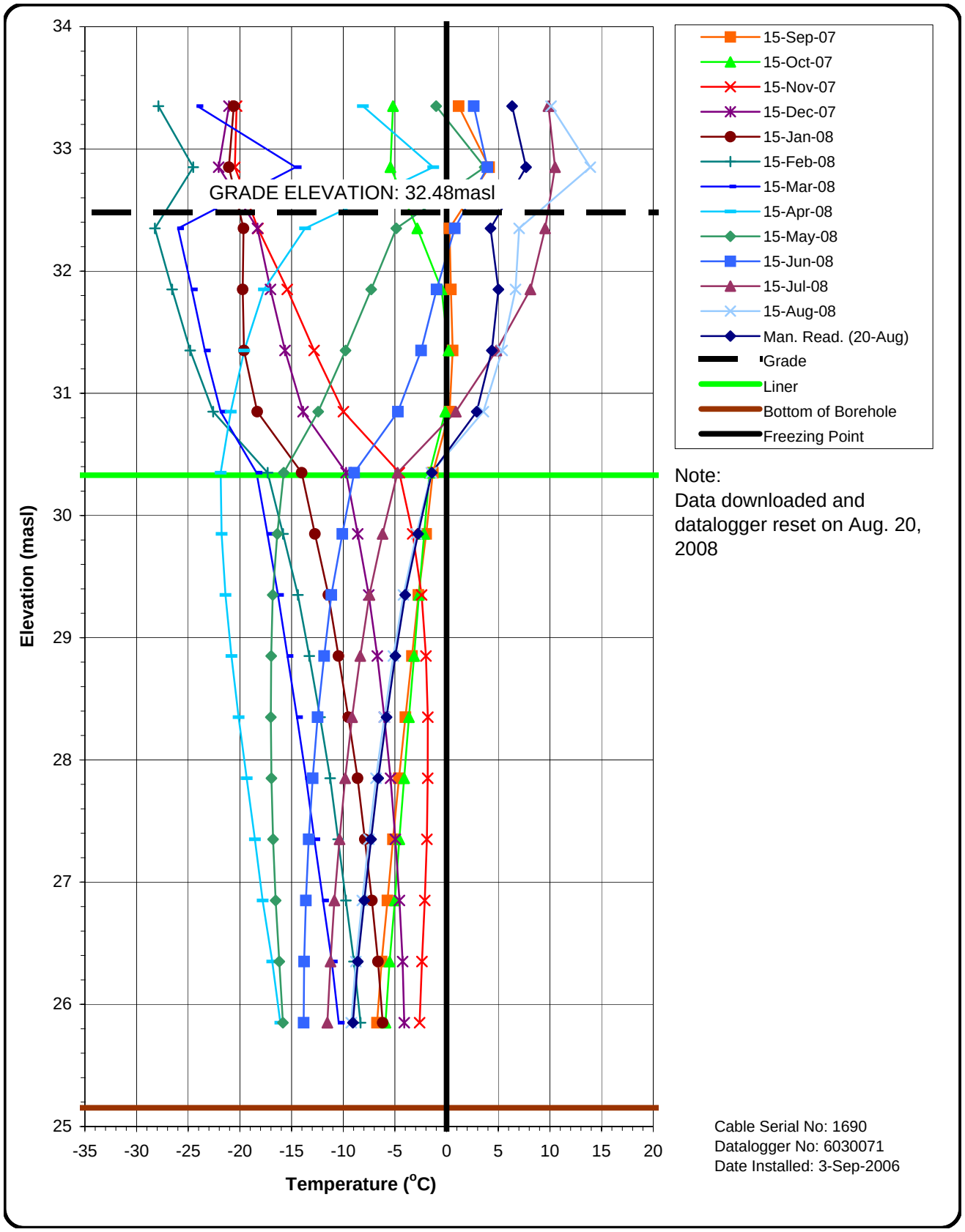
Manual Ground Temperature Readings

Bead	ohms	Temp. (ºC)
1	**10750**	**8.4**
2	**11490**	**7.1**
3	**13150**	**4.3**
4	**12920**	**4.6**
5	**13680**	**3.5**
6	**16830**	**-0.5**
7	**17740**	**-1.5**
8	**18820**	**-2.7**

Bead	ohms	Temp. (ºC)
9	**19880**	**-3.7**
10	**20820**	**-4.6**
11	**21770**	**-5.4**
12	**22650**	**-6.2**
13	**23450**	**-6.9**
14	**24240**	**-7.5**
15	**24950**	**-8.0**
16	**25610**	**-8.5**

