NWB Annual Report **Year being reported:** 2007

License No: 1BR-SAR0916 **Issued Date:** March 8, 2009
Expiry Date: January 30, 2016

Project Name: CAM-F Sarcpa Lake Long-Term Monitoring

Licensee: Indian and Northern Affairs Canada

Mailing Address:
PO Box 2200
Iqaluit NU
X0A 0H0

Name of Company filing Annual Report (if different from Name of Licensee please clarify relationship between the two entities, if applicable):

General Background Information on the Project (*optional):

The CAM-F Intermediate Distant Early Warning (DEW) Line Site was constructed in 1957 and subsequently abandoned in 1963. It was converted to a scientific research station in 1977 under the Science Institute of the Northwest Territories and Canada, Department of Indian and Northern Affairs and operated seasonally until 1988. The site is located on the Melville Peninsula, approximately 85 km west of Hall Beach, and 100 km south-west of Igloolik, Nunavut.

Both years of the planned two year remediation phase of the CAM-F Sarcpa Lake Remediation Project have been completed and all equipment and personnel have been demobilized from the site. The site is now undergoing long-term monitoring which involves a 1-2 day site visit during monitoring years.

Licence Requirements: the licensee must provide the following information in accodance with

Part B Item 2

A summary report of water use and waste disposal activities, including, but not limited to: methods of obtaining water; sewage and greywater management; drill waste management; solid and hazardous waste management.

Water Source(s): Monitoring wells - water samples only

Water Quantity:

N/A	Quantity Allowable Domestic (cu.m)
~0.025	Actual Quantity Used Domestic (cu.m)
	Quantity Allowable Drilling (cu.m)
	Total Quantity Used Drilling (cu.m)

Waste Management and/or Disposal

- [x] Solid Waste Disposal
- [ ] Sewage
- [ ] Drill Waste
- [ ] Greywater
- [ ] Hazardous
- [ ] Other:

Additional Details:

Solid waste generated during the monitoring program was removed from the site and disposed of in the Iqaluit Municipal Landfill.

A list of unauthorized discharges and a summary of follow-up actions taken.

Spill No.: None (as reported to the Spill Hot-line)

Date of Spill:

Date of Notification to an Inspector:

Additional Details: (impacts to water, mitigation measures, short/long term monitoring, etc)

Revisions to the Spill Contingency Plan

No Spill Contingency Plan (SCP) submitted or approved

Additional Details:

Revisions to the Abandonment and Restoration Plan

No Abandonment and Restoration (AR) Plan submitted or approved

Additional Details:

Progressive Reclamation Work Undertaken

Additional Details (i.e., work completed and future works proposed)

WORK COMPLETED

- Camp set up
  - Initial levelling
  - Access road improvement
  - Generator set up
  - Camp module installation
  - Waste water lagoon construction
  - Fuel storage facility construction
  - Communication system set up and operation
  - Incinerator set up and operation
  - Closure
- Debris removal and disposal
  - Collection and disposal of non-hazardous debris
    - Scattered debris (2000 cubic metres)
    - Drums (~10,000)
  - Consolidation of liquids in drums, equipment & tanks
  - Cleaning of contaminated debris
  - Treatment of contaminated water from cleaning
  - Debris removal in and around Sarcpa Lake using a barge and tugboat
    - Drums (~700), wood & steel
- Demolition work
  - Asbestos removal
  - PCB contaminated concrete removal & containerization
  - PCB amended painted material removal & containerization
  - Structural demolition (Module Train, Warehouse, Garage, POL Tanks, Quonset House)
  - Renovation of the Inuit House into a Hunting Shelter for use by the Hall Beach HTO
  - Hazardous materials removed and packaged
- Construction of disposal facilities and waste processing area
  - Initial survey & facility location
  - Borrow area development
  - Key trench excavation
  - Granular material production placement and compaction
  - Construction of water lagoon and lined processing area
  - Closure of water lagoon and lined processing area
  - Secure Soil Disposal Facility construction completed
    - Contains 3444 cubic metres of soil
  - Non-Hazardous Waste Landfill completed
    - Contains ~3000 cubic metres of non-hazardous debris
- Demobilization (April 2008)
  - Remove equipment from site
  - Transport hazardous material south for proper disposal
- Long-Term Monitoring (August 2008)
  - Year 1 of the long-term monitoring plan has been completed

FUTURE WORK PROPOSED

- Long-Term Monitoring
  - Started in 2008, continues until 2032.

Results of the Monitoring Program including:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where sources of water are utilized;

Not Applicable (N/A)

Additional Details:

The GPS Co-ordinates (in degrees, minutes and seconds of latitude and longitude) of each location where wastes associated with the licence are deposited;

Not Applicable (N/A)

Additional Details:

Results of any additional sampling and/or analysis that was requested by an Inspector

No additional sampling requested by an Inspector or the Board

Additional Details: (date of request, analysis of results, data attached, etc)

Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

No additional sampling requested by an Inspector or the Board

Additional Details: (Attached or provided below)

Any responses or follow-up actions on inspection/compliance reports

No inspection and/or compliance report issued by INAC

Additional Details: (Dates of Report, Follow-up by the Licensee)

Any additional comments or information for the Board to consider

Photographs of the Non-Hazardous Waste Landfill and the Secure Soil Disposal Facility are provided in Appendix 1.

A copy of the Long-Term Monitoring Report for 2008 is provided in Appendix 2.

Date Submitted:	March 26, 2009	
Submitted/Prepared by:	Natalie Plato	
Contact Information:	**Tel:**	(867) 975-4730
	Fax:	(867) 975-4736
	email:	natalie.plato@inac-ainc.gc.ca

APPENDIX 1: PHOTOGRAPHS

Pictures of the Non-Hazardous Waste Landfill and Secure Soil Disposal Facility taken during the site visit on August 31, 2008

Non-Hazardous Waste Landfill

Secure Soil Disposal Facility

APPENDIX 2: LONG-TERM MONITORING 2008 CAM-F DEW LINE SITE, NU

Indian and Northern Affairs Canada

Long Term Monitoring 2008
CAM-F DEW Line Site, NU

Prepared by:

UMA Engineering Ltd.
17007 - 107 Avenue
Edmonton, AB T5S 1G3
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www.uma.aecom.com

Project Number: 4440-079-00
Date: January 8, 2009

Disclaimer

The attached Report (the "Report") has been prepared by UMA Engineering Ltd. ("UMA") for the benefit of Indian and Northern Affairs Canada ("Client") in accordance with the agreement between UMA and Client (the "Agreement") for the services described therein, and is subject to the budgetary, time and other constraints and limitations set forth therein.

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

UMA Engineering Ltd.
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January 8, 2008 File Name: 4440-079-00

Mr. Mark Yetman
Contaminated Sites Project Manager
Indian and Northern Affairs Canada
PO Box 2200
Iqaluit, NU X0A 0H0

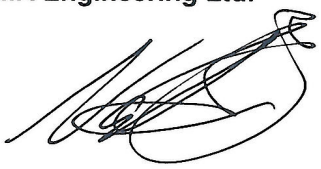
Dear Mr. Yetman:

Re: Long Term Monitoring 2008, CAM-F DEW Line Site, NU

UMA Engineering Ltd. is pleased to submit our report outlining the results of the 2008 Long Term Monitoring at CAM-F, Sarcpa Lake.

We thank you for the opportunity to complete this work on behalf of Indian and Northern Affairs Canada. Should you have any questions or require additional information please contact the undersigned at (780) 486-7000.

Sincerely,
UMA Engineering Ltd.



Nick Oke, M.Sc., P.Chem. (AB)
Project Manager
nick.oke@aecom.com

NO:sm

Revision Log

REVISION	DATE	ISSUE / REVISION DESCRIPTION
	October 2008	Draft Report
	January 2009	Final Report

Signature Page

REPORT PREPARED BY:	REPORT REVIEWED BY:
KScott	REGISTERED PROFESSIONAL ENGINEER C.A. CORRIGAN LICENSEE Jan 7/09 NWT/NU
KATIE SCOTT, B.SC. ENVIRONMENTAL SCIENTIST UMA ENGINEERING LTD.	CATHY CORRIGAN, M.SC., P.ENG SENIOR GEOLOGICAL ENGINEER UMA ENGINEERING LTD.

REPORT REVIEWED BY:
NICK OKE, M.SC., P.CHEM. SENIOR ENVIRONMENTAL SCIENTIST / PROJECT MANAGER UMA ENGINEERING LTD.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
P 007
UMA ENGINEERING LTD.

Executive Summary

The 2008 landfill monitoring program was conducted at the CAM-F DEW Line site at Sarcpa Lake, on August 30, 2008. The landfill monitoring program consisted of a visual inspection of both the Non-Hazardous Waste Landfill (NHWL) and the Secure Soil Disposal Facility (SSDF) as well as soil and groundwater sampling and ground temperature monitoring at the SSDF.

Features noted at the NHWL and SSDF included some settlement, minor erosion on the sideslopes and ponding water at the toe of the berm. Seepage was also noticed at the SSDF. Overall, both landfills are performing as per design.

Surface and shallow depth soil monitoring and groundwater monitoring conducted at the SSDF shows no sign of increased contaminant concentrations down-gradient of the landfill. No deficiencies were noted in the landfill performance based on sample results.

Ground temperature readings taken in 2008 show that the maximum active layer depth of the SSDF ranged between 1.7 metres (m) and 2.4 m approximately one year after installation. Complete freeze back typically occurs several years after landfill completion, therefore, the active layer thickness is anticipated to decrease in subsequent years.

The overall site was assessed visually while flying within the charter aircraft. Aerial photographs were obtained and all areas of remedial activity were noted in good condition. Due to timing constraints and inability to obtain an All Terrain Vehicle locally, only the Airstrip, Inuit House, Borrow Areas 1 and 4 and the Station Area vicinity were assessed on foot. All of these areas were noted in good condition.

Table of Contents

1.0 Introduction

The CAM-F DEW Line site at Sarcpa Lake (68° 33'N, 83° 19'W) is located on the Melville Peninsula in Nunavut, 85 km west of Hall Beach and 100 km southwest of Igloolik. The CAM-F Intermediate DEW Line site was constructed in 1957 and operated until 1963. In 1977, the site converted into a scientific research station and operated seasonally until 1988, under support from the Science Institute of the Northwest Territories and the Department of Indian Affairs and Northern Development (DIAND).

The CAM-F site consists of three main areas, including a Station Area, an East Station Area and a former Construction Camp. Site clean-up activities were conducted between 2005 and 2008. The clean-up included the construction of a Non-Hazardous Waste Landfill (NHWL) for the disposal of non-hazardous wastes generated from demolition and collection of site debris and a Secure Soil Disposal Facility (SSDF) for disposal of Tier II impacted soil.

The 2008 landfill monitoring program was conducted on August 30, 2008 by Ryan Teplitsky, P.Eng. (Alberta) and Anwar Majid, M.Sc., P.Eng. of UMA Engineering Ltd. (UMA). Weather conditions at the time of monitoring were partially cloudy with wind and a temperature of +4°C.

1.1 Landfill Monitoring Program

The general components of the landfill monitoring program at CAM-F include:

- Visual Inspection;
- Surface and shallow depth soil sampling and analyses;
- Groundwater sampling and analyses; and
- Ground temperature monitoring.

The requirements for landfill monitoring, as laid out in the CAM-F Sarcpa Lake Long-Term Monitoring Plan, are summarized in Table 1.

Table 1 - CAM-F Sarcpa Lake Landfill Monitoring Requirements

LANDFILL DESIGNATION	VISUAL INSPECTION	GROUNDWATER SAMPLING	SOIL SAMPLING	THERMAL MONITORING
Non-Hazardous Waste Landfill	√			
Secure Soil Disposal Facility	√	√	√	√

1.1.1 Visual Inspection

The physical condition of each landfill was inspected in accordance with the Abandoned Military Site Remediation Protocol, noting any signs of erosion, settlement, frost action, debris exposure, staining, or water ponding.

Photographs were taken of the landfills and of the features noted during the visual inspections of the landfills. The location and aspect of each photographic image is shown on Figures A1 and A2. The arrowheads on the figures denote approximate image orientation. Selected photographs for the Non-Hazardous Waste Landfill (NHWLF) and the Secure Soil Disposal Facility (SSDF) are included in Sections 2.0 and 3.0, respectively. All electronic images taken during the landfill monitoring inspection and photo logs are provided on the Data CD provided in Appendix D.

The overall site was assessed visually while flying within the charter aircraft. Aerial photographs were obtained and all areas of remedial activity were noted in good condition. Due to timing constraints and inability to obtain an All Terrain Vehicle locally, only areas readily accessible by foot were inspected on the ground, which included the Airstrip, Inuit House, Borrow Areas 1 and 4 and the Station Area vicinity. All of these areas were noted in good condition.

Overall site photos are on the Data CD provided in Appendix D.

1.1.2 Soil Sampling

Surface and shallow depth (0.5 m) soil samples were collected adjacent to monitoring well locations.

Soil sampling locations are indicated on the site-specific landfill drawings included in the annexes to this report. Samples collected during baseline and first year landfill monitoring were analyzed for the following parameters:

- Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc.
- Mercury.
- PCBs (polychlorinated biphenyls - total Aroclor).
- TPH (Total Petroleum Hydrocarbons) - Fractions F1-F4.

1.1.3 Groundwater Sampling

Groundwater monitoring wells were installed hydraulically up-gradient and down-gradient of both landfills during construction. Analytical data from water samples collected from wells up and down-gradient are reviewed in conjunction with soil analytical data to evaluate potential impacts associated with the landfill.

For baseline and for the first year monitoring event, the following physical measurements are recorded prior to collection of groundwater samples from a monitoring well:

- Water elevation.
- Total water depth.
- Height of well stick-up.
- Depth to bottom of well.
- Presence of hydrocarbons.
- Hydrocarbon thickness (if appropriate).

Prior to sampling during the 2008 monitoring event, the monitoring wells were purged of three times the standing water column volume where possible. In the event of low recharge volumes, standing water was sampled and specifically documented. Sampling done during construction involved purging the wells until pH, temperature and conductivity stabilized. Dissolved metals water samples were filtered and preserved. Total metals samples were shipped unfiltered and unpreserved.

Following withdrawal of a water sample, other physical measurements recorded include:

- Colour and odour.
- pH, conductivity, and temperature.

Groundwater samples were analyzed for the following parameters:

- Inorganic elements (total and dissolved concentrations): arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc.
- Mercury.
- PCBs (polychlorinated biphenyls - total Aroclor).
- TPH (Total Petroleum Hydrocarbons) - Fractions F1-F4.

1.1.4 Thermal Monitoring

Four ground temperature cables were installed in the SSDF in September 2007. A Lakewood System UltraLogger is connected to each of the ground temperature cables and records temperature every 12 hours at each of the thermistor beads along the cable. All data loggers were functional at the time of site inspection.

A complete set of ground temperature data (from September 2007 to August 30, 2008) was downloaded from each data logger. After downloading the data, the data loggers were reset and redeployed. The batteries in the data logger were changed and a set of manual temperature readings were taken using a Lakewood resistance meter and switchbox.

The data obtained from the ground temperature instrumentation is provided on the Data CD in Appendix D. The ground temperature data for the months of March, June, and August 2008 were plotted to determine the position of 0°C isotherm. The ground temperature plots are presented in Section 3.0. The annual maintenance reports containing manual readings of the ground temperature are also presented in Sections 2.0 and 3.0.

