# THE COLLECTION OF LANDFILL MONITORING DATA AT THE FORMER CAM-2 DEW LINE SITE

Gladman Point, Nunavut

**FINAL REVISION 1 – 2012**

(O/Ref.: CD2656) (Y/Ref.: DLCMON (KITIK))

**DEFENCE CONSTRUCTION CANADA**

March 2013

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, suite 200
Quebec City, Quebec
G1P 2J7 CANADA

Tel.: 418-653-4422
Fax: 418-653-3583

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**DEFENCE CONSTRUCTION CANADA**

March 2013

Presented to: Nahed Farah
Defence Construction Canada

Written by:
Brandon MacKay
Field Technician

Verified by:
Guillaume Robert
Team Leader

Approved by:
Alexander Leclair, P.Eng.
Project Engineer

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# 1 INTRODUCTION

## 1.1 OBJECTIVES AND SCOPE OF WORK

The objective of Defence Construction Canada's (DCC) Landfill Monitoring Program is to collect sufficient information to assess the Landfill's performance from a geotechnical and environmental perspective. DCC has specified the requirements for the Landfill Monitoring Program in the document Terms of Reference – Services for the Collection of Landfill Monitoring Data – PIN-3 Lady Franklin Point, CAM-M Cambridge Bay, CAM-2 Gladman Point, CAM-3 Shepherd Bay, and CAM-4 Pelly Bay DEW Line Sites, Nunavut Territory, Kitikmeot Region DCC Project #: DLCLFMP2 (KITIK12), March 20, 2012.

During the 2012 monitoring program a visual inspection was completed to identify erosional features as well as soil sampling was conducted at all landfills. Groundwater sampling was conducted at the Tier II and the Non-Hazardous Waste Landfill (NHWL). Thermal monitoring was conducted at the Tier II facility; the datalogger batteries (ULB-15 and ULB-1) were replaced. Datalogger VT-3 was reinstalled as requested since the Datalogger had been removed for repairs in 2010, no dataset available for VT-3. Table I summarizes the monitoring requirements of the 2012 season.

Table I: **2012 Monitoring Requirements for CAM-2 Landfills**

| Landfill | Visual Inspection | Soil Sampling | Groundwater Sampling | Thermal Monitoring |
|---|---|---|---|---|
| Station Landfill | ✓ | ✓ | | |
| West Landfill – North | ✓ | ✓ | | |
| West Landfill – South | ✓ | ✓ | | |
| Tier II Disposal Facility | ✓ | ✓ | ✓ | ✓ |
| Non-Hazardous Waste Landfill | ✓ | ✓ | ✓ | |

## 1.2 FIELD PROGRAM STAFF AND TIMING

The 2012 on-site field program at CAM-2 Gladman Point took place from August 24 to 28, 2012. Biogenie sub-contracted Sila Remediation Inc. (Sila) from Igloolik, Nunavut to perform the field work. The Sila field program was executed by Mr. Brandon MacKay and three local Inuit representatives.

The team was comprised of the following individuals:

- Brandon MacKay, Site Technician.
- Jay Evalik Field Assistant
- Dwayne Allukpik, Field Assistant.
- Joe Koaha, Wildlife Monitor.

## 1.3 2012 WEATHER CONDITIONS

Seasonably average temperatures were observed during the 2012 monitoring program, consisting of an average daily temperature of 5ºC. Light precipitation and localized fog occurred during the morning, giving way to sun by afternoon. Night time temperature averaged 0ºC.

Further details on weather conditions for each landfill at the time of the visual inspection are provided in the “Visual Inspection” sections of the report (Sections 3.2, 4.2, 5.2, 6.2 and 7.2).

## 1.4 DEVIATIONS FROM THE TERMS OF REFERENCE

As stipulated by Sections 6.11.1 and 6.12.2 of the Terms of Reference (TOR), inter-laboratory comparison soil and groundwater samples are to be taken and analyzed during each monitoring event. The soil and groundwater samples were taken at a frequency of 10% however, the cooler was lost in transport and consequently the samples were not analyzed. Cambridge Bay experienced several plane delays and cancellations prior to and during the 2012 monitoring program. It is believed the resulting backlog of shipments to and from Cambridge Bay may have resulted in the misplacing of the inter-lab samples.

As stipulated by section 6.11.8 samples are to be collected from two depths at each sampling location; surface (0 – 15 cm) and depth (40 – 50 cm). A depth sample from sampling location C2-2, (sample ID 12-C2-2-B) was not received at the laboratory facility and subsequently not analyzed. As a meticulous inventory of all samples was conducted in the field after returning to the field camp, it is believed the sample was incorrectly placed within the inter-lab cooler by field staff and as stated above this cooler was ultimately lost during transport.

## 1.5 REPORT FORMAT

This report describes the work carried out in August 2012 at five Landfill sites at CAM-2 Gladman Point. Results from soil and groundwater sampling, thermal monitoring and visual inspection of the Sites are also presented in the formats described in the TOR (Reference B). An electronic version of the report and its component tables, figures and data files is included in an Addendum DVD-ROM, which is appended to this report.

The report is organized with a separate section for each of the Landfill areas. Each section contains all relevant information for that Landfill area for the 2012 Landfill Monitoring Program. The following information is provided in each Landfill section:

- Visual inspection checklist;
- Visual inspection drawing mark-up;
- A selection of visual inspection photos;
- Thermal monitoring summary and inspection reports (where applicable);
- Summary of 2012 soil analytical data;
- Summary of 2012 groundwater analytical data (where applicable); and
- Monitoring well development/sampling reports (where applicable).

For the photographic record, the printed copy of the report only includes an index and thumbnail images of photos for each of the Landfill areas. The full resolution photos are included in electronic format in the Addendum DVD-ROM to this report. Certificates of Analysis, QA/QC analytical results and field notes are attached in the Appendices.

# CAM-2.1 Overall Site Plan

# 2 METHODOLOGY

## 2.1 VISUAL INSPECTION

Data and information collected during the visual inspection of the CAM-2 Landfills is included in the visual inspection datasheets. These datasheets include inspection data such as the location of settlement, erosion, frost action, sloughing and cracking, animal burrows, vegetation cover and stress, staining, seepage points, exposed debris, and any other features of note.

Each feature was identified with an alphabetical tag to be used consistently each year in an effort to track changes in condition for each specific feature. New features are added to the checklist and are noted as new observations. This letter is shown on the figures for each Landfill along with the symbol for the particular feature.

Digital photos with a measure of scale were taken to show the actual general state of the Landfills, as well as features of interest. Annotated sketches/diagrams are included in this report for each Landfill.

The photos were taken with an Olympus TG-820 iHS 12 megapixel (MP) digital camera. Full resolution digital jpeg copies are available on the DVD-ROM appended with this report. The photo log, including the local coordinates from where the photo was taken, orientation (relative to map north), feature of note and picture numbers are included with each Landfill report. Panoramic photographs were “stitched” using Adobe Photoshop.

## 2.2 SOIL SAMPLING

The soil sampling methodology conformed to guidance provided in the following Canadian Council of Ministers of the Environment (CCME) documents:

- CCME Guidance Document on the Management of Contaminated Sites in Canada, April 1997, CCME PN 1279. (CCME catalogue - http://www.ccme.ca/pdfs/cat_eng.pdf);
- CCME EPC-NCS62E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I: Main Report, Dec 93 (CCME catalogue - http://www.ccme.ca/pdfs/cat_eng.pdf);
- CCME EPC-NCS66E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume II: Analytical Method Summaries, Dec. 93 (CCME catalogue - http://www.ccme.ca/pdfs/cat_eng.pdf);

- Reference method for the Determination of Petroleum Hydrocarbons in Soil – Tier I Method, 2001; and
- CCME Subsurface Assessment Handbook for Contaminated Sites, March 1994, EPC-NCSRP-48E (CCME catalogue - "http://www.ccme.ca/pdfs/cat_eng.pdf").

For the 2012 monitoring program, 22 soil sampling stations were visited. A surface (0-15 cm depth) and subsurface sample (40-50 cm depth below surface) were taken at each sampling station. No frozen ground or frost was encountered at the soil stations during the August 2012 sampling.

As specified in the TOR (Reference B), the following soil sampling procedures were adhered to:

- where required, the soil samples were collected from locations between a two to four metre radius of the monitoring wells;
- blind field duplicates (10%) were collected for QA/QC purposes;
- duplicate samples (10%) were also taken and sent to a second laboratory for quality control purposes; and
- An additional 10% of soil samples taken were sent to the owner's representative (ESG OPS CENTRE) in Kingston for archiving as specified by DCC.

The soil samples were analyzed for requested parameters (TPH (F1-F3), total metals and PCBs) as specified by DCC. Table II below summarizes the soil sampling at CAM-2 during the August, 2012 field program.

Table II: Summary of Soil Sampling at CAM-2, August 2012

| **Landfill Site** | **Soil Sample Locations** | | | | |
|---|---|---|---|---|---|
| Station Landfill | C2-1 | C2-2 | C2-3 | C2-4 | C2-5 |
| West Landfill - North | C2-6 | C2-7 | C2-8 | C2-9 | C2-10 |
| West Landfill - South | C2-11 | C2-12 | C2-13 | C2-14 | |
| Tier II Disposal Facility | MW-1 | MW-2 | MW-3 | MW-4 | |
| Non-Hazardous Waste Landfill | MW-5 | MW-6 | MW-7 | MW-8 | |

**Notes**:
Soil samples annotated as "MW" were collected as per the TOR (Reference B) between two to four metres from monitoring wells. All soil samples were collected from two depths (0-15 cm and 40-50 cm). For 2012 sampling, total number of soil samples = 48 samples (22 samples x two depths + four QA/QC (Intra + Inter-laboratory comparison) + four for Owner's Representative (ESG Archives).

## 2.3 GROUNDWATER SAMPLING

The groundwater sampling methodology conformed to guidance provided in the following Canadian Council of Ministers of the Environment (CCME) documents:

- CCME EPC-NCS62E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume I: Main Report, Dec 93 (CCME catalogue - http://www.ccme.ca/pdfs/cat_eng.pdf").); and
- CCME EPC-NCS66E Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites - Volume II: Analytical Method Summaries, Dec 93 (CCME catalogue - "http://www.ccme.ca/pdfs/cat_eng.pdf").

Wells were purged as specified and measurements of in-situ temperature, conductivity and pH were taken. Sampling took place when these parameters were stabilized. Turbidity readings were also collected at each station. The samples were not acidified and were not filtered (as directed in the TOR).

The 2012 field program included sampling eight monitoring wells at CAM-2. A summary of the groundwater sampling undertaken at CAM-2 is summarized in Table III.

In sampled wells, no signs of free-phase hydrocarbon products were detected. Monitoring Well Development and Sampling Record forms are included in appropriate sections in this report.

Table III: Summary of Groundwater Sampling at CAM-2, August 2012

| **Landfill Site** | **Groundwater Sample Locations** | | | |
|---|---|---|---|---|
| Tier II Disposal Facility | MW-1 | MW-2 | MW-3 | MW-4 |
| Non-Hazardous Waste Landfill | MW-5 | MW-6 | MW-7 | MW-8 |

**Notes**:
All monitoring wells were inspected and found to be in good condition with no significant concerns identified.
For 2012 sampling, total number of water samples = 11 samples (eight monitoring well samples + three QA/QC (inter and intra-laboratory duplicates + one field blank) + one travel blank (TPH only).

## 2.4 THERMAL MONITORING

All thermistors at the Tier II Disposal Facility were inspected and found to be in good condition with no significant concerns not identified previously. Further details on thermal monitoring will be discussed in Section 6.6 of this report.

## 2.5 FIELD NOTES AND DATA

Field notes from the 2012 Landfill Monitoring Program, including soil and water sampling, are included in Appendix B for reference. Notes were written in field books or entered directly into a field computer (in the case of thermistor and monitoring well data). The notes were scanned to an Adobe pdf document for future reference and back up. Locations of all observations and features

for the visual inspection were recorded using a hand-held Garmin GPSmap 60CSx GPS, which included a combination of continuous tracks and discrete waypoints. Data packages collected from the individual vertical thermistors was downloaded directly to a field laptop computer.

## 2.6 QUALITY CONTROL

Sila implemented standard sample collection techniques to decrease the likelihood of compromising collected samples. The methods used for sample collection are summarized in Sections 2.4 and 2.5 of this report. The following measures were taken to minimize sample cross-contamination:

- All samples were placed directly into the appropriate laboratory supplied containers (for the particular analysis);
- Soil samples were collected with the use of decontaminated sampling equipment and/or nitrile gloves that were used only once; and
- Water samples were collected through the use of dedicated Waterra foot valves and tubing.

Chain of Custody (COC) forms were completed by the Field Coordinator after sample collection. The samples were refrigerated prior to off-site shipment in chilled coolers by First Air Cargo directly to AGAT in Calgary (via Yellowknife) and ESG in Kingston (via Ottawa), where they were checked in by laboratory representatives. As stated previously, Quality assurance soil and groundwater samples shipped to Maxxam in Montreal were lost during transport and consequently were not received.

## 2.7 QA/QC PROCEDURES

Sila used standard QA/QC procedures as specified in the TOR and CCME Guidance documents for this project. The following is a summary of the analytical QA/QC samples collected:

- 10% Blind Duplicate Samples of soil and water were sent to AGAT;
- 10% Inter-laboratory Duplicate Samples were sent to Maxxam (looking for variation in procedures causing significant difference in analytical result). These samples were lost during air transportation and consequently, were not analyzed;
- 10% Archival Samples of soil to ESG.
- As well as the respective QA/QC procedures of AGAT

## 2.8 PROJECT REFERENCES

The following references are specifically relevant to the 2012 Landfill Monitoring activities:

A. Invitation to Tender – Contractor Services for the Collection of Landfill Monitoring Data Nunavut Territory – Kitikmeot Region at PIN-3 (Lady Franklin Point), CAM-M (Cambridge Bay), CAM-2 (Gladman Point), CAM-3 (Shepherd Bay), CAM-4 (Pelly Bay) – DCC Project Number: DLCMON (KITIK) – March 26, 2012.

B. Terms of Reference – Services for the collection of Landfill Monitoring Data: PIN-3 (Lady Franklin Point), CAM-M (Cambridge Bay), CAM-2 (Gladman Point), CAM-3 (Shepherd Bay), CAM-4 (Pelly Bay). DEW Line Sites, Nunavut Territory, Kitikmeot Region – DCC Project #: DLCLFMP2 (KITIK12).

C. Contractor Services for the Collection of Landfill Monitoring Data Nunavut Territory – Kitikmeot Region at PIN-3 (Lady Franklin Point), CAM-M (Cambridge Bay), CAM-2 (Gladman Point), CAM-3 (Shepherd Bay), CAM-4 (Pelly Bay): Technical Proposal – May 2012.