Observations and Proposed Maintenance

C6 – Thermistor Graphs

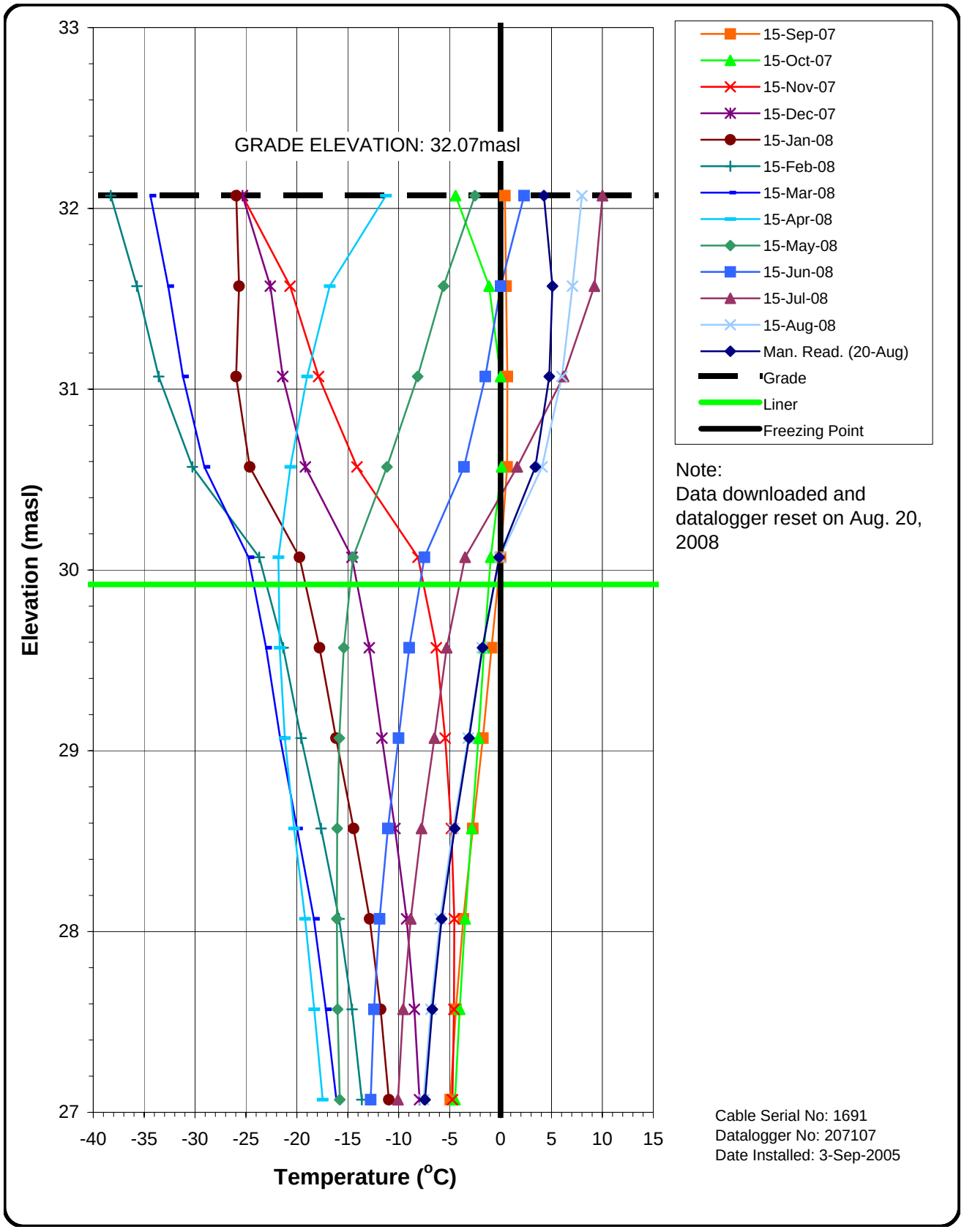


Note:
Data downloaded and datalogger reset on Aug. 20, 2008

Cable Serial No: 1690
Datalogger No: 6030071
Date Installed: 3-Sep-2006

AECOM

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

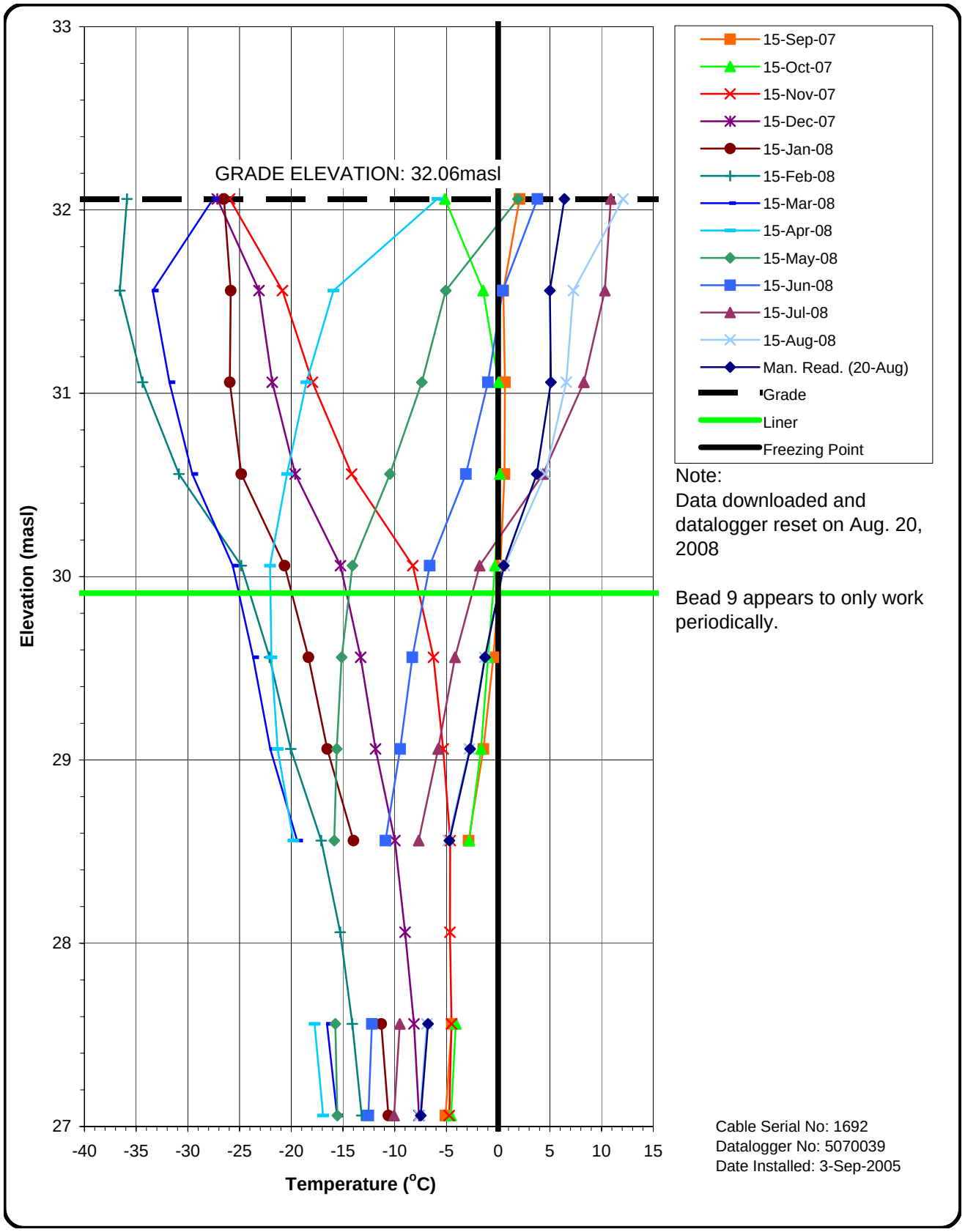


Note:
Data downloaded and datalogger reset on Aug. 20, 2008

Cable Serial No: 1691
Datalogger No: 207107
Date Installed: 3-Sep-2005

AECOM

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



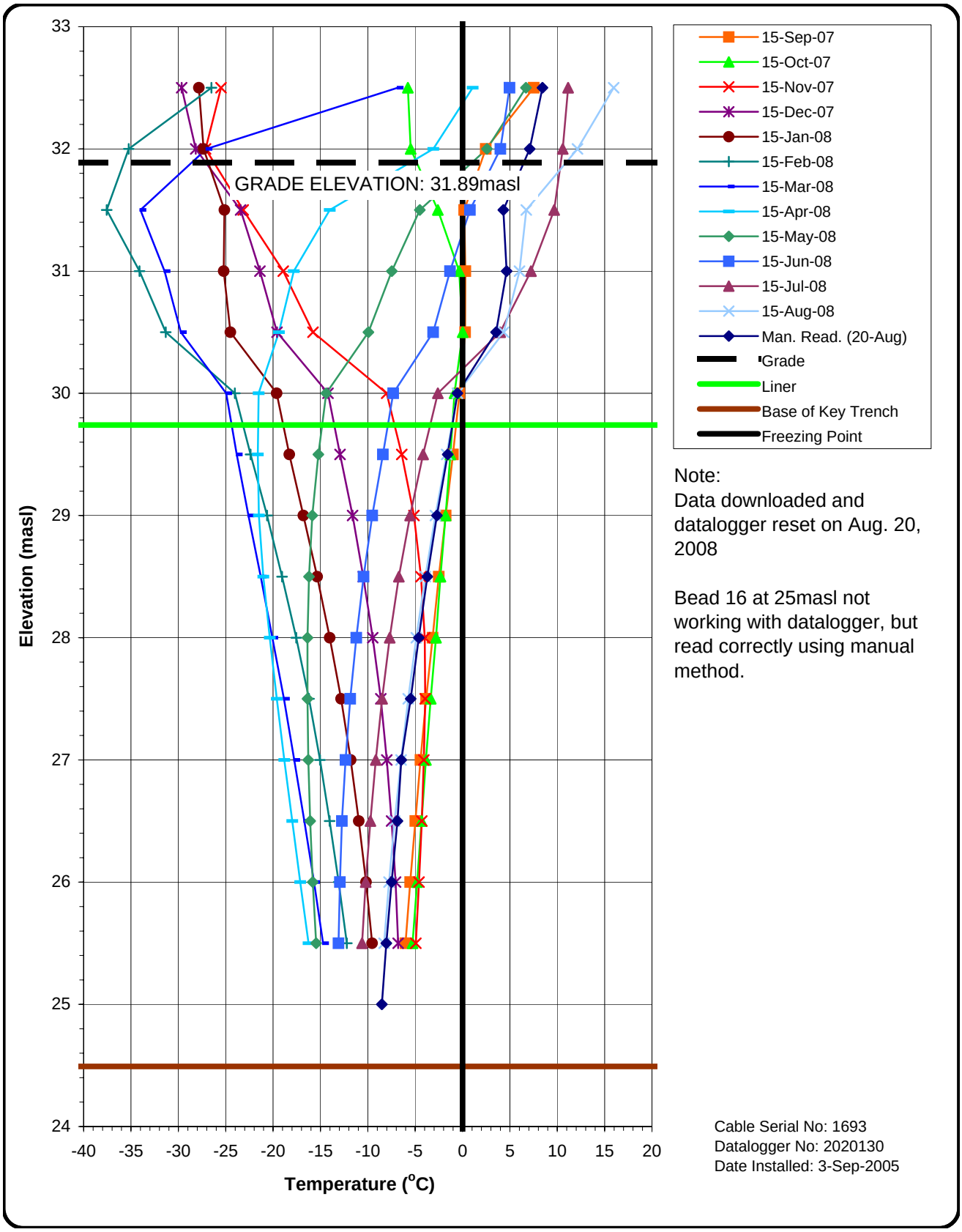
Note:
Data downloaded and datalogger reset on Aug. 20, 2008

Bead 9 appears to only work periodically.

Cable Serial No: 1692
Datalogger No: 5070039
Date Installed: 3-Sep-2005

AECOM

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



Note:
Data downloaded and datalogger reset on Aug. 20, 2008

Bead 16 at 25masl not working with datalogger, but read correctly using manual method.

Cable Serial No: 1693
Datalogger No: 2020130
Date Installed: 3-Sep-2005

AECOM

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

C7 – Field Notes

(appendix ti pgs)

WINDS @ 50 knots. Tents bowed over, almost snapping poles

Sta 15 (103-0061) 548518 7618812
Looking NW from top of Tier II to 3 cells to the west of the Main cell
- standing on crest at NE corner of Tier II

Sta 16 (103-0062, 0063) 548521 7618810
Panoramic of Station LF
Looking N from the NE crest of the Tier II LF

TOO WINDY TO CONTINUE
BACKPACK PARTIALLY FILLED WITH ROCK AND STILL ROLLING IN WIND
HAD TO CHASE FIELD BOOK 100m when the wind ripped it from my hand
- Heading back to camp to make sure tents are still standing

I will start making some notes for Tier II in preparation for inspection
- visual inspection yesterday confirmed that conditions are essentially unchanged from last year and cracks have not worsened.

CAM-2 -2°C Aug 20/2008 13

Extreme winds and cold prevented us from completing more inspections last night
- call to Peter Armstrong informed us that bad weather was moving in and that we had to prepare for a rough(er) ride
- extreme winds and snow overnight
- light dusting of snow in the morning is rapidly disappearing with the wind

Wind has eased to about 25 to 30 knots and temp rising to around -1°C
We are still on track a 2pm pick-up, weather permitting

T2-1 (104-0002 0001) 548557 7618829
Panoramic of North side of LF looking W from about 30 NE of NE corner
Pen frozen → switching to pencil

T2-2 (104-0003) 548542 7618819
Looking WNW along toe of slope from NE toe

T2-3 (104-0004) 548523 7618810
Looking WNW along crest
Thermistr VT- visible

T2-4 (104-0005) 548448 7618863
Looking S along west slope of LF from about 30m NW of NW corner

T2-5 (104-0006) 548455 7618847
Looking ESE along toe from NW corner of LF towards area where minor cracking was previously observed last year
-cracking in foreground, largely infilled
-detailed photos will follow general photos

T2-6 (104-0007) 548451 7618844
Looking S along toe of west slope from NW corner

T2-7 (104-0008) 548462 7618830
Looking S along crest from NW corner
-no features of note and minor cracks from last year are ~~not~~ hardly visible and no worse

-3°C, Windy

T2-8 (104-0009) 548406 7618767
Looking E to SW corner from about 30m SW of SW corner

T2-9 (104-0010) 548433 7618765
Looking E along toe of South side from SE corner
- 20m long tension crack (old) runs parallel to slope. Will photograph separately

T2-10 (104-0011) 548442 7618778
Looking E along crest from SW corner

T2-11 (104-0012, 0013) 548522 7618720
Looking NW to SW corner of LF
- MW-2 visible in foreground

T2-12 (104-0014) 548518 7618744
Looking N along east slope toe from SE corner

T2-13 (104-0015) 548505 7618759
Looking N along east crest from SE ~~corner~~ crest corner

T2-14 (104-0016,0017) 548503 7618762
Looking NW from near SE corner
- 2 shots scanning L to R showing about ⅔ top surface

T2-15 (104-0018,0019) 548461 7618825
Looking ESE from NW corner
- 2 shots scanning L to R starting along N crest

Detailed inspection of fine cracks that were first observed last year
- no new cracks & old cracks appear stable

Close-up
T2-16 (104-0020) 548533 7618796
Start of fine crack that runs from 20m S of NE corner to about 20m W of NE corner
- 1 to 4mm wide, parallel to toe, 5m upslope from toe, portions infilled

T2-17 (104-0021) 548527 7618790
Looking N to NE corner
- Fine crack starts between glove and pen and progresses around corner to just downslope of backpack and continues at roughly same elevation for another 35m, splays up to 1m offset

T2-18 (104-0022) 548535 7618806
Close-up of same crack, about as wide as it gets, representative of most of the crack

T2-19 (104-0023) 548534 7618813
Close-up of crack, Packpack in same location as photo T2-17

T2-20 (104-0024) 548524 7618824
Close up of crack north slope near NE toe ≈10 west of corner

T2-21 (104-0025) 548515 7618826
Standing on crack looking west to end of this crack
- backpack on end of crack 548505 7618827
- crack is between gloves, largely infilled, no sign of recent movement

T2-22 (104-0026) 548505 7618827
Close-up of previous crack between gloves from T2-21

T2-23 (104-0027) 548501 7618830
Looking west along N slope to old crack
1mm to 7mm wide, largely eroded/infilled
- backpack at end (starts 5m east, ends 12m W)

T2-24 (104-0028) 548485 7618841
Looking west to NW corner along toe and old, eroded tension crack
- heavy rain and wind has essentially infilled the other cracks that were observed last year

	starts	end
This crack ~~starts~~	548482	548460
~~ends~~	7618842	7618848

T2-25 (104-0029) 548470 7618845
Close-up of old crack noted above

T2-26 (104-0030) 548451 7618839
Looking south from near NW corner along old crack. Gloves @ 548449 7618835

Portions of the cracks from last year are still visible, largely infilled
- no sign of recent movement

Just time for a few representative photos

T2-27 (104-0031) 548445 7618821
Close-up of representative crack
- this crack continues, splaying into two parallel cracks, 1m to 2m apart, and back again along entire toe of slope
- same as last year w/ no sign of recent movement

T2-28 (104-0032) 548436 7618807
looking S along toe of west slope
along old, partially infilled crack
- crack passes between gloves and ends at backpack

T2-29 (104-0033) 548435 7618796
Close-up of crack between gloves

T2-30 (104-0034) 548431 7618765
Looking E along toe from SW corner
- old cracks runs between gloves and ends at backpack 548446 7618758
- all other cracks completely infilled or not observed

Completed visual inspection of Non Haz LF before heading in for lunch and to warm up
- conditions essentially unchanged from last year
- previously observed fine cracks on the North and West sides could not be observed → likely infilled in places

- cracks observed on the South and East Slopes, similar to last year
- crack also observed along crest of East slope extending all the way to NE corner
  * infilled around corner and then faintly visible along North crest for about 20m, mostly infilled

Non Haz 1 (104-0035, 0036) 548750 7618495
Looking SW towards NE corner of Landfill

NH 2 (104-0037) 548741 7618483
Looking west along the toe of the north side from NE corner

NH 3 (104-0038) 548738 7618473
Looking W along crest from NE corner

NH 4 (104-0039) 548672 7618474
Looking S along west side of LF from 10m NW of NW corner

Aug 18

C2-8 N 7619634
E 547945

C2-8A Surface
C2-8B Depth
Soil - organic peat w clay w some sand & Gravel below
Photo 4 - Test pit

C2-9 N 7619567
E 548041
C2-9A Surface
C2-9B Depth
Soil - organic peat with sand & gravel and clay underneath
Photo 5 - Test pit

Aug 19

Tier II
~~MW-1~~

Weather: windy, cold, sunny w clouds
Samplers: KB, SK

MW-1 water collected
C2-MW-1 4x 1L AG
2x VOC Vial
1x 250mL Plastic
Photo 6 - MW-1
Soil sample
C2-MW-1A Surface
C2-MW-1B Depth
Photo 7 - Test pit

MW-2 water collected
C2-MW-2 4x 1L AG
2x VOC Vial
1x 250ml Plastic
Photo 8 - MW-2
Soil collected
C2-MW-2A Surface
C2-MW-2B Depth
Photo 9 - Test pit.