A summary of the ground temperature cables and data loggers installed is presented in Table 2 below.

Table 2 - Summary of Ground Temperature Cable and Data Loggers

SITE/INSTALATION	LOCATION	CABLE NO.	CABLE LENGTH (m)	DATA LOGGER SERIAL NO.
VT-1	SSDF	CAMF 01-VT	7.8	07060039
VT-2	SSDF	CAMF 02-VT	7.8	05070003
VT-3	SSDF	CAMF 03-VT	8.4	05070006
VT-4	SSDF	CAMF 04-VT	8.4	05070020

1.2 2008 Monitoring Results

The results of the 2008 monitoring program are organized by landfill: Section 2.0 describes the Non-Hazardous Waste Landfill, and Section 3.0, the Secure Soil Disposal Facility.

The following information is provided in each of the following sections:

- Visual inspection checklist;
- Visual inspection drawing mark-up;
- A selection of visual inspection photos (all photos will be provided electronically);
- Thermal monitoring summary (where applicable);
- Plots of ground temperatures with depth at each thermistor installation (where applicable);
- Evaluation of 2008 soil analytical data, as compared to background conditions;
- Summary of 2008 soil analytical data; and
- Thermistor maintenance reports (where applicable).

2.0 Non-Hazardous Waste Landfill

The NHWL is located east of the road to Dump A within a depression as shown on Figure A1 and was constructed to accept non-hazardous waste debris generated from demolition and removal of site debris. Tier I and F3/F4 impacted soils were also placed in this landfill.

The landfill design includes perimeter berms and placement of a cover of compacted granular fill over the landfilled material. Three groundwater monitoring wells were installed at the landfill perimeter.

The 2008 monitoring program included a visual inspection of the landfill.

2.1 Noted Visual Inspection Features

A panoramic view of the landfill is shown on Photos 1 and 2. Photos 3 to 9 show the condition of the landfill and groundwater monitoring wells. Deviations in physical performance of the landfill were observed during inspection including settlement on the landfill surface, minor erosion on the sideslopes, and some ponding near the toe of the berms.

Settlement was noted at two locations on the landfill surface as shown on Figure A1 and Photos 3 to 6. Ponding of water was not observed in the settled areas during site inspection. Due to porous cover material the surface runoff likely infiltrates into the cover material and seeps along the frozen/unfrozen soil contact until it appears on the sideslopes. Seepage on sideslopes was not observed during inspection, but appeared to have occurred on the berm (Pictures 017, 019, 021 on Data CD).

Minor erosion due to surface runoff/seepage was also observed on the berms, but channelling of runoff was not noted. The minor erosion that has occurred is a result of downslope washing of fine-grained particles between cobbles and boulders. The landfill is covered with erosion resistant material and will naturally resist further erosion.

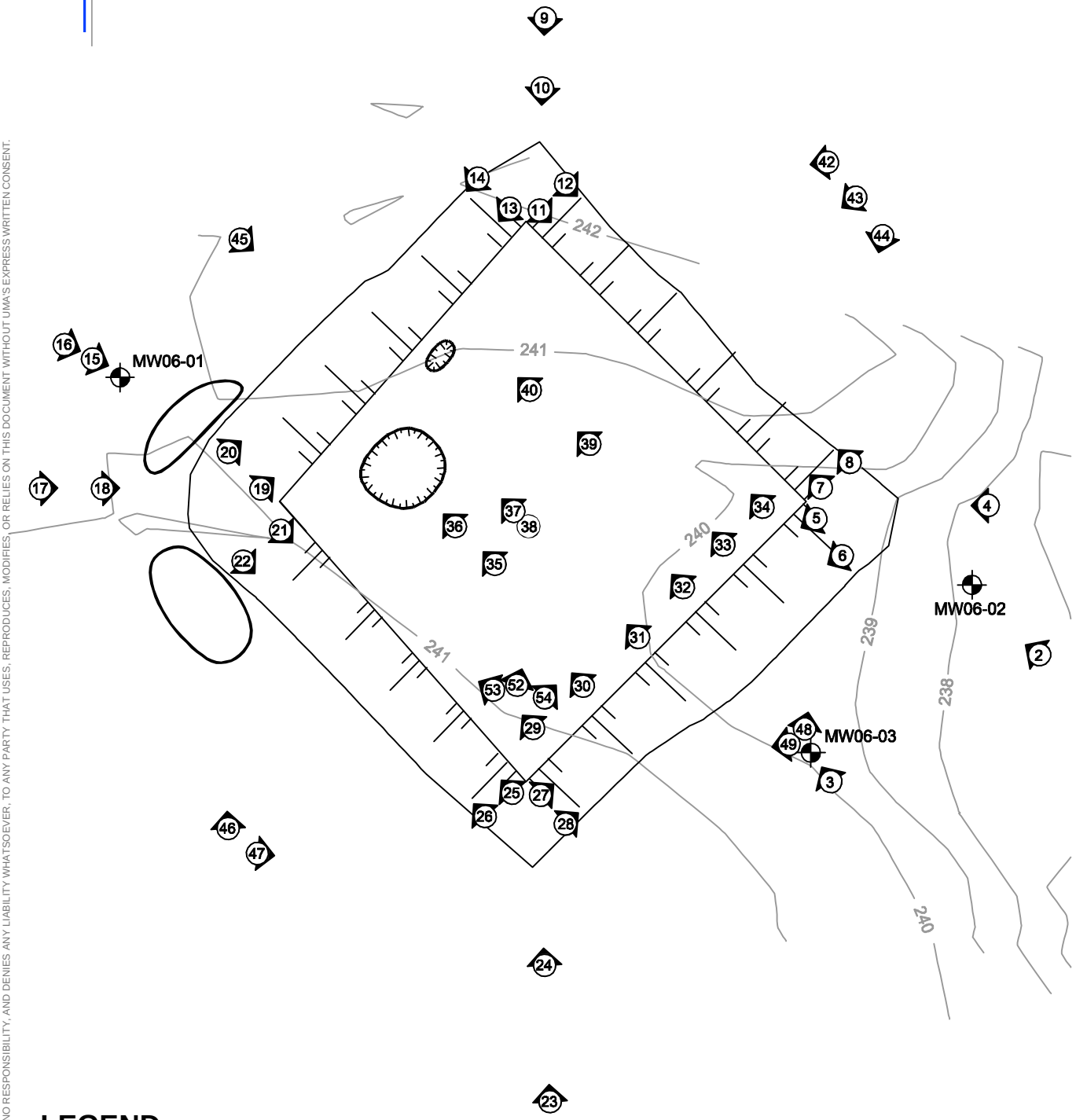
Photos 7 to 9 show the condition of groundwater monitoring wells at the NHWLF. The monitoring wells were leaning slightly towards the protective casing possibly because of frost jacking. The monitoring wells were generally in good conditions and no damage to the monitoring wells was noted.

The above noted features are not affecting the overall performance of the landfill and are of little consequence. The landfill is in good condition and is performing as designed.

Figures, visual inspection reports and photographic records of the NHWL are included on the following pages. Photo view points for all photographs included in Appendix D are shown on Figure A1.

GENERAL NOTES:

1. CONTOURS ARE SHOWN AT A 1.0m INTERVAL



LEGEND:

- 24 — PICTURE NUMBER VIEWPOINT
- MW06-03 — MONITORING WELL LOCATIONS
- SETTLEMENT
- PONDING

0 7.5 15 m SCALE 1:750

Indian & Northern Affairs Canada
CAM-F Sarcpa Lake
2008 Long Term Monitoring

UMA | AECOM

Non-Hazardous Waste Landfill

Figure A1

CAM-F SARCPA LAKE
LANDFILL VISUAL INSPECTION

Date:	August 30, 2008
Landfill:	Non-Hazardous Waste Landfill

1. Erosion	Answer
a) **Is erosion occurring on the surface or berms of the landfill?**	Yes
i) Are there preferred drainage channels?	No
ii) Is there sloughing of material?	No
b) What is the extent of the erosion? *(percentage of surface area)*	<5%
i) Is it localized or continuous?	Localized
c) Where is the erosion occurring? Sideslopes	
d) Explanation: Minor erosion was observed on the sideslopes likely resulting from downslope washing of fines between cobbles and boulders. Erosion rills or pot holes were not observed during inspection.	

2. Settlement	Answer
a) Is there differential settlement occurring on the surface?	Yes
i) Are there low areas or depressions?	Yes
ii) Are voids forming?	No
b) What is the extent of the settlement? *(percentage of surface area)*	< 2 %
i) Is it localized or continuous?	Localized
ii) How deep is it?	0.1 – 0.3 m
c) Where is the settlement occurring? See Figure A2 and Photos 3 to 6	
d) **Explanation:** Settlement was noted at two locations (8mx8m and 4mx2m, 0.1 to 0.3 m deep) as shown on Figure A2. Ponding was not noted at the time of inspection. Due to cover material containing cobbles and boulders, the surface water infiltrates though the cover material, and seeps along the frozen/unfrozen soil contact through the landfill body and the side slopes.	

3. Frost Action	Answer
a) Is there frost action/damage to the landfill?	No
i) Is there exposed debris due to uplift?	No
ii) Is there tension cracking along the berms?	No
iii) Is there sorting of granular fill?	No
b) What is the extent of the frost action? *(percentage of surface area)*	
i) Is it localized or continuous?	
c) Where is the heaving/cracking occurring?	
d) Explanation:	

4. Monitoring Instruments
a) What is the condition of the monitoring wells and thermistor strings? All monitoring wells (MW06-01 to 03) were in good condition. No damage to the monitoring wells was observed (Photos 7 to 9).

5. Sketch

See Figure A1

6. General Comments

Minor deviations in physical performance of the landfill were observed during inspection including minor settlement on the landfill surface and minor surface erosion. Based on our observations during the site inspection, the noted features are of little consequence. The landfill is acceptable and is performing as designed.

PHOTOGRAPHIC RECORDS

Photo 1: Picture 59 NHWLF – Aerial View of the Landfill, Minor Ponding near the NW Corner

Photo 2: Picture 57 NHWLF – Panoramic View Looking Southeast

PHOTOGRAPHIC RECORDS

Photo 3: Picture 35 NHWLF –Settlement (8mx8m) on Landfill Surface in Northwest Corner (Figure A2)

Photo 4: Picture 35 NHWLF –Settlement (8mx8m) on Landfill Surface in Northwest Corner (Figure A2)

PHOTOGRAPHIC RECORDS

Photo 5: Picture 39 NHWLF – Settlement (4mx2m) on the Landfill Surface (Figure A2)

Photo 6: Picture 40 NHWLF – Settlement (4mx2m) on the Landfill Surface, (Figure A2)

PHOTOGRAPHIC RECORDS

Photo 7: Picture 15 NHWLF – MW06-01 Looking Southeast

Photo 8: Picture 2 NHWLF – MW06-02 Looking Northwest

PHOTOGRAPHIC RECORDS

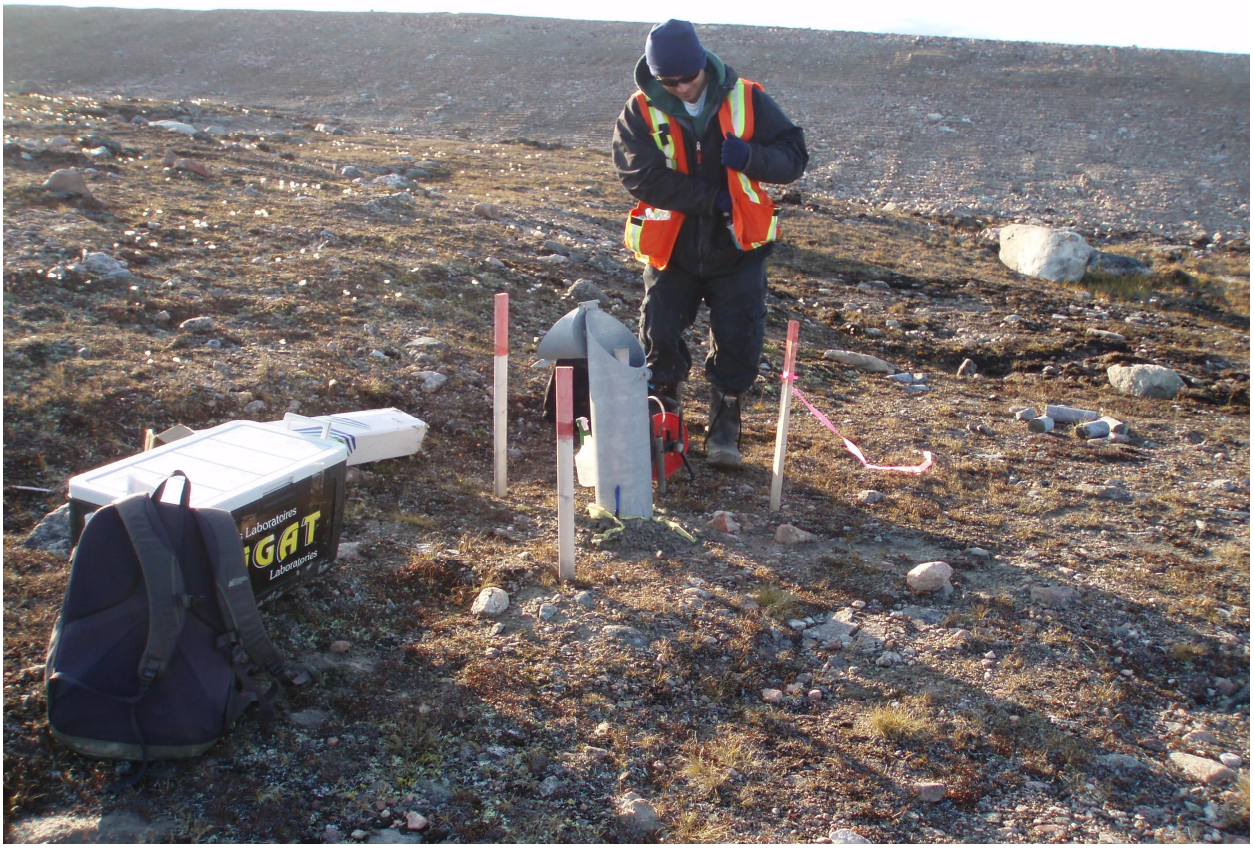


Photo 9: Picture 3 NHWLF – MW06-03 Looking Northwest

3.0 Secure Soil Disposal Facility

The SSDF is located northeast of the airstrip approach area and south of the road to the former construction site. It was constructed to contain Tier II and F1/F2 impacted soil.

The SSDF was designed on the assumption that the facility would freeze in 3 to 4 years after construction and would remain in frozen state after that. The design used permafrost as the primary containment and the thickness of the soil cover was calculated to prevent the thaw of contaminated soil and berms. Consideration was also given to the impact of climate change on permafrost conditions in the arctic. To monitor the freeze back of the landfill contents and berms, four ground temperature cables (VT-1 to VT-4) were installed in the SSDF as shown on Figure A2.

The assessment of the physical performance of the landfill consisted of a visual inspection with emphasis on the geotechnical performance as it pertained to the containment of the enclosed waste. The thermal monitoring consisted of retrieving ground temperature data from the existing installations, servicing and redeploying the on-site data loggers and taking a set of manual temperature readings.