D. Post-Field Progress Report, CAM-2 Landfill Monitoring 2012, September, 2012

# 3 STATION LANDFILL

## 3.1 SUMMARY

During the 2012 monitoring event of the Station Landfill at CAM-2 Gladman Point soil samples were collected at 5 locations (1 upgradient and 4 downgradient locations) and a visual inspection was conducted to identify and assess erosional features on the regraded lobes.

PCBs were not detected in any of the soil samples at the Station Landfill. TPH was detected at all sample locations at surface and depth with the exception of C2-2 and C2-5 where TPH was not detected at depth. TPH concentrations ranged from 12 to 485 mg/kg with the highest concentration detected at the C2-2 at surface (0 – 15 cm). All detected TPH was primarily in the F3 fraction. Currently all TPH readings are below the standard site criteria of 2500 mg/kg and are therefore acceptable. A relatively high concentration of arsenic (13.9 mg/kg) was detected at the surface of C2-1 based on the CCME soil quality guidelines.

Over the course of two years since the last monitoring program of the Station Landfill, there have been increases in settlement, erosion and the onset of plant colonization. Despite the increases in settlement and erosion no significant or unacceptable features were observed. Erosion features on the east slope of Lobe 2 are self-armouring and the newly observed erosion channels on the slope remain minor at this time. The areas of settlement are not currently impacting the overall stability of the lobe.

The current overall performance rating of the Station Landfill is acceptable.

## 3.2 VISUAL INSPECTION REPORT

The visual inspection of the Station Landfill was conducted on August 26, 2012. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table IV of this report. Please refer to Figure CAM-2.2 for the locations of photographs and erosional features at the Station Landfill.

Weather Conditions at Time of Inspection

At the time of the visual inspection of the Station, the temperature was approximately 2°C; skies were overcast with light rain. Little to no wind was observed at the Station Landfill

Settlement

Four areas of minor settlement were noted at the Station Landfill at Lobes: 1 (Feature M), 2 (Feature B) and 5 (Features A and Q) during the 2012 monitoring program.

Feature M, a new observation, consists of two circular depressions ("potholes") on the northern surface of Lobe 1. Lobe 1 continues to function as designed; the depressions have little to no impact on the overall stability of the Lobe at this time.

Further settlement has been observed in the vicinity of Feature B which was first identified during the 2010 monitoring program; two additional linear depressions were observed within 5 m of the original feature. Despite the increases in the settlement, the features are relatively minor and the Landfill Lobe continues to function as designed.

Indications of settlement have increased at Lobe 5 of the Station Landfill. An additional two depressions have been observed at Feature A, for total of four. Feature Q consists of a depression associated with large cobble and vegetation. Based on the size of the extent of the vegetation although small, Feature Q is believed to have existed for some time (potentially since construction, given its associated cobble). Lobe 5 continues to function as designed.

Erosion

Erosion was observed at two of the five Lobes at the Station Landfill, Lobes 2 and 3. Observations of shallow erosion on the east and west side slopes of Lobe 3 remain consistent with the 2010 sampling program. The performance of Lobe 3 is considered acceptable.

Lobe 2 has several pronounced areas of erosion that occur at the geometric inflection points of the Lobe where localized runoff converges on the Landfill surface. Six general areas of erosion (Features D, E, F, G, N and O) have been identified, an addition of two features since 2010. 2012 observations of Features D, E and F are relatively consistent with 2010 measurements with slight increases in the depth of erosion. Each erosion channel appears to be self-armouring and features a large deposition of fine material on the tundra at the toe of the Landfill. Feature O consists of a relatively minor erosion channel located 12 m north of Feature F on the east slope of the Landfill. The feature is self-armouring and of little impact to the stability of the Lobe. Feature N consists of a small erosion channel on the north Landfill surface, the erosion channel does not extend onto the east side slope. Although not indicated on the drawings, the slope at this location has been armoured with a coarser material (Type 2) than at the southern extent of the east slope. Feature N has an acceptable severity rating. Minor erosion was also noted along the base of the engineered drainage channel constructed along the north side of Lobe 2 (Feature G). The level of erosion appears consistent with observations from previous years and planned

remedial measures to direct flow around the Landfill. The erosion is not in direct contact with the Landfill.

Frost Action

Evidence of frost action was not noted.

Evidence of Burrowing Animals

Indications of burrowing animals were not noted.

Vegetation

Evidence of vegetation was noted at one location on Lobe 5 of the Station Landfill. Feature R associated with the depression, (Feature Q) consists of a small concentration of vegetation growing on the base of the depression, and a few scattered plants to the north of the depression. At the time of the monitoring program, the plants within the depression had dried with the change in season, making them difficult to identify. During the 2015 monitoring program, an attempt will be made to identify the plants colonizing on Lobe 5.

Staining

One area of rust-coloured staining (Feature H) was observed on the northeast corner of Lobe 2, extending from the Landfill toe to a nearby pond situated approximately 25 m to the east, and from the pond north; encompassing a low lying area approximately 75 x 50 m. Similar staining was observed at other low lying areas not associated with the Landfill, and in keeping with the conclusions drawn in the 2010 monitoring report, appear to be a natural feature of the area. Bacterial sheen was observed on the surface of ponded water at the toe of the Landfill.

A hydrocarbon stain (Feature P) was observed approximately in the middle of Lobe 4. As it was not observed during previous monitoring programs, it is assumed the stain is a result of recent activities or was simply an oversight (although unlikely). A consultation with the Field Assistants and Bear Monitors revealed that the area is frequented by members of a nearby community for Ranger duties and hunting trips. ATVs and snowmobiles are used to access the site and are thus, a potential source of leaks and therefore stains.

Seepage Points

Although there are increases in the extent of rust-coloured staining (Feature H) with this feature, the area of seepage on the northern section of Lobe 2 remains consistent with previous observations. Wet and saturated soil conditions were observed on the down gradient slope within 5 m of the toe.

Debris

There were no observations of exposed debris during the 2012 monitoring program.

Presence/Condition of Monitoring Instruments

There are no monitoring instruments installed at this Landfill.

Other Features of Note

During the 2010 monitoring program, several tension/desiccation cracks were noted on the surface and/side slope of Lobes 2 and 3. During the 2012 monitoring program, Features I, K and L were not observed, and Feature J was ¼ the length previously observed. In the week leading up to the monitoring program, as well as during the site visit, the area experienced several precipitation events which may have eliminated any cracks caused by desiccation and/or filled in smaller cracks through erosion processes. Features J and L on Lobe 2 consisted of relatively short parallel cracks that extended approximately 45 degrees to the slope direction. What remains of Feature J has an acceptable severity rating.

Table IV: Visual Inspection Checklist / Report – Station Landfill

DEW LINE CLEANUP: POST-CONSTRUCTION - LANDFILL MONITORING
VISUAL INSPECTION CHECKLIST
**INSPECTION REPORT – PAGE 1 of 3**

| |
|---|
| **SITE NAME**: CAM-2 Gladman Point |
| **LANDFILL/AREA DESIGNATION**: Station Landfill (Existing Landfill – Regrade) |
| **DATE OF INSPECTION**: August 26, 2012 |
| **DATE OF PREVIOUS INSPECTION**: August 14, 2010 |
| **INSPECTED BY**: Brandon MacKay |
| **REPORT PREPARED BY**: Brandon MacKay |
| **LANDFILL MONITORING EVENT #:** 7 |
| **The inspector/reporter represents to the best of his/her knowledge that the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.** |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record (2012-C2-Station-) | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | FEATURE A<br>See Figure CAM-2.2<br>(Lobe 5) | 0.3 - 0.5 | 0.3 - 0.5 | 0.1 | Occasional | Minor depressions | 63-66 | Acceptable | Number of depressions at this location has increased as of the 2012 monitoring program from one to four. |
| | | FEATURE B<br>See Figure CAM-2.2<br>(Lobe 2) | 1.2 - 3.0 | 0.2 - 0.4 | 0.05 - 0.10 | | Minor depressions | 29, 30, 31 | Acceptable | Three minor depression along crest of lobe, previously only one depression was observed. |
| | | FEATURE M<br>See Figure CAM-2.2<br>(Lobe 1) | 1 | 0.7 | 0.15 | | Minor depressions | 15,16,17 | Acceptable | New Observation: Two minor depressions on the northern section of the landfill cap. |
| | | FEATURE Q<br>See Figure CAM-2.2<br>(Lobe 5) | 0.5 | 0.3 | 0.1 | | Minor depressions | 67 | Acceptable | New Observation: Minor depressions on the northern toe of the landfill, associated with a large cobble stone and vegetation. |
| Erosion | Yes | FEATURE C<br>See Figure CAM-2.2<br>(Lobe 3) | 2.5 - 3.0 | 0.1 - 0.2 | < 0.05 | Occasional | Minor surficial erosion | 51 - 55 | Acceptable | Minor erosion noted at five locations on the west side and two locations on the east side lobe, extending from top to toe. |
| | | FEATURE D<br>See Figure CAM-2.2<br>(Lobe 2) | 15<br>8 | 0.10 - 2.00<br>0.05 - 0.20 | 0.10 - 0.15<br>0.05 - 0.10 | | Minor surficial erosion | 41 - 44 | Acceptable | Two areas of minor erosion where water drains from the southern portion of the landfill cap, self-armouring. |
| | | FEATURE E<br>See Figure CAM-2.2<br>(Lobe 2) | 12.2 | 0.1 0 - 0.50 | 0.10 - 0.15 | | Minor surficial erosion | 39, 40 | Acceptable | Three erosion channels extending from the landfill surface to the toe, depositing fine sediment on the tundra. |
| | | FEATURE F<br>See Figure CAM-2.2<br>(Lobe 2) | 36 | 0.30 - 2.0 | 0.05 - 0.20 | | Minor surficial erosion | 36, 37, 38 | Acceptable | Minor erosion noted on surface of landfill (2 cm), increasing to 5-20 cm depth on downgradient slope. Self-armouring. |
| | | FEATURE G<br>See Figure CAM-2.2<br>(drainage channel on north side of Lobe 2) | 60 | 1 | 0.10 - 0.15 | | Minor erosion along base of engineered drainage channel | 20, 21, 22, 23 | Acceptable | Minor erosion noted along drainage channel extending along north side of lobe. Little to no change since previous inspection. Self-armouring. |
| | | FEATURE N<br>See Figure CAM-2.2<br>(Lobe 2) | 10 | 0.05 | 0.03 | | Minor surficial erosion | 27, 28 | Acceptable | New Observation: Minor erosion channel on the landfill surface extending to the side slope at the north end of the east side slope of the lobe. |
| | | FEATURE O<br>See Figure CAM-2.2<br>(Lobe 2) | 10 | 0.15 - 0.50 | 0.05 - 0.25 | | Minor surficial erosion | 34, 35 | Acceptable | New Observation: Minor erosion channel on the landfill surface extending to the side slope. |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record (2012-C2-Station-) | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Frost Action | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation | Yes | FEATURE R See Figure CAM-2.2 (Lobe 2) | N/A | N/A | N/A | N/A | Small vegetation | 67 | Acceptable | New Observation: Vegetation growing in the base of feature Q, with a few scattered smaller plants around the outside of the depression. |
| Staining | Yes | FEATURE H See Figure CAM-2.2 (north east of Lobe 2) | ~75 | ~50 | Unknown | N/A | Rust coloured staining | 24 | Acceptable | Rust coloured staining extending from the northeast toe of landfill to adjacent pond and to the northwest for approximately 75 m. |
| | | FEATURE P See Figure CAM-2.2 (Lobe 4) | 0.6 | 0.5 | unknown | Isolated | Hydrocarbon stain | 58 | Acceptable | New Observation: Hydrocarbon stain on the landfill cap, assumed to be from leaking off-road equipment. |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Seepage Points | Yes | FEATURE H See Figure CAM-2.2 (north east area of Lobe 2) | 8.0 | 4.0 | N/A | Isolated <1% | Seepage along toe of slope | 24, 25, 26 | Acceptable | Seepage along the toe extending to the pool of water to the east of the landfill, iron bacteria present on surface of ponded water. Iron staining present on soil in a much larger area than previously reported, potentially the area flooded during spring melt. |
| Debris Exposed | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Other Features of Note: | Yes | FEATURE J See Figure CAM-2.2 (south end of Lobe 2) | 1.2 | 0.01 - 0.05 | 0.05 | Isolated <1% | Parallel cracks extending from crest in north east direction | 45, 46 | Acceptable | Thin tension cracks extending from crest on south end of lobe, no longer visible to the same extent as in 2010. |
| Additional Photos | Yes | See Figure CAM-2.2 and Photographic Record | N/A | N/A | N/A | N/A | General Photographic Record | N/A | Not Observed | General photos for documentation, no features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

## 3.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Station Landfill has been completed as per the TOR and is included as Table V hereafter.

### Table V: Preliminary Stability Assessment – Station Landfill

| Feature | Severity Rating | Extent |
|---|---|---|
| Settlement | Acceptable | Occasional |
| Erosion | Acceptable | Occasional |
| Frost Action | Not observed | None |
| Staining | Acceptable | Isolated |
| Vegetation Stress | Not observed | None |
| Seepage/Ponded Water | Acceptable | Isolated |
| Debris exposure | Not observed | None |
| **Overall Landfill Performance** | **Acceptable** | |

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

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

## 3.4 LOCATION PLAN

The Location Plan for the Station Landfill has been completed as per the TOR and is included in the following page as Figure CAM-2.2 Gladman Point – Station Landfill.