C2-MW-9A Surface Dup

Aug 19

MW-3 water collected

CZ-MW-3 ~~2~~ × 1L AG
2 × VOC
1 × 250mL Plastic

Photo 10 - MW-3

Soil collected

CZ-MW-3A Surface

CZ-MW-3B Depth

Photo 11 - test pit

MW-4 water collected

CZ-MW-4 4 × 1L AG
2 × VOC
1 × 250mL P

Photo 12 - MW-4

Soil collected

CZ-MW-4A Surface

CZ-MW-4B Depth

Photo 13 - Test pit

Aug 19

Non-Haz

MW-5 water

CZ-MW-5 4 × 1L AG
2 × VOC
1 × 250 P

Photo 14 - MW-5

Soil

CZ-MW-5A } surface
CZ-MW-10A } ← Dup

CZ-MW-5B Depth

Photo 15 - Test pit

MW-6 water

CZ-MW-6 12 × 1L AG
CZ-MW-9 Dup 4 × VOC
4 × 250 P

Photo 16 - MW-6

Soil

CZ-MW-6A Surface

CZ-MW-6B Depth

Photo 17 - Test pit

Aug 20

VT-1 data downloaded, manual read taken
Photo 31

VT-2 data d/l, man. read taken
Photo 32

VT-3 data d/l, man. read taken
Photo 33

VT-4 data d/l, man. read taken
Photo 34.

2008 Monitoring Well Sampling Log (MW # 1)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-1
Facility:	Tiger JL

Known Data

Depth of installation* (m):	3.50
Length of screened section (m):	1.87
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):	1.40
Well height above ground (m):	0.47	Depth to bottom (m):	2.10
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.70	Evidence of sludge:	—
Well volume of water (L):	1.42	Evidence of freezing/siltation:	—
Static water level* (m):	0.93		
Length of screen collecting water (m):	~~1.50~~ ~~1.03~~	0.70	

Development/Purging Information

Equipment: Peristaltic Pump, Horiba U-22 w Flow through cell, LDPE tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
9:20	1.5	2.7	6.91	2900	12.7	Clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	9:30	Date and Time Collected:	9:40
Sample Number - Water:	C2-MW-1	Sample Number - Soil:	C2-MW-1A
			C2-MW-1B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL Glass
	2x VOC Vial		
	1x 250mL Plastic		
Procedure/Equipment:	Per. 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

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 # 2)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-2
Facility:	Tier II

Known Data

Depth of installation* (m):	3.50
Length of screened section (m):	1.85
Depth to top of screen* (m):	0.65

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter.
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.03
Well height above ground (m):	0.30	Depth to bottom (m):	1.67
Diameter of well (m):	0.05	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.64	Evidence of sludge:	—
Well volume of water (L):	1.3	Evidence of freezing/siltation:	—
Static water level* (m):	0.73		
Length of screen collecting water (m):	~~1.67~~ ~~0.72~~ 0.64		

Development/Purging Information

Equipment: Per. Pump, Horiba U-22 w flow through, LDPE Tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
10:05	1.5	2.81	6.88	5640	1.0	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	10:15	Date and Time Collected:	10:20
Sample Number - Water:	C2-MW-2	Sample Number - Soil:	C2-MW-2A
			C2-MW-2B
			C2-MW-9A Dup
Sample Containers:	4 x 1L AG	Sample Containers:	1 x 250 Glass
	2 x VOC Vial		
	1 x 250 Plastic		
Procedure/Equipment:	Per. 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

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 # 3)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-3
Facility:	Tier II

Known Data

Depth of installation* (m):	3.60
Length of screened section (m):	2.00
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.00
Well height above ground (m):	0.47	Depth to bottom (m):	1.85
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.85	Evidence of sludge:	-
Well volume of water (L):	1.72	Evidence of freezing/siltation:	
Static water level* (m):	0.53		
Length of screen collecting water (m):	~~1.35~~ ~~0.80~~ ← 0.85		

Development/Purging Information

Equipment: Per. Pump, Horiba w flow through, LDPE Tubing

Well went dry at end of purge

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
11:00	1.75	3.1	11.96	2900	35	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	11:05	Date and Time Collected:	11:15
Sample Number - Water:	C2-MW-3	Sample Number - Soil:	C2-MW-3A
			C2-MW-3B
well ran dry several times during sampling			
Sample Containers:	2x 1L AG	Sample Containers:	4x 250mL glass
	2x VOC Vial		
	1x 250mL Plastic		
Procedure/Equipment:	Per. Pump LDPE tubing	Procedure/Equipment:	SS Trowel
Water Description:	cloudy white/grey	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 # 4)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-4
Facility:	Tier II

Known Data

Depth of installation* (m):	3.30
Length of screened section (m):	1.00
Depth to top of screen* (m):	0.40

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.47
Well height above ground (m):	0.75	Depth to bottom (m):	2.18
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.71	Evidence of sludge:	-
Well volume of water (L):	1.44	Evidence of freezing/siltation:	-
Static water level* (m):	0.72		
Length of screen collecting water (m):	~~1.00~~ 0.71		

Development/Purging Information

Equipment: Per Pump, Horiba & flow through, LDPE Tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
11:45	1.5	2.61	6.94	6040	15	Clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	11:55	Date and Time Collected:	12:05
Sample Number - Water:	C2-MW-4	Sample Number - Soil:	C2-MW-4A
			C2-MW-4B
Sample Containers:	4x 1L AG	Sample Containers:	4 x 250mL Glass
	2 x VOC Vials		
	1 x 250mL Plastic		
Procedure/Equipment:	Per. Pump LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	Clear colourless	Soil Description:	S & G
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 20
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	**CAM-2**		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	**VT4**		Inclination	**Vertical**			
Install Date:	**30-Aug-05**		First Date Event	08/26/07		Last Date Event	08/20/08
Coordinates and Elevation		N	**7618772**	E	**548479.02**	Elev	**31.89**
Length of Cable (m)	**11.9**	Cable Lead Above Ground (m)	**4.4**	Nodal Points	**16**		
Datalogger Serial #	**2020130**			Cable Serial Number			**1693**

Code CAM-2VT4

Thermistor Inspection

	Good	Needs Maintenance
Casing	✓	
Cover	✓	
Data Logger	✓	
Cable	✓	
Beads	✓	
Battery Installation Date		
Battery Levels	Main 11.34	Aux 13.50

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	11.90	
2	11.13	
3	13.18	
4	12.71	
5	13.11	
6	14.10	
7	17.62	
8	18.97	

Bead	ohms	Temp. (°C)
9	20.12	
10	21.15	
11	22.11	
12	23.07	
13	23.95	
14	24.82	
15	25.73	
16	26.33	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 20
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	CAM-2	Thermistor Location	**Tier II Disposal Facility**		
Thermistor Number:	VT#2	Inclination	**Vertical**		
Install Date:	**30-Aug-05**	First Date Event	8/26/07	Last Date Event	8/20/08
Coordinates and Elevation	N	**7618792**	E	**548495.38**	Elev **32.06**
Length of Cable (m)	**9.9**	Cable Lead Above Ground (m)	**4.4**	Nodal Points	**12**
Datalogger Serial #	**5070039**			Cable Serial Number	**1692**

Code CAM-2VT3

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☑	12 not reading on comp
Battery Installation Date			
Battery Levels	Main 11.94	Aux 13.02	

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	13.20	
2	12.67	
3	12.61	
4	13.77	
5	16.49	
6	17.93	
7	19.20	
8	20.71	

Bead	ohms	Temp. (°C)
9	22.13	
10	23.25	
11	24.17	
12	—	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 20
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	CAM-2		Thermistor Location	**Tier II Disposal Facility**			
Thermistor Number:	VT# 3		Inclination	**Vertical**			
Install Date:	**30-Aug-05**		First Date Event	8/26/07	Last Date Event	8/20/08	
Coordinates and Elevation		N	**7618799**	E	**548474.24**	Elev	**32.072**
Length of Cable (m)	**9.9**	Cable Lead Above Ground (m)	**4.4**	Nodal Points	**12**		
Datalogger Serial #	**207107**			Cable Serial Number			**1691**

Code CAM-2VT2

Thermistor Inspection

	Good	Needs Maintenance	
Casing	☑	☐	
Cover	☑	☐	
Data Logger	☑	☐	
Cable	☑	☐	
Beads	☐	☒	10 & 12 not red comp
Battery Installation Date			
Battery Levels	Main 11.34	Aux 13.07	

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	11.87	
2	12.73	
3	12.66	
4	13.55	
5	15.99	
6	17.45	
7	18.81	
8	20.93	

Bead	ohms	Temp. (°C)
9	—	
10	23.35	
11	24.24	
12	—	

Observations and Proposed Maintenance

Thermal Monitoring
Ground Temperature Annual Maintenance Report

Contarctor Name:	**Gartner Lee Limited**	Inspection Date:	Aug 20
Prepared By:	**Ken Boldt**		

Thermistor Information

Site Name:	CAM-2	Thermistor Location	Tier II Disposal Facility		
Thermistor Number:	VT4	Inclination	Vertical		
Install Date:	30-Aug-05	First Date Event	8/26/07	Last Date Event	8/20/08
Coordinates and Elevation	N 7618811	E	548508.81	Elev	32.48
Length of Cable (m)	11.9	Cable Lead Above Ground (m)	4.4	Nodal Points	16
Datalogger Serial #	207019			Cable Serial Number	1690

Code CAM-2VT1

Thermistor Inspection

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

Manual Ground Temperature Readings

Bead	ohms	Temp. (°C)
1	10.75	
2	11.49	
3	13.15	
4	12.92	
5	13.68	
6	16.83	
7	17.74	
8	18.82	

Bead	ohms	Temp. (°C)
9	19.88	
10	20.82	
11	21.77	
12	22.65	
13	23.45	
14	24.24	
15	24.95	
16	25.61	

Observations and Proposed Maintenance

Appendix D

Non-hazardous Waste Landfill

- D1 – Site Condition/Visual Inspection Records
- D2 – Geotechnical Inspection Photographic Records
- D3 – Monitoring Photographic Records
- D4 – Monitoring Well Sampling Records
- D5 – Field Notes

(appendix ti pgs)

1. Non-hazardous Waste Landfill

1.1 Landfill Summary

The Non-Hazardous Waste Landfill is located 200m southeast of the station area and was constructed for the disposal of non-hazardous wastes and debris generated and collected during site clean-up. The design of this landfill includes perimeter berms and the placement of a cover of compacted granular fill over the landfilled material. Four groundwater monitoring wells were installed at the landfill perimeter. The landfill configuration and sample locations are shown on Figure D-1. The long term monitoring plan consists of visual monitoring, and the periodic collection of soil and groundwater samples.

For 2008, the monitoring requirements for the Non-hazardous Waste Landfill included visual inspection, soil sampling, and groundwater sampling.

1.2 Visual Monitoring

A visual inspection of the Non-Hazardous Waste (NHW) Landfill was completed on August 20, 2008. Based on the visual inspection, the NHW landfill appears to be in reasonably good condition overall. The condition of the landfill is substantially unchanged since 2007. Previously noted tension cracks and areas of minor surficial erosion (noted at the time of the 2007 inspection) appear to have stabilized and show no indication of further degradation.