3.1 Soil and Groundwater Monitoring

Approximate locations for the collection of soil and groundwater samples are identified on Figure A2.

Soil baseline monitoring results were generally consistent between the up-gradient (MW06-04) and down-gradient (MW06-05 and MW06-06) wells. Monitoring well MW06-06 had low levels of F3 hydrocarbons (11 ppm) during the 2006 sampling event. Low levels of arsenic, chromium, cobalt, copper, lead, nickel, and zinc were detected during both monitoring events, both up and down-gradient.

The 2008 soil sample results were generally consistent with the baseline sample results. F3 and F4 hydrocarbons were detected in down-gradient well MW06-05 at surface and depth at low levels. Hydrocarbon concentrations at this well should be monitored during future sampling events for changes.

Groundwater samples were collected from monitoring well MW06-05 and MW06-06 in 2007. The metals water results from 2006 have not been included in this report as they were analysed for dissolved constituents instead of total concentrations. Low levels of Cr, Co, Cu, Pb, Ni and Zn were detected in 2007. F1-F4 hydrocarbon testing was not conducted in 2006. Hydrocarbon results were non-detect in 2007. PCB results from 2006 and 2007 were below detection limits.

Groundwater results for 2008 were similar between the 2008 monitoring event and previous monitoring events with the exception of lead (total), zinc (dissolved and total) and conductivity. Total lead concentrations were significantly increased over concentrations in 2007. Zinc concentrations were also increased from results in 2006 and 2007. This may be due to the high suspended solid levels in the water sampled in 2008 (inferred from the high colour values and field notes). The conductivity decreased significantly in monitoring wells MW06-04 and MW06-06 from 2006 to 2008 and increased slightly in MW06-05.

The noted discrepancies in soil and groundwater chemistry do not indicate any deficiencies in landfill operation.

The 2008 laboratory results are located in Appendix A.

3.2 Noted Features

A panoramic view of the landfills is shown on Photos 1 and 2. Photos 3 to 19 show the condition of the landfill, groundwater monitoring wells, and thermal monitoring installations. Deviations in the physical performance of the landfill were observed during inspection including seepage and minor erosion on the berms, minor settlement on the landfill surface, and erosion channels and ponding near the toe of the berms. These features are shown on Figure A2.

Seepage was noted on all berms during site inspection as shown on the panoramic view of the landfill on Photos 1 and 2. The seepage was occurring approximately 2 to 2.5 m below the landfill top surface and was likely due to a rainfall on August 29, 2008. It appears that some surface water infiltrates through the porous cover material and seeps along the frozen/unfrozen soil contact until it appears on berms. The seepage and surface runoff have created a few erosion rills and small potholes containing water on the south and west facing slopes as shown on Photos 3 to 6. The seepage is expected to occur in the future at the frozen/unfrozen soil contact; however, frozen/unfrozen soil contact will move up as permafrost aggrades with time.

The minor erosion that has occurred on all sideslopes is a result of downslope washing of fine-grained particles between cobbles and boulders. The landfill is covered with erosion resistant material and will naturally resist further erosion. Surface runoff has also eroded small channels in the silty soil near the south facing slope as shown on Figure A1 and Photos 7 to 10. The erosion channels are not in direct contact with the landfill and are not affecting the landfill structure. Minor ponding was also noted near the toe of all berms.

A small wood bench was lying on the landfill surface as shown on Photo 11. The wood bench is likely from the Inuit House.

A subtle depression was noted on the surface of the landfill as shown on Figure A2 and Photos 12 and 13. Ponding was not noted in the depression during site inspection. There is potential for additional settlement to occur as the landfill settles over time and this settlement could express itself as an area of water ponding.

The above noted features are not affecting the overall performance of the landfill and are of little consequence.

The monitoring wells were generally in good condition and no damage to the monitoring wells was noted (Photos 14 and 15). The ground temperature cables, data loggers and protective casing were all in good condition and no damage was observed to any of the installation (Photos 16 to 19).

Ground Temperature (Thermal) Monitoring

Four ground temperature cables are installed at CAM-F DEW Line site within the Secure Soil Disposal Facility (SSDF) to monitor long-term thermal performance of the landfill. During landfill construction, an additional 1.0 m of fill was added to the final cover to account for new information on the rate of climate change in arctic environments. The thermistor cables were brought to site before the changes in design were made. The thermistor cables were to be installed from surface to the bottom of the key trench in the original design, but with the additional cover, two of the thermistor cables (01-VT and 02-VT) were installed from surface to the top of the key trench and two (03-VT and 04-VT) were installed from 1.5 m to the middle of the key trench.

The data loggers connected to each of the cables was successfully downloaded. Manual readings were also taken from all four ground temperature cables prior to reconnecting the data loggers and the ground temperature data was checked with that recorded by the loggers.

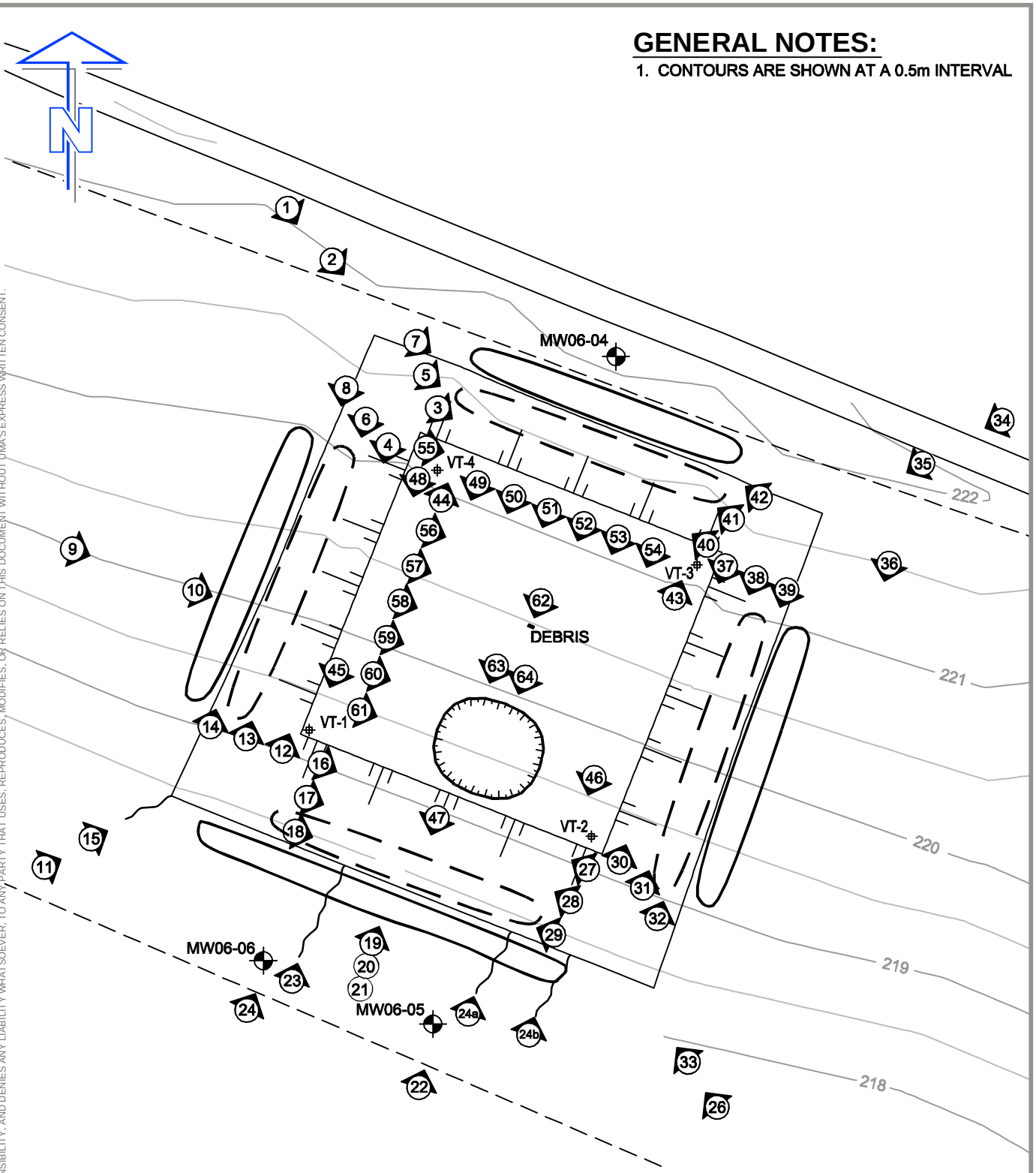
The position of the 0°C isotherm was measured from the data logger ground temperature collected on August 20, 2007. The results presented in Table 3 provide an estimate of the maximum active layer thickness within the SSDF one year after ground temperature cables were installed.

Table 3 - Summary of SSDF Active Layer

	01-VT	02-VT	03-VT	04-VT
Depth (m) of 0°C Isotherm on August 30, 2008	1.7	2.3	2.4	2.1

Active layer measured on August 30, 2008 in SSDF ranged from 1.7 m to 2.4 m below the landfill top surface. The thickest active layer was measured at 03-VT (2.4 m) and thinnest active layer was measured at 01-VT (1.7 m). Typically, it takes several years after construction completion of a landfill/facility for thermal equilibrium to establish. Therefore, the active layers presented in Table 3 are expected to decrease in thickness over time.

Figures, analytical results, visual monitoring reports and photographic records are included on the following pages. Photo viewpoints for all photographs included in Appendix D are shown on Figure A2.



Indian & Northern Affairs Canada
CAM-F Sarcpa Lake
2008 Long Term Monitoring

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Secure Soil Disposal Facility

Figure A2

Table 4: SSDF - Soil Data

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH Identity			
														F1	F2	F3	F4
Upgradient Soil Samples																	
MW06-04	MW06-04	2006		20	20	7.4	<0.3	6	42	30	1	<0.05	<0.01	<10	<10	11	<10
952	MW06-04	2007	0	10	12	4.0	<0.9	<10	28	17	<0.7		<0.1	<10	<20	<20	<20
953	MW06-04	2007	30	12	13	4.0	<0.9	<10	29	18	<0.7		<0.1	<10	<20	<20	<20
MW06-04	MW06-04	2008	0	16	19	6.4	0.5	9	39	29	0.8	<0.5	<0.005	<10	<10	<10	<10
MW06-04	MW06-04	2008	30	16	17	6.0	<0.5	13	38	27	0.7	<0.5	<0.005	<10	<10	<10	<10
Downgradient Soil Samples																	
MW06-05	MW06-05	2006		23	20	7.6	<0.3	7	41	28	1	<0.05	<0.01	<10	<10	<10	<10
949	MW06-05	2007	0	12	13	4.0	<0.9	<10	33	19	<0.7		<0.1	<10	<20	<20	<20
950	MW06-05	2007	30	11	12	4.0	<0.9	<10	29	17	<0.7		<0.1	<10	<20	<20	<20
951	MW06-05	2007	30	13	13	4.0	<0.9	<10	31	18	<0.7		<0.1	<10	<20	<20	<20
MW06-05	MW06-05	2008	0	14	16	6.0	<0.5	9	41	26	0.6	<0.5	<0.005	<10	<10	61	22
MW06-05	MW06-05	2008	30	17	14	5.2	<0.5	8	36	24	0.6	<0.5	<0.005	<10	<10	72	61
MW06-07	MW06-05	2008	0	15	16	5.5	<0.5	8	37	25	0.6	<0.5	<0.005	<10	<10	18	<10
MW06-07	MW06-05	2008	30	15	15	5.2	<0.5	8	34	24	0.5	<0.5	<0.005	<10	<10	58	42
MW06-06	MW06-06	2006		18	20	8.0	<0.3	6	42	30	1.0	<0.05	<0.01	<10	<10	<10	<10
947	MW06-06	2007	0	9	11	4.0	<0.9	<10	29	17	<0.7		<0.1	<10	<20	<20	<20
948	MW06-06	2007	30	14	14	5.0	<0.9	<10	33	19	<0.7		<0.1	<10	<20	<20	<20
MW06-06	MW06-06	2008	0	17	20	6.8	<0.5	10	42	30	0.8	<0.5	<0.005	<10	<10	<10	<10
MW06-06	MW06-06	2008	30	26	19	6.4	0.5	9	38	29	0.8	<0.5	<0.005	<10	<10	<10	<10
	N Value			18	18	18	18	18	18	18	18	11	18	18	18	18	18
	Average			16	16	5.5	<0.9	7	36	24	0.6	<0.05	<0.005	<10	<10	<10	<10
	Minimum			9	11	4.0		<10	28	17	<0.7					<10	<10
	Maximum			26	20	8.0		13	42	30	1.0					72	61

Table 5: SSDF - Groundwater Data

Sample #	Location	Date	Cu [mg/L]	Diss. Cu [mg/L]	Ni [mg/L]	Diss. Ni [mg/L]	Co [mg/L]	Diss. Co [mg/L]	Cd [mg/L]	Diss. Cd [mg/L]	Pb [mg/L]	Diss. Pb [mg/L]	Zn [mg/L]	Diss. Zn [mg/L]	Cr [mg/L]	Diss. Cr [mg/L]	As [mg/L]	Diss. As [mg/L]	Hg [mg/L]	Diss. Hg [mg/L]
Upgradient Groundwater Samples																				
MW06-04	MW06-04	2006		0.002		0.004		0.001		<0.0001		<0.0005		<0.005		<0.005		<0.001		
MW06-04	MW06-04	2008	0.032	0.008	0.04	<0.003	0.003	0.001	0.000163	<0.000025	3.71	<0.001	0.234	0.05	0.019	<0.001	0.001	<0.001	<0.000025	<0.000025
Downgradient Groundwater Samples																				
MW06-05	MW06-05	2006		0.008		0.015		0.0017		0.0001		<0.0005		0.047		<0.005		0.001		
MW06-05	MW06-05	2007	0.006		0.009		0.002		<0.001		0.001		0.03		0.006		<0.001			
MW06-05	MW06-05	2008	0.012	0.012	0.02	0.006	0.003	0.002	0.000261	<0.000025	0.807	<0.001	0.043	0.347	0.011	<0.001	0.002	<0.001	<0.000025	<0.000025
MW06-05	MW06-07	2008	0.016	0.01	0.02	0.006	0.002	0.002	0.000307	<0.000025	1.1	<0.001	0.063	0.04	0.016	<0.001	0.002	<0.001	<0.000025	<0.000025
MW06-06	MW06-06	2006		0.004		0.003		<0.0005		<0.0001		<0.0005		0.009		<0.005		<0.001		
MW06-06	MW06-06	2007	0.013		0.022		0.002		<0.001		0.001		0.17		0.025		<0.001			
MW06-06	MW06-06	2008	0.046	0.013	0.03	0.008	0.006	0.001	0.000453	<0.000025	7.39	<0.001	6.21	6.65	0.097	<0.001	0.002	<0.001	<0.000025	<0.000025
N Value			6	7	6	7	6	7	6	7	6	7	6	7	6	7	6	7	4	4
Average			0.021	0.008	0.024	0.006	0.003	0.0010	0.000364	<0.0001	2.168	<0.001	1.125	1.020	0.029	<0.005	0.001	<0.001	<0.000025	<0.000025
Minimum			0.006	0.002	0.009	0.003	0.002	<0.0005	0.000163		0.001	<0.0005	0.030	<0.005	0.006					
Maximum			0.046	0.013	0.040	0.015	0.006	0.0020	<0.001		7.390	<0.001	6.210	6.650	0.097					

Sample #	Location	Date	PCBs [mg/L]	TPH Identity				Conductivity [µmho/cm]	pH	Colour
				F1	F2	F3	F4			
Upgradient Groundwater Samples										
MW06-04	MW06-04	2006	<0.00005					3110	7.9	
MW06-04	MW06-04	2008	<0.00001	<0.1				630	8.2	>70
Downgradient Groundwater Samples										
MW06-05	MW06-05	2006	<0.00005					847	7.8	
MW06-05	MW06-05	2007	<0.0001	<25	<0.1	<0.1	<0.1			
MW06-05	MW06-05	2008	<0.00001	<0.1				1010	8.1	60
MW06-05	MW06-07	2008	<0.00001	<0.1				1000	8.1	60
MW06-06	MW06-06	2006	<0.00005					2260	8.1	
MW06-06	MW06-06	2007	<0.0001	<25	<0.1	<0.1	<0.1			
MW06-06	MW06-06	2008	<0.00001	0.2				1060	8.0	>70
N Value			9	6	6	6	6	7	7	4
Average			<0.0001	<25	<0.1	<0.1	<0.1	1417	8.0	>70
Minimum								630	7.8	60
Maximum								3110	8.2	>70

CAM-F SARCPA LAKE
LANDFILL VISUAL INSPECTION

Date:	August 30, 2008
Landfill:	Secure Soil Disposal Facility (SSDF)

1. Erosion	Answer
a) **Is erosion occurring on the surface or berms of the landfill?**	Yes
i) Are there preferred drainage channels?	No
ii) Is there sloughing of material?	No
b) What is the extent of the erosion? *(percentage of surface area)*	< 1 %
i) Is it localized or continuous?	Localized
c) Where is the erosion occurring? South and West Facing Slopes	

d) Explanation: Minor erosion was noted on the south and west facing slopes. The slope is surfaced with granular material containing cobbles and boulders that are erosion resistant and stable. Minor erosion is due to seepage of water from the side slopes washing fines from the erosion resistant cover material. Few erosion rills and small pot holes trapping seepage water were noted on the south and west facing slopes (Photos 3,4,5,6, Figure A1).