Figure 1 : CAM-2.2 Gladman Point – Station Landfill

## 3.5 PHOTOGRAPHIC RECORDS

The Photographic Record for Station Landfill has been completed as per the TOR and is included as Table VI hereafter. The Photographic Record only contains an index and “thumbnail” photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

# Table VI: Landfill Visual Inspection Photo Log – Station Landfill

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 1** | | | | | | | |
| 14 |  | 2012-C2-Station-14 | 2.650 | 26/08/2012 | 548550 | 7618938 | View SE of the northwestern portion of the Lobe 1 Cap |
| 15 |  | 2012-C2-Station-15 | 2.390 | 26/08/2012 | 548567 | 7618932 | **Feature M:** Close-up view of one of two depressions observed on the landfill surface, this being the western of the two. Depression is marked in photograph by fine material below the field note book. |
| 16 |  | 2012-C2-Station-16 | 2.380 | 26/08/2012 | 548567 | 7618932 | **Feature M:** Close-up view of one of two shallow circular depressions observed on the landfill surface, this being the eastern of the two. Depression is marked in photograph by fine material below the field note book. |
| 17 |  | 2012-C2-Station-17 | 2.290 | 26/08/2012 | 548567 | 7618932 | Feature M. View SE of two shallow circular depressions. (1.00 m x 0.70 m x 0.15 m) |
| 18 |  | 2012-C2-Station-18 | 2.820 | 26/08/2012 | 548606 | 7618913 | View NW of northern portion of landfill cap, taken from the south west corner |
| 19 |  | 2012-C2-Station-19 | 2.660 | 26/08/2012 | 548606 | 7618920 | View NW of southern portion of landfill cap, taken from the south west corner |
| **Lobe 2** | | | | | | | |
| 20 |  | 2012-C2-Station-20 | 2.580 | 26/08/2012 | 548433 | 7619069 | **Feature G:** View NNE of engineered drainage channel, minor erosion present along the base of the channel. Taken from the southern end of the channel (highest point). |
| 21 |  | 2012-C2-Station-21 | 2.870 | 26/08/2012 | 548443 | 7619088 | **Feature G:** View NE of engineered drainage channel, minor erosion present along the base of the channel, taken 21 m NNE of southern end of the drainage channel |
| 22 |  | 2012-C2-Station-22 | 2.580 | 26/08/2012 | 548448 | 7619103 | **Feature G:** View NE of engineered drainage channel, minor erosion present along the base of the channel, taken 37 m NNE of southern end of the drainage channel |
| 23 |  | 2012-C2-Station-23 | 2.590 | 26/08/2012 | 548458 | 7619119 | **Feature G:** View SSW of engineered drainage channel, taken at the NNE extent of the channel. |
| 24 |  | 2012-C2-Station-24 | 59.400 | 26/08/2012 | 548473 | 7619104 | **Feature H:** Panoramic view NNW-E of Feature H, seepage/staining. |
| 25 |  | 2012-C2-Station-25 | 2.760 | 26/08/2012 | 548473 | 7619107 | **Feature H:** Close up of iron bacteria present at ponded water at landfill toe |
| 26 |  | 2012-C2-Station-26 | 2.880 | 26/08/2012 | 548473 | 7619107 | **Feature H:** Close up of clumped iron bacteria present at ponded water at landfill toe. |
| 27 |  | 2012-C2-Station-27 | 2.290 | 26/08/2012 | 584579 | 7619070 | **Feature N:** View NE of a minor erosion channel extending from the landfill cap to the side slope. (10 m x 0.05 m x 0.03 m) |
| 28 |  | 2012-C2-Station-28 | 2.570 | 26/08/2012 | 584579 | 7619070 | **Feature N:** Close-up view of minor erosion channel. |
| 29 |  | 2012-C2-Station-29 | 2.390 | 26/08/2012 | 548478 | 7619026 | **Feature B:** 1 of 3 (southern) minor depressions on east crest of lobe, (3 m x 0.4 m x 0.10 m). |
| 30 |  | 2012-C2-Station-30 | 2.430 | 26/08/2012 | 548476 | 7619034 | **Feature B:** 2 of 3 (middle) minor depressions on east crest of lobe, (2 m x 0.2 m x 0.05 m). |
| 31 |  | 2012-C2-Station-31 | 2.500 | 26/08/2012 | 548476 | 7619034 | **Feature B:** 3 of 3 (northern) minor depressions on east crest of lobe, (1.5 m x 0.3 m x 0.10 m). |
| 32 |  | 2012-C2-Station-32 | 38.000 | 26/08/2012 | 548543 | 7619031 | Panoramic view S - NNW of East slope of lobe 2. |
| 33 |  | 2012-C2-Station-33 | 52.000 | 26/08/2012 | 548476 | 7619029 | Panoramic view SSE - SW of the southern portion of the landfill cap of lobe 2. |
| 34 |  | 2012-C2-Station-34 | 2.530 | 26/08/2012 | 548509 | 7618964 | **Feature O:** View NE of minor superficial erosion starting at the crest of the landfill and continuing across the east slope to the toe. (10 m x 0.15-0.50 m x 0.05 - 0.25 m) |
| 35 |  | 2012-C2-Station-35 | 2.380 | 26/08/2012 | 548512 | 7618967 | **Feature O:** View SW of minor superficial erosion starting at the crest of the landfill and continuing across the east slope to the toe. (10 m x 0.15-0.50 m x 0.05 - 0.25 m) |
| 36 |  | 2012-C2-Station-36 | 2.430 | 26/08/2012 | 548504 | 7618952 | **Feature F:** View NE of minor erosion on the landfill surface. (36 m x 0.30 - 2.0 m x 0.02 - 0.30m). |

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 2** | | | | | | | |
| 37 |  | 2012-C2-Station-37 | 2.450 | 26/08/2012 | 548510 | 7618957 | **Feature F:** View NE of the continuation of the erosion channel on the eastern slope of the landfill, self-armouring, taken from the landfill crest (36 m x 0.20 - 2.0 m x 0.02 - 0.30m). |
| 38 |  | 2012-C2-Station-38 | 2.510 | 26/08/2012 | 548534 | 7618974 | **Feature F:** View SW of the erosion channel from the bottom, channel continues onto the local tundra (36 m x 0.30 - 2.0 m x 0.02 - 0.20 m). |
| 39 |  | 2012-C2-Station-39 | 2.520 | 26/08/2012 | 548532 | 7618937 | **Feature E:** View NE from the landfill crest of three erosion channels, sediment can be seen deposited on the local tundra. (12.2 m x 0.10 - 0.50 m x 0.10 - 0.15m) |
| 40 |  | 2012-C2-Station-40 | 2.560 | 26/08/2012 | 548542 | 7618944 | **Feature E:** View SW from the bottom of three erosion channels, sediment can be seen deposited on the local tundra. (12.2 m x 0.10 - 0.50 m x 0.10 - 0.15m) |
| 41 |  | 2012-C2-Station-41 | 2.560 | 26/08/2012 | 548538 | 7618916 | **Feature D:** View east of the northern erosion channels associated with this feature, two channels converge at the landfill toe to form one channel self armouring. (15 m x 0.10 - 1.5 m x 0.10 m) |
| 42 |  | 2012-C2-Station-42 | 2.570 | 26/08/2012 | 548553 | 7618919 | **Feature D:** View west of the southern channels, two channels converge to form a larger channel at the landfill toe. (8 m x 0.20 - 0.50 m x 0.10 - 0.15 m). |
| 43 |  | 2012-C2-Station-43 | 2.490 | 26/08/2012 | 548540 | 7618879 | **Feature D:** View east of smaller erosion channel associated with this feature, to the south of the larger channels, self armouring (8 m x 0.20 - 0.50 m x 0.05 - 0.10 m). |
| 44 |  | 2012-C2-Station-44 | 2.460 | 26/08/2012 | 548548 | 7618882 | **Feature D:** View west of smaller erosion channel associated with this feature, to the south of the larger channels, self armouring (8 m x 0.05 - 0.20 m x 0.10 - 0.15 m). |
| 45 |  | 2012-C2-Station-45 | 2.390 | 26/08/2012 | 548538 | 7618874 | **Feature J:** Tension crack, no longer visible for the full extend observed in 2010. (1.20 m x 0.01 - 0.05 m x 0.05 m) |
| 46 |  | 2012-C2-Station-46 | 2.580 | 26/08/2012 | 548538 | 7618874 | **Feature J:** Close-up of tension crack. |
| 47 |  | 2012-C2-Station-47 | 64.200 | 26/08/2012 | 548534 | 7618861 | Panoramic view NNW to NNE of the southern portion of the landfill cap and the western toe/crest. Taken from the S end of the landfill. |
| 48 |  | 2012-C2-Station-48 | 2.640 | 26/08/2012 | 548534 | 7618861 | View NW of W toe of the landfill. |
| 49 |  | 2012-C2-Station-49 | 2.480 | 26/08/2012 | 548544 | 7618941 | View N of the E toe of the landfill. |
| **Lobe 3** | | | | | | | |
| 50 |  | 2012-C2-Station-50 | 75.400 | 26/08/2012 | 548454 | 7618865 | Panoramic view NW - NNE of the southeastern section of Lobe 3 |
| 51 |  | 2012-C2-Station-51 | 2.490 | 26/08/2012 | 548440 | 7618870 | **Feature C:** View of minor erosion on the west landfill toe |
| 52 |  | 2012-C2-Station-52 | 2.480 | 26/08/2012 | 548433 | 7618882 | **Feature C:** View of minor erosion on the west landfill toe |
| 53 |  | 2012-C2-Station-53 | 2.520 | 26/08/2012 | 548430 | 7618885 | **Feature C:** View of minor erosion on the west landfill toe |
| 54 |  | 2012-C2-Station-54 | 2.440 | 26/08/2012 | 548442 | 7618914 | **Feature C:** View of minor erosion on the east landfill toe |
| 55 |  | 2012-C2-Station-55 | 2.420 | 26/08/2012 | 548436 | 7618922 | **Feature C:** View of minor erosion on the east landfill toe |
| 56 |  | 2012-C2-Station-56 | 2.500 | 26/08/2012 | 548414 | 7618950 | View SSE of east toe of landfill, Tier II visible in the background |
| 57 |  | 2012-C2-Station-57 | 2.650 | 26/08/2012 | 548383 | 7618915 | View SE of W corner of landfill. |

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 4** | | | | | | | |
| 58 |  | 2012-C2-Station-58 | 2.390 | 26/08/2012 | 548318 | 7619021 | **Feature P:** Hydrocarbon stain, approximately center on the lobe. (0.60 m x 0.50 m) |
| 59 |  | 2012-C2-Station-59 | 115.000 | 26/08/2012 | 548301 | 7619003 | Panoramic view NE - E of landfill |
| 61 |  | 2012-C2-Station-61 | 118.000 | 26/08/2012 | 548340 | 7619034 | Panoramic view SSW - WSW of landfill |
| **Lobe 5** | | | | | | | |
| 63 |  | 2012-C2-Station-63 | 2.390 | 26/08/2012 | 548256 | 7619023 | **Feature A:** Four minor depressions on the landfill surface, an increase from 2 as previously reported. |
| 64 |  | 2012-C2-Station-64 | 2.390 | 26/08/2012 | 548255 | 7619025 | **Feature A:** Four minor depressions on the landfill surface, an increase from 2 as previously reported. |
| 65 |  | 2012-C2-Station-65 | 2.400 | 26/08/2012 | 548254 | 7619027 | **Feature A:** Four minor depressions on the landfill surface, an increase from 2 as previously reported. |
| 66 |  | 2012-C2-Station-66 | 2.470 | 26/08/2012 | 548251 | 7619026 | **Feature A:** Four minor depressions on the landfill surface, an increase from 2 as previously reported. |
| 67 |  | 2012-C2-Station-67 | 2.500 | 26/08/2012 | 548264 | 7619049 | **Feature Q/R:** Minor depression on the north tore of the landfill, associated with a large coble (Q). Vegetation present in the bottom and adjacent to depression (R). |
| 68 |  | 2012-C2-Station-68 | 79.500 | 26/08/2012 | 548252 | 7619062 | Panoramic view SE - SSW of landfill |
| 69 |  | 2012-C2-Station-69 | 86.400 | 26/08/2012 | 548296 | 7619024 | Panoramic view SW to NW of landfill |
| **General** | | | | | | | |
| 11 |  | 2012-C2-Station-11 | 2.620 | 26/08/2012 | 548460 | 7618828 | View from Tier II of Lobes 4 and 5 as well as the west corner of lobe 3 |
| 12 |  | 2012-C2-Station-12 | 2.240 | 26/08/2012 | 548460 | 7618828 | View from the Tier II of lobe 3 |
| 13 |  | 2012-C2-Station-13 | 2.200 | 26/08/2012 | 548460 | 7618828 | View from Tier II of Lobes 2 |
| 70 |  | 2012-C2-Station-70 | 64.500 | 28/08/2012 | Aerial | | Aerial view of the Station landfill, taken from a Twin Otter. |
| **Soil Sampling** | | | | | | | |
| 1 |  | 2012-C2-Station-1 | 2.420 | 24/08/2012 | 548458 | 7619127 | **C2-1:** Close-up of open soil test pit |
| 2 |  | 2012-C2-Station-2 | 2.340 | 24/08/2012 | 548458 | 7619127 | **C2-1:** Close-up of closed soil test pit |
| 3 |  | 2012-C2-Station-3 | 2.390 | 24/08/2012 | 548508 | 7619065 | **C2-2:** Close-up of open soil test pit |
| 4 |  | 2012-C2-Station-4 | 2.370 | 24/08/2012 | 548508 | 7619065 | **C2-2:** Close-up of closed soil test pit |
| 5 |  | 2012-C2-Station-5 | 2.410 | 24/08/2012 | 548537 | 7618996 | **C2-3:** Close-up of open soil test pit |
| 6 |  | 2012-C2-Station-6 | 2.410 | 24/08/2012 | 548537 | 7618996 | **C2-3:** Close-up of closed soil test pit |
| 7 |  | 2012-C2-Station-7 | 2.370 | 24/08/2012 | 548579 | 7618949 | **C2-4:** Close-up of open soil test pit |
| 8 |  | 2012-C2-Station-8 | 2.300 | 24/08/2012 | 548579 | 7618949 | **C2-4:** Close-up of closed soil test pit |
| 9 |  | 2012-C2-Station-9 | 2.400 | 24/08/2012 | 548363 | 7619022 | **C2-5:** Close-up of open soil test pit |
| 10 |  | 2012-C2-Station-10 | 2.360 | 24/08/2012 | 548363 | 7619022 | **C2-5:** Close-up of closed soil test pit |

## 3.6 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and evaluation of analytical data for the 2012 Station Landfill samples are presented in Tables VII and VIII respectively. Certificates of Analysis and results from field duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