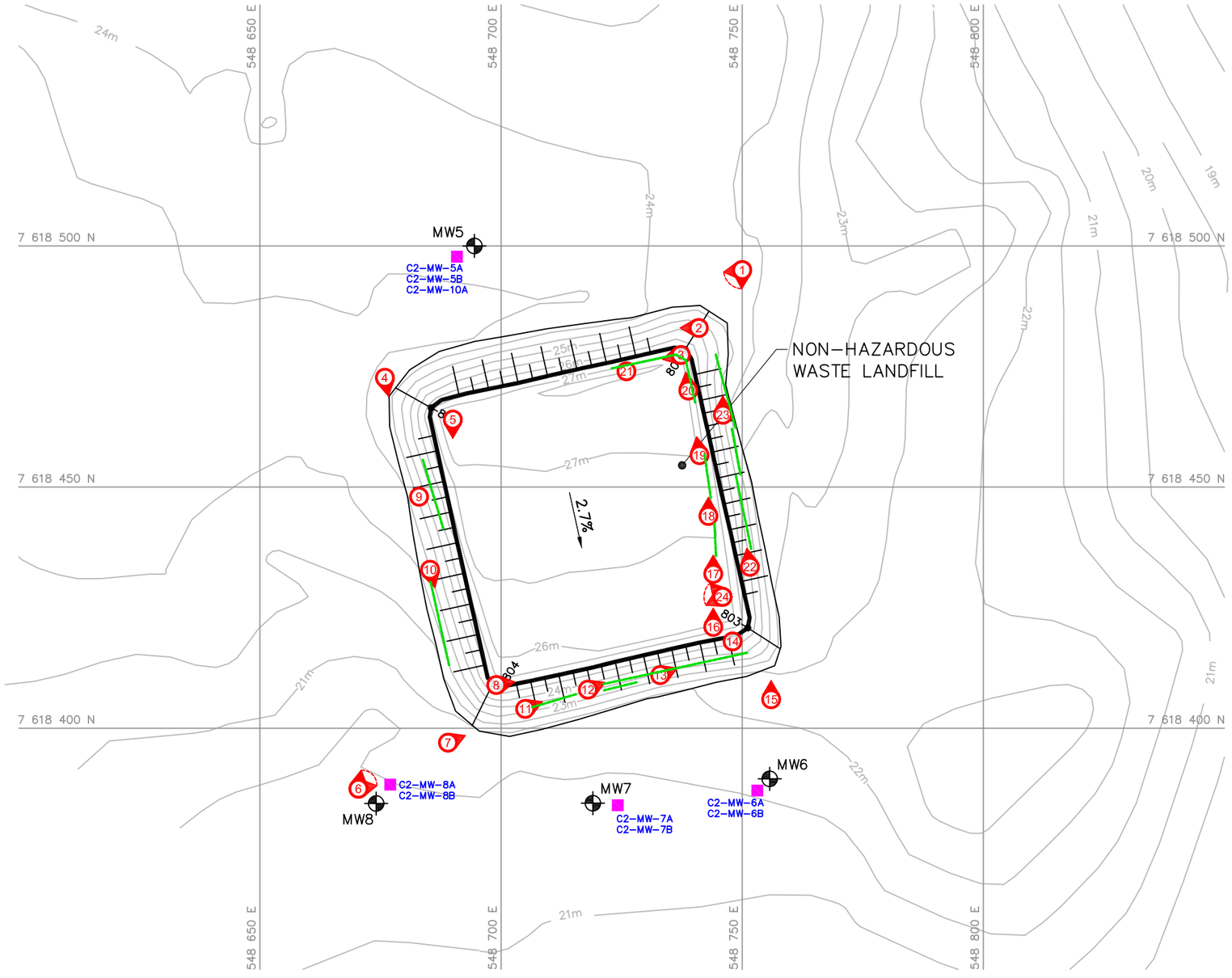
The granular cover appears to be self armouring and resistant to erosion. Areas of previously observed minor surficial erosion, described as washing out of fine-grained material from the coarse granular matrix in the 2007 inspection report, appear to have stabilized and show no indication of further degradation. There are no erosional features that warrant remediation at this time.

Numerous thin tension cracks, typically on the order of 1mm to 5mm width, were observed around the perimeter of the landfill as well as northern, southern and eastern crest of the landfill (refer to Photos 5, 7, 9 thru 14 and 17 thru 23). In all instances, the cracks were roughly parallel to the toe of slope and in multiple locations there were several roughly parallel sets of cracks between the toe of slope and crest.

The condition of the side slopes and landfill cap appear consistent with the site photos available from the previous inspection in 2006, with the notable exception that additional tension cracks appear to have developed around the crest and perimeter of the landfill. Some tension cracks were noted during the 2006 inspection; however, the cracks were not documented in detail. Given the relatively large number of hairline cracks that were observed in 2007, combined with the tendency of washed fines to obscure visual identification of the tension cracks over time, it would appear that the bulk of the tension cracks that were observed in 2007 were recent. Many of the tension cracks that were observed in 2007 appear to have been infilled with fines and could not be located in 2008. The cracks that were observed showed clear signs of weathering (rounded sides, partial infilling) and no indications of recent movement.

Based on a visual assessment, the granular cover material appears to contain sufficient fines (i.e., >5% silt sized particles) to make it potentially frost susceptible. Given the gradation of the granular cover, it is expected that some of the observed tension cracks may be related to freeze/thaw processes. The orientation and spacing of the tension cracks suggests some minor slope movement, however, the landfill slopes appear to be stable and do not appear to be in imminent danger of large-scale movement.

From the visual inspection 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. No immediate action is warranted. The tension cracks have been documented in detail to facilitate on-going monitoring. The overall preliminary stability assessment of the NHW landfill is marginal.



Legend

- COORDINATE POINT
- C2-MW-6A / C2-MW-6B — MONITORING SOIL SAMPLE LOCATION
- MONITORING WELL LOCATION
- PHOTOGRAPH LOCATION
- TENSION CRACK (NTS)

COORDINATE POINTS (AS BUILT) MONITORING WELLS

NO.	NORTHING	EASTING	ELEV.
MW5	7 618 500.0	548 694.5	23.8
MW6	7 618 389.5	548 755.7	21.8
MW7	7 618 384.4	548 719.0	21.5
MW8	7 618 384.4	548 674.1	21.4

COORDINATE POINTS (AS-BUILT) NON-HAZARDOUS WASTE LANDFILL

NO.	NORTHING	EASTING	ELEV.
801	7 618 466.4	548 685.5	26.3
802	7 618 478.5	548 738.2	26.4
803	7 618 420.8	548 751.2	25.0
804	7 618 408.5	548 699.8	25.0

RECORD DRAWING
NOT FOR CONSTRUCTION

Map Sources / Notes:
Source drawing from UMA: C2-RD06.dwg

N W E S

0 5 10 20 30 40 m

1 : 1000
UTM Zone 14W, NAD83

File Name: C2-RD06.dwg
Reviewed by: JAT
Date Issued: January, 2009
Prepared by: KAB
Project Number: 80-297

Defence Construction Canada

2008 DEW Line Monitoring Program
CAM-2 Gladman Point
Nunavut Territory

NON-HAZARDOUS WASTE LANDFILL

AECOM

Figure D-1
Version 2

Date Plotted: October 16, 2006 Path: N:\Projects\20080\80297\2008\WorkInProgress\Documents\80297-2_CAM-2-FINAL-Report\ACAD_Files\C2-RD06.dwg

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 D-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-8 was excavated to a depth of 0.3m before the water table was reached, and sample C2-MW-8B was collected at this depth. A photograph of the test pit at each location sampled is shown in Appendix D3.

AECOM did not identify any hydrocarbon odours, staining, or free product, at any of the sampling locations at the Non-hazardous Waste Landfill. No detectable concentrations of TPH (C6-34) were found in the soil samples collected from the Non-hazardous Waste Landfill. The laboratory results show no detectable levels of PCB in any soil samples collected from the Non-hazardous Waste Landfill. Low levels of copper, cobalt, lead, zinc and chromium were detected in the various soil samples from the Non-hazardous Waste 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 D-1 and the laboratory certificate is provided in Appendix E.

Table D-1. CAM-2 Gladman Point, Summary of 2008 Soil Analysis - Non-hazardous Waste 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																
C2-MW-5A	MW-5	0.1	1.8	<5.0	<2.0	<0.50	2	3.3	2.5	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-5B	MW-5	0.5	2.5	<5.0	<2.0	<0.50	2.7	7.1	3.7	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-10A	MW-5	0.1	1.9	<5.0	<2.0	<0.50	2.1	4.3	2.9	<5.0	<0.050	<0.050	<10	<30	<50	ND
Downgradient Samples																
C2-MW-6A	MW-6	0.1	2.6	<5.0	<2.0	<0.50	<2.0	5.5	3.1	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-6B	MW-6	0.5	4	<5.0	2.1	<0.50	5.8	6.3	6.3	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-7A	MW-7	0.1	6.2	<5.0	2.4	<0.50	7.5	9.3	8.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-7B	MW-7	0.5	5.8	<5.0	2.6	<0.50	8	8.9	8.2	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-8A	MW-8	0.1	2	<5.0	<2.0	<0.50	3.4	6.3	4.5	<5.0	<0.050	<0.050	<10	<30	<50	ND
C2-MW-8B	MW-8	0.3	1.4	<5.0	<2.0	<0.50	2.4	3.9	3.5	<5.0	<0.050	<0.050	<10	<30	<50	ND

***** *Denotes duplicate sample. (Further information located in Table 2 of main report)*
Note: mg/L approx. equals mg/kg
TPH = The sum of F1, F2, and F3 as per the TOR
ND = No detectable concentrations observed

1.4 Groundwater Sampling

Groundwater depths and monitoring well conditions were documented for wells MW-5, MW-6, MW-7 and MW-8. The monitoring well development records are provided in Appendix D4. Generally the monitoring wells appeared to be in good condition during AECOM's site visit.

All of the wells at the Non-hazardous Waste Landfill contained sufficient water volume to collect a full sample suite. Wells were purged and samples were collected at a maximum flow rate of 100mL/min using a peristaltic pump, and disposable LDPE tubing at each well. 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.

The laboratory results revealed no detectable levels of petroleum hydrocarbons or PCB and only a very low concentration of zinc; however AECOM does not consider the detectable level to be of significance. It is recommended that all the results be evaluated in the context of the DEW Line Landfill Monitoring Plan.

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

Table D-2. CAM-2 Gladman Point, Summary of 2008 Groundwater Analysis - Non-hazardous Waste 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																
C2-MW-5	MW-5	23.75	<0.010	<0.050	<0.0050	<0.00050	<0.010	0.125	<0.0050	<0.010	<0.00020	<0.0010	<0.10			<1.0
Downgradient Samples																
C2-MW-6	MW-6	21.51	<0.020	<0.10	<0.010	<0.0010	<0.020	<0.010	<0.010	<0.020	<0.00020	<0.0010	<0.10			<1.0
C2-MW-9 *	MW-6	21.51	<0.020	<0.10	<0.010	<0.0010	<0.020	<0.010	<0.010	<0.020	<0.00020	<0.0010	<0.10			<1.0
C2-MW-7	MW-7	21.33	<0.020	<0.10	<0.010	<0.0010	<0.020	0.021	<0.010	<0.020	<0.00020	<0.0010	<0.10			<1.0
C2-MW-8	MW-8	21.30	<0.010	<0.050	<0.0050	<0.00050	<0.010	<0.0050	<0.0050	<0.010	<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.