Seepage was occurring on all side slopes approximately 2 to 2.5 m below the landfill top surface (Photos 1, 2, Figure A1). It appeared that water infiltrates though the porous cover material and seeps along frozen/unfrozen soil contact through the landfill body and on the side slopes. The seepage at the time of inspection was likely due to rainfall on August 29, 2008.

The surface runoff and seepage from the landfill surface has eroded small erosion channels near the toe of the south facing slope (Photos 1, 7 to 10, Figure A1). The erosion channels are not in direct contact with the landfill.

2. Settlement	Answer
a) Is there differential settlement occurring on the surface?	Yes
i) Are there low areas or depressions?	Yes
ii) Are voids forming?	No
b) What is the extent of the settlement? *(percentage of surface area)*	~ 3 %
i) Is it localized or continuous?	Localized
ii) How deep is it?	0.1–0.15 m
c) Where is the settlement occurring? See Figure A1 and Photos 12 and 13	

d) Explanation: Minor settlement, approximately 15mx15m and 0.1 to 0.15 m deep, was observed on the landfill surface as shown on Figure A1**.** Ponding was not noted at the time of inspection likely because surface water infiltrates though the cover material.

3. Frost Action	Answer
a) Is there frost action/damage to the landfill?	No
i) Is there exposed debris due to uplift?	No
ii) Is there tension cracking along the berms?	No
iii) Is there sorting of granular fill?	No
b) What is the extent of the frost action? *(percentage of surface area)*	
i) Is it localized or continuous?	
c) Where is the heaving/cracking occurring?	
d) Explanation:	

4. Monitoring Instruments

a) What is the condition of the monitoring wells and thermistor strings? All monitoring wells (MW06-04 to 06) were in good condition. No damage to the monitoring wells was observed (Photos 14 and 15).

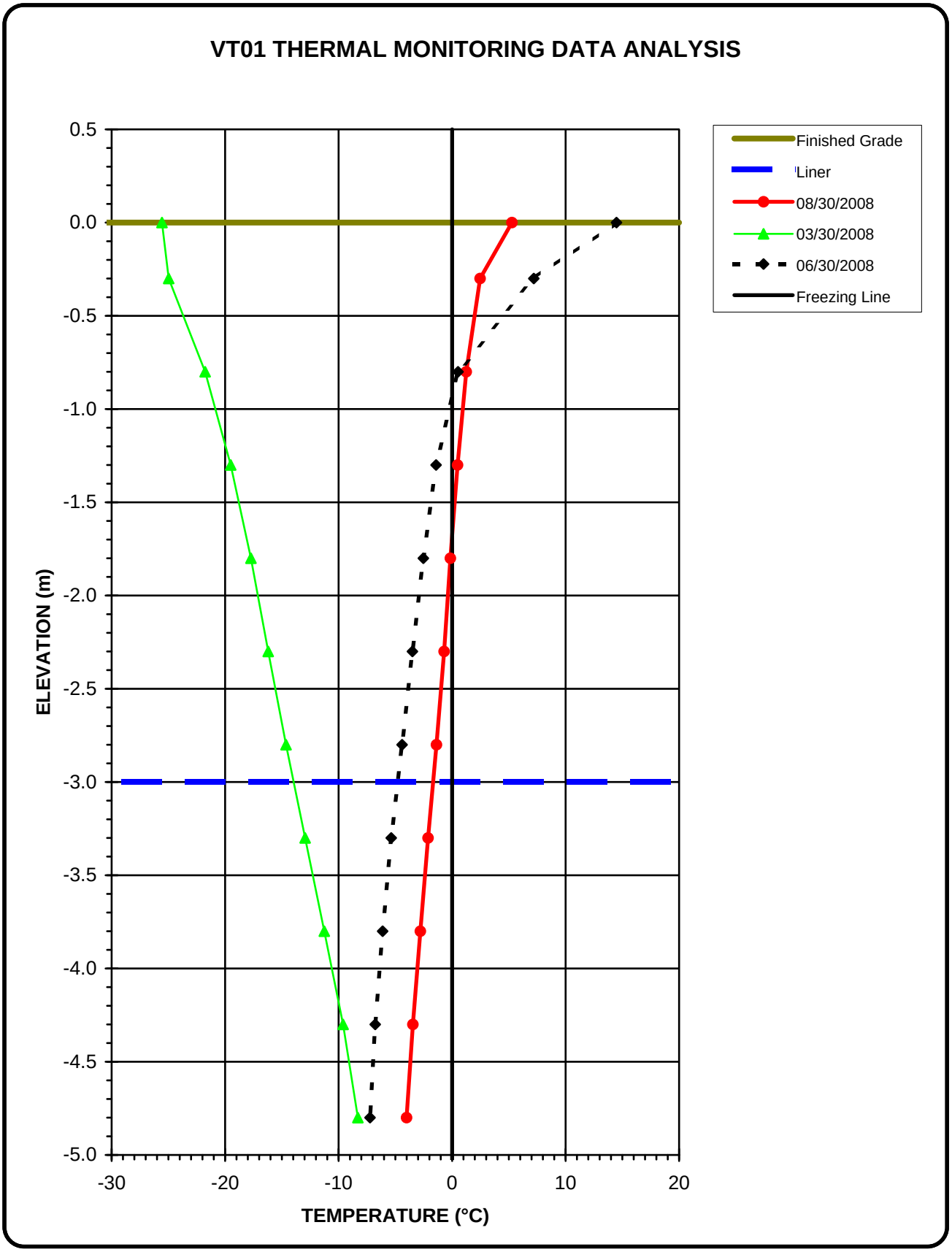
Manual readings were taken from all four thermistor strings (CAMF 01-VT to 04-VT) and ground temperature data was checked with that recorded by the data loggers. All thermistor strings, data loggers and protective casings were in good condition (Photos 16 to 19). The keys for casing locks (01-VT to 04-VT) was lost due to which the locks were broken. The casing cover was secured with duct tape and broken lock. The locks need to be replaced during 2009 inspection.

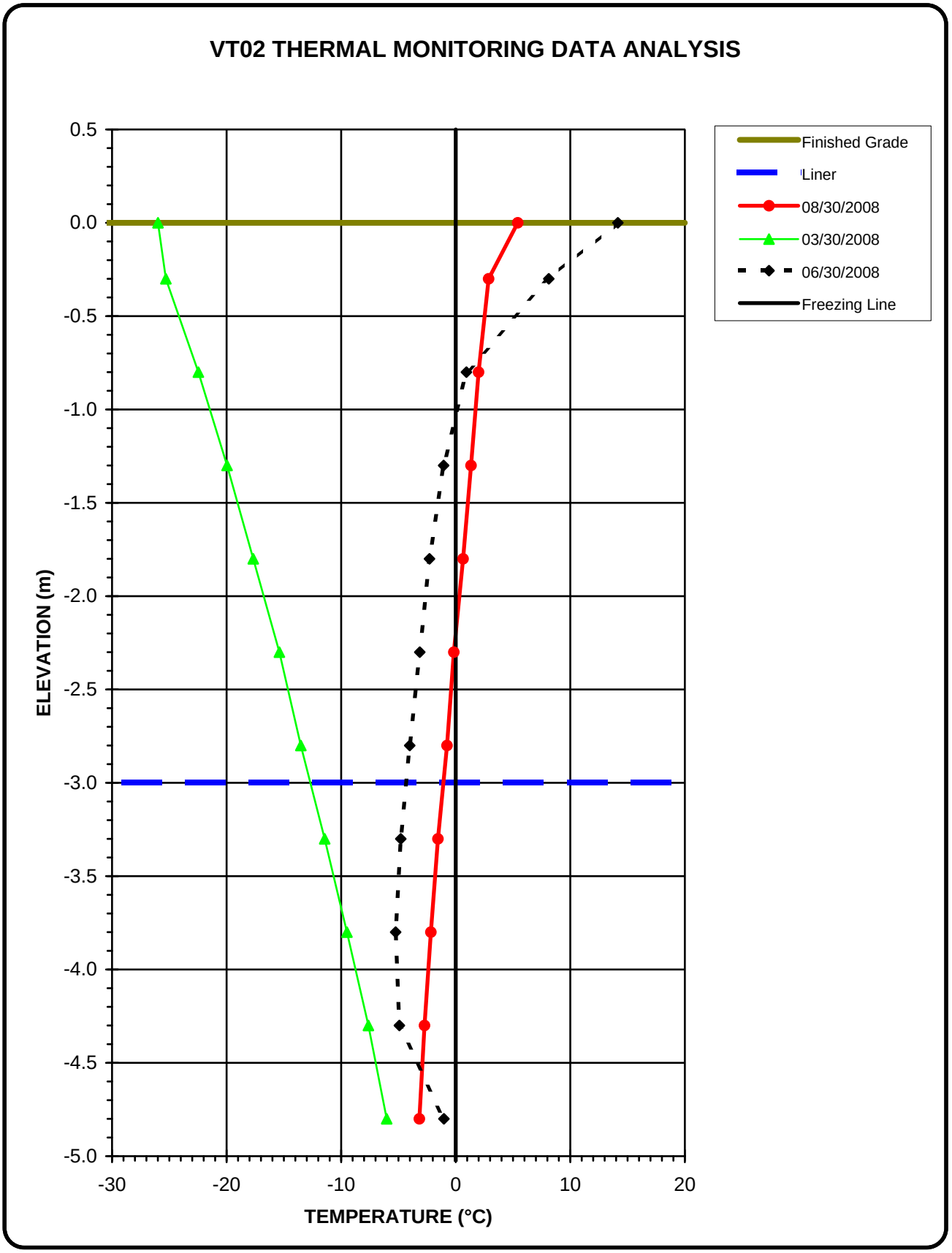
5. Sketch

See Figure A2

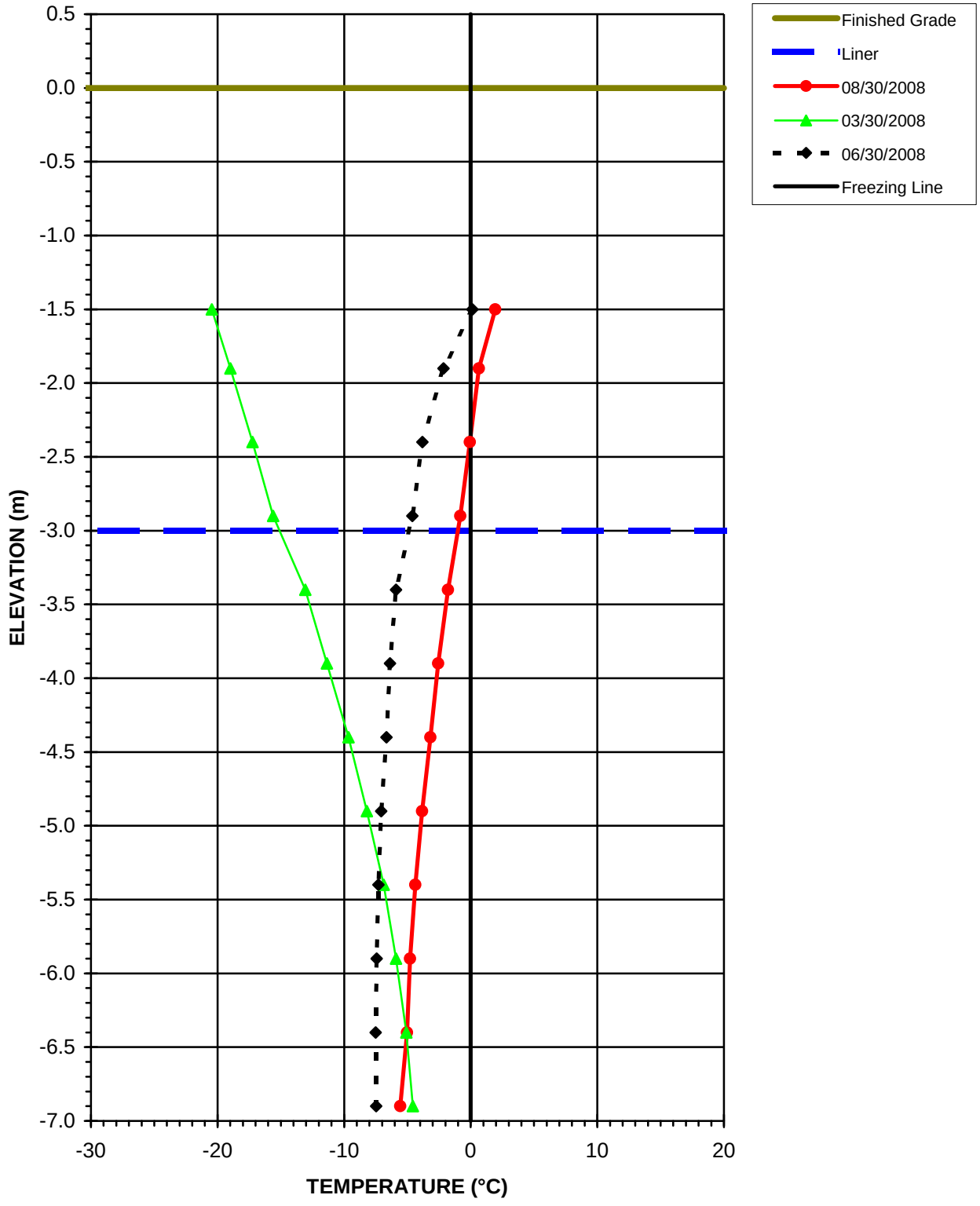
6. General Comments

Minor deviations in physical performance of the landfill were observed during inspection including minor settlement on the landfill surface, minor surface erosion and ponding near toe of the side slopes. Based on our observations during the site inspection, the noted features are of little consequence. The landfill is acceptable and is performing as designed.