### Table VII: Station Landfill Summary Table of Soil Analytical Results

| Sample # | Location | 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] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-5-A | C2-5 | 0-15 | 5.5 | 5.7 | 2.1 | <0.5 | 3.6 | 14 | 6.3 | 1.0 | <0.5 | <0.05 | <10 | <10 | 101 | 101 |
| C2-12-5-B | | 40-50 | 1.8 | 3.3 | 1.1 | <0.5 | 2.5 | 4 | 4.2 | 0.6 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-1-A | C2-1 | 0-15 | 7.8 | 4.5 | 1.3 | <0.5 | 4.0 | 11 | 4.7 | 13.9 | <0.5 | <0.05 | <10 | <10 | 438 | 438 |
| C2-12-1-B | | 40-50 | 1.7 | 3.3 | 1.2 | <0.5 | 3.1 | 6 | 4.1 | 0.7 | <0.5 | <0.05 | <10 | <10 | 20 | 20 |
| C2-12-2-A | C2-2 | 0-15 | 5.3 | 4.5 | 1.4 | <0.5 | 3.9 | 12 | 7.6 | 1.3 | <0.5 | <0.05 | <10 | 11 | 382 | 393 |
| C2-12-2-A-D | | 0-15 | 5.9 | 3.6 | 1.2 | <0.5 | 3.5 | 14 | 7.0 | 0.9 | <0.5 | <0.05 | <10 | <10 | 485 | 485 |
| C2-12-2-B | | 40-50 | 1.8 | 2.8 | 0.9 | <0.5 | 2.7 | 8 | 3.4 | <0.5 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| C2-12-3-A | C2-3 | 0-15 | 2.0 | 2.9 | 1.0 | <0.5 | 2.2 | 5 | 3.1 | 0.6 | <0.5 | <0.05 | <10 | <10 | 13 | 13 |
| C2-12-3-B | | 40-50 | 3.9 | 4.0 | 1.3 | <0.5 | 3.3 | 6 | 4.3 | 1.0 | <0.5 | <0.05 | <10 | <10 | 21 | 21 |
| C2-12-4-A | C2-4 | 0-15 | 2.3 | 3.7 | 1.1 | <0.5 | 2.7 | 7 | 4.5 | <0.5 | <0.5 | <0.05 | <10 | <10 | 44 | 44 |
| C2-12-4-B | | 40-50 | 1.8 | 3.1 | 0.9 | <0.5 | 2.1 | 4 | 3.4 | <0.5 | <0.5 | <0.05 | <10 | <10 | 12 | 12 |

## Table VIII: Evaluation of 2012 Soil Analytical Data – Station Landfill

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all sample locations. Concentrations ranged from 1.7 – 7.8 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of copper was detected in the surface sample of C2-2. All values were below CCME guidelines. |
| Nickel (Ni) | Nickel was detected at all sample locations. Results were consistent at upgradient and downgradient locations with concentrations ranging from 2.8 – 5.7 mg/kg. The highest concentration was detected in the surface sample of C2-5, the upgradient sample. All values were below CCME guidelines. |
| Cobalt (Co) | Cobalt was detected at all sample locations. Concentrations ranged from 0.9 – 2.1 mg/kg. Concentrations were similar at upgradient and downgradient sample locations The highest concentration of cobalt was detected in the surface sample of C2-2. All values were below CCME guidelines. |
| Cadmium (Cd) | Cadmium was below the method detection limit at all sampling locations. |
| Lead (Pb) | Lead was detected at all sample locations. Concentrations ranged from 2.1 – 4.0 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of lead was detected in the surface sample of C2-1. All values were below CCME guidelines. |
| Zinc (Zn) | Zinc was detected at all sample locations. Concentrations ranged from 4 – 14 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of zinc was detected at two locations in the surface sample of C2-2 and C2-5. All values were below CCME guidelines. |
| Chromium (Cr) | Chromium was detected at all sample locations. Concentrations ranged from 3.1 – 7.6 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of chromium was detected in the surface sample of C2-2. All values were below CCME guidelines. |
| Arsenic (As) | Arsenic was detected at surface and depth for all locations with the exception of C2-4 where it was not detected and C2-2 where it was only detected in the surface sample. The highest detected concentration 13.9 mg/kg at C2-1 is above the CCME criteria of 12 mg/kg. All other detected arsenic concentrations were relatively low, ranging from 0.6 – 1.3. |
| Mercury (Hg) | Mercury was below the method detection limit at all sampling locations. |
| PCBs | PCBs were below the method detection limit at all sampling locations. |
| TPH | TPH was detected at all sampling locations at surface and depth with the exception of sampling locations C2-2 and C2-5 where TPH was only detected in the surface samples. Detected TPH concentrations ranged from 12 – 485 mg/kg with the highest concentration detected at the surface of C2-2. All TPH concentrations are below standard DEW Line remediation criterion for TPH concentrations in soil. |

# 4 WEST LANDFILL - NORTH

## 4.1 SUMMARY

During the 2012 monitoring event of the West Landfill - North at CAM-2 Gladman Point soil samples were collected at 5 locations (1 upgradient and 4 downgradient locations) and a visual inspection was conducted to identify and assess erosional features on the regraded lobes.

PCBs or relatively high metal concentrations were not detected at any of the soil sampling locations. TPH was detected at all sampling locations and in all samples with the exception of the surface sample at C2-6. Detectable TPH concentrations ranged from 14 to 446 mg/kg with the highest concentration detected at the surface of the C2-7 sampling location. All detected TPH was primarily in the F3 fraction. Currently all TPH readings are below the standard site criteria of 2500 mg/kg and are therefore acceptable.

During the 2012 monitoring program, little change was observed at the West Landfill – North in comparison to the 2010 monitoring program. No significant or unacceptable erosional features were observed and therefore the West Landfill – North is rated as acceptable.

## 4.2 VISUAL INSPECTION REPORT

The visual inspection of the West Landfill – North area was conducted on August 26, 2012. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table IX of this report. Please refer to Figure CAM-2.3 for the location of photographs and erosional features at the West Landfill – North.

Weather Conditions at Time of Inspection

At the time of the visual inspection of the West Landfill - North, the temperature was approximately 2°C, skies were overcast and winds of 20 km/h from the south were observed.

Settlement

Settlement was noted at two locations during the 2012 monitoring program at Lobe 2 (Feature B) and Lobe 3 (Feature C). Feature B on the south/middle surface of Lobe 2 is a long shallow depression of little consequence to the stability of the Lobe. Feature C consists of three depressions, one on the south side slope, a linear depression running parallel to the toe and a

group depression on the southeast surface of the Landfill. The cover of the Landfill continues to remain stable. Feature B and C have acceptable severity ratings.

Erosion

Minor surface erosion was noted along a runoff channel that extends between two closely spaced Lobes (Lobes 4 and 5) in the central area of the Landfill (Feature A). The erosion extends along the toe of Lobe 4 and is not in direct contact with the Landfill. 2012 observations of Feature A remain consistent with the 2010 findings.

Frost Action

Evidence of frost action was not noted.

Evidence of Burrowing Animals

Evidence of an animal was observed at the south corner (on the side slope) of Lobe 4, Feature D. Similar burrows were observed at different areas on the Site but the feature at Lobe 4 was the only burrow observed on a Landfill Lobe. The small size of the burrow suggests it was made by a small rodent of an unknown type, no animals were observed entering or leaving the burrow. Feature D has an acceptable severity rating.

Vegetation

Evidence of vegetation was not noted.

Staining

Areas of staining were not observed at the time of the inspection.

Seepage Points

No seepage points were observed at this Landfill.

Debris

There was no evidence of exposed debris at this Landfill.

Presence/Condition of Monitoring Instruments

There are no monitoring instruments installed at this Landfill.

Other Features of Note

A single area of ponding water was noted at the toe of one of the down gradient Lobes. The ponded water was contained to a small dugout area located immediately adjacent to Lobe 6.

Another feature of note (Feature E) was observed on the north eastern surface of Lobe 4, a raised area approximately 10 m in diameter and 1.5 m above the grade of the surrounding Landfill surface. The change in gradient is not indicated on the drawings and was not mentioned in the 2010 report.

Table IX: Visual Inspection Checklist / Report – West Landfill – North

DEW LINE CLEANUP: POST-CONSTRUCTION - LANDFILL MONITORING
VISUAL INSPECTION CHECKLIST
**INSPECTION REPORT – PAGE 1 of 2**

| |
|---|
| **SITE NAME**: CAM-2 Gladman Point |
| **LANDFILL DESIGNATION**: West Landfill - North (Existing Landfill – Regrade) |
| **DATE OF INSPECTION**: August 27, 2012 |
| **DATE OF PREVIOUS INSPECTION**: August 16, 2010 |
| **INSPECTED BY**: B. MacKay |
| **REPORT PREPARED BY**: B. MacKay |
| **LANDFILL MONITORING EVENT #:** 7 |
| **The inspector/reporter represents to the best of his/her knowledge that the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.** |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent (m) | Description | Photographic Record (2012-C2-West-N) | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | FEATURE B See Figure CAM-2.3 (between Lobe 2) | 2.5 | 0.4 | 0.1 | Occasional | Linear depression | 18 | Acceptable | New Observation: Singular depression of the landfill surface. |
| | | FEATURE C See Figure CAM-2.3 (between Lobe 3) | 1.5 - 4.0 | 0.20 - 0.50 | 0.10 - 0.15 | | Depression | 22, 22B | Acceptable | New Observation: Three areas of settlement including a linear depression of the north landfill toe, and two areas of settlement on the landfill surface. |
| Erosion | Yes | FEATURE A See Figure CAM-2.3 (between Lobes 4 and 5) | 20 m | 0.4 m | 5 cm | Isolated <1% | Minor erosion between regrade lobes | 23, 24 | Acceptable | Runoff channel located between regrade areas, extending NE along the toe of Lobe 4. Feature has not significantly changed in size since the previous inspection. |
| Frost Action | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Animal Burrows | Yes | FEATURE D See Figure CAM-2.3 (between Lobe 4 ) | 0.05 | 0.04 | Unknown | Isolated | Small animal burrow | 30 | Acceptable | New Observation: Small animal burrow in the side of the landfill, suspected to be of a lemming due to the dimensions of the hole. |
| Vegetation | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Staining | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Debris Exposed | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Other Features of Note: | Yes | Feature E | 10 | 10 | 1.5 | Isolated | Above grade section | 31 | Acceptable | New Observation: Area 10 m in diameter that is 1.5 m above the surrounding grade of the landfill - not previously reported and not indicated on drawings as part of the natural contours of the landfill cap. |
| | | See Figure CAM-2.3 (ponding) | 3 | 2 | 0.2 | <1 | Isolated | 38 | Acceptable | Dug-out area at edge of regrade area. |
| Additional Photos | Yes | See Figure CAM-2.3 and Photographic Record | N/A | N/A | N/A | N/A | General Photographic Record | N/A | Not Observed | General photos for documentation, no features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

## 4.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for West Landfill – North has been completed as per the TOR and is included as Table X hereafter.

Table X: Preliminary Stability Assessment – West Landfill – North

| Feature | Severity Rating | Extent |
|---|---|---|
| Settlement | Acceptable | Occasional |
| Erosion | Acceptable | Isolated |
| Frost Action | Not observed | None |
| Staining | Not observed | None |
| Vegetation Stress | Not observed | None |
| Seepage/Ponded Water | Acceptable | Isolated |
| Debris exposure | Not observed | None |
| **Overall Landfill Performance** | **Acceptable** | |

## 4.4 LOCATION PLAN

The Location Plan for the West Landfill – North has been completed as per the TOR and is included in the following page as Figure CAM-2.3 Gladman Point – West Landfill – North.

Figure 2 : CAM-2.3 Gladman Point – West Landfill – North

## 4.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the West Landfill – North has been completed as per the TOR and is included in the following pages as Table XI. The Photographic Record only contains an index and "thumbnail" photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

# Table XI: Landfill Visual Inspection Photo Log – West Landfill – North

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 1** | | | | | | | |
| 11 |  | 2012-C2-West-N-11 | 116.000 | 27/08/2012 | 547713 | 7619688 | Panoramic view NW - NNE of SW side of landfill |
| 12 |  | 2012-C2-West-N-12 | 82.500 | 27/08/2012 | 547745 | 7619716 | Panoramic view SE - SW of the north side of the landfill |
| 13 |  | 2012-C2-West-N-13 | 2.600 | 27/08/2012 | 547735 | 7619708 | View SW of the landfill cap from the NE corner |
| **Lobe 2** | | | | | | | |
| 14 |  | 2012-C2-West-N-14 | 111.000 | 27/08/2012 | 547749 | 7619716 | Panoramic view ESE - S of the N and W landfill toes |
| 15 |  | 2012-C2-West-N-15 | 95.000 | 27/08/2012 | 547804 | 7619700 | Panoramic view SSW - W of the N and E landfill toes |
| 16 |  | 2012-C2-West-N-16 | 66.800 | 27/08/2012 | 547758 | 7619662 | Panoramic view NW - E of the south landfill toe and a portion of the eastern cap. |
| 17 |  | 2012-C2-West-N-17 | 85.000 | 27/08/2012 | 547743 | 7619673 | Panoramic view N - ESE taken from the SW corner of the lobe |
| 18 |  | 2012-C2-West-N-18 | 2.430 | 27/08/2012 | 547773 | 7619672 | **Feature B:** Close-up of a minor depression on the landfill surface (2.5 m x 0.40 m x 0.10 m) |
| **Lobe 3** | | | | | | | |
| 19 |  | 2012-C2-West-N-19 | 80.300 | 27/08/2012 | 547761 | 7619658 | Panoramic view E - SE of regraded area between Lobes 2 and 3 |
| 20 |  | 2012-C2-West-N-20 | 174.000 | 27/08/2012 | 547759 | 7619649 | Panoramic view E - SE of the NE corner and associated toes of the lobe. |
| 21 |  | 2012-C2-West-N-21 | 57.900 | 27/08/2012 | 547784 | 7619606 | Panoramic view NNW - E of the landfill cap, taken from the southern corner of the lobe |
| 22 |  | 2012-C2-West-N-22 | 2.480 | 27/08/2012 | 547793 | 7619605 | **Feature C:** View E of linear depression on the south toe of the landfill (4 m x 0.25 m x 0.15 m) |
| 22B |  | 2012-C2-West-N-22B | 2.450 | 27/08/2012 | 547801 | 7619607 | **Feature C:** View of two shallow depressions on the landfill surface, GPS device is in the middle of the two depressions. (1.5 m x 0.20 - 0.50 m x 0.10 m) |
| **Lobe 4** | | | | | | | |
| 23 |  | 2012-C2-West-N-23 | 2.530 | 27/08/2012 | 547860 | 7619603 | **Feature A:** View NE of minor erosion of the base of the runoff channel between lobes 4 and 5. (20 m x 0.40 m x 0.05 m) |
| 24 |  | 2012-C2-West-N-24 | 2.650 | 27/08/2012 | 547871 | 7619612 | **Feature A:** View SW of minor erosion of the base of the runoff channel between lobes 4 and 5. (20 m x 0.40 m x 0.05 m) |
| 25 |  | 2012-C2-West-N-25 | 51.000 | 27/08/2012 | 547854 | 7619605 | Panoramic view WSW - NNE of the landfill cap, taken from the SE corner of the lobe, adjacent to the drainage channel |
| 26 |  | 2012-C2-West-N-26 | 87.800 | 27/08/2012 | 547845 | 7619690 | Panoramic view SE - SSE of the landfill cap, taken from the NW corner of the lobe. |
| 27 |  | 2012-C2-West-N-27 | 60.400 | 27/08/2012 | 547901 | 7619664 | Panoramic view S - NW of the landfill cap, taken from the NE corner of the lobe. |
| 28 |  | 2012-C2-West-N-28 | 64.100 | 27/08/2012 | 547923 | 761966 | Panoramic view SW - NW of the landfill cap, taken from the tundra, 20 m ENE of the NE corner. |
| 29 |  | 2012-C2-West-N-29 | 112.000 | 27/08/2012 | 547810 | 7619597 | Panoramic view N - W of the landfill cap, taken from the SW corner of the landfill. |
| 30 |  | 2012-C2-West-N-30 | 2.580 | 27/08/2012 | 547810 | 7619597 | **Feature D:** Close-up of an animal burrow at the SW corner of the landfill. |
| 31 |  | 2012-C2-West-N-31 | 2.850 | 27/08/2012 | 547843 | 7619664 | View E of a portion of the regrade that is 1.5 m then the surrounding grade, approximately 10 m in diameter. |