D1 – Site Condition/Visual Inspection Records

(appendix ti pgs)

Visual Inspection Checklist
Inspection Report – Page 1 of 3

SITE NAME:	CAM-2 Gladman Point
LANDFILL/AREA DESIGNATION:	Non-hazardous Waste Landfill
DATE OF INSPECTION:	August 20, 2008
DATE OF PREVIOUS INSPECTION:	August 25, 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	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 Cracks	Marginal	Numerous
Overall Landfill Performance	**Marginal**	

Checklist Item	Present Yes/No	Location	Dimensions			Extent (% Landfill Surface)	Description	Photographic Records (Photos referenced in photolog and in figures)	Additional Comments/ Preliminary Stability Assessment
			Length	Width	Depth				
Settlement	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Erosion	Yes	a) South slope	a) 10 m	a) 10 m	a) 0.01 to 0.06 m	<< 1%	Surficial erosion (self armoring and stable)	Photo 13	Dozer tracks oriented parallels to landfill slopes tend to concentrate runoff. Granular fill is self armouring and has stabilized (Acceptable)
Frost Action	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Staining	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Presence/ Condition of Monitoring Instruments	Good	Refer to Figure D1	N/A	N/A	N/A	N/A	MW5, MW6, MW7, MW8 (no thermistors)	Refer to Appendix D3	All NHW Landfill wells were sampled in 2008
Other Features of Note.	Yes	Tension cracks observed along all four sides of the landfill (along toe, mid-slope and crest)	Variable, 5m to 50m	Hairline to 8mm	unknown	< 10%	Numerous thin tension cracks running parallel to the landfill slopes. Appear essentially unchanges since last year.	Photos 5, 7, 9 thru 14, 17 thru 23	Cracks are likely, in part, related to freeze/thaw desiccation and small scale slope movement. The cracks appear partially weathered and infilled with sediments, suggesting no recent movement. (Marginal)
Additional Photos	Yes	Refer to Figure D1	N/A	N/A	N/A	N/A	Additional photos	Photos 1 thru 4, 6, 8, 15, 16, 24	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

D2 – Geotechnical Inspection Photographic Records

(appendix ti pgs)

Photograph NH-1. Looking SW towards NE corner of Landfill. ↑

Photograph NH-2. Looking W along the toe of the N side of NE corner. ↑

Photograph NH-3. Looking W along crest from NE corner. ↑

Photograph NH-4. Looking S along W side of LF from 10m NW of NW corner. ↑

Photograph NH-5. Looking S along crest from NW corner. Fine cracks that were observed last year cannot be seen. ↑

Photograph NH-6. Panoramic looking NE from adjacent to MW-8 looking to SW corner of LF. ↑

Photograph NH-7. Looking ENE along toe of S slope from SW corner of LF. Backpack located next to old in-filled crack. ↑

Photograph NH-8. Looking ENE along crest from SW top of LF. ↑

Photograph NH-9. Close-up of crack from last year, partially in-filled with no sign of recent movement (gloves and pen for scale). Splays and offset by up to 1m, always fine. ↑

Photograph NH-10. Close-up, portion of lower crack along W toe that was observed last year. Most has been in-filled and cannot be seen. ↑

Photograph NH-11. Looking ENE along slope along old, partially in-filled crack (between gloves). ↑

Photograph NH-12. Looking ENE at parallel cracks (old). ↑

Photograph NH-13. Looking ENE at parallel cracks (old) approaching SE corner. Area of minor (self armoured) surficial erosion visible in background. Zone of erosion appears unchanged from the time of the 2007 inspection. ↑

Photograph NH-14. Close-up, crack becomes narrow at SE corner. ↑

Photograph NH-15. Looking N along E toe from SE corner. ↑

Photograph NH-16. Looking N along crest from SE corner. ↑

Photograph NH-17. Minor crack along crest (old) looking N. ↑

Photograph NH-18. Crack along E crest looking N. Similar to last year. Gloves on either side of crack. ↑

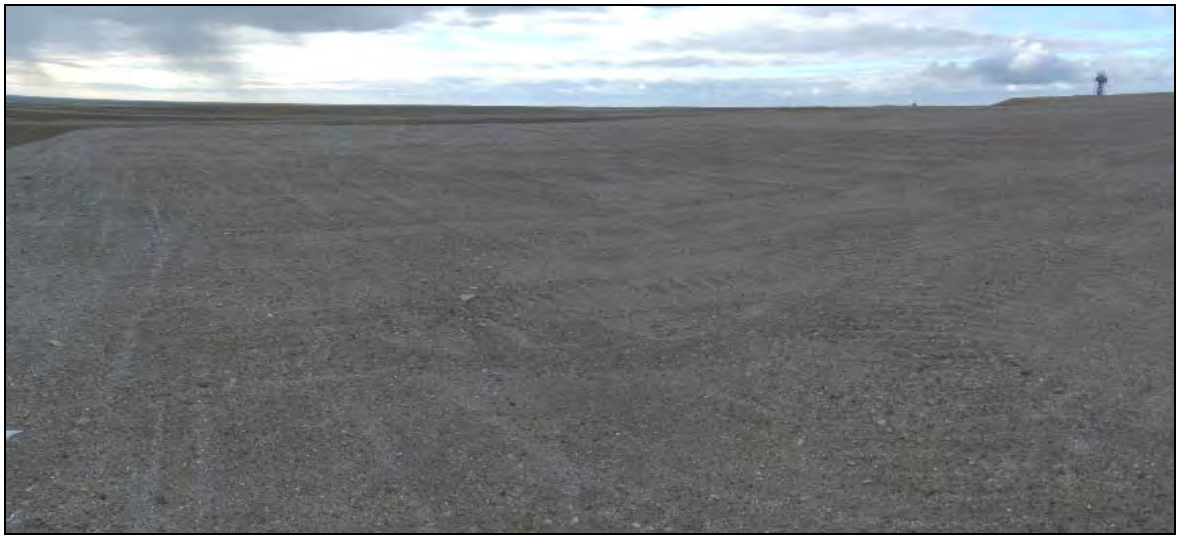
Photograph NH-19. Following crack on crest. Looking N approaching NE corner. ↑

Photograph NH-20. Following crest crack to NE corner. Crack largely in-filled as it rounds corner. Faintly visible from about 30m W along N crest. ↑

Photograph NH-21. Representative picture of crack as it rounds corner and turns W. Gloves for scale on either side of in-filled crack. ↑

Photograph NH-22. Representative crack along E slope looking N. ↑

Photograph NH-23. Following crack on E slope looking N. ↑



Photograph NH-24. Looking NW from SE corner scanning L to R. Note approaching snow! ↑

D3 – Monitoring Photographic Records

(appendix ti pgs)

Photograph 1. Monitoring Well MW-5. Sample C2-MW-5 collected. ↑

Photograph 2. Test pit at MW-5. Samples C2-MW-5A, C2-MW-5B, and C2-MW-10A (Duplicate) collected. ↑

Photograph 3. Monitoring Well MW-6. Sample C2-MW-6 collected.

Photograph 4. Test pit at MW-6. Samples C2-MW-6A and C2-MW-6B collected.

Photograph 5. Monitoring Well MW-7. Sample C2-MW-7 collected.

Photograph 6. Test pit at MW-7. Samples C2-MW-7A and C2-MW-7B collected.

Photograph 7. Monitoring Well MW-8. Sample C2-MW-8 collected. ↑

Photograph 8. Test pit at MW-8. Samples C2-MW-8A and C2-MW-8B collected. Water table at 0.20m. ↑

D4 – Monitoring Well Sampling Records

(appendix ti pgs)

2008 Monitoring Well Sampling Log (MW #5)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-5
Facility:	Non-hazardous Waste Landfill

Known Data

Depth of installation* (m):	3.07
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.78

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	0.65
Well height above ground (m):	0.30	Depth to bottom (m):	1.47
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.82
Well volume of water (L):	1.61
Static water level* (m):	0.35
Length of screen collecting water (m):	0.39

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-19, 2008 14:45	1.75	2.46	7	5600	Error	Clear, colourless

Water Sampling

Date & Time Collected:	Aug-19, 2008 15:00
Sample Number - Water:	C2-MW-5
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-19, 2008 15:10
Sample Number - Soil:	C2-MW-5A
	C2-MW-5B
	C2-MW-10A (Dup.)
Sample Containers:	10 x 250mL Glass
Procedure/Equipment:	SS Trowel
Soil Description:	Sand & 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

AECOM

2008 Monitoring Well Sampling Log (MW #6)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-6
Facility:	Non-hazardous Waste Landfill

Known Data	
Depth of installation* (m):	3.70
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.76

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	0.98
Well height above ground (m):	0.35	Depth to bottom (m):	1.60
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.62	Evidence of sludge:	-
Well volume of water (L):	1.22	Evidence of freezing/siltation:	-
Static water level* (m):	0.63		
Length of screen collecting water (m):	0.49		

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-19, 2008 15:30	1.5	2.58	7.66	6130	56.0	Clear, colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	Aug-19, 2008 15:45	Date and Time Collected:	Aug-19, 2008 16:05
Sample Number - Water:	C2-MW-6	Sample Number - Soil:	C2-MW-6A
	C2-MW-9 (Dup.)		C2-MW-6B
Sample Containers:	12 x 1L Amber Glass	Sample Containers:	4 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:	Organics & sand at surface, sand and clay at 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

*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:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-7
Facility:	Non-hazardous Waste Landfill

Known Data

Depth of installation* (m):	3.80
Length of screened section (m):	1.73
Depth to top of screen* (m):	0.88

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	0.77
Well height above ground (m):	0.40	Depth to bottom (m):	1.46
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.69
Well volume of water (L):	1.35
Static water level* (m):	0.37
Length of screen collecting water (m):	0.18

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-19, 2008 16:55	1.5	1.8	6.98	1240	41	Clear, colourless

Water Sampling

Date & Time Collected:	Aug-19, 2008 17:10
Sample Number - Water:	C2-MW-7
Sample Containers:	4 x 1L Amber Glass
	2 x VOC vials
	1 x 250mL Plastic
Procedure/Equipment:	Peristaltic Pump, LDPE Tubing
Water Description:	clear, and colourless
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

Soil Sampling

Date and Time Collected:	Aug-19, 2008 17:15
Sample Number - Soil:	C2-MW-7A
	C2-MW-7B
Sample Containers:	4 x 250mL Glass
Procedure/Equipment:	SS Trowel
Soil Description:	clay with some 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

AECOM

2008 Monitoring Well Sampling Log (MW #8)

Site name:	CAM-2
Date of sampling event:	19-Aug
Names of samplers:	Ken Boldt
	Susie Koaha
Monitoring well ID:	MW-8
Facility:	Non-hazardous Waste Landfill

Known Data

Depth of installation* (m):	3.70
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.67

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	0.64
Well height above ground (m):	0.57	Depth to bottom (m):	1.18
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.54
Well volume of water (L):	1.06
Static water level* (m):	0.07
Length of screen collecting water (m):	-0.06

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-19, 2008 17:40	1.25	0.77	6.46	9320	9	Clear, colourless

Water Sampling

Date & Time Collected:	Aug-19, 2008 17:50
Sample Number - Water:	C2-MW-8
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-19, 2008 18:00
Sample Number - Soil:	C2-MW-8A
	C2-MW-8B
Sample Containers:	4 x 250mL Glass
Procedure/Equipment:	SS Trowel
Soil Description:	organic peat at surface clay at depth water table at 10cm
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

AECOM

D5 – Field Notes

(appendix ti pgs)

T2-28 (104-0032) 548436 7618807
looking S along toe of west slope
along old, partially infilled crack
- crack passes between gloves and ends at backpack

T2-29 (104-0033) 548435 7618796
Close-up of crack between gloves

T2-30 (104-0034) 548431 7618765
Looking E along toe from SW corner
- old cracks runs between gloves and ends at backpack 548446 7618758
- all other cracks completely infilled or not observed

Completed visual inspection of Non Haz LF before heading in for lunch and to warm up
- conditions essentially unchanged from last year
- previously observed fine cracks on the North and West sides could not be observed → likely infilled in places

- cracks observed on the South and East Slopes, similar to last year
- crack also observed along crest of East slope extending all the way to NE corner
  * infilled around corner and then faintly visible along North crest for about 20m, mostly infilled

Non Haz 1 (104-0035, 0036) 548750 7618495
Looking SW towards NE corner of Landfill

NH 2 (104-0037) 548741 7618483
Looking west along the toe of the north side from NE corner

NH 3 (104-0038) 548738 7618473
Looking W along crest from NE corner

NH 4 (104-0039) 548672 7618474
Looking S along west side of LF from 10m NW of NW corner

NH5 (104-0040) 548690 7618464
Looking S along crest from NW corner
- fine cracks that were observed last year cannot be seen

NH 6 (104-0041, 0042) 548674 7618384
Panoramic looking NE from adjacent to MW-8 looking to SW corner of landfill

NH 7 (104-0043) 548689 7618397
Looking ENE along toe of south slope from SW corner of landfill. Back located next to old infilled crack

NH 8 (104-0044) 548696 7618411
Looking ENE along crest from SW top of landfill

Going Back to take some photos of old cracks that I noted on second walkover

NH 9 (104-0045) 548683 7618448
Close-up of crack from last year, partially infilled with no sign of recent movement (gloves and pen for scale)
Start 548683 7618451 end 548691 7618420 Splays and offset by up to 1m. Always fine