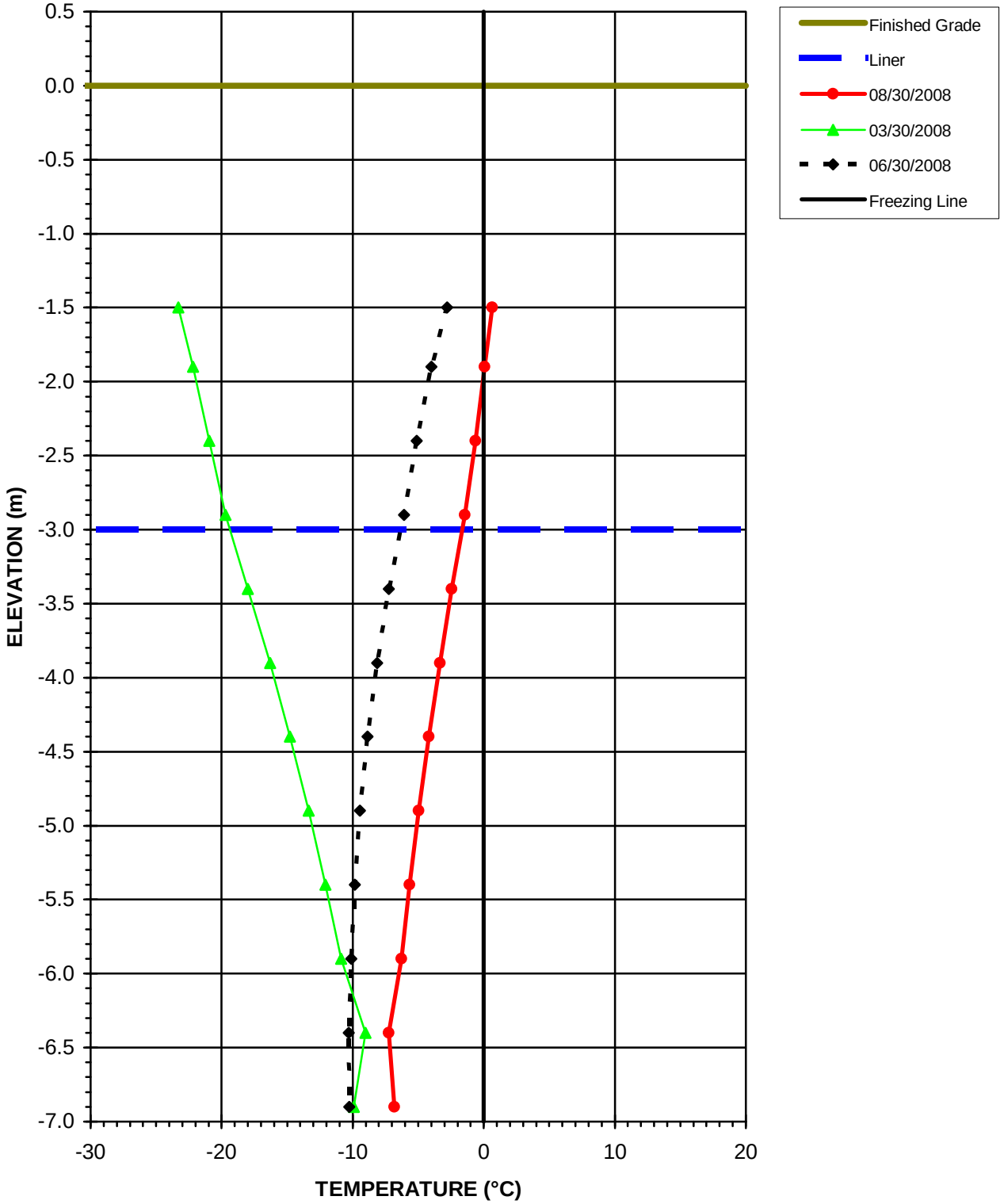

VT01 THERMAL MONITORING DATA ANALYSIS
ELEVATION (m)
TEMPERATURE (°C)
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-30
-20
-10
0
10
20
Finished Grade
Liner
08/30/2008
03/30/2008
06/30/2008
Freezing Line


VT02 THERMAL MONITORING DATA ANALYSIS
ELEVATION (m)
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-30
-20
-10
0
10
20
TEMPERATURE (°C)
Finished Grade
Liner
08/30/2008
03/30/2008
06/30/2008
Freezing Line

VT03 THERMAL MONITORING DATA ANALYSIS



VT04 THERMAL MONITORING DATA ANALYSIS



Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	30/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-F	Thermistor Location:	Secure Soil Disposal Facility		
Thermistor Number:	CAMF 01-VT	Inclination:	Vertical		
Install Date:	21/09/2007	First Date Event:	30/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m): 7605524	E (m): 405936	Elev (masl):	
Length of Cable (m):	7.8	Cable Length Above Ground (m): 3	No. of Beads: 11		
Datalogger Serial No:	07060039	Cable Serial No:			

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	30/08/2008	
Battery Levels (V)	Main 11.36	Aux 13.26

Manual Ground Temperature Readings

Bead	ohms	°C
1	12.378	5.50
2	14.357	2.53
3	15.336	1.22
4	15.954	0.45
5	16.458	-0.16
6	16.963	-0.75
7	17.528	-1.39
8	18.176	-2.09

Bead	ohms	°C
9	18.815	-2.76
10	19.456	-3.40
11	19.989	-3.92

Observations and Proposed Maintenance

Batteries changed
Key for the casing locks was not available during inspection; therefore, locks were broken. The casing cap was secured by duct tap. Need new locks next year

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	30/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-F	Thermistor Location:	Secure Soil Disposal Facility		
Thermistor Number:	CAMF 02-VT	Inclination:	Vertical		
Install Date:	23/09/2007	First Date Event:	30/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m): 7605544	E (m): 405886	Elev (masl):	
Length of Cable (m):	7.8	Cable Length Above Ground (m): 3	No. of Beads: 11		
Datalogger Serial No:	05070003		Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	30/08/2008	
Battery Levels (V)	Main 11.34	Aux 13.75

Manual Ground Temperature Readings

Bead	ohms	°C
1	11.931	6.25
2	13.949	3.10
3	14.763	1.98
4	15.282	1.30
5	15.833	0.60
6	16.466	-0.17
7	16.957	-0.75
8	17.549	-1.41

Bead	ohms	°C
9	18.143	-2.06
10	18.691	-2.63
11	19.154	-3.10

Observations and Proposed Maintenance

Batteries changed
Key for the casing locks was not available during inspection; therefore, locks were broken. The casing cap was secured by duct tap. Need new locks next year

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	30/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-F	Thermistor Location:	Secure Soil Disposal Facility		
Thermistor Number:	CAMF 03-VT	Inclination:	Vertical		
Install Date:	16/09/2007	First Date Event:	30/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m): 7605574.5	E (m): 405956.9	Elev (masl):	
Length of Cable (m):	8.4	Cable Length Above Ground (m):	1.5	No. of Beads:	12
Datalogger Serial No:	05070006		Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	30/08/2008	
Battery Levels (V)	Main 11.34	Aux 13.02

Manual Ground Temperature Readings

Bead	ohms	°C
1	14.995	1.67
2	15.886	0.53
3	16.398	-0.09
4	16.994	-0.79
5	17.872	-1.76
6	18.562	-2.50
7	19.341	-3.29
8	19.962	-3.89

Bead	ohms	°C
9	20.531	-4.43
10	20.981	-4.84
11	21.421	-5.23
12	21.891	-5.64

Observations and Proposed Maintenance

Batteries changed
Key for the casing locks was not available during inspection; therefore, locks were broken. The casing cap was secured by duct tap. Need new locks next year

Thermistor Annual Maintenace Report

Contractor Name:	UMA Engineering Ltd	**Inspection Date:**	30/08/2008
Prepared By:	Anwar Majid, P.Eng.		

Thermistor Information

Site Name:	CAM-F	Thermistor Location:	Secure Soil Disposal Facility		
Thermistor Number:	CAMF 04-VT	Inclination:	Vertical		
Install Date:	17/09/2007	First Date Event:	30/08/2008	Last Date Event:	
Coordinates and Elevation:		N (m): 7605594.1	E (m): 405906.5	Elev (masl):	
Length of Cable (m):	8.4	Cable Length Above Ground (m):	1.5	No. of Beads:	12
Datalogger Serial No:	05070020		Cable Serial No:		

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	30/08/2008	
Battery Levels (V)	Main 11.34	Aux 12.65

Manual Ground Temperature Readings

Bead	ohms	°C
1	15.808	0.63
2	16.253	0.08
3	16.840	-0.61
4	17.507	-1.37
5	18.444	-2.37
6	19.314	-3.26
7	20.070	-3.99
8	20.900	-4.77

Bead	ohms	°C
9	21.640	-5.43
10	22.380	-6.06
11	23.440	-6.93
12	22.940	-6.53

Observations and Proposed Maintenance

Batteries changed
Key for the casing locks was not available during inspection; therefore, locks were broken.
The casing capwas secured by duct tap. Need new locks next year

PHOTOGRAPHIC RECORDS

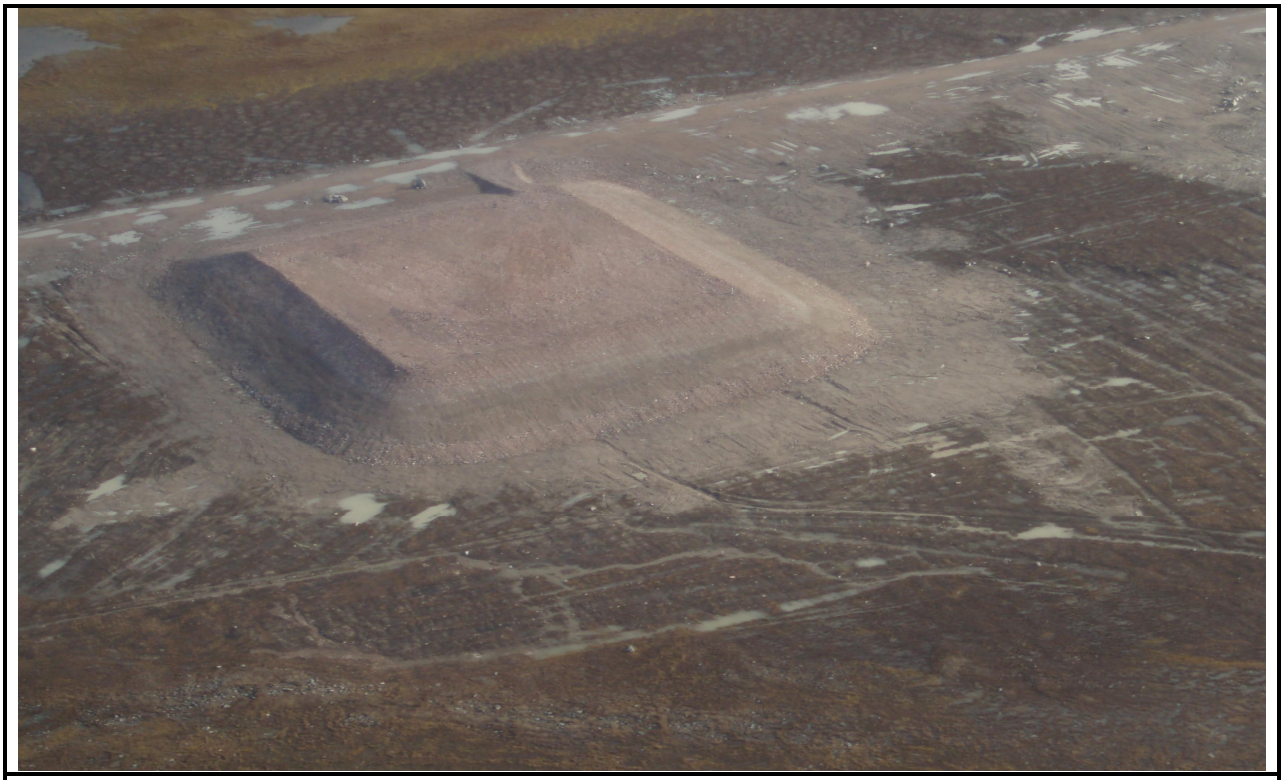


Photo 1: Picture 66 SSDF – Aerial View of the Landfill; Seepage on Sideslopes, Ponding Near the Landfill and Erosion Channels Near the South Facing Slope

Photo 2: Picture 73 SSDF – Panorama of the Landfill Looking SE

PHOTOGRAPHIC RECORDS

Photo 3: Picture 20 SSDF – Seepage/Erosion on South Facing Slope (Figure A1)

Photo 4: Picture 20 SSDF – Seepage/Erosion on South Facing Slope (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 5: Picture 9 SSDF – Seepage/Erosion on West Facing Slope (Figure A1)

Photo 6: Picture 10 SSDF – Seepage/Erosion on West Facing Slope (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 7: Picture 23 SSDF – Erosion Channel at the Toe of South Facing Slope (Figure A1)

Photo 8: Picture 24a SSDF – Erosion Channel at the Toe of South Facing Slope (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 9: Picture 24b SSDF – Erosion Channel at the Toe of South Facing Slope (Figure A1)