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 5** | | | | | | | |
| 32 |  | 2012-C2-West-N-32 | 123.000 | 27/08/2012 | 547855 | 7619596 | Panoramic view SE - NE of the landfill cap, taken from the NW corner of the lobe adjacent to the drainage channel. Lobe 6 is visible in the background of the photo. |
| 33 |  | 2012-C2-West-N-33 | 64.700 | 27/08/2012 | 547934 | 7619588 | Panoramic view SE - NW of the northern landfill toe. |
| 34 |  | 2012-C2-West-N-34 | 70.000 | 27/08/2012 | 547972 | 7619544 | Panoramic view SE - NW of the northern landfill toe. |
| 35 |  | 2012-C2-West-N-35 | 2.660 | 27/08/2012 | 547946 | 7619514 | View NW of landfill cap taken from the SE corner of the landfill. |
| 36 |  | 2012-C2-West-N-36 | 66.900 | 27/08/2012 | 547936 | 7619498 | Panoramic view NW - NE of southern landfill toe, taken from the SE corner of the landfill |
| **Lobe 6** | | | | | | | |
| 37 |  | 2012-C2-West-N-37 | 96.200 | 27/08/2012 | 547964 | 7619614 | Panoramic view SW - WNW of NE landfill toe. |
| 38 |  | 2012-C2-West-N-38 | 2.530 | 27/08/2012 | 547944 | 7619605 | View SE of water pooled in a dug-out area adjacent to the lobe. |
| 39 |  | 2012-C2-West-N-39 | 178.000 | 27/08/2012 | 547902 | 7619627 | Panoramic view NE - E of the S landfill toe |
| 40 |  | 2012-C2-West-N-40 | 101.000 | 27/08/2012 | 547934 | 7619588 | Panoramic view NNW - NE of the SE landfill toe. |
| 41 |  | 2012-C2-West-N-41 | 2.600 | 27/08/2012 | 547998 | 7619543 | View N of lobe. |
| **General** | | | | | | | |
| 42 |  | 2012-C2-West-N-42 | 6.400 | 28/08/2012 | Aerial | | Aerial view of the regrades |
| **Soil Samples** | | | | | | | |
| 1 |  | 2012-C2-West-N-1 | 2.430 | 25/08/2012 | 547771 | 7619712 | **C2-6:** Close-up of open soil test pit |
| 2 |  | 2012-C2-West-N-2 | 2.350 | 25/08/2012 | 547771 | 7619712 | **C2-6:** Close-up of closed soil test pit |
| 3 |  | 2012-C2-West-N-3 | 2.470 | 25/08/2012 | 547872 | 7619696 | **C2-7:** Close-up of open soil test pit |
| 4 |  | 2012-C2-West-N-4 | 2.340 | 25/08/2012 | 547872 | 7619696 | **C2-7:** Close-up of closed soil test pit |
| 5 |  | 2012-C2-West-N-5 | 2.440 | 25/08/2012 | 547966 | 7619632 | **C2-8:** Close-up of open soil test pit |
| 6 |  | 2012-C2-West-N-6 | 2.440 | 25/08/2012 | 547966 | 7619632 | **C2-8:** Close-up of closed soil test pit |
| 7 |  | 2012-C2-West-N-7 | 2.630 | 25/08/2012 | 548025 | 7619574 | **C2-9:** Close-up of open soil test pit |
| 8 |  | 2012-C2-West-N-8 | 2.360 | 25/08/2012 | 548025 | 7619574 | **C2-9:** Close-up of closed soil test pit |
| 9 |  | 2012-C2-West-N-9 | 2.410 | 25/08/2012 | 547768 | 7619599 | **C2-10:** Close-up of open soil test pit |
| 10 |  | 2012-C2-West-N-10 | 2.410 | 25/08/2012 | 547768 | 7619599 | **C2-10:** Close-up of closed soil test pit |

## 4.6 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and evaluation of analytical data for the 2010 West Landfill – North area samples are presented in Tables XII and XIII hereafter. Certificates of Analysis and results from field duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

### Table XII: West Landfill – North Summary Table for Soil Analytical Results

| Sample # | Location | 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] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-10-A | C2-10 | 0-15 | 3.3 | 6.0 | 2.0 | <0.5 | 3.9 | 11 | 6.8 | 1.1 | <0.5 | <0.05 | <10 | <10 | 32 | 32 |
| C2-12-10-B | | 40-50 | 3.0 | 5.4 | 2.1 | <0.5 | 3.4 | 11 | 6.4 | 1.2 | <0.5 | <0.05 | <10 | <10 | 14 | 14 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-6-A | C2-6 | 0-15 | 2.2 | 1.9 | 0.7 | <0.5 | 1.2 | 6 | 2.9 | <0.5 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| C2-12-6-B | | 40-50 | 1.3 | 2.9 | 0.7 | <0.5 | 1.3 | 3 | 2.6 | <0.5 | <0.5 | <0.05 | <10 | <10 | 31 | 31 |
| C2-12-7-A | C2-7 | 0-15 | 20.8 | 6.6 | 1.4 | <0.5 | 3.0 | 6 | 5.4 | 1.4 | <0.5 | <0.05 | <10 | 11 | 435 | 446 |
| C2-12-7-B | | 40-50 | 3.9 | 3.9 | 1.0 | <0.5 | 2.2 | 5 | 4.5 | 0.6 | <0.5 | <0.05 | <10 | <10 | 115 | 115 |
| C2-12-8-A | C2-8 | 0-15 | 5.7 | 4.3 | 2.4 | <0.5 | 2.3 | 6 | 4.6 | 2.2 | <0.5 | <0.05 | <10 | <10 | 106 | 106 |
| C2-12-8-B | | 40-50 | 16.2 | 15.4 | 6.9 | <0.5 | 14.7 | 37 | 24.6 | 2.9 | <0.5 | <0.05 | <10 | <10 | 59 | 59 |
| C2-12-9-A | C2-9 | 0-15 | 3.3 | 7.6 | 3.4 | <0.5 | 2.8 | 18 | 8.8 | 1.9 | <0.5 | <0.05 | <10 | <10 | 24 | 24 |
| C2-12-9-B | | 40-50 | 11.5 | 12.6 | 5.5 | <0.5 | 10.4 | 32 | 21.9 | 2.9 | <0.5 | <0.05 | <10 | <10 | 42 | 42 |

## Table XIII: Evaluation of 2012 Soil Analytical Data – West Landfill – North

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all sample locations. Concentrations ranged from 1.3 – 20.8 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of copper was detected at the surface of C2-7. All values were below CCME guidelines. |
| Nickel (Ni) | Nickel was detected at all sample locations. Results were consistent at upgradient and downgradient locations with concentrations ranging from 1.9 – 15.4 mg/kg. The highest concentration was detected at depth at C2-8, a downgradient sample. All values were below CCME guidelines. |
| Cobalt (Co) | Cobalt was detected at all sample locations. Concentrations ranged from 0.7 – 6.9 mg/kg. Concentrations were similar at upgradient and downgradient sample locations The highest concentration of cobalt was detected at depth at C2-8, a downgradient sample. All values were below CCME guidelines. |
| Cadmium (Cd) | Cadmium was below the method detection limit at all sampling locations. |
| Lead (Pb) | Lead was detected at all sample locations. Concentrations ranged from 1.2 – 14.7mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of lead was detected at depth at C2-8, a downgradient sample 1. All values were below CCME guidelines. |
| Zinc (Zn) | Zinc was detected at all sample locations. Concentrations ranged from 3 – 37 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of zinc was detected at depth at C2-8, a downgradient sample. All values were below CCME guidelines. |
| Chromium (Cr) | Chromium was detected at all sample locations. Concentrations ranged from 2.6 – 24.6 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of chromium was detected at depth at C2-8, a downgradient sample. All values were below CCME guidelines. |
| Arsenic (As) | Arsenic was detected at all sample locations with the exception of C2-6. Detected concentrations ranged from 0.6 – 2.9 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of arsenic was detected at depth at two locations C2-8 and C2-9, a downgradient samples. All values were below CCME guidelines. |
| Mercury (Hg) | Mercury was below the method detection limit at all sampling locations. |
| PCBs | PCBs were below the method detection limit at all sampling locations. |
| TPH | TPH was detected at all sampling locations at surface and depth with the exception of C2-6 where TPH was only detected at depth. Detected TPH concentrations ranged from 14 – 446 mg/kg with the highest concentration detected at the surface of C2-7. All TPH concentrations are below standard DEW Line remediation criterion for TPH concentrations in soil. |

# 5 WEST LANDFILL – SOUTH

## 5.1 SUMMARY

During the 2012 monitoring event of the West Landfill - South at CAM-2 Gladman Point soil samples were collected at 4 locations (1 upgradient and 3 downgradient locations) and a visual inspection was conducted to identify and assess erosional features on the regraded lobes.

PCBs or relatively high metal concentrations were not detected at any of the soil sampling locations. TPH was detected at all sampling locations and in all samples with the exception of the depth samples at locations C2-12, 13 and 14. Detectable TPH concentrations ranged from 12 to 210 mg/kg with the highest concentration detected at the surface of the C2-11 sampling location. All detected TPH was in the F3 fraction. Currently all TPH readings are below the standard site criteria of 2500 mg/kg and are therefore acceptable.

The West Landfill – South has experienced little change in the overall stability since the 2010 monitoring program, with only a few indications of increased settlement and one area of seepage. As all of the features present at the West Landfill – South have an acceptable severity rating and soil analytical results are acceptable, the Landfill's overall performance is rated as acceptable.

## 5.2 VISUAL INSPECTION REPORT

The visual inspection of the West Landfill – South area was conducted on August 27, 2012. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XIV of this report. Please refer to Figure CAM-2.4 for the location of photographs and erosional features at the West Landfill – South.

Weather at Time of Visual Inspection

At the time of the visual inspection of the West Landfill - South, the temperature was approximately 2°C, skies were partly cloudy and winds of 20 km/h from the south were observed.

Settlement

During the 2012 monitoring program, minor indications of settlement were noted at three locations at the West Landfill – South, including two areas at Lobe 8 (Feature A and C) and a third location at Lobe 10 (Feature E)

Feature A, first noted in the 2010 monitoring program, showed a series of three closely spaced depressions on the east surface of Lobe 8, which have experienced little to no significant change. Feature C includes six depressions east of Feature A on the surface of the Lobe, four of which are a tight cluster of potholes, while two slightly to the south appear to be the remnants of pick-up tire tracks. It appears as though settlement has increased since the 2010 monitoring program however, at least two of the depressions are a relic of the remediation contract.

Feature E, a new observation, consists of a small linear depression on the northern slope of Lobe 10, which runs parallel to the Landfill toe.

All areas of settlement observed at the West Landfill – South are considered to have an acceptable severity rating.

Erosion

Indications of erosion were not noted.

Frost Action

Evidence of frost action was not noted.

Evidence of Burrowing Animals

Indications of burrowing animals were not noted.

Re-establishment of Vegetation

Evidence of vegetation was not noted.

Staining

Areas of staining were not observed at the time of the inspection.

Seepage Points

Feature D, first noted during the 2012 monitoring program, consists of surface wetting across the north portion of the Landfill toe, extending 5 m onto the surface of the Lobe. Ponded water in direct contact with the toe is present in two locations, on the northwest and the northeast side of the landfill. The tundra on the northwest side has evidence of rutting from machinery traffic which is now collecting water.

Debris

Feature B, a piece of partially exposed black geotextile associated with the engineered drainage channel at the southeast end of Lobe 11 remains unchanged from previous years.

Presence/Condition of Monitoring Instruments

There are no monitoring instruments installed at this Landfill.

Other Features of Note

A single area of ponding water was noted in a low lying area extending between Lobe 11 and adjacent to Lobe 10 to the north. There were no seepage points or staining associated with the ponded water.

Table XIV: Visual Inspection Checklist / Report – West Landfill – South

DEW LINE CLEANUP: POST-CONSTRUCTION - LANDFILL MONITORING
VISUAL INSPECTION CHECKLIST
**INSPECTION REPORT – PAGE 1 of 2**

| |
|---|
| **SITE NAME**: CAM-2 Gladman Point |
| **LANDFILL DESIGNATION**: West Landfill – South (Existing Landfill – Regrade) |
| **DATE OF INSPECTION**: August 27, 2012 |
| **DATE OF PREVIOUS INSPECTION**: August 14, 2010 |
| **INSPECTED BY**: B. MacKay |
| **REPORT PREPARED BY**: B. MacKay |
| **LANDFILL MONITORING EVENT #:** 7 |
| **The inspector/reporter represents to the best of his/her knowledge that the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.** |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | FEATURE A See Figure CAM-2.4 (east side of Lobe 8) | 0.5 - 0.8 | 0.5 - 0.8 | 0.05 - 0.15 | Occasional | Three small depressions (potholes) on surface of lobe | 11, 12 | Acceptable | Three small depressions on the east side of the lobe, shows little or no change in dimension since the previous inspection in 2010. |
| | | FEATURE C See Figure CAM-2.4 (east side of Lobe 8) | 0.5 - 2.0 | 0.5 - 1.0 | 0.1 - 0.2 | | Six small depressions (potholes) on surface of lobe | 13, 14, 15 | Acceptable | New Observation: Six small depressions on the surface of the landfill, four of which are located in the east corner of the landfill with the remaining two on the south west side of the landfill. Depressions on the south west side appear to be from a pick-up truck and thus, an oversight on previous inspections. |
| | | FEATURE E See Figure CAM-2.4 (Lobe 10) | 0.3 | 0.2 | 0.1 | | Small depression on the north slope | 22 | Acceptable | New Observation: Small depression on the north slope of Lobe 10. |
| Erosion | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Frost Action | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Staining | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Seepage Points | Yes | FEATURE D See Figure CAM-2.4 (North side of Lobe 9) | 20 | 5 | Unknown | Isolated | Seepage, surface wetting and ponded water | 18, 19 | Acceptable | New Observation: Feature consists of surface wetting across the north portion of the landfill toe, extending 5 m onto the surface of the lobe. Ponded water in direct contact with toe is present in two locations, on the northwest side of the landfill and the north east. The tundra on the northwest side has evidence of rutting from machinery traffic which is now collecting water. |
| Debris Exposed | Yes | FEATURE B See Figure CAM-2.4 (east end of drainage channel - Lobe 11) | 0.3 | 0.4 | Unknown | Isolated | Black geotextile fabric | 28, 29 | Acceptable | Similar material used in construction of drainage channel. |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Other Features of Note | Yes | See Figure CAM-2.4 (ponding north of Lobe 11) | 25 | 41186 | 41187 | N/A | Ponding in downgradient area north of Lobe 11 | 25 | Acceptable | Localized ponding between lobes. |
| Additional Photos | Yes | See Figure CAM-2.4 and Photographic Record | N/A | N/A | N/A | N/A | General Photographic Record | N/A | Not Observed | General photos for documentation, no features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

## 5.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for West Landfill – South has been completed as per the TOR and is included as Table XV hereafter.