NH 10 (104-0046) 548682 7618432
Close-up (looking S) Portion of lower crack along west toe that was observed last year. Most has been infilled and cannot be seen

NH11 (104-0047) 548705 7618404
Looking ENE along slope along old, partially infilled crack (between gloves)
Start 548697 7618403 End → NE corner

The same crack continues as up to 3 parallel fine sets all the way around the SE corner to the NE corner

Detailed inspection suggest no movement since last ~~pr~~ inspection. I am very pressed for time and weather is rapidly degrading so I will just take a few representative photos of this crack "system"

NH12 (104-0048) 548718 7618408
Looking ENE at parallel cracks (old)

NH13 (104-0049) 548733 7618411
Looking ENE at parrallel cracks (old) approaching SE corner
-area of minor erosion visible in background

NH14 (104-0050) 548748 7618418
Closeup Crack becomes narrow at SE corner

NH15 (104-0051) 548756 7618406
Looking N along East toe from SE corner

NH16 (104-0052) 548744 7618421
Looking N along crest from SE corner

NH17 (104-0053) 548744 7618432
Minor crack along crest (old) looking N

NH18 (104-0054) 548743 7618444
Crack along east crest looking N
-similar to last year. Gloves on either side of crack

WIND GETTING VERY STRONG

NH19 (104-0055) 548736 7618456
Following crack on crest. Looking N
Approaching NE corner

NH20 (104-0056) 548734 7618470
Following crest crack to NE corner
Crack largely infilled as it rounds corner. Faintly visible for about 30m west along North crest

NH21 (104-0057) 548726 7618474
Representative picture of crack as it rounds corner and turns west
Gloves for scale on either side of infilled crack

NH22 (104-0058) 548748 7618438
Representative crack along east slope
Looking N

NH23 (104-0059) 548746 7618465
Following crack on east slope looking N
Crack ends 548743 7618471

NHt24 (104-0060,0061) 548745 7648423
Looking NW from SE corner scanning
L to R. Note approaching snow!

Aug 19

MW-3 water collected

CZ-MW-3 ~~2~~ × 1L AG
2 × VOC
1 × 250mL Plastic

Photo 10 - MW-3

Soil collected

CZ-MW-3A Surface

CZ-MW-3B Depth

Photo 11 - test pit

MW-4 water collected

CZ-MW-4 4 × 1L AG
2 × VOC
1 × 250mL P

Photo 12 - MW-4

Soil collected

CZ-MW-4A Surface

CZ-MW-4B Depth

Photo 13 - Test pit

Aug 19

Non-Haz

MW-5 water

CZ-MW-5 4 × 1L AG
2 × VOC
1 × 250 P

Photo 14 - MW-5

Soil

CZ-MW-5A } surface
CZ-MW-10A } ← Dup

CZ-MW-5B Depth

Photo 15 - Test pit

MW-6 water

CZ-MW-6 12 × 1L AG
CZ-MW-9 Dup 4 × VOC
4 × 250 P

Photo 16 - MW-6

Soil

CZ-MW-6A Surface

CZ-MW-6B Depth

Photo 17 - Test pit

Aug 19

MW-7 water

CZ-MW-7 4x1L AG
2x VOC vial
1x 250mL Plastic

Photo 18 - MW-7
Soil
CZ-MW-7A Shallow
CZ-MW-7B Depth
Photo 19 - Test pit

MW-8 water

CZ-MW-8 4x1L AG
2x VOC Vial
1x 250mL Plastic

Photo 20 - MW-8
Soil
CZ-MW-8A Surface
CZ-MW-8B Depth
water table @ 20cm
Photo 21 - Test pit

Aug 20

Station Landfill

CZ-1 N 7619113
E 548458
CZ-1A Surface
CZ-1B Depth
Soil - S&G muddy
w/t @ 20cm
Photo 22
CZ-16A Duplicate

CZ-2 N 7619084
E 548487
CZ-2A Surface
CZ-2B Depth
Soil - organic peat @ surface
S&G @ depth w/t @ 20cm
Photo 23

CZ-3 N 7619002
E 548533
CZ-3A Surface
CZ-3B Depth
Soil - S&G w/t @ 40cm

Photo 24

2008 Monitoring Well Sampling Log (MW # 5)

Site name:	CAM - 2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-5
Facility:	Non-Haz

Known Data

Depth of installation* (m):	3.07
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.78

Measured Data

Condition of well:	Good	Procedure/Equipment:	Ext. Meter.
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	0.65
Well height above ground (m):	0.30	Depth to bottom (m):	1.47
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.82	Evidence of sludge:	-
Well volume of water (L):	1.66	Evidence of freezing/siltation:	-
Static water level* (m):	0.35		
Length of screen collecting water (m):	0.39		

Development/Purging Information

Equipment: Per. Pump, Horiba U-22 f/t cell, LDPE Tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
2:45	1.75	2.46	7.00	5600	-	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	3:00	Date and Time Collected:	3:10
Sample Number - Water:	C2-MW-5	Sample Number - Soil:	C2-MW-5A
			C2-MW-5B
			C2-MW-10A Dup
Sample Containers:	4 x 1L AG	Sample Containers:	1 x 250 Glass
	2 x VOC		
	1 x ~~500~~ mL Plastic		
Procedure/Equipment:	Per. Pump LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	clear colourless	Soil Description:	S&G
Sampling Equipment Decontamination (Y/N):	Y	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	4	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 # 6)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-6
Facility:	Non-Haz

Known Data	
Depth of installation* (m):	3.70
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.76

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	M. Tape	Depth to water surface (m):	0.98
Well height above ground (m):	0.35	Depth to bottom (m):	1.60
Diameter of well (m):	0.05	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.62	Evidence of sludge:	-
Well volume of water (L):	1.26	Evidence of freezing/siltation:	-
Static water level* (m):	0.63		
Length of screen collecting water (m):	0.49		

Development/Purging Information

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

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
3:30	1.5	2.58	7.66	6130	56	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	3:45	Date and Time Collected:	4:05
Sample Number - Water:	C2-MW-6	Sample Number - Soil:	C2-MW-6A
	C2-MW-9 Dup		C2-MW-6B
Sample Containers:	12 x 1L AG	Sample Containers:	4 x 250mL Glass
	4 x VOC vials		
	3 x 250mL Plastic		
Procedure/Equipment:	Per Pump LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	clear colourless	Soil Description:	organics and @ surface sand & clay @ 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

2008 Monitoring Well Sampling Log (MW # 7)

Site name:	CAM-2
Date of sampling event:	Aug 19
Names of samplers:	KB SK
Monitoring well ID:	MW-7
Facility:	Non-Haz

Known Data

Depth of installation* (m):	3.80
Length of screened section (m):	1.73
Depth to top of screen* (m):	0.88

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	M. Tape	Depth to water surface (m):	0.77
Well height above ground (m):	0.40	Depth to bottom (m):	1.46
Diameter of well (m):	0.85	Free product thickness (mm):	—

Calculations		Notes	
Depth of water (m):	0.69	Evidence of sludge:	—
Well volume of water (L):	1.40	Evidence of freezing/siltation:	—
Static water level* (m):	0.37		
Length of screen collecting water (m):	0.18		

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
8:55	1.5	1.80	6.98	1240	41.0	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	9:10	Date and Time Collected:	5:15
Sample Number - Water:	C2-MW-7	Sample Number - Soil:	C2-MW-7A
			C2-MW-7B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL Glass
	2x VOC Vials		
	1x 250mL Plastic		
Procedure/Equipment:	Per. Pump LDPE Tubing	Procedure/Equipment:	SS Trowel
Water Description:	clear colourless	Soil Description:	clay 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 # 8)

Site name:	CAM - 2
Date of sampling event:	Aug 19
Names of samplers:	KB, SK
Monitoring well ID:	MW-8
Facility:	Non-Haz

Known Data

Depth of installation* (m):	3.70
Length of screened section (m):	1.88
Depth to top of screen* (m):	0.67

Measured Data

Condition of well:	Good	Procedure/Equipment:	Int. Meter
Procedure/Equipment:	M. Tape	Depth to water surface (m):	0.64
Well height above ground (m):	0.57	Depth to bottom (m):	1.18
Diameter of well (m):	0.05	Free product thickness (mm):	—

ice chips from into surface on meter

Calculations		Notes	
Depth of water (m):	0.54	Evidence of sludge:	—
Well volume of water (L):	1.09	Evidence of freezing/siltation:	—
Static water level* (m):	0.07		
Length of screen collecting water (m):	?		

Development/Purging Information

Equipment: Per Pump, Horiba w f/E cell, LDPE Tubing

Date & Time	Volume Removed (L)	Temperature (°C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
5:40	1.25	0.77	6.46	9320	9.0	clear colourless

Water Sampling		Soil Sampling	
Date & Time Collected:	5:50	Date and Time Collected:	6:00
Sample Number - Water:	CZ-MW-8	Sample Number - Soil:	CZ-MW-8A
			CZ-MW-8B
Sample Containers:	4x 1L AG	Sample Containers:	4x 250mL
	2x VOC Vials		Glass
	1x 250mL Plastic		
Procedure/Equipment:	Per. Pump LDPE Tubing	Procedure/Equipment:	SS trowel
Water Description:	clear colourless	Soil Description:	org. peat @ surface clay @ depth w/t @ 10 cm
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

Appendix E

Laboratory Reports

(appendix ti pgs)

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)

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

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		
SAMPLE PREPARATION:		TOTAL	TOTAL		
DATE SAMPLED:		Aug 19/08	Aug 19/08		
CANTEST ID:		808250426	808250446	DETECTION LIMIT	UNITS
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

REPORTED TO: Gartner Lee Limited

REPORT DATE: September 4, 2008

GROUP NUMBER: 90825112

CANTEST

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

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

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

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

8×1AGS, 3×0M, 10×VOCS

Client Name: Gartner Lee Limited (GARO05)

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: KITIKOS

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: Kitikmeot 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	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	TPH-A	CCMESRR			HOLD - DO NOT ANALYZE	Number of Containers
90825112																																		
B0825446	C2-MW-9	D: Aug 19 T:	water	X																							X		X					6
LAB 446	P3-MW-13	D: Aug 15 T:	water	X																							X		X					5
B 447	C2-15A	D: Aug 18 T:	Soil				X																				X			X				2
U 449	C2-MW-9A	D: Aug 19 T:	"				X																				X			X				2
S 450	P3-MW-13B	D: Aug 15 T:	"				X																				X			X				2
E 451	C2-MW-10A	D: Aug 19 T:	"				X																				X			X				2
O 452	C2-16A	D: Aug 20 T:	"				X																				X			X				2
N		D: T:																																
L		D: T:																																
Y		D: T:																																

Total Number of Containers: 21

Relinquished by: Ken Boldt	Date Aug 21	Time	Received by:		
Relinquished by:	Date	Time	Received by:		
Method of Shipment: MB	Waybill No.:		Received for Lab by: KL	Date Aug 25	Time 1030
Shipped by:	Shipment Condition:		Cooler opened by:	Date	Time

*Please indicate appropriate regulatory guidelines:

WATER	SOIL
☐ CCME	☐ CCME
☐ BC-CSR	☐ BC-CSR
☒ Other (please specify) LVL-AW1	☒ 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

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 15-SEP-08 02:06 PM
Revision: 4

Lab Work Order #: L673725 **Date Received:** 25-AUG-08

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065118, C065119

Other Information:

Comments: Please note: this revision of the report contains lower detection limits for Lead in soil for all samples.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS Canada Ltd.
Part of the ALS Laboratory Group
1988 Triumph Street, Vancouver, BC V5L 1K5
Phone: +1 604 253 4188 Fax: +1 604 253 6700 www.alsglobal.com
A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673725-1	L673725-2	L673725-3	L673725-4	L673725-5
	Description					
	Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08
	Sampled Time					
	Client ID	C2-MW-1A	C2-MW-1B	C2-MW-2A	C2-MW-2B	C2-MW-3A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	5.05	8.28	4.62	3.89	11.6
	pH (pH)	8.02	7.84	8.43	8.47	8.34
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)	3.8	2.9	3.8	3.0	4.0
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	2.9	2.8	2.3	2.9	8.2
	Lead (Pb) (mg/kg)	4.7	3.2	3.9	2.8	6.0
	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)	6.8	5.0	5.4	4.1	9.2
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	101	99	97	100
	Surrogate: Fluorobenzene (SS) (%)	95	104	107	101	104
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) (%)	88	88	93	91	89
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)	0.125	<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)	0.125	<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	L673725-6	L673725-7	L673725-8	L673725-9	L673725-10
	Description					
	Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08
	Sampled Time					
	Client ID	C2-MW-3B	C2-MW-4A	C2-MW-4B	C2-MW-5A	C2-MW-5B
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	4.03	5.80	4.84	3.42	8.20
	pH (pH)	8.21	8.12	8.13	8.16	8.01
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)	2.8	3.0	4.6	2.5	3.7
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	2.4	4.0	2.2	1.8	2.5
	Lead (Pb) (mg/kg)	5.3	4.4	2.6	2.0	2.7
	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)	3.6	7.9	5.2	3.3	7.1
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) (%)	110	98	115	98	98
	Surrogate: Fluorobenzene (SS) (%)	106	101	119	104	99
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) (%)	90	89	91	101	85
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	L673725-11	L673725-12	L673725-13	L673725-14	L673725-15
	Description					
	Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08
	Sampled Time					
	Client ID	C2-MW-6A	C2-MW-6B	C2-MW-7A	C2-MW-7B	C2-MW-8A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	14.1	7.48	7.50	8.20	9.94
	pH (pH)	7.72	7.96	8.26	8.33	8.01
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)	3.1	6.3	8.2	8.2	4.5
	Cobalt (Co) (mg/kg)	<2.0	2.1	2.4	2.6	<2.0
	Copper (Cu) (mg/kg)	2.6	4.0	6.2	5.8	2.0
	Lead (Pb) (mg/kg)	<2.0	5.8	7.5	8.0	3.4
	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)	5.5	6.3	9.3	8.9	6.3
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) (%)	98	105	95	108	116
	Surrogate: Fluorobenzene (SS) (%)	99	96	106	100	96
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) (%)	90	83	86	94	90
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	L673725-16	L673725-17	L673725-18		
		Description					
		Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08		
		Sampled Time					
		Client ID	C2-MW-8B	C2-MW-9A	C2-MW-10A		
Grouping	**Analyte**						
SOIL							
Physical Tests	% Moisture (%)		11.5	4.31	3.14		
	pH (pH)		7.88	8.48	8.53		
Metals	Arsenic (As) (mg/kg)		<5.0	<5.0	<5.0		
	Cadmium (Cd) (mg/kg)		<0.50	<0.50	<0.50		
	Chromium (Cr) (mg/kg)		3.5	4.0	2.9		
	Cobalt (Co) (mg/kg)		<2.0	<2.0	<2.0		
	Copper (Cu) (mg/kg)		1.4	2.5	1.9		
	Lead (Pb) (mg/kg)		2.4	11.6	2.1		
	Mercury (Hg) (mg/kg)		<0.050	<0.050	<0.050		
	Nickel (Ni) (mg/kg)		<5.0	<5.0	<5.0		
	Zinc (Zn) (mg/kg)		3.9	6.0	4.3		
Volatile Organic Compounds	Benzene (mg/kg)		<0.040	<0.040	<0.040		
	Ethylbenzene (mg/kg)		<0.050	<0.050	<0.050		
	Methyl t-butyl ether (MTBE) (mg/kg)		<0.20	<0.20	<0.20		
	Styrene (mg/kg)		<0.050	<0.050	<0.050		
	Toluene (mg/kg)		<0.050	<0.050	<0.050		
	ortho-Xylene (mg/kg)		<0.050	<0.050	<0.050		
	meta- & para-Xylene (mg/kg)		<0.050	<0.050	<0.050		
	Xylenes (mg/kg)		<0.10	<0.10	<0.10		
	Surrogate: 4-Bromofluorobenzene (SS) (%)		96	103	105		
	Surrogate: Fluorobenzene (SS) (%)		97	106	103		
Hydrocarbons	F2 (C10-C16) (mg/kg)		<30	<30	<30		
	F3 (C16-C34) (mg/kg)		<50	<50	<50		
	F1-BTEX (mg/kg)		<10	<10	<10		
	F1 (C6-C10) (mg/kg)		<10	<10	<10		
	Surrogate: 2,4-Dichlorotoluene (SS) (%)		85	93	95		
Polychlorinated Biphenyls	PCB-1016 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1221 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1232 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1242 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1248 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1254 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1260 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1262 (mg/kg)		<0.050	<0.050	<0.050		
	PCB-1268 (mg/kg)		<0.050	<0.050	<0.050		
	Total Polychlorinated Biphenyls (mg/kg)		<0.050	<0.050	<0.050		

* 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.

6

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065118

Page 1 of 2

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	EMAIL 1: kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
Markham On 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: Kitnuna 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: 867-983-7500 FAX: 867-983-7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673725	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
	C2-MW-1A	Aug 19		Soil							2
	C2-MW-1B	"									2
	C2-MW-2A	"									2
	C2-MW-2B										2
	C2-MW-3A										2
	C2-MW-3B										2
	C2-MW-4A										2
	C2-MW-4B										2
	C2-MW-5A										2
	C2-MW-5B										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*.

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 20 08 12:45	TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	5°C	

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

6

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065119

Page 2 of 2

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: Gartner Lee limited	STANDARD ✓ OTHER ____	✓ REGULAR SERVICE (DEFAULT)
CONTACT: Ken Boldt	PDF ____ EXCEL ✓ CUSTOM ____ FAX ____	RUSH SERVICE (2-3 DAYS)
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: POBox 92, Cambridge Bay, Nu X0B 0C0	PO /AFE:	
	Legal Site Description:	
PHONE: 867-983-7508 FAX: 867-983-7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673725	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS F1	CWS F2 + F3	Total Metals	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	C2-MW-6A	Aug 19		Soil							2
	C2-MW-6B										2
	C2-MW-7A										2
	C2-MW-7B										2
	C2-MW-8A										2
	C2-MW-8B										2
	C2-MW-9A										2
	C2-MW-10A										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*.

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:
Ken Boldt		AK	Aug 25/08 12:45
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)
5°C	

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 15-SEP-08 02:17 PM
Revision: 3

Lab Work Order #: **L673729** **Date Received:** **25-AUG-08**

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065107, C065116, C065117

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-M.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS Canada Ltd.
Part of the **ALS Laboratory Group**
1988 Triumph Street, Vancouver, BC V5L 1K5
Phone: +1 604 253 4188 Fax: +1 604 253 6700 www.alsglobal.com
A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673729-1	L673729-2	L673729-3	L673729-4	L673729-5
	Description					
	Sampled Date	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08
	Sampled Time					
	Client ID	C2-1A	C2-1B	C2-2A	C2-2B	C2-3A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	7.15	7.86	56.0	16.6	19.9
	pH (pH)	8.15	8.03	6.98	7.51	7.75
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)	5.9	6.2	6.7	2.3	2.9
	Cobalt (Co) (mg/kg)	<2.0	<2.0	2.3	<2.0	<2.0
	Copper (Cu) (mg/kg)	4.2	4.1	11.6	2.5	1.2
	Lead (Pb) (mg/kg)	4.4	4.7	4.5	<2.0	2.2
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Nickel (Ni) (mg/kg)	<5.0	<5.0	6.1	<5.0	<5.0
	Zinc (Zn) (mg/kg)	6.9	6.6	9.1	3.0	3.1
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) (%)	102	107	91	107	107
	Surrogate: Fluorobenzene (SS) (%)	97	104	88	97	98
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	136	<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) (%)	102	104	83	104	96
Polychlorinated Biphenyls	PCB-1016 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1221 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1232 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1242 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1248 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1254 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1260 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1262 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	PCB-1268 (mg/kg)	<0.050	<0.050	<0.070	<0.050	<0.050
	Total Polychlorinated Biphenyls (mg/kg)	<0.050	<0.050	<0.070	<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	L673729-6	L673729-7	L673729-8	L673729-9	L673729-10
	Description					
	Sampled Date	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08
	Sampled Time					
	Client ID	C2-3B	C2-4A	C2-4B	C2-5A	C2-5B
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	17.7	26.9	15.5	8.74	8.21
	pH (pH)	7.81	7.77	7.90	7.98	8.23
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)	2.5	2.9	3.6	2.3	5.9
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	1.8	1.1	1.9	3.7	4.8
	Lead (Pb) (mg/kg)	2.4	<2.0	2.3	2.5	6.1
	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)	3.0	3.8	3.7	3.8	6.8
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) (%)	108	107	108	108	106
	Surrogate: Fluorobenzene (SS) (%)	104	101	102	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) (%)	103	101	100	100	103
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	L673729-11	L673729-12	L673729-13	L673729-14	L673729-15
	Description					
	Sampled Date	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08
	Sampled Time					
	Client ID	C2-6A	C2-6B	C2-7A	C2-7B	C2-8A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	8.74	7.33	27.6	15.0	19.4
	pH (pH)	8.09	8.08	7.69	7.07	7.12
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)	<2.0	2.7	10.8	3.8	3.7
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	1.0	1.4	9.4	2.1	6.3
	Lead (Pb) (mg/kg)	<2.0	<2.0	7.6	2.2	2.5
	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)	3.5	2.7	12.2	4.3	4.5
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) (%)	109	104	109	105	96
	Surrogate: Fluorobenzene (SS) (%)	102	101	100	100	92
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) (%)	104	102	90	105	94
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	L673729-16	L673729-17	L673729-18	L673729-19	L673729-20
	Description					
	Sampled Date	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08	18-AUG-08
	Sampled Time					
	Client ID	C2-8B	C2-9A	C2-9B	C2-10A	C2-10B
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	12.6	16.5	13.1	9.29	8.37
	pH (pH)	7.65	7.78	7.64	8.06	8.01
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)	3.1	<2.0	4.5	4.0	3.5
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	2.4	<1.0	1.7	2.7	2.6
	Lead (Pb) (mg/kg)	<2.0	<2.0	2.6	3.4	3.2
	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
	Zinc (Zn) (mg/kg)	3.6	2.9	4.8	6.9	6.2
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) (%)	106	107	104	106	96
	Surrogate: Fluorobenzene (SS) (%)	98	104	101	98	102
Hydrocarbons	F2 (C10-C16) (mg/kg)	<30	<30	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	<50	<50	52	<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) (%)	100	100	106	98	110
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	L673729-21	L673729-22	L673729-23	L673729-24	L673729-25
	Description					
	Sampled Date	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08
	Sampled Time					
	Client ID	C2-11A	C2-11B	C2-12A	C2-12B	C2-13A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	13.7	15.0	23.2	19.7	18.4
	pH (pH)	7.96	7.97	7.58	7.76	7.51
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)	2.6	13.1	2.0	4.2	2.6
	Cobalt (Co) (mg/kg)	<2.0	3.7	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	<1.0	8.1	1.4	3.3	1.9
	Lead (Pb) (mg/kg)	<2.0	9.1	<2.0	2.7	<2.0
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Nickel (Ni) (mg/kg)	<5.0	7.6	<5.0	<5.0	<5.0
	Zinc (Zn) (mg/kg)	2.4	18.4	5.6	6.9	7.3
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) (%)	97	96	93	96	99
	Surrogate: Fluorobenzene (SS) (%)	101	98	91	97	99
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) (%)	104	102	99	112	109
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	L673729-26	L673729-27	L673729-28	L673729-29	L673729-30
	Description					
	Sampled Date	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08	20-AUG-08
	Sampled Time					
	Client ID	C2-13B	C2-14A	C2-14B	C2-15A	C2-16A
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	11.4	4.87	2.04	10.7	6.43
	pH (pH)	8.31	7.97	7.96	7.88	8.21
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)	2.6	3.7	2.8	2.2	5.3
	Cobalt (Co) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Copper (Cu) (mg/kg)	<1.0	1.6	1.4	1.1	3.3
	Lead (Pb) (mg/kg)	<2.0	2.0	2.1	<2.0	4.2
	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)	3.3	4.1	3.1	2.9	5.9
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) (%)	104	116	104	93	106
	Surrogate: Fluorobenzene (SS) (%)	100	103	105	96	103
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) (%)	105	112	118	106	52
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.