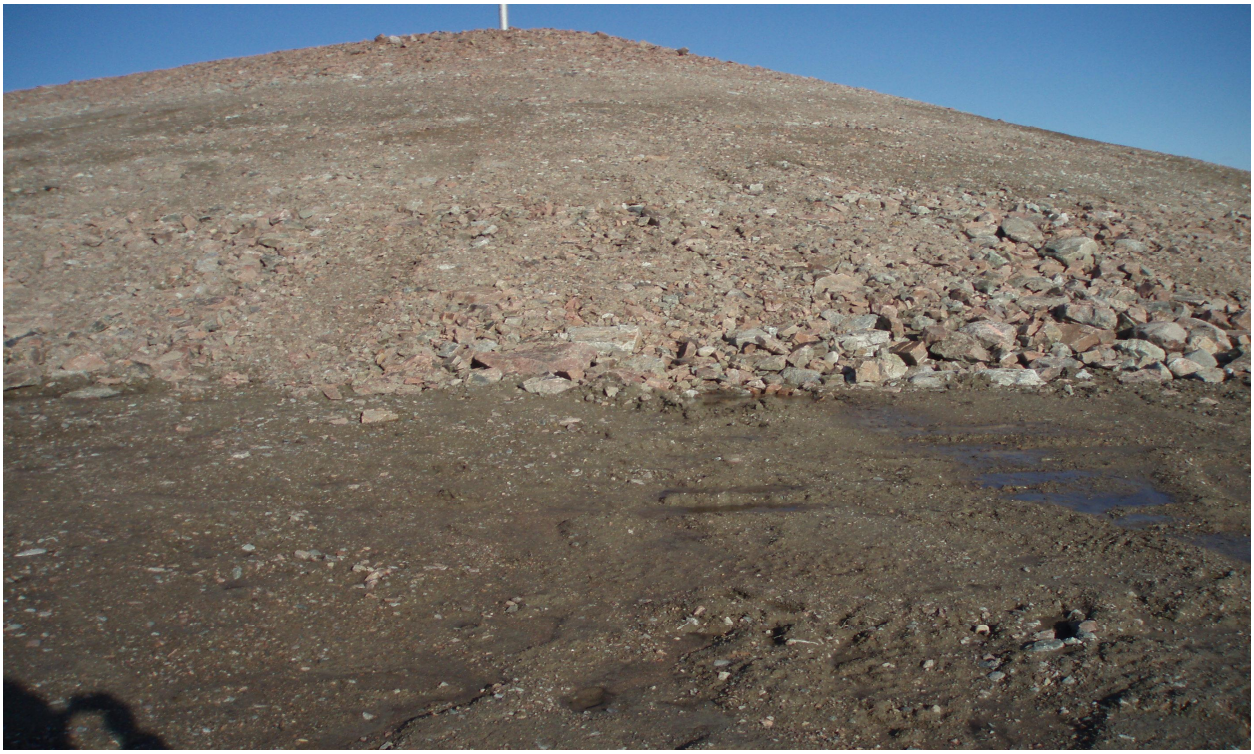


Photo 10: Picture 15 SSDF – Erosion Channel at the Toe of South Facing Slope (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 11: Picture 62 SSDF – Left Over Debris on Landfill Surface (Figure A1)

Photo 12: Picture 63 SSDF – Minor Settlement (15mx15mx0.10-0.15m) on Landfill Surface (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 13: Picture 64 SSDF – Minor Settlement (15mx15mx0.10-0.15m) on Landfill Surface (Figure A1)

Photo 14: Picture 22 SSDF – MW06-05 (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 15: Picture 22 SSDF – MW06-06 (Figure A1)

Photo 16: Picture 45 SSDF – VT-1 (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 17: Picture 45 SSDF – VT-2 (Figure A1)

Photo 18: Picture 43 SSDF – VT-3 (Figure A1)

PHOTOGRAPHIC RECORDS

Photo 19: Picture 43 SSDF – VT-4 (Figure A1)

Appendix A

2008 Laboratory Results

AGAT Laboratories

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PH: (403)735-2005
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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME BTEX/F1/F2 in Water

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Benzene	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Toluene	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes	mg/L		0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
C6 - C10 (F1)	mg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
C6 - C10 (F1 minus BTEX)	mg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
C10 - C16	mg/L		0.1	<0.1	<0.1	0.2	0.1	<0.1

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

1065842-1065854
The F1 (C6 - C10) fraction is determined by integrating the FID chromatogram from the beginning of the n-C6 peak to the apex of the last n-C10 peak.
The C6 - C10 fraction is calculated from the FID toluene response factor.
The F2 (C10 - C16) fraction is determined by integrating the FID chromatogram from the apex of the n-C10 peak to the apex of the n-C16 peak.
The F2 (C10 - C16) fraction is calculated using the average response factor for n-C10, n-C16, and n-C34.
Quality control for the calibration follows the guidelines set out in the CCME Contaminated Sites Method for Soils.
The (F1 minus BTEX) has been calculated by subtracting the BTEX concentration from Fraction 1.

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Polychlorinated Biphenyls Analysis - Water

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Polychlorinated Biphenyls	µg/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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

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AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Polychlorinated Biphenyls Analysis [by Aroclor]

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
PCB 1242	ug/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 1254	ug/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCB 1260	ug/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PCBs, Total	ug/L		0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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

1065842-1065854 Analysis multiple peak pattern method by GC/ECD.

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AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Total Petroleum Hydrocarbon Analysis - Water

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Total Purgeable Hydrocarbons	mg/L		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Extractable Hydrocarbons	mg/L		0.1	<0.1	<0.1	0.2	<0.1	<0.1
Total Petroleum Hydrocarbons	mg/L		0.1	<0.1	<0.1	0.2	<0.1	<0.1

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

1065842
Recovery of toluene-d8 surrogate added to sample prior to TPGH analysis: 103%
Total Petroleum Hydrocarbons (TPH, n-C5 - n-C32); Calculated based on addition of n-C5 to n-C10 fraction (purgeable method) and n-C10 to n-C32 fraction (TEH extraction).
Total Extractable Hydrocarbons (TEH, n-C10 - n-C32); Calculated based on all extractable compounds using n-eicosane response.
Total Purgeable Hydrocarbons (TPGH, n- C5 - n-C10); Calculated based on all purgeable compounds using toluene response.
Sample is blank corrected.

1065846
Recovery of toluene-d8 surrogate added to sample prior to TPGH analysis: 105 %
Total Petroleum Hydrocarbons (TPH, n-C5 - n-C32); Calculated based on addition of n-C5 to n-C10 fraction (purgeable method) and n-C10 to n-C32 fraction (TEH extraction).
Total Extractable Hydrocarbons (TEH, n-C10 - n-C32); Calculated based on all extractable compounds using n-eicosane response.
Total Purgeable Hydrocarbons (TPGH, n- C5 - n-C10); Calculated based on all purgeable compounds using toluene response.
Sample is blank corrected.

1065848-1065853
Recovery of toluene-d8 surrogate added to sample prior to TPGH analysis: 102 %
Total Petroleum Hydrocarbons (TPH, n-C5 - n-C32); Calculated based on addition of n-C5 to n-C10 fraction (purgeable method) and n-C10 to n-C32 fraction (TEH extraction).
Total Extractable Hydrocarbons (TEH, n-C10 - n-C32); Calculated based on all extractable compounds using n-eicosane response.
Total Purgeable Hydrocarbons (TPGH, n- C5 - n-C10); Calculated based on all purgeable compounds using toluene response.
Sample is blank corrected.

1065854
Recovery of toluene-d8 surrogate added to sample prior to TPGH analysis:101 %
Total Petroleum Hydrocarbons (TPH, n-C5 - n-C32); Calculated based on addition of n-C5 to n-C10 fraction (purgeable method) and n-C10 to n-C32 fraction (TEH extraction).
Total Extractable Hydrocarbons (TEH, n-C10 - n-C32); Calculated based on all extractable compounds using n-eicosane response.
Total Purgeable Hydrocarbons (TPGH, n- C5 - n-C10); Calculated based on all purgeable compounds using toluene response.
Sample is blank corrected.

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Metals (Dissolved)

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Dissolved Aluminum	mg/L	0.005	0.002	**0.016**	**0.052**	**0.033**	**0.014**	<0.002
Dissolved Antimony	mg/L	NA	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Arsenic	mg/L	0.005	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Barium	mg/L	NA	0.001	0.006	0.045	0.031	0.021	0.001
Dissolved Boron	mg/L		0.01	0.10	0.07	0.06	0.07	<0.01
Dissolved Cadmium	mg/L	0.000017	0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025
Dissolved Chromium	mg/L	0.05	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.002	0.002	**0.008**	**0.012**	**0.013**	**0.010**	<0.002
Dissolved Iron	mg/L	0.3	0.001	0.008	0.021	0.045	0.004	0.001
Dissolved Lead	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Manganese	mg/L		0.001	0.017	0.013	0.095	0.012	<0.001
Dissolved Mercury (Low Level)	mg/L	0.000026	0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025
Dissolved Molybdenum	mg/L	0.073	0.003	0.007	<0.003	0.007	<0.003	<0.003
Dissolved Nickel	mg/L	0.025	0.003	<0.003	0.006	0.008	0.006	<0.003
Dissolved Selenium	mg/L	0.001	0.001	**0.002**	**0.004**	**0.002**	<0.001	<0.001
Dissolved Silver	mg/L	0.0001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dissolved Sodium	mg/L		0.6	35.2	34.5	69.6	33.2	0.7
Dissolved Thallium	mg/L	0.0008	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Uranium	mg/L	NA	0.001	0.034	0.102	0.054	0.104	<0.001
Dissolved Zinc	mg/L	0.03	0.001	**0.050**	**0.347**	**6.65**	**0.040**	0.003

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME 2007 (FWAL)

1065842-1065854 < - Values refer to Method Detection Limit.

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Metals (Total)

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	RDL	MW06-06 1065848	RDL	MW06-07 1065853	MW06-08 1065854
Total Aluminum	mg/L		0.002	3.94	0.672	0.002	6.63	0.002	0.997	<0.002
Total Antimony	mg/L		0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Total Arsenic	mg/L		0.001	0.001	0.002	0.001	0.002	0.001	0.002	<0.001
Total Barium	mg/L		0.001	0.020	0.016	0.001	0.062	0.001	0.023	<0.001
Total Boron	mg/L		0.01	0.02	0.02	0.01	0.04	0.01	0.02	<0.01
Total Cadmium	mg/L		0.000025	0.000163	0.000261	0.000025	0.000453	0.000025	0.000307	<0.000025
Total Chromium	mg/L		0.001	0.019	0.011	0.001	0.097	0.001	0.016	<0.001
Total Copper	mg/L		0.002	0.032	0.012	0.002	0.046	0.002	0.016	0.017
Total Iron	mg/L		0.001	3.71	0.807	0.001	7.39	0.001	1.10	0.001
Total Lead	mg/L		0.001	0.008	0.002	0.001	0.008	0.001	0.010	<0.001
Total Manganese	mg/L		0.001	0.095	0.020	0.001	0.217	0.001	0.027	<0.001
Total Mercury (Low Level)	mg/L		0.000025	<0.000025	<0.000025	0.000025	<0.000025	0.000025	<0.000025	<0.000025
Total Molybdenum	mg/L		0.003	0.010	<0.003	0.003	0.005	0.003	0.003	<0.003
Total Nickel	mg/L		0.01	0.04	0.02	0.01	0.03	0.01	0.02	<0.01
Total Selenium	mg/L		0.001	<0.001	0.001	0.001	0.002	0.001	0.002	<0.001
Total Silver	mg/L		0.00005	0.00026	0.00008	0.00005	0.00039	0.00005	0.00047	<0.00005
Total Thallium	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005	<0.0005
Total Uranium	mg/L		0.001	0.056	0.130	0.001	0.083	0.001	0.123	<0.001
Total Zinc	mg/L		0.001	0.234	0.043	0.010	6.21	0.001	0.063	0.013

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME FWAL

1065842-1065854 < - Values refer to Method Detection Limit.

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Routine Chemistry Water Analysis - UMA

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	RDL	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	RDL	MW06-08 1065854
pH		6.5-8.5	NA	8.2	NA	8.1	8.0	8.1	NA	7.4
p - Alkalinity (as CaCO3)	mg/L		5	<5	5	<5	<5	<5	5	<5
T - Alkalinity (as CaCO3)	mg/L		5	141	5	186	268	186	5	<5
Bicarbonate	mg/L		5	141	5	186	268	186	5	<5
Carbonate	mg/L		5	<5	5	<5	<5	<5	5	<5
Hydroxide	mg/L		5	<5	5	<5	<5	<5	5	<5
Electrical Conductivity	uS/cm		1	630	1	1010	1060	1000	1	1
Chloride	mg/L	250	0.03	12.4	0.03	35.8	22.6	37.0	0.03	0.19
Fluoride	mg/L	1.5	0.01	0.51	0.01	0.53	0.36	0.49	0.01	<0.01
Nitrate	mg/L	45	0.08	3.47	0.08	6.52	2.96	6.29	0.08	<0.08
Nitrite	mg/L	3.2	0.03	<0.03	0.03	<0.03	<0.03	<0.03	0.03	<0.03
Sulfate	mg/L	500	0.03	168	0.30	314	304	314	0.03	0.22
Dissolved Calcium	mg/L		0.3	35.2	0.3	89.8	90.1	90.9	0.3	<0.3
Dissolved Magnesium	mg/L		0.2	27.3	0.2	67.8	39.1	68.2	0.2	<0.2
Dissolved Sodium	mg/L	200	0.6	44.8	0.6	34.5	69.6	33.2	0.6	0.7
Dissolved Potassium	mg/L		0.6	4.3	0.6	6.9	6.4	6.7	0.6	<0.6
Dissolved Iron	mg/L		0.001	0.008	0.001	0.021	0.045	0.004	0.001	0.001
Dissolved Manganese	mg/L	0.05	0.001	0.017	0.001	0.013	**0.095**	0.012	0.001	<0.001
Colour	Colour Units		5	>70	5	60	>70	60	5	<5
% Difference Cation/Anion	%			1.50		4.44	2.35	4.42		
Anion Sum (Water)	meq/L			6.24		10.7	11.4	10.8		
Calculated Electrical Conductivity	uS/cm			624		1160	1140	1160		
Calculated TDS	mg/L			381		667	696	668		
Cation Sum (Water)	meq/L			6.06		11.7	10.9	11.7		
Ion Balance				0.970		1.09	0.954	1.09		
Nitrate + Nitrite (as Nitrogen)	mg/L			0.784		1.47	0.669	1.42		<0.017
Nitrate-N	mg/L			0.784		1.47	0.669	1.42		<0.017
Nitrite-N	mg/L			<0.009		<0.009	<0.009	<0.009		<0.009
Total Hardness	mg CaCO3/L			200		503	386	508		<1

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Routine Chemistry Water Analysis - UMA

DATE SAMPLED: Aug 30, 2008	DATE RECEIVED: Sep 03, 2008	DATE REPORTED: Sep 22, 2008	SAMPLE TYPE: Water

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME 2007 (D Water)

1065842-1065854 < - Values refer to Method Detection Limits.