Table XV: Preliminary Stability Assessment – West Landfill – South

| Feature | Severity Rating | Extent |
|---|---|---|
| Settlement | Acceptable | Occasional |
| Erosion | Not observed | None |
| Frost Action | Not observed | None |
| Staining | Not observed | None |
| Vegetation Stress | Not observed | None |
| Seepage/Ponded Water | Acceptable | Isolated |
| Debris exposure | Acceptable | Isolated |
| **Overall Landfill Performance** | **Acceptable** | |

## 5.4 LOCATION PLAN

The Location Plan for the West Landfill – South has been completed as per the TOR and is included in the following page as Figure CAM-2.4 Gladman Point – West Landfill – South.

Figure 3 : CAM-2.4 Gladman Point – West Landfill – South

## 5.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the West Landfill – South has been completed as per the TOR and is included in the following pages as Table XVI. The Photographic Record only contains an index and “thumbnail” photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

# Table XVI: Landfill Visual Inspection Photo Log – West Landfill – South

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 8** | | | | | | | |
| 9 |  | 2012-C2-West-S-9 | 2.650 | 27/08/2012 | 547989 | 7619441 | View SE of the NE portion of the landfill cap. |
| 10 |  | 2012-C2-West-S-10 | 100.000 | 27/08/2012 | 547989 | 7619441 | Panoramic view NNE - SSE of the W toe of the landfill. |
| 11 |  | 2012-C2-West-S-11 | 2.420 | 27/08/2012 | 548012 | 7619456 | **Feature A:** View E of three small depressions on the E side of Lobe 8, the GPS indicates the middle and most prominent depression (0.5-0.8 m x 0.5-0.8 m x 0.05 - 0.15 m) |
| 12 |  | 2012-C2-West-S-12 | 2.410 | 27/08/2012 | 548012 | 7619456 | **Feature A:** Close-up of the most prominent of the three depressions (0.80 m x 0.75 m x 0.15 m) |
| 13 |  | 2012-C2-West-S-13 | 2.440 | 27/08/2012 | 548025 | 7619442 | **Feature C:** View E of 4 of 6 new depressions observed on the landfill surface. These particular depressions are in the E corner of the lobe. (0.5-2.0 m x 0.5-1.0 m x 0.1-0.20 m) |
| 14 |  | 2012-C2-West-S-14 | 2.400 | 27/08/2012 | 548025 | 7619442 | **Feature C:** Close-up of depression |
| 15 |  | 2012-C2-West-S-15 | 2.410 | 27/08/2012 | 548030 | 7619434 | **Feature C:** View of 2 of 6 depressions along the SW side of the lobe |
| 16 |  | 2012-C2-West-S-16 | 1.050 | 27/08/2012 | 548052 | 7619436 | Panoramic view SW - NW of the E landfill toe. |
| **Lobe 9** | | | | | | | |
| 17 |  | 2012-C2-West-S-17 | 2.800 | 27/08/2012 | 548052 | 7619436 | View SE of the W portion of the lobe. |
| 18 |  | 2012-C2-West-S-18 | 2.410 | 27/08/2012 | 548093 | 7619432 | **Feature D:** Close-up of seepage/ponded water at the N landfill toe. |
| 19 |  | 2012-C2-West-S-19 | 2.460 | 27/08/2012 | 548130 | 7619427 | **Feature D:** View SW of NE portion of the landfill, ponded water is visible along the toe in the ruts of heavy machinery. |
| 20 |  | 2012-C2-West-S-20 | 1.420 | 27/08/2012 | 548109 | 7619388 | Panoramic view WNW - NNW of S portion of the landfill cap. |
| **Lobe 10** | | | | | | | |
| 21 |  | 2012-C2-West-S-21 | 2.700 | 27/08/2012 | 548109 | 7619388 | View SE of N landfill toe and cap, taken from the north corner of the landfill (Coordinate 352) |
| 22 |  | 2012-C2-West-S-22 | 2.520 | 27/08/2012 | 548122 | 7619382 | **Feature E:** Close-up linear depression on the N slope of the landfill. |
| 23 |  | 2012-C2-West-S-23 | 7.810 | 27/08/2012 | 548112 | 7619359 | Panoramic view NNW - NE of the landfill cap and S toe. |
| 24 |  | 2012-C2-West-S-24 | 2.720 | 27/08/2012 | 548171 | 7619361 | View NW of the E corner of the lobe, taken from Lobe 11. |

| Photo | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Lobe 11** | | | | | | | |
| 25 |  | 2012-C2-West-S-25 | 2.660 | 27/08/2012 | 548172 | 7619361 | View NW of ponded water at the NW corner of the lobe |
| 26 |  | 2012-C2-West-S-26 | 7.240 | 27/08/2012 | 548201 | 7619369 | Panoramic view SSE - W of northern portion of the landfill cap and associated toe. |
| 27 |  | 2012-C2-West-S-27 | 9.990 | 27/08/2012 | 548262 | 7619331 | Panoramic view S - W of NE portion of the landfill cap and associated toe, taken from the NE corner of the lobe (Coordinate 359) |
| 28 |  | 2012-C2-West-S-28 | 2.350 | 27/08/2012 | 548269 | 7619262 | **Feature B:** Close-up of exposed geotextile debris in the engineered drainage channel along the SE toe of the lobe. |
| 29 |  | 2012-C2-West-S-29 | 2.460 | 27/08/2012 | 548269 | 7619262 | **Feature B:** View E of exposed geotextile debris |
| 30 |  | 2012-C2-West-S-30 | 2.590 | 27/08/2012 | 548225 | 7619251 | View ENE of engineered channel |
| 31 |  | 2012-C2-West-S-31 | 2.590 | 27/08/2012 | 548226 | 7619251 | View W of S landfill toe |
| 32 |  | 2012-C2-West-S-32 | 8.728 | 27/08/2012 | 548175 | 7619251 | Panoramic view NNW - E of the S portion of the landfill, including the S toe and SE corner. |
| 33 |  | 2012-C2-West-S-33 | 7.380 | 27/08/2012 | 548159 | 7619261 | Panoramic view N - E of S portion of the landfill cap, taken from the NW corner. |
| 34 |  | 2012-C2-West-S-34 | 17.400 | 27/08/2012 | 548172 | 7619308 | Panoramic view N-S of landfill cap taken at the approximate midpoint of the W side of the landfill. |
| **Soil Sampling** | | | | | | | |
| 1 |  | 2012-C2-West-S-1 | 2.590 | 25/08/2012 | 548133 | 7619437 | **C2-11:** Close-up of open soil test pit |
| 2 |  | 2012-C2-West-S-2 | 2.350 | 25/08/2012 | 548133 | 7619437 | **C2-11:** Close-up of closed soil test pit |
| 3 |  | 2012-C2-West-S-3 | 2.290 | 25/08/2012 | 548222 | 7619371 | **C2-12:** Close-up of open soil test pit |
| 4 |  | 2012-C2-West-S-4 | 2.370 | 25/08/2012 | 548222 | 7619371 | **C2-12:** Close-up of closed soil test pit |
| 5 |  | 2012-C2-West-S-5 | 2.380 | 25/08/2012 | 548266 | 7619315 | **C2-13:** Close-up of open soil test pit |
| 6 |  | 2012-C2-West-S-6 | 2.400 | 25/08/2012 | 548266 | 7619315 | **C2-13:** Close-up of closed soil test pit |
| 7 |  | 2012-C2-West-S-7 | 2.430 | 25/08/2012 | 548147 | 7619262 | **C2-14:** Close-up of open soil test pit |
| 8 |  | 2012-C2-West-S-8 | 2.360 | 25/08/2012 | 548147 | 7619262 | **C2-14:** Close-up of closed soil test pit |

## 5.6 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and evaluation of 2012 analytical data for the West Landfill – South area samples are presented in Tables XVII and XVIII respectively. Certificates of Analysis and results from field duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

### Table XVII: West Landfill – South Summary Table of Soil Analytical Data

| Sample # | Location | 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] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-14-A | C2-14 | 0-15 | 3.3 | 4.5 | 1.6 | <0.5 | 2.9 | 16 | 4.9 | 0.8 | <0.5 | <0.05 | <10 | <10 | 58.0 | 58.0 |
| C2-12-14-B | | 40-50 | 2.8 | 3.5 | 1.3 | <0.5 | 2.3 | 6 | 4.3 | 0.8 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-11-A | C2-11 | 0-15 | 4.2 | 5.7 | 1.7 | <0.5 | 3.6 | 10 | 6.8 | 0.6 | <0.5 | <0.05 | <10 | <10 | 130.0 | 130.0 |
| C2-12-11-A-D | | 0-15 | 5.7 | 4.9 | 1.4 | <0.5 | 3.0 | 9 | 6.6 | 0.7 | <0.5 | <0.05 | <10 | <10 | 210.0 | 210.0 |
| C2-12-11-B | | 40-50 | 5.3 | 6.3 | 2.2 | <0.5 | 3.1 | 12 | 7.7 | 0.8 | <0.5 | <0.05 | <10 | <10 | 12.0 | 12.0 |
| C2-12-12-A | C2-12 | 0-15 | 2.0 | 4.7 | 2.1 | <0.5 | 2.1 | 14 | 7.0 | 0.6 | <0.5 | <0.05 | <10 | <10 | 32.0 | 32.0 |
| C2-12-12-B | | 0-15 | 4.0 | 4.2 | 1.9 | <0.5 | 1.3 | 11 | 6.3 | <0.5 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| C2-12-13-A | C2-13 | 0-15 | 1.3 | 3.4 | 1.2 | <0.5 | 2.0 | 5 | 3.0 | <0.5 | <0.5 | <0.05 | <10 | <10 | 14.0 | 14.0 |
| C2-12-13-B | | 40-50 | 1.6 | 3.5 | 0.9 | <0.5 | 2.1 | 4 | 3.3 | 0.7 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |

## Table XVIII: Evaluation of 2012 Soil Analytical Data – West Landfill – South

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all sample locations. Concentrations ranged from 1.3 – 5.7 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of copper was detected at the surface of C2-11. All values were below CCME guidelines. |
| Nickel (Ni) | Nickel was detected at all sample locations. Results were consistent at upgradient and downgradient locations with concentrations ranging from 3.4 – 6.3 mg/kg. The highest concentration was detected at depth at C2-11, a downgradient sample. All values were below CCME guidelines. |
| Cobalt (Co) | Cobalt was detected at all sample locations. Concentrations ranged from 0.9 – 2.2 mg/kg. Concentrations were similar at upgradient and downgradient sample locations The highest concentration of cobalt was detected at depth at C2-11, a downgradient sample. All values were below CCME guidelines. |
| Cadmium (Cd) | Cadmium was below the method detection limit at all sampling locations. |
| Lead (Pb) | Lead was detected at all sample locations. Concentrations ranged from 1.3 – 3.6 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of lead was detected at surface at C2-11, a downgradient sample. All values were below CCME guidelines. |
| Zinc (Zn) | Zinc was detected at all sample locations. Concentrations ranged from 4 – 16 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of zinc was detected at depth at C2-14, the upgradient sample. All values were below CCME guidelines. |
| Chromium (Cr) | Chromium was detected at all sample locations. Concentrations ranged from 3.0 – 7.7 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of chromium was detected at depth at C2-11, a downgradient sample. All values were below CCME guidelines. |
| Arsenic (As) | Arsenic was detected at all sample locations; at C2-12 it was not detected at depth while at C2-13 it was not detected at surface, at all other locations it was detected at the surface and at depth. Detected concentrations ranged from 0.6 – 0.8 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of arsenic was detected at two locations C2-11 at depth and C2-14 at surface and depth. All values were below CCME guidelines. |
| Mercury (Hg) | Mercury was below the method detection limit at all sampling locations. |
| PCBs | PCBs were below the method detection limit at all sampling locations. |
| TPH | TPH was detected at all sampling locations at surface and depth with the exception of C2-12, 13 and 14 where TPH was only detected at the surface. Detected TPH concentrations ranged from 14 – 210 mg/kg with the highest concentration detected at the surface of C2-11. All TPH concentrations are below standard DEW Line remediation criterion for TPH concentrations in soil. |

# 6 TIER II DISPOSAL FACILITY

## 6.1 SUMMARY

During the 2012 monitoring event of the Tier II Disposal Facility at CAM-2 Gladman Point soil and groundwater samples were collected at 4 locations (1 upgradient and 3 downgradient), a visual inspection was conducted to identify and assess erosional features on the facility and thermal monitoring data was downloaded from three locations, the datalogger for a fourth location was reinstalled this year. Manuel readings of thermistors were conducted at all four locations, the batteries were also replaced.

PCBs or relatively high metal concentrations were not detected at any of the soil sampling locations. TPH was detected at all sampling locations and in all samples with the exception of the depth sample at MW4. Detectable TPH concentrations ranged from 11 to 162 mg/kg with the highest concentration detected at the surface of the MW3. All detected TPH was primarily in the F3 fraction. Currently all TPH readings are below the standard site criteria of 2500 mg/kg and are therefore acceptable.

PCBs were not detected in any of the groundwater samples. No relatively high metal concentrations were detected in the Tier II groundwater samples. Low concentrations of TPH were detected at two monitoring wells MW1 (upgradient) and MW3 (downgradient). As the relatively high metal concentrations and TPH were detected at both up and downgradient wells, it does not appear to be reflection of the performance of the Tier II facility.

Upon comparing the 2010 and 2012 monitoring program results, it is clear the Tier II Disposal Facility has experienced little in the way of changes over the past two years. There are currently no significant or unacceptable features at the Tier II facility.

Thermal monitoring equipment is functioning properly.

Based on the results of the soil and groundwater results as well as the visual inspection the Tier II facility has an acceptable overall performance rating.