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.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065107

Page 1 of 3

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	EMAIL 1: kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
Markham, On, L3R 5Z6	EMAIL 2:	EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS
PHONE: 905 477 0400 FAX: 905 477 1456		

INVOICE TO: SAME AS REPORT ? YES / NO	INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →
COMPANY: Kitnuna Projects Inc	CLIENT / PROJECT INFORMATION:
CONTACT: Peter Armstrong	JOB #: 80297
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): L673729

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
	C2-1A	Aug 20		Soil							2
	C2-1B	"		"							2
	C2-2A	"		"							2
	C2-2B	"		"							2
	C2-3A	"		"							2
	C2-3B	"		"							2
	C2-4A	"		"							2
	C2-4B	"		"							2
	C2-5A	"		"							2
	C2-5B	"		"							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*.
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:
Ken Boldt		AH	Aug 25/08 2:45
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)
10°	

6

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065116

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 - 390 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 X0B0C0	PO /AFE:	
	Legal Site Description:	
PHONE: 867 983 7508 FAX: 867 983 7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673729	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
	C2-6A	Aug 18		Soil							2
	C2-6B	"		"							2
	C2-7A	"		"							2
	C2-7B	"		"							2
	C2-8A	"		"							2
	C2-8B	"		"							2
	C2-9A	"		"							2
	C2-9B	"		"							2
	C2-10A	"		"							2
	C2-10B	"		"							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*.
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:
Ken Boldt		AK	Aug 25/08 12:45
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)
10°	

5

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065117

Page 3 of 3

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: Gartner Lee Limited	STANDARD ✓ OTHER ____	✓ REGULAR SERVICE (DEFAULT)
CONTACT: Ken Boldt	PDF ✓ EXCEL ✓ CUSTOM ____ FAX ____	RUSH SERVICE (2-3 DAYS)
ADDRESS: 200-300 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: 905-477-8100 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: POBox 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): L673729	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
	C2-11A	Aug 20		Soil							2
	C2-11B	"		"							2
	C2-12A	"		"							2
	C2-12B	"		"							2
	C2-13A	"		"							2
	C2-13B	"		"							2
	C2-14A	"		"							2
	C2-14B	"		"							2
	C2-15A	"		"							2
	C2-16A	"		"							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*.
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 25/08 12:45	TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	10°C	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 16-SEP-08 04:27 PM
Revision: 2

Lab Work Order #: **L673739** **Date Received:** **25-AUG-08**

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065115

Other Information:

Comments: Please note that the certain Metalss detection limits have been increased for some of the samples due to the matrix interferences encountered during the analysis.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673739-1	L673739-2	L673739-3	L673739-4	L673739-5
	Description					
	Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	15-AUG-08
	Sampled Time					
	Client ID	C2-MW-1	C2-MW-2	C2-MW-3	C2-MW-4	P2-MW-13
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1130	1140	983	844	1170
Total Metals	Arsenic (As)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/L)	<0.00025	<0.00050	<0.00050	<0.00025	<0.00025
	Chromium (Cr)-Total (mg/L)	<0.0025	<0.0050	<0.0050	0.0031	<0.0025
	Cobalt (Co)-Total (mg/L)	0.0068	0.0086	<0.0050	<0.0025	<0.0025
	Copper (Cu)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.0050	<0.0050
	Lead (Pb)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.0050	<0.0050
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Nickel (Ni)-Total (mg/L)	<0.025	<0.050	<0.050	<0.025	<0.025
	Zinc (Zn)-Total (mg/L)	10.9	20.8	0.816	16.4	<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)	0.00151	<0.00050	<0.00050	<0.00050	<0.00050
	meta- & para-Xylene (mg/L)	0.00177	<0.00050	<0.00050	<0.00050	<0.00050
	Xylenes (mg/L)	0.0033	<0.0010	<0.0010	<0.0010	<0.0010
	Surrogate: 4-Bromofluorobenzene (SS) (%)	97	95	93	96	103
	Surrogate: Fluorobenzene (SS) (%)	97	102	94	95	100
Hydrocarbons	TPH10-32 (mg/L)	<1.0	<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) (%)	93	109	106	109	98
Polychlorinated Biphenyls	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

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

Reference Information

Methods Listed (if applicable):

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

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 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.

2

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065115

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	EMAIL 1: kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
Markham, On, 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: Kitnuna Projects Inc	CLIENT / PROJECT INFORMATION:	
CONTACT: Peter Armstrong	JOB #: 80297	
ADDRESS: PO Box 92, Cambridge Bay, Nu	PO /AFE:	
X0B 0C0	Legal Site Description:	
PHONE: 867 983-7508 FAX: 867 983 7501	QUOTE #: ALSEQ08-411	
Lab Work Order # (lab use only): L673739	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS FI	TPH (C_{10}-C_{32})	Metals CSR pkg	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	C2-MW-1	Aug 19		Water							7
	C2-MW-2	Aug 19		Water							7
	C2-MW-3	Aug 19		Water							7
	C2-MW-4	Aug 19		Water							7
	P3-MW-13	Aug 15		Water							7

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:
Ken Boldt			Aug 25/08 12:45
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	

Certificate of Analysis

GARTNER LEE LTD.

ATTN: KEN BOLDT

300 TOWN CENTRE BOULVARD
SUITE 300
MARKHAM ON L3R 5Z6

Reported On: 04-SEP-08 05:23 PM
Revision: 2

Lab Work Order #: **L673741** **Date Received:** **25-AUG-08**

Project P.O. #: KSL-00627
Job Reference: 80297
Legal Site Desc:
CofC Numbers: C065109

Other Information:

Comments:

Natasha Markovic-M.

NATASHA MARKOVIC-MIROVIC
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L673741-1	L673741-2	L673741-3	L673741-4	L673741-5
	Description					
	Sampled Date	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08	19-AUG-08
	Sampled Time					
	Client ID	C2-MW-5	C2-MW-6	C2-MW-7	C2-MW-8	C2-MW-9
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1170	1090	2020	2260	1100
Total Metals	Arsenic (As)-Total (mg/L)	<0.010	<0.020	<0.020	<0.010	<0.020
	Cadmium (Cd)-Total (mg/L)	<0.00050	<0.0010	<0.0010	<0.00050	<0.0010
	Chromium (Cr)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.0050	<0.010
	Cobalt (Co)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.0050	<0.010
	Copper (Cu)-Total (mg/L)	<0.010	<0.020	<0.020	<0.010	<0.020
	Lead (Pb)-Total (mg/L)	<0.010	<0.020	<0.020	<0.010	<0.020
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Nickel (Ni)-Total (mg/L)	<0.050	<0.10	<0.10	<0.050	<0.10
	Zinc (Zn)-Total (mg/L)	0.125	<0.010	0.021	<0.0050	<0.010
Volatile Organic Compounds	Surrogate: 4-Bromofluorobenzene (SS) (%)	99	101	99	97	95
	Surrogate: Fluorobenzene (SS) (%)	97	99	98	98	101
Hydrocarbons	F1 (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	TPH10-32 (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Surrogate: 2,4-Dichlorotoluene (SS) (%)	118	105	107	107	104
Polychlorinated Biphenyls	PCB-1016 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1221 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1232 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1242 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1248 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1254 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1260 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1262 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	PCB-1268 (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Polychlorinated Biphenyls (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* 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.

3

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C065109

Page 1 of 1

REPORT TO:	REPORT FORMAT / DISTRIBUTION	SERVICE REQUESTED
COMPANY: Gartner Lee limited	STANDARD ✓ OTHER ___	✓ REGULAR SERVICE (DEFAULT)
CONTACT: Ken Boldt	PDF ___ EXCEL ✓ CUSTOM ___ FAX ___	RUSH SERVICE (2-3 DAYS)
ADDRESS: 300-300 Town Centre Blvd	EMAIL 1: kboldt@gartnerlee.com	PRIORITY SERVICE (1 DAY or ASAP)
Markham, On, 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: POBox 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): L6737741	SAMPLER (Initials): KB	

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	CWS F1	TPH (C_{10}-C_{32})	Metals CSR plus	Total PCB	HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	C2-MW-5	Aug 19		Water							7
	C2-MW-6	"		"							7
	C2-MW-7	"		"							7
	C2-MW-8	"		"							7
	C2-MW-9	"		"							7

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				TEMPERATURE	SAMPLES RECEIVED IN GOOD CONDITION ? (YES / NO) (If no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:	7°	
		MB	Aug 25		

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

10 5 Y

Appendix F

Quality Assurance/Quality Control

- Table F1 – Soil Sampling QA/QC Results
- Table F2 – Water Sampling QA/QC Results

Table F1. Soil QA/QC

	Sample Ident.	Sample Location	Depth (m)	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)
	C2-MW-2A	MW-2	0.1	ALS	2.3	<5.0	<2.0	<0.50	3.9	5.4	3.8	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-MW-9A *	MW-2	0.1	ALS	2.5	<5.0	<2.0	<0.50	10.31	6	4	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-MW-9A *	MW-2	0.1	Cantest	2	2	1	< 0.2	3.4	7	3	0.9	< 0.01	< 0.03	< 5	< 5	33	33
Average					2.27	n/a	n/a	n/a	5.87	6.13	3.60	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD					11%	n/a	n/a	n/a	66%	13%	15%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	C2-MW-5A	MW-5	0.1	ALS	1.8	<5.0	<2.0	<0.50	2	3.3	2.5	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-MW-10A *	MW-5	0.1	ALS	1.9	<5.0	<2.0	<0.50	2.1	4.3	2.9	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-MW-10A *	MW-5	0.1	Cantest	2	< 2	< 1	< 0.2	2.1	5	2	0.8	< 0.01	< 0.03	< 5	< 5	12	12
Average					1.90	n/a	n/a	n/a	2.07	4.20	2.47	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD					5%	n/a	n/a	n/a	3%	20%	18%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	C2-6A	C2-6	0.1	ALS	1	<5.0	<2.0	<0.50	<2.0	3.5	<2.0	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-15A *	C2-6	0.1	ALS	1.1	<5.0	<2.0	<0.50	<2.0	2.9	2.2	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-15A *	C2-6	0.1	Cantest	1	< 2	< 1	< 0.2	1.2	5	2	0.5	< 0.01	< 0.03	< 5	< 5	< 5	-
Average					1.03	n/a	n/a	n/a	n/a	3.80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD					6%	n/a	n/a	n/a	n/a	28%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	C2-1A	C2-1	0.1	ALS	4.2	<5.0	<2.0	<0.50	4.4	6.9	5.9	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-16A *	C2-1	0.1	ALS	3.3	<5.0	<2.0	<0.50	4.2	5.9	5.3	<5.0	<0.050	<0.050	<10	<30	<50	-
	C2-16A *	C2-1	0.1	Cantest	3	4	2	< 0.2	4.1	8	4	1.6	< 0.01	< 0.03	< 5	< 5	22	22
Average					3.50	n/a	n/a	n/a	4.23	6.93	5.07	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RSD					18%	n/a	n/a	n/a	4%	15%	19%	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.*

Table F2. 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)
C2-MW-6	MW-6	ALS	<0.020	<0.10	<0.010	<0.0010	<0.020	<0.010	<0.010	<0.020	<0.00020	<0.0010	<0.10			<1.0
C2-MW-9 *	MW-6	ALS	<0.020	<0.10	<0.010	<0.0010	<0.020	<0.010	<0.010	<0.020	<0.00020	<0.0010	<0.10			<1.0
C2-MW-9 *	MW-6	Cantest	0.0033	0.0036	0.0009	< 0.00004	< 0.0002	0.004	0.0003	0.002	< 0.00002	< 0.0004				0.2
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
RPD			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.*