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Water Analysis - Dissolved Co

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Dissolved Cobalt	mg/L		0.001	0.001	0.002	0.001	0.002	<0.001

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

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Water Analysis - Total Co

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 22, 2008** | **SAMPLE TYPE: Water**

	Unit	G / S	RDL	MW06-04 1065842	MW06-05 1065846	MW06-06 1065848	MW06-07 1065853	MW06-08 1065854
Total Cobalt	mg/L		0.001	0.003	0.003	0.006	0.002	<0.001

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

Certified By:

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Guideline Violation

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

SAMPLE ID	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1065842	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Aluminum	0.005	0.016
1065842	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Copper	0.002	0.008
1065842	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Selenium	0.001	0.002
1065842	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Zinc	0.03	0.050
1065846	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Aluminum	0.005	0.052
1065846	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Copper	0.002	0.012
1065846	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Selenium	0.001	0.004
1065846	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Zinc	0.03	0.347
1065848	CCME 2007 (D Water)	Routine Chemistry Water Analysis - UMA	Dissolved Manganese	0.05	0.095
1065848	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Aluminum	0.005	0.033
1065848	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Copper	0.002	0.013
1065848	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Selenium	0.001	0.002
1065848	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Zinc	0.03	6.65
1065853	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Aluminum	0.005	0.014
1065853	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Copper	0.002	0.010
1065853	CCME 2007 (FWAL)	CCME Metals (Dissolved)	Dissolved Zinc	0.03	0.040

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Certificate of Analysis

AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Metals (soil)

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 10, 2008** | **SAMPLE TYPE: Soil**

	Unit	G / S	RDL	MW06-01 - 0-0.15m 1065965	MW06-01 - 0. 35-0.5m 1065967	MW06-02 - 0-0.15m 1065968	MW06-02 - 0. 35-0.5m 1065971	MW06-03 - 0-0.15m 1065972	MW06-03 - 0. 35-0.5m 1065974	MW06-04 - 0-0.15m 1065975	MW06-04 - 0. 35-0.5m 1065976
Antimony	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	mg/kg	12	0.5	0.7	0.7	0.5	1.0	0.7	0.8	0.8	0.7
Barium	mg/kg	750	0.5	41.7	43.5	41.5	45.6	69.5	76.9	49.6	47.3
Beryllium	mg/kg	4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Chromium	mg/kg	64	0.5	25.0	25.7	14.3	30.0	24.0	27.3	29.1	26.9
Cobalt	mg/kg	40	0.5	5.8	5.5	3.3	6.1	7.4	6.7	6.4	6.0
Copper	mg/kg	63	0.5	12.9	14.0	11.6	20.3	19.1	15.1	16.2	16.4
Lead	mg/kg	70	0.5	8.0	8.5	4.4	6.6	11.4	10.2	8.9	12.5
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	50	0.5	16.1	16.3	9.2	19.2	16.3	17.3	19.0	17.4
Selenium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	1.2	0.9	<0.5	0.7	1.3	1.0	0.9	1.0
Uranium	mg/kg	23	0.5	1.6	1.8	6.6	1.5	2.1	2.0	2.4	2.4
Vanadium	mg/kg	130	0.5	21.6	22.0	12.7	21.3	27.2	27.0	25.1	23.5
Zinc	mg/kg	200	1	37	34	30	33	49	43	39	38

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AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Metals (soil)

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 10, 2008** | **SAMPLE TYPE: Soil**

	Unit	G / S	RDL	MW06-05 - 0-0.15m 1065977	MW06-05 - 0. 35-0.5m 1065978	MW06-06 - 0-0.15m 1065979	MW06-06 - 0. 35-0.5m 1065980	MW06-07 - 0-0.15m 1065981	MW06-07 - 0. 35-0.5m 1065982
Antimony	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	mg/kg	12	0.5	0.6	0.6	0.8	0.8	0.6	0.5
Barium	mg/kg	750	0.5	46.0	42.8	57.2	52.8	43.4	42.2
Beryllium	mg/kg	4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	26.3	23.8	30.0	28.6	24.9	24.1
Cobalt	mg/kg	40	0.5	6.0	5.2	6.8	6.4	5.5	5.2
Copper	mg/kg	63	0.5	14.2	16.8	17.4	26.3	14.7	15.4
Lead	mg/kg	70	0.5	9.0	7.7	9.9	8.5	8.0	7.9
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	50	0.5	16.4	14.4	19.6	19.1	15.5	14.7
Selenium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Tin	mg/kg	5	0.5	0.9	0.8	1.0	1.1	1.0	0.9
Uranium	mg/kg	23	0.5	5.1	6.7	2.6	2.2	6.6	7.5
Vanadium	mg/kg	130	0.5	22.6	20.9	26.3	25.3	21.7	20.5
Zinc	mg/kg	200	1	41	36	42	38	37	34

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME 2007 (Ag,F)

1065965-1065982 Results are based on the dry weight of the sample.

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AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Petroleum Hydrocarbons in Soil (CWS)

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 10, 2008** | **SAMPLE TYPE: Soil**

	Unit	G / S	RDL	MW06-01 - 0-0.15m 1065965	MW06-01 - 0. 35-0.5m 1065967	MW06-02 - 0-0.15m 1065968	MW06-02 - 0. 35-0.5m 1065971	MW06-03 - 0-0.15m 1065972	MW06-03 - 0. 35-0.5m 1065974	MW06-04 - 0-0.15m 1065975	MW06-04 - 0. 35-0.5m 1065976
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg	210	10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg	150	10	<10	<10	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg	1300	10	<10	38	114	<10	<10	<10	<10	<10
C34 - C50 (F4)	mg/kg	5600	10	<10	94	70	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	14	10	39	9	14	5	10	9

	Unit	G / S	RDL	MW06-05 - 0-0.15m 1065977	MW06-05 - 0. 35-0.5m 1065978	MW06-06 - 0-0.15m 1065979	MW06-06 - 0. 35-0.5m 1065980	MW06-07 - 0-0.15m 1065981	MW06-07 - 0. 35-0.5m 1065982
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg	210	10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg	150	10	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg	1300	10	61	72	<10	<10	18	58
C34 - C50 (F4)	mg/kg	5600	10	22	61	<10	<10	<10	42
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	24	31	10	10	23	23

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AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

CCME Petroleum Hydrocarbons in Soil (CWS)

DATE SAMPLED: Aug 30, 2008	DATE RECEIVED: Sep 03, 2008	DATE REPORTED: Sep 10, 2008	SAMPLE TYPE: Soil

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to CCME 2007 (Ag,F)

1065965-1065982

Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.

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AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

CLIENT NAME: UMA ENGINEERING LTD.

ATTENTION TO: Nick Oke

Polychlorinated Biphenyls Analysis [by Aroclor]

DATE SAMPLED: Aug 30, 2008 | **DATE RECEIVED: Sep 03, 2008** | **DATE REPORTED: Sep 10, 2008** | **SAMPLE TYPE: Soil**

	Unit	G / S	RDL	MW06-01 - 0-0.15m 1065965	MW06-01 - 0. 35-0.5m 1065967	MW06-02 - 0-0.15m 1065968	MW06-02 - 0. 35-0.5m 1065971	MW06-03 - 0-0.15m 1065972	MW06-03 - 0. 35-0.5m 1065974	MW06-04 - 0-0.15m 1065975	MW06-04 - 0. 35-0.5m 1065976
PCB 1242	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 1254	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 1260	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCBs, Total	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

	Unit	G / S	RDL	MW06-05 - 0-0.15m 1065977	MW06-05 - 0. 35-0.5m 1065978	MW06-06 - 0-0.15m 1065979	MW06-06 - 0. 35-0.5m 1065980	MW06-07 - 0-0.15m 1065981	MW06-07 - 0. 35-0.5m 1065982
PCB 1242	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 1254	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 1260	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCBs, Total	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

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

1065965-1065982 Analysis multiple peak pattern method by GC/ECD.

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Appendix B

QA/QC Results

QA/QC RESULTS

During the 2008 program, 1 field water duplicate and 2 field soil duplicates were collected and analyzed to provide an indication of overall sampling and analytical precision. Relative percent differences (RPDs) were calculated for the arctic suite of parameters in each sample. The results of these calculations are summarized in the table that follows.

All soil samples fell within acceptable RPD limits (35% for metals and 50% for PHCs and PCBs) with one exception. The surface soil sample for F3 PHC had an RPD of 109%. This result is considered not strictly valid because the sample concentration is not >10 times the method detection limit.

The groundwater results for copper, dissolved copper, cobalt, lead, zinc, dissolved zinc and chromium were all above the accepted 25% RPD limit. However, the water samples had quite high colour readings, suggesting that there was large amounts of suspended solids in the samples. This would mean homogenization between the two samples would have been difficult. All other parameters were within acceptable limits (25% for general chemistry and 40% for PHCs and PCBs).

All laboratory QA/QC results were within acceptable QA/QC limits. The laboratory QA/QC results are included at the end of this appendix and in Appendix D on the CD.

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Quality Assurance

CLIENT NAME: UMA ENGINEERING LTD.

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

ATTENTION TO: Nick Oke

Trace Organics Analysis

RPT Date: Sep 22, 2008			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Petroleum Hydrocarbon Analysis - Water															
Total Purgeable Hydrocarbons (mg/L)	2513				0.0%	< 0.1	93%	70%	130%	99%	70%	130%	87%	70%	130%
Total Extractable Hydrocarbons (mg/L)	244				0.0%	< 0.1	98%	70%	130%	98%	70%	130%	99%	60%	140%
CCME BTEX/F1/F2 in Water															
Benzene (mg/L)	2513				0.0%	< 0.0005	84%	80%	120%	83%	80%	120%	105%	70%	130%
Toluene (mg/L)	2513				0.0%	< 0.0005	90%	80%	120%	87%	80%	120%	108%	70%	130%
Ethylbenzene (mg/L)	2513				0.0%	< 0.0005	86%	80%	120%	86%	80%	120%	103%	70%	130%
Xylenes (mg/L)	2513				0.0%	< 0.0005	92%	80%	120%	88%	80%	120%	105%	70%	130%
C6 - C10 (F1) (mg/L)	2513				0.0%	< 0.1	93%	80%	120%	99%	80%	120%	87%	70%	130%
C10 - C16 (mg/L)	244				0.0%	< 0.1	96%	70%	130%	97%	70%	130%	99%	70%	130%
Polychlorinated Biphenyls Analysis - Water															
Polychlorinated Biphenyls (µg/L)	1534				0.0%	< 0.01	102%	70%	130%	89%	70%	130%			
Polychlorinated Biphenyls Analysis [by Aroclor]															
PCB 1242 (ug/L)	1534				0.0%	< 0.01	108%	70%	130%	92%	70%	130%			
PCB 1254 (ug/L)	1534				0.0%	< 0.01	108%	70%	130%	83%	70%	130%			
PCB 1260 (ug/L)	1534				0.0%	< 0.01	90%	70%	130%	90%	70%	130%			
PCBs, Total (ug/L)	1534				0.0%	< 0.01	102%	70%	130%	89%	70%	130%			

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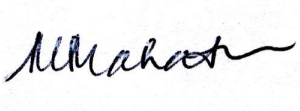

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Quality Assurance

CLIENT NAME: UMA ENGINEERING LTD.

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

ATTENTION TO: Nick Oke

Water Analysis

RPT Date: Sep 22, 2008			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Routine Chemistry Water Analysis - UMA															
pH	1223	605	8.6	8.7	1.2%		100%	90%	110%						
T - Alkalinity (as CaCO3) (mg/L)	1223	605	569	570	0.2%	< 5	106%	90%	110%						
Chloride (mg/L)	3739		3.74	3.75	0.3%	< 0.03	90%	90%	110%				92%	90%	110%
Fluoride (mg/L)	3739		0.48	0.47	2.1%	< 0.01	96%	90%	110%				101%	90%	110%
Nitrate (mg/L)	3739		4.46	4.43	0.7%	< 0.08	100%	90%	110%				101%	90%	110%
Nitrite (mg/L)	3739		3.63	3.62	0.3%	< 0.03	93%	90%	110%				96%	90%	110%
Sulfate (mg/L)	6012				1.0%	< 0.03	100%	90%	110%				103%	90%	110%
Dissolved Calcium (mg/L)	6012				0.1%	< 0.3	100%	90%	110%				104%	90%	110%
Dissolved Magnesium (mg/L)	6012				0.6%	< 0.2	99%	90%	110%				100%	90%	110%
Dissolved Sodium (mg/L)	6012				1.0%	< 0.6	99%	90%	110%				100%	90%	110%
Dissolved Potassium (mg/L)	6012				2.7%	< 0.6	100%	90%	110%				103%	90%	110%
Dissolved Iron (mg/L)	6012				22.2%	< 0.001	99%	90%	110%				94%	90%	110%
Dissolved Manganese (mg/L)	6012				0.0%	< 0.001	98%	90%	110%				100%	90%	110%
Colour (Colour Units)	5686		>70	>70	0.0%	< 5	100%	90%	110%						
Comments: N/A - Not Available.															
CCME Metals (Dissolved)															
Dissolved Aluminum (mg/L)	6102				0.0%	< 0.002	99%	90%	110%				101%	90%	110%
Dissolved Antimony (mg/L)	994				0.0%	< 0.001	105%	90%	110%				98%	75%	125%
Dissolved Arsenic (mg/L)	994				0.0%	< 0.001	101%	90%	110%				97%	75%	125%
Dissolved Barium (mg/L)	6102				2.4%	< 0.001	102%	90%	110%				104%	90%	110%
Dissolved Boron (mg/L)	994				2.3%	< 0.01	102%	90%	110%				94%	75%	125%
Dissolved Cadmium (mg/L)	994				0.0%	<	98%	90%	110%				100%	90%	110%
Dissolved Chromium (mg/L)	994				0.0%	< 0.001	99%	90%	110%				93%	90%	110%
Dissolved Copper (mg/L)	6102				0.0%	< 0.002	101%	90%	110%				102%	90%	110%
Dissolved Iron (mg/L)	6102				0.0%	< 0.001	100%	80%	120%				96%	75%	125%
Dissolved Lead (mg/L)	994				0.0%	< 0.001	97%	90%	110%				103%	75%	125%
Dissolved Manganese (mg/L)	6102				0.0%	< 0.001	100%	90%	110%				97%	90%	110%
Dissolved Mercury (Low Level) (mg/L)	7				0.0%	<	99%	90%	110%	112%	80%	120%	99%	85%	115%
Dissolved Molybdenum (mg/L)	6102				0.0%	< 0.003	104%	90%	110%				99%	90%	110%
Dissolved Nickel (mg/L)	6102				0.0%	< 0.003	98%	90%	110%				96%	90%	110%
Dissolved Selenium (mg/L)	994				10.7%	< 0.001	95%	90%	110%				101%	75%	125%
Dissolved Silver (mg/L)	994				0.0%	< 0.00001	101%	90%	110%				99%	75%	125%
Dissolved Sodium (mg/L)	6102				4.3%	< 0.6	96%	90%	110%				101%	90%	110%
Dissolved Thallium (mg/L)	994				18.2%	< 0.0001	94%	90%	110%				102%	75%	125%

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Quality Assurance

CLIENT NAME: UMA ENGINEERING LTD.

AGAT WORK ORDER: 08C291381

PROJECT NO: 4440-079-00 CAM-F

ATTENTION TO: Nick Oke

Water Analysis (Continued)

RPT Date: Sep 22, 2008			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Uranium (mg/L)	994				1.5%	< 0.001	97%	90%	110%				102%	75%	125%
Dissolved Zinc (mg/L)	6102				0.0%	< 0.001	101%	90%	110%				105%	90%	110%
Water Analysis - Dissolved Co															
Dissolved Cobalt (mg/L)	616				0.0%	< 0.001	101%	90%	110%				96%	90%	110%
CCME Metals (Total)															
Total Aluminum (mg/L)	6105				0.0%	< 0.002	100%	90%	110%				105%	90%	110%
Total Antimony (mg/L)	1000				22.0%	< 0.001	94%	80%	120%				90%	75%	125%
Total Arsenic (mg/L)	1000				17.0%	< 0.001	104%	80%	120%				101%	75%	125%
Total Barium (mg/L)	6105				0.0%	< 0.001	102%	90%	110%				104%	90%	110%
Total Boron (mg/L)	1000				0.0%	< 0.01	110%	80%	120%				102%	75%	125%
Total Cadmium (mg/L)	1000				0.0%	<	95%	80%	120%				92%	75%	125%
Total Chromium (mg/L)	1000				0.0%	< 0.001	93%	90%	110%				92%	90%	110%
Total Copper (mg/L)	6105				0.0%	< 0.002	100%	90%	110%				99%	90%	110%
Total Iron (mg/L)	6105				0.0%	< 0.001	100%	90%	110%				97%	90%	110%
Total Lead (mg/L)	1000				21.5%	< 0.001	112%	80%	120%				106%	75%	125%
Total Manganese (mg/L)	6105				0.0%	< 0.001	100%	90%	110%				97%	90%	110%
Total Mercury (Low Level) (mg/L)	13				7.1%	<	97%	90%	110%	97%	90%	110%	96%	85%	115%
Total Molybdenum (mg/L)	6105				0.0%	< 0.003	102%	90%	110%				97%	90%	110%
Total Nickel (mg/L)	6105				0.0%	< 0.01	98%	90%	110%				97%	90%	110%
Total Selenium (mg/L)	1000				0.0%	< 0.001	104%	80%	120%				107%	75%	125%
Total Silver (mg/L)	1000				0.0%	< 0.00005	109%	80%	120%				102%	75%	125%
Total Thallium (mg/L)	1000				1.7%	< 0.0005	110%	90%	110%				106%	90%	110%
Total Uranium (mg/L)	1000				0.0%	< 0.001	106%	90%	110%				101%	90%	110%
Total Zinc (mg/L)	6105				0.0%	< 0.001	99%	90%	110%				98%	90%	110%
Water Analysis - Total Co															
Total Cobalt (mg/L)	6105				0.0%	< 0.001	100%	90%	110%				96%	90%	110%

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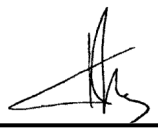

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Quality Assurance

CLIENT NAME: UMA ENGINEERING LTD.

AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

ATTENTION TO: Nick Oke

Soil Analysis

RPT Date: Sep 10, 2008			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME Metals (soil)															
Antimony (mg/kg)	991				0.0%	< 0.5	100%	90%	110%				96%	90%	110%
Arsenic (mg/kg)	991				1.4%	< 0.5	87%	80%	120%				92%	90%	110%
Barium (mg/kg)	991				2.3%	< 0.5	87%	80%	120%				104%	90%	110%
Beryllium (mg/kg)	991				0.0%	< 0.5	97%	90%	110%				93%	90%	110%
Cadmium (mg/kg)	991				0.4%	< 0.5	88%	80%	120%				95%	90%	110%
Chromium (mg/kg)	991				2.1%	< 0.5	88%	80%	120%				93%	90%	110%
Cobalt (mg/kg)	991				4.3%	< 0.5	96%	90%	110%				93%	90%	110%
Copper (mg/kg)	991				24.0%	< 0.5	103%	90%	110%				96%	90%	110%
Lead (mg/kg)	991				2.0%	< 0.5	88%	80%	120%				90%	90%	110%
Mercury (mg/kg)	249				0.0%	< 0.5	96%	90%	110%	111%	80%	120%	114%	80%	120%
Molybdenum (mg/kg)	991				0.0%	< 0.5	90%	90%	110%				92%	90%	110%
Nickel (mg/kg)	991				3.1%	< 0.5	107%	90%	110%				93%	90%	110%
Selenium (mg/kg)	991				3.3%	< 0.5	93%	90%	110%				98%	90%	110%
Silver (mg/kg)	991				0.0%	< 0.5	93%	90%	110%				93%	90%	110%
Thallium (mg/kg)	991				20.8%	< 0.5	90%	90%	110%				111%	80%	120%
Tin (mg/kg)	991				12.1%	< 0.5	105%	90%	110%				97%	90%	110%
Uranium (mg/kg)	991				1.2%	< 0.5	90%	90%	110%				104%	90%	110%
Vanadium (mg/kg)	991				2.5%	< 0.5	92%	90%	110%				96%	90%	110%
Zinc (mg/kg)	991				3.7%	< 1	89%	80%	120%				89%	80%	120%

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Quality Assurance

CLIENT NAME: UMA ENGINEERING LTD.

AGAT WORK ORDER: 08C291428

PROJECT NO: 4440-079-00 CAM-F

ATTENTION TO: Nick Oke

Trace Organics Analysis

RPT Date: Sep 10, 2008			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME Petroleum Hydrocarbons in Soil (CWS)															
Benzene (mg/kg)	315				0.0%	< 0.005	95%	80%	120%	102%	80%	120%	104%	60%	140%
Toluene (mg/kg)	315				0.0%	< 0.05	90%	80%	120%	106%	80%	120%	104%	60%	140%
Ethylbenzene (mg/kg)	315				0.0%	< 0.01	88%	80%	120%	110%	80%	120%	108%	60%	140%
Xylenes (mg/kg)	315				0.0%	< 0.05	90%	80%	120%	114%	80%	120%	112%	60%	140%
C6 - C10 (F1) (mg/kg)	315				0.0%	< 10	102%	80%	120%	107%	80%	120%	105%	60%	140%
C6 - C10 (F1 minus BTEX) (mg/kg)	315					< 10		0%	0%		0%	0%		0%	0%
C10 - C16 (F2) (mg/kg)	818				0.0%	< 10	108%	70%	130%	112%	70%	130%	117%	60%	140%
C16 - C34 (F3) (mg/kg)	818				0.0%	< 10	108%	70%	130%	116%	70%	130%	121%	60%	140%
C34 - C50 (F4) (mg/kg)	818				0.0%	< 10	108%	70%	130%	121%	70%	130%	122%	60%	140%
Polychlorinated Biphenyls Analysis [by Aroclor]															
PCB 1242 (mg/kg)	1534				0.0%	< 0.005	108%	70%	130%	92%	70%	130%			
PCB 1254 (mg/kg)	1534				0.0%	< 0.005	108%	70%	130%	83%	70%	130%			
PCB 1260 (mg/kg)	1534				0.0%	< 0.005	90%	70%	130%	90%	70%	130%			
PCBs, Total (mg/kg)	1534				0.0%	< 0.005	102%	70%	130%	89%	70%	130%			

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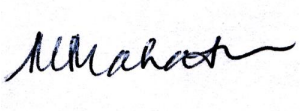

Table 6: QA/QC Results - Soil

Sample #	Location	Date	Depth (cm)	Cu [mg/kg]	Ni [mg/kg]	Co [mg/kg]	Cd [mg/kg]	Pb [mg/kg]	Zn [mg/kg]	Cr [mg/kg]	As [mg/kg]	Hg [mg/kg]	PCBs [mg/kg]	TPH Identity [mg/L]			
														F1	F2	F3	F4
MW06-05	MW06-05	2008	0	14	16	6.0	<0.5	9	41	26	0.6	<0.5	<0.005	<10	<10	61	22
MW06-07	MW06-05	2008	0	15	16	5.5	<0.5	8	37	25	0.6	<0.5	<0.005	<10	<10	18	<10
Relative Percent Difference				3	6	9		12	10	5	0					**109**	
MW06-05	MW06-05	2008	30	17	14	5.2	<0.5	8	36	24	0.6	<0.5	<0.005	<10	<10	72	61
MW06-07	MW06-05	2008	30	15	15	5.2	<0.5	8	34	24	0.5	<0.5	<0.005	<10	<10	58	42
Relative Percent Difference				9	2	0		3	6	1	18					22	37

Table 7: QA/QC Results - Groundwater

Sample #	Location	Date	Cu [mg/L]	Diss. Cu [mg/L]	Ni [mg/L]	Diss. Ni [mg/L]	Co [mg/L]	Diss. Co [mg/L]	Cd [mg/L]	Diss. Cd [mg/L]	Pb [mg/L]	Diss. Pb [mg/L]	Zn [mg/L]	Diss. Zn [mg/L]	Cr [mg/L]	Diss. Cr [mg/L]	As [mg/L]	Diss. As [mg/L]	Hg [mg/L]	Diss. Hg [mg/L]
MW06-05	MW06-05	2008	0.012	0.012	0.02	0.006	0.003	0.002	0.000261	<0.000025	0.807	<0.001	0.043	0.347	0.011	<0.001	0.002	<0.001	<0.000025	<0.000025
MW06-05	MW06-07	2008	0.016	0.01	0.02	0.006	0.002	0.002	0.000307	<0.000025	1.1	<0.001	0.063	0.04	0.016	<0.001	0.002	<0.001	<0.000025	<0.000025
Relative Percent Difference			**29**	**18**	0	0	**40**	0	16		**31**		**38**	**159**	**37**		0			

Sample #	Location	Date	PCBs [mg/L]	TPH Identity [mg/L]				Conductivity [µmho/cm]	pH	Colour
				F1	F2	F3	F4			
MW06-05	MW06-05	2008	<0.00001	<0.1				1010	8.1	60
MW06-05	MW06-07	2008	<0.00001	<0.1				1000	8.1	60
Relative Percent Difference								1	0	0

Appendix C

Field Notes

5/3 1/5 37

UMA Groundwater Monitoring and Sampling Field Record

Job number: 4440-079

Client/Facility: INAC/CAM-F

Well I.D.: MW06-04

Date: AUG 30, 2008

Field Personnel: RT, AM, MY

Well Condition:

Casing: ✓ Protective Cover: ✓ Label: Yes ~~X~~ No

Dedicated sampling device: WATERA Tubing - Frozen, in Well

Well depth & casing diameter: 3.50 mBTOC and 45mm OD stainless mm

General conditions: WATER surrounding - in puddle. Bentonite inside steel casing swelled up around pipe. Casing bent slightly

Monitoring:

Organic vapour concentration: ppm LEL

Depth from top of casing to water level (SWL, mBTOC): 0.63 m

Free product present:

Depth from top of casing to free product: m

Measured stick up: 0.37 m

0.52 - 0.15

Purge Volume Calculation:

Bottom of hole ~~3.87~~ mBTOC

− depth to water mBTOC

= standing water column m

x 2 L/m

= standing water volume L

x 3 casing volumes

= purge volume L

Well Purging Details: → Trying to remove WATERA → removed watera

Method of purging: ~~BAILER~~

Date/Time started:

One casing volume: L

Total volume purged: 1 L

Date/Time completed: FROZEN @ 0.08 m BTOC

Comments: Clear then murky +0.94 - 1.02

Field Sampling Details:

Method of sampling: BAILER

Date/Time started:

Sample I.D.: MW06-04

Depth of water at time of sampling: mBTOC

Percentage recovery: Bottom of hole (mBTOC) – depth of water at time of sampling (mTOC)/bottom of hole (mBTOC) - SWL (mBTOC):

Recovery time:

Sample Field Parameters:

pH 7.68 EC 562 Temperature 3.6°C Time

Weather conditions: SUN

Sample characteristics: murky No field filter or preserves

Sample analysis parameters in order of collection, containers, preservatives, and tests performed: put Rout in PCB ROUT / TPH vials → very slow recovery + Metals → bailers do not fit / green chunks from bailer may be in sample

Sample Storage Method for Transport to the Laboratory:

Cooler Ice Packs Other clay, soapy

Note: mBGS = meters below ground surface
mBTOC = meters below top of casing

SOIL SAMPLED - 2 JARS
N SIDE OF ROAD
MW06-04 SOIL
0 - 0.15
0.35 0.5 - 1 BAG

UMA Groundwater Monitoring and Sampling Field Record

Job number: 4440 -079

Client/Facility: ~~FN~~ CAM-F

Well I.D.: MW06-05

Date: AUG 30, 2008

Field Personnel: RT

Well Condition:

Casing: SS Protective Cover: ✓ Label: ✓ Yes ___ No

Dedicated sampling device: None

Well depth & casing diameter: 3.50 mBTOC and 45 55 mm

General conditions: Good drainage, looks good, BE raised up walls + around casing

Monitoring:

Organic vapour concentration: ___ ppm ___ LEL

Depth from top of casing to water level (SWL, mBTOC): 0.70 m

Free product present: ___

Depth from top of casing to free product: ___ m

Measured stick up: 0.58 m

Purge Volume Calculation:

Bottom of hole 4.08 mBTOC

− depth to water 0.70 mBTOC

= standing water column 3.28 m

x 2 L/m

= standing water volume 6.6 L

x 3 casing volumes

= purge volume 19 L

Well Purging Details:

Method of purging: bailer – removed bailer

Date/Time started: 12:40

One casing volume: 1 L

Total volume purged: 1 L

Date/Time completed: 12:40

Comments: Frozen @ 1.05 m BTOC

Field Sampling Details:

Method of sampling: bailer

Date/Time started: 2:30

Sample I.D.: MW06-05 + MW06-07 Dup.

Depth of water at time of sampling: ___ mBTOC

Percentage recovery: Bottom of hole (mBTOC) -- depth of water at time of sampling (mTOC)/bottom of hole (mBTOC) - SWL (mBTOC): ___

Recovery time: ___

Sample Field Parameters:

pH 7.49 EC 956 Temperature 3.5°C Time ___

Weather conditions: Sun + clouds wind + 4°C

Sample characteristics: Murky, no smell, white flakes, floaties/ice)

Sample analysis parameters in order of collection, containers, preservatives, and tests performed:

Root / PCB / TPH / Metals

Sample Storage Method for Transport to the Laboratory:

✓ Cooler ___ Ice Packs ___ Other

Note: mBGS = meters below ground surface
mBTOC = meters below top of casing

~~Soil – MW06-05 + MW06-07~~

WP 05

Bluish ~~grey~~ silt — Brown black clay → 0–0.15 BAG + Clear jars x 2

~~grey~~ clay G 0.35–0.50

UMA GROUNDWATER MONITORING AND SAMPLING FIELD RECORD

Job number: 4440-079

Client/Facility: INAC CAM. F

Well I.D.: MW06-06

Date: AUG 30, 2008

Field Personnel: RT

Well Condition:

Casing: ✓ Protective Cover: NO lock ✓ Label: ✓ Yes ___ No

Dedicated sampling device: NONE

Well depth & casing diameter: 3.50 mBTOC and 45 SS mm

General conditions: GOOD, DRAINAGE AWAY from Cover, BE UP side of casing, Protective Casing LOOSE

Monitoring:

Organic vapour concentration: ___ ppm ___ LEL

Depth from top of casing to water level (SWL, mBTOC): 0.68 m

Free product present:

Depth from top of casing to free product: ___ m

Measured stick up: 0.60 m

Purge Volume Calculation:

Bottom of hole 4.16 mBTOC

− depth to water 0.68 mBTOC

= standing water column 3.48 m

x 2 L/m

= standing water volume 7 L

x 3 casing volumes

= purge volume 21 L

Well Purging Details:

Method of purging: bailer

Date/Time started: 12:10 PM

One casing volume: ___ L

Total volume purged: 1 L

Date/Time completed: 12:12

Comments: FROZEN AT 1.06 mBTOC, clear initially, then murky @ bottom

Field Sampling Details:

Method of sampling: BAILER

Date/Time started:

Sample I.D.: MW06 – 06

Depth of water at time of sampling: ___ mBTOC

Percentage recovery: Bottom of hole (mBTOC) – depth of water at time of sampling (mTOC)/bottom of hole (mBTOC) - SWL (mBTOC):

Recovery time:

Sample Field Parameters:

pH 6.83 EC 888 Temperature 4.0°C Time

Weather conditions: SUN, Cloud, wet +4°C

Sample characteristics: murky, white floating

Sample analysis parameters in order of collection, containers, preservatives, and tests performed:

PHC/ PCB/ PAH/C / metals

Sample Storage Method for Transport to the Laboratory:

Cooler ✓ Ice Packs ___ Other

Note: mBGS = meters below ground surface
mBTOC = meters below top of casing

SOIL WP 4 Near well
0 - 0.15
0.30 - 0.50
gravelly & [illegible]

M5-01-0402.DOC

Appendix D

Additional Information