## 6.2 VISUAL INSPECTION REPORT

The visual inspection of the Tier II Disposal Facility was conducted on August 26, 2012. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XIX of this report. Please refer to Figure CAM-2.5 for the location of photographs and erosional features at the Tier II Disposal Facility.

Weather at Time of Visual Inspection

At the time of the visual inspection of the Tier II Disposal, the temperature was approximately 5°C, skies were overcast with light right, fog was observed and little to no wind was observed. Precipitation was heavier during the early morning hours of August 26, 2012.

Settlement

Indications of settlement were noted at five locations (Features A through D and K) on the surface and side slopes of the Tier II Disposal Facility, an increase of one area from the 2010 monitoring program.

Feature A consists of subtle narrow linear depressions extending along the north and south crests of the landfill, whereas Features B, C, D and K consist of more localized depressions. Observations of Feature A are consistent with the dimensions observed during the 2010 monitoring program however, the small tension crack associated with this feature is no longer visible. Feature B on the eastern slope of the Landfill has decreased in size from the 2010 monitoring program, potentially the result of deposition of material eroded from further up the slope. Feature C, a relatively small depression at the time of the 2010 monitoring program at 0.4 m in length, has increased to 12 m in length extending along the crest of the Landfill. Feature D remains constant in size and extent. Newly observed Feature K consists of a small linear depression close to the middle of the slope and runs parallel to the Landfill toe.

Currently the severity rating of the observed depressions is rated as acceptable.

Erosion

Evidence of minor surface erosion was noted at two locations on the surface of the Tier II Disposal Facility including Feature E located on the slope southwest of VT-4 and Feature F located on the northeast corner of the Landfill. Both features extend perpendicular to the slope, appear to be self-armouring, and have an acceptable severity rating. Features E and F exhibited little to no change since 2009 and have an acceptable severity rating.

One additional area (Feature G), of minor erosion, was noted along the northwest toe and is not in direct contact with the Tier II Disposal Facility. Overall, the Tier II Disposal Facility cover appears stable and relatively unchanged from the 2010 report.

Frost Action

Evidence of frost action was not noted.

Evidence of Burrowing Animals

Indications of burrowing animals were not noted.

Vegetation

Indications of vegetation were noted on the southern slope of the Tier II Disposal Facility. Plants have colonized the slope at an approximate density of 1 plant per 3 $m^2$.

Staining

Areas of staining were not observed at the time of the inspection.

Seepage Points

Due to precipitation events in the timeframe of the monitoring program, it is difficult to assess the extent of the seepage at the Tier II Disposal Facility, as all slopes were to some degree wet for the duration of the monitoring program.

Debris

Evidence of debris was noted at one location on the northwest toe of the Tier II Disposal Facility (Feature I), consisting of a partially exposed piece of 50 mm diameter iron pipe. The iron pipe was subsequently removed and disposed of. Feature I will not be included in 2015 monitoring program.

Presence/Condition of Monitoring Instruments

All monitoring well and thermistor installations were found to be in good condition at the Tier II Disposal Facility.

Other Features of Note

Tension and desiccation cracks were not as numerous as reported in the 2010 monitoring program with only Feature J observed on the north slope of the Landfill. The previously observed desiccation cracks were likely eliminated by the precipitation events experienced during the monitoring program and the week leading up to the monitoring program. A new discontinuous crack (Feature K) was observed on the east slope of the Landfill.

Table XIX: Visual Inspection Checklist / Report – Tier II Disposal Facility

DEW LINE CLEANUP: POST-CONSTRUCTION - LANDFILL MONITORING
VISUAL INSPECTION CHECKLIST
**INSPECTION REPORT – PAGE 1 of 2**

| |
|---|
| **SITE NAME**: CAM-2 Gladman Point |
| **LANDFILL DESIGNATION**: Tier II Disposal Facility (New Landfill) |
| **DATE OF INSPECTION**: August 26, 2012 |
| **DATE OF PREVIOUS INSPECTION**: August 13-14, 2010 |
| **INSPECTED BY**: B. MacKay |
| **REPORT PREPARED BY**: B. MacKay |
| **LANDFILL MONITORING EVENT #:** 7 |
| **The inspector/reporter represents to the best of his/her knowledge that the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.** |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | Feature A See Figure CAM-2.5 (north and south crests) | 20 - 30 | 0.2 - 0.4 | 0.05 - 0.1 | Occasional | Linear depressions extending along north and south crests | 9, 10, 11, 12 | Acceptable | Cover and slopes appear stable. Small tension crack previously noted associated with the depression on the north crest was not visible during the 2012 field program. |
| | | Feature B See Figure CAM-2.5 (east of VT-3) | 2 | 0.75 | 0.1 | | Localized depression on slope perpendicular to toe | 35 | Acceptable | Feature has decreased slightly in size from 2010, potentially as a result of erosion and deposition on the side slopes of the facility. |
| | | Feature C See Figure CAM-2.5 (south east corner) | 12 | 0.1 - 0.5 | 0.1 | | Linear depressions extending along east crest | 42, 43 | Acceptable | Feature has increased significantly in length, now extending 12 m along the landfill crest. The previously identified area was clearly observed, however as of 2012, an additional area of linear settlement was observed extending the length of the depression from 0.4 m to 12 m. |
| | | Feature D See Figure CAM-2.5 (south of VT-4) | 1 | 0.05 - 0.2 | 0.05 - 0.15 | | Localized linear depression on surface | 37 | Acceptable | Dimensions of feature have remained relatively constant, feature appears stable. |
| | | Feature K See Figure CAM-2.5 (east of VT-3) | 0.75 | 0.2 | 0.05 | | Localized linear depression on surface | 36 | Acceptable | New Observation: Minor depression on the east slope of the landfill running parallel to the landfill toe. |
| Erosion | Yes | Feature E See Figure CAM-2.5 (south of VT-4) | 16 | 1 - 1.25 | 0.05 - 0.10 | Occasional | Minor surficial erosion | 38, 39 | Acceptable | Minor erosion noted on surface of landfill. Slope appears stable with minor change from 2010 and consequently from 2009 (based on 2010 Report). Self-armouring. |
| | | Feature F See Figure CAM-2.5 (north east corner) | 15 | 0.5 | 0.05 - 0.1 | | Minor surficial erosion | 34 | Acceptable | Minor erosion noted on surface of landfill. Cover appears stable and unchanged from 2010 and consequently 2009. Self armouring. |
| | | Feature G See Figure CAM-2.5 (north west toe) | 10 | 0.5 m | 2 cm | | Minor surficial erosion | 12 | Acceptable | Minor erosion noted along toe of landfill, little change since 2010. Self-armouring. |
| Frost Action | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation | Yes | Feature L See Figure CAM-2.5 (south slope) | N/A | N/A | N/A | N/A | Small plants colonizing the south slope of the landfill | 41, 45 | Acceptable | Plants have begun to colonize the south slope of the Tier II Facility, plant density is approximately 1 plant/3 m^2 |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | Feature A See Figure CAM-2.5 (north and south crests) | 20 - 30 | 0.2 - 0.4 | 0.05 - 0.1 | Occasional | Linear depressions extending along north and south crests | 9, 10, 11, 12 | Acceptable | Cover and slopes appear stable. Small tension crack previously noted associated with the depression on the north crest was not visible during the 2012 field program. |
| Staining | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Not Observed | N/A |
| Seepage Points | Yes | Feature H See Figure CAM-2.5 (south west, south and north slopes) | Unknown | Unknown | N/A | Occasional | Wetted areas on side slopes | N/A | Acceptable | Unable to properly assess wetting on slopes of Tier II Facility due to precipitation events experienced throughout the field program. |
| Debris Exposed | Yes | Feature I See Figure CAM-2.5 (north west toe) | 1.65 | 0.05 | N/A | Isolated | Partially exposed iron pipe at toe of landfill | 17, 18, 19, 20 | Acceptable | Iron pipe was removed from the landfill cover, Feature I will no longer be a concern for future monitoring programs. |
| Presence/Condition of Monitoring Instruments | Yes | See Figure CAM-2.5 | N/A | N/A | N/A | N/A | Thermistors and monitoring wells | Various | N/A | Sampled and monitored in 2012, monitoring equipment is functioning properly |
| Other Features of Note | Yes | Feature J See Figure CAM-2.5 (north slope) | Variable, 5.0 - 10.0 | 0 - 0.05 | Unknown | Occasional | Continuous and discontinuous tension cracks extending perpendicular to side slopes (majority within 1 - 5 m of toe) | 22, 23, 27, 28, 29, 40 | Acceptable | Cracks less frequent than 2010, being only observed on the north slope where observed previously. |
| | | Feature M See Figure CAM-2.5 (East slope) | 2.0 - 4.0 | 0.01 - 0.05 | Unknown | | Discontinuous tension cracks extending parallel to side slopes | 27-29 | Acceptable | New Observation: Two cracks running parallel to the toe of the landfill, located on the east side slope of the landfill |
| Additional Photos | Yes | See Figure CAM-2.5 and Photographic Record | N/A | N/A | N/A | N/A | General Photographic Record | N/A | Not Observed | General photos for documentation, no features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

## 6.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Tier II Disposal Facility has been completed as per the TOR and is included as Table XX hereafter.

Table XX: Preliminary Stability Assessment – Tier II Disposal Facility

| Feature | Severity Rating | Extent |
|---|---|---|
| Settlement | Acceptable | Occasional |
| Erosion | Acceptable | Occasional |
| Frost Action | Not observed | None |
| Staining | Not observed | None |
| Vegetation Stress | Not observed | None |
| Seepage/Ponded Water | Acceptable | Occasional |
| Debris exposure | Not Observed (removed) | None |
| **Overall Landfill Performance** | **Acceptable** | |

## 6.4 LOCATION PLAN

The Location Plan for the Tier II Disposal Facility has been completed as per the TOR and is included in the following page as Figure CAM-2.5 Gladman Point – Tier II Disposal Facility.

Figure 4 : CAM-2.5 Gladman Point – Tier II Disposal Facility

## 6.5 THERMAL MONITORING DATA

Manual readings and monitoring program results for each thermistor are presented on the Thermistor Annual Maintenance Reports included in this report as well as Table XXI as requested by the TOR. A complete datalogger RAW data set for the 2010 - 2012 period has been forwarded to DCC under separate cover as per the TOR and is provided in the attached DVD.

All thermistors at the Tier II Disposal Facility were inspected and found to be in good condition with no significant concerns identified. VT-3, which was removed during the 2010 monitoring program, was successfully reinstalled.

Manual resistive and temperature data readings were collected from the thermistor strings as per the TOR. All analogues/thermocouples were observed to be functioning properly at the time of the monitoring program, with the exception of the bottom sensors at VT-2 (#12), VT-3 (#12) and VT-4 (#16), consistent with observations from the previous 2010 monitoring program. New to 2012, the #9 sensor of VT-3 was observed to be off-line. Further review of the downloaded data identified a consistent error in temperature readings obtained from these sensors throughout the monitoring period.

Batteries were replaced in all dataloggers on August 25 and 26, 2012 as specified in the TOR. All clocks exhibited slight drift and were synchronized using the Prolog software.

It is suggested that two of the locks be replaced during the next monitoring event, the locks are still functional but heavily rusted and required extra effort to be removed, it is anticipated the locks will need to be cut during the next monitoring event. As well VT-2 is missing a cover for the small P1/25 port.

# Table XXI: Tabulated Thermistor Data – Tier II Disposal Facility

| Thermistor | Bead | Ohms | Degrees °C |
|---|---|---|---|
| 1 | 1 | 7.968 | 14.676 |
| | 2 | 7.644 | 15.565 |
| | 3 | 11.116 | 7.716 |
| | 4 | 10.983 | 7.963 |
| | 5 | 12.985 | 4.567 |
| | 6 | 14.334 | 2.596 |
| | 7 | 17.188 | -0.964 |
| | 8 | 18.255 | -2.128 |
| | 9 | 19.306 | -3.202 |
| | 10 | 20.100 | -3.971 |
| | 11 | 21.000 | -4.802 |
| | 12 | 21.720 | -5.439 |
| | 13 | 22.500 | -6.103 |
| | 14 | 23.250 | -6.718 |
| | 15 | 24.070 | -7.365 |
| | 16 | 24.590 | -7.763 |
| 2 | 1 | 10.186 | 9.514 |
| | 2 | 11.676 | 6.714 |
| | 3 | 12.626 | 5.131 |
| | 4 | 13.952 | 3.132 |
| | 5 | 16.594 | -0.281 |
| | 6 | 17.797 | -1.638 |
| | 7 | 18.903 | -2.798 |
| | 8 | 20.220 | -4.084 |
| | 9 | 21.520 | -5.265 |
| | 10 | 22.540 | -6.137 |
| | 11 | 23.370 | -6.814 |
| | 12 | OL | N/A |
| 3 | 1 | 9.195 | 11.646 |
| | 2 | 11.338 | 7.312 |
| | 3 | 12.287 | 5.68 |
| | 4 | 13.608 | 3.629 |
| | 5 | 16.094 | 0.316 |
| | 6 | 17.191 | -0.968 |
| | 7 | 18.440 | -2.322 |
| | 8 | 20.400 | -4.253 |
| | 9 | OL | N/A |
| | 10 | 22.750 | -6.311 |
| | 11 | 23.610 | -7.005 |
| | 12 | OL | N/A |
| 4 | 1 | 7.530 | 15.888 |
| | 2 | 8.824 | 12.511 |
| | 3 | 11.231 | 7.506 |
| | 4 | 12.365 | 5.552 |
| | 5 | 13.525 | 3.751 |
| | 6 | 16.649 | -0.345 |
| | 7 | 17.418 | -1.222 |
| | 8 | 18.275 | -2.149 |
| | 9 | 19.141 | -3.038 |
| | 10 | 19.914 | -3.794 |
| | 11 | 20.640 | -4.475 |
| | 12 | 21.370 | -5.133 |
| | 13 | 21.540 | -5.282 |
| | 14 | 22.730 | -6.294 |
| | 15 | 23.350 | -6.798 |
| | 16 | 23.930 | -7.256 |

## 6.6 THERMISTOR ANNUAL MAINTENANCE REPORTS

The Thermistor Annual Maintenance Reports, VT-1 to VT-4, are presented in this section.

# Thermistor Annual Maintenance Report

| | | | |
|---|---|---|---|
| Contractor Name: | Biogenie/ Sila Remediation | Inspection Date: | 26-Aug-12 |
| Prepared By: | Brandon MacKay | | |

Thermistor Information

| | | | | | |
|---|---|---|---|---|---|
| Site Name: | CAM-2 Gladman Point | Thermistor Location | Tier II Disposal Facility | | |
| Thermistor Number: | VT-1 | Inclination | Vertical | | |
| Install Date: | 08/30/2005 | First Date Event: August 14, 2012 | | Last Date Event: August 26, 2012 | |
| Coordinates and Elevation | N 7618811 | E 548508.81 | | Elev | 32.48 |
| Length of Cable (m) | 10.5 | Cable Lead Above Ground (m) | 3.6 | Nodal Points | 16 |
| Datalogger Serial # | 207019 | | | Cable Serial Number | 1690 |

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | X | ☐ | |
| Cover | X | ☐ | |
| Data Logger | X | ☐ | |
| Cable | X | ☐ | |
| Beads | X | ☐ | |
| Battery Installation Date | August 26/2012 | | |
| Battery Levels | Main 11.34 | Aux | 13.4 |

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C | Bead | ohms | Degrees C |
|---|---|---|---|---|---|
| 1 | 7.968 | 14.676 | 9 | 19.306 | -3.202 |
| 2 | 7.644 | 15.565 | 10 | 20.1 | -3.971 |
| 3 | 11.116 | 7.716 | 11 | 21 | -4.802 |
| 4 | 10.983 | 7.963 | 12 | 21.72 | -5.439 |
| 5 | 12.985 | 4.567 | 13 | 22.5 | -6.103 |
| 6 | 14.334 | 2.596 | 14 | 23.25 | -6.718 |
| 7 | 17.188 | -0.964 | 15 | 24.07 | -7.365 |
| 8 | 18.255 | -2.128 | 16 | 24.59 | -7.763 |

**Observations and Proposed Maintenance**

Clock was 1 hour and 10 minutes slow, reset using prolog software.

**Verified known Data:** Yes

# Thermistor Annual Maintenance Report

| | | | |
|---|---|---|---|
| Contractor Name: | Biogenie/ Sila Remediation | Inspection Date: August 26, 2012 | |
| Prepared By: | Brandon MacKay | | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: | CAM-2 Gladman Point | Thermistor Location | Tier II Disposal Facility |
| Thermistor Number: | VT-2 | Inclination: Vertical | |
| Install Date: | 08/30/2005 | First Date Event: August 14, 2010 | Last Date Event: August 26, 2012 |

| | | | | | |
|---|---|---|---|---|---|
| Coordinates and Elevation | N | 7618799 | E | 548474.24 | Elev 32.07 |
| Length of Cable (m) | 8 | Cable Lead Above Ground (m) | 2.75 | Nodal Points | 12 |
| Datalogger Serial # | 207107 | | | Cable Serial Number | 1691 |

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | X | ☐ | |
| Cover | X | ☐ | |
| Data Logger | X | ☐ | |
| Cable | X | ☐ | |
| Beads | X | ☐ | |
| Battery Installation Date | August 26/2012 | | |
| Battery Levels | Main 11.34 | Aux 12.9 | |

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C | Bead | ohms | Degrees C |
|---|---|---|---|---|---|
| 1 | 10.186 | 9.514 | 9 | 21.52 | -5.265 |
| 2 | 11.676 | 6.714 | 10 | 22.54 | -6.137 |
| 3 | 12.626 | 5.131 | 11 | 23.37 | -6.814 |
| 4 | 13.952 | 3.132 | 12 | OL | N/A |
| 5 | 16.594 | -0.281 | | | |
| 6 | 17.797 | -1.638 | | | |
| 7 | 18.903 | -2.798 | | | |
| 8 | 20.22 | -4.084 | | | |

**Observations and Proposed Maintenance**

Original bolts are not used to keep cover In place, a smaller set has been used - functional.
Missing cover to port P1/15, may need replacement.
Clock was 1 hour and 5 minutes slow, reset using prolog software.
Bead 12 is offline, consistent with 2010 observations.

**Verified known Data:** Yes

# Thermistor Annual Maintenance Report

| | | | |
|---|---|---|---|
| Contractor Name: | Biogenie/ Sila Remediation | Inspection Date: August 25, 2012 | |
| Prepared By: | Brandon MacKay | | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: | CAM-2 Gladman Point | Thermistor Location | Tier II Disposal Facility |
| Thermistor Number: | VT-3 | Inclination: Vertical | |
| Install Date: | 08/30/2005 | First Date Event: N/A | Last Date Event: N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Coordinates and Elevation | N | 7618792 | E | 548495.38 | Elev | 32.06 |
| Length of Cable (m) | 8 | Cable Lead Above Ground (m) | 2.9 | Nodal Points | | 12 |
| Datalogger Serial # | 5070039 | | | Cable Serial Number | | 1692 |

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | X | □ | |
| Cover | □ | X | Lock will need replacement |
| Data Logger | X | □ | |
| Cable | X | □ | |
| Beads | X | □ | |
| Battery Installation Date | Aug-25 | | |
| Battery Levels | Main 11.34 | Aux 13.9 | |

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C | Bead | ohms | Degrees C |
|---|---|---|---|---|---|
| 1 | 9.195 | 11.646 | 9 | OL | N/A |
| 2 | 11.338 | 7.312 | 10 | 22.75 | -6.311 |
| 3 | 12.287 | 5.680 | 11 | 23.61 | -7.005 |
| 4 | 13.608 | 3.629 | 12 | OL | N/A |
| 5 | 16.094 | 0.316 | 13 | | |
| 6 | 17.191 | -0.968 | 14 | | |
| 7 | 18.44 | -2.322 | 15 | | |
| 8 | 20.4 | -4.253 | 16 | | |

**Observations and Proposed Maintenance**

Reinstalled data logger.
Data logger is functioning properly.
Reset memory.
Beads 9 and 12 are offline.
Lock will need replacement during next monitoring event, was oiled but is heavily rusted.

**Verified known Data:** Yes

# Thermistor Annual Maintenance Report

| | | | |
|---|---|---|---|
| Contractor Name: | Biogenie/ Sila Remediation | Inspection Date: August 25, 2012 | |
| Prepared By: | Brandon MacKay | | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: | CAM-2 Gladman Point | Thermistor Location | Tier II Disposal Facility |
| Thermistor Number: | VT-4 | Inclination: Vertical | |
| Install Date: | 08/30/2005 | First Date E\ | 14-Aug-10 |
| Last Date Event | 25-Aug-12 | | |
| Coordinates and Elevation | N 7618772 | E 548479.02 | Elev 31.89 |
| Length of Cable (m) | 10.5 | Cable Lead Above Ground (m) | 3.5 |
| Nodal Points | 16 | | |
| Datalogger Serial # | 2020130 | Cable Serial Number | 1693 |

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | X | ☐ | Some flaking of Paint |
| Cover | ☐ | X | Lock should be replaced next monitoring even |
| Data Logger | X | ☐ | |
| Cable | X | ☐ | |
| Beads | X | ☐ | |
| Battery Installation Date | Aug-25 | | |
| Battery Levels | Main 11.34 | Aux 11.4 | |

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C | Bead | ohms | Degrees C |
|---|---|---|---|---|---|
| 1 | 7.53 | 15.888 | 9 | 19.141 | -3.038 |
| 2 | 8.824 | 12.511 | 10 | 19.914 | -3.794 |
| 3 | 11.231 | 7.506 | 11 | 20.64 | -4.475 |
| 4 | 12.365 | 5.552 | 12 | 21.37 | -5.133 |
| 5 | 13.525 | 3.751 | 13 | 21.54 | -5.282 |
| 6 | 16.649 | -0.345 | 14 | 22.73 | -6.294 |
| 7 | 17.418 | -1.222 | 15 | 23.35 | -6.798 |
| 8 | 18.275 | -2.149 | 16 | 23.93 | -7.256 |

**Observations and Proposed Maintenance**

Clock was 1 hour and 5 minutes slow, reset using prolog software

Lock will need replacement during next monitoring event, was oiled but is heavily rusted.

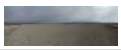
**Verified known Data:** Yes

## 6.7 PHOTOGRAPHIC RECORDS

The Photographic Record for the Tier II Disposal Facility has been completed as per the TOR and is included in the following pages as Table XXII. The Photographic Record only contains an index and “thumbnail” photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

# Table XXII: Landfill Visual Inspection Photo Log – Tier II Disposal Facility

| Photo (2012-C2-Tier II-) | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **General Photos** | | | | | | | |
| 9 |  | 2012-C2-Tier II-9 | 2.570 | 26/08/2012 | 548478 | 7618824 | **Feature A:** View ESE of linear depression running parallel to the N crest of the landfill surface, taken from the W most point of the feature. |
| 10 |  | 2012-C2-Tier II-10 | 2.570 | 26/08/2012 | 548484 | 7618821 | **Feature A:** Close-up of the depression |
| 11 |  | 2012-C2-Tier II-11 | 2.630 | 26/08/2012 | 548493 | 7618817 | **Feature A:** View ESE of linear depression running parallel to the N crest of the landfill surface, taken from the midpoint of the feature. |
| 12 |  | 2012-C2-Tier II-12 | 2.630 | 26/08/2012 | 548511 | 7618811 | **Feature A:** View WNW of linear depression running parallel to the N crest of the landfill surface, taken from the NE corner of the landfill |
| 13 |  | 2012-C2-Tier II-13 | 2.860 | 26/08/2012 | 548463 | 7618829 | View ESE from the NW corner of the the N side slope. |
| 14 |  | 2012-C2-Tier II-14 | 2.670 | 26/08/2012 | 548463 | 7618829 | View SSW from the NW corner of the W side slope. |
| 15 |  | 2012-C2-Tier II-15 | 2.490 | 26/08/2012 | 548466 | 7618849 | **Feature G:** View ESE of minor erosion along the N landfill toe |
| 16 |  | 2012-C2-Tier II-16 | 2.510 | 26/08/2012 | 548466 | 7618849 | **Feature G:** Close-up of minor erosion along the toe of the landfill |
| 17 |  | 2012-C2-Tier II-17 | 2.530 | 26/08/2012 | 548453 | 7618849 | **Feature I:** Metal debris on the side slope of the NW corner of the landfill |
| 18 |  | 2012-C2-Tier II-18 | 2.460 | 26/08/2012 | 548453 | 7618849 | **Feature I:** Exposure of the metal debris to determine its full extent |
| 19 |  | 2012-C2-Tier II-19 | 2.520 | 26/08/2012 | 548453 | 7618849 | **Feature I:** Removal of metal debris from side slope of facility. |
| 20 |  | 2012-C2-Tier II-20 | 2.440 | 26/08/2012 | 548453 | 7618849 | **Feature I:** Soil was placed to fill the void left by the metal debris. |
| 21 |  | 2012-C2-Tier II-21 | 2.230 | 26/08/2012 | 548505 | 7618836 | View N of MW-1, taken from the N toe of the landfill. |
| 22 |  | 2012-C2-Tier II-22 | 2.510 | 26/08/2012 | 548447 | 7618857 | **Feature J:** View WNW of tension crack on the N side slope of the landfill, taken roughly center on the side slope, 3 m from the landfill toe. |
| 23 |  | 2012-C2-Tier II-23 | 2.530 | 26/08/2012 | 548447 | 7618857 | **Feature J:** Close-up of tension crack on the N side slope. |
| 24 |  | 2012-C2-Tier II-24 | 0.467 | 26/08/2012 | 548420 | 7618768 | Panoramic view ESE - SSW of NW corner of the landfill. |
| 25 |  | 2012-C2-Tier II-25 | 0.463 | 26/08/2012 | 548415 | 7618777 | Panoramic view NNE - ESE of SW corner of the landfill. |
| 26 |  | 2012-C2-Tier II-26 | 0.454 | 26/08/2012 | 548510 | 7618728 | Panoramic view WNW - NNE of SE corner of the landfill. |
| 27 |  | 2012-C2-Tier II-27 | 2.490 | 26/08/2012 | 548510 | 7618750 | **Feature K:** View N of discontinuous tension crack on the E side slope. Crack runs parallel to the landfill toe. |
| 28 |  | 2012-C2-Tier II-28 | 2.640 | 26/08/2012 | 548510 | 7618750 | **Feature K:** Close up of tension crack |
| 29 |  | 2012-C2-Tier II-29 | 2.490 | 26/08/2012 | 548519 | 7618760 | **Feature K:** Close-up of second tension crack 13 m NE of other crack on the east slope. |

| Photo (Tier II-) | Thumbnail | Filename | Size (MB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **General Photos** | | | | | | | |
| 30 |  | 2012-C2-Tier II-30 | 0.533 | 26/08/2012 | 548548 | 7618852 | Panoramic view SSW - WNW of E corner of the landfill. |
| 31 |  | 2012-C2-Tier II-31 | 0.435 | 26/08/2012 | 548545 | 7618842 | Close-up of debris removed from Tier II landfill and surrounding area. |
| 32 |  | 2012-C2-Tier II-32 | 2.580 | 26/08/2012 | 548478 | 7618823 | View NE of ponded water off the N slope of the landfill, Lobe 2 of the Station landfill is visible in the background. |
| 33 |  | 2012-C2-Tier II-33 | 2.440 | 26/08/2012 | 548514 | 7618783 | View SE of ponded water of the E slope of the landfill, the former Module train area is visible in the background. |
| 34 |  | 2012-C2-Tier II-34 | 2.510 | 26/08/2012 | 548523 | 7618809 | **Feature F:** View NE of minor erosion extending 15 m from the crest of landfill. |
| 35 |  | 2012-C2-Tier II-35 | 2.430 | 26/08/2012 | 548522 | 7618795 | **Feature B:** Minor depression on E side slope of the landfill, the depression runs perpendicular to the toe of the landfill. (2 m x 0.75 m x 0.10 m) |
| 36 |  | 2012-C2-Tier II-36 | 2.500 | 26/08/2012 | 548521 | 7618784 | **Feature K:** Minor depression on the E slope of the landfill, running parallel to the landfill toe. (0.75 m x 0.20 m x 0.05 m) |
| 37 |  | 2012-C2-Tier II-37 | 2.410 | 26/08/2012 | 548480 | 7618770 | **Feature D:** Minor depression on the landfill surface, running parallel to the crest of the S crest of the landfill. (1 m x 0.20 m x 0.15 m). |
| 38 |  | 2012-C2-Tier II-38 | 2.450 | 26/08/2012 | 548480 | 7618770 | **Feature E:** View SSW from the landfill surface of minor erosion extending from the landfill surface to the toe. (16 m x 1.0 - 1.25 m x 0.05 - 0.10 m). |
| 39 |  | 2012-C2-Tier II-39 | 2.580 | 26/08/2012 | 548475 | 7618755 | **Feature E:** View NNE from the landfill toe of erosion channel. |
| 40 |  | 2012-C2-Tier II-40 | 2.420 | 26/08/2012 | 548476 | 7618751 | **Feature J:** Small section of crack along the south toe of the landfill. |
| 41 |  | 2012-C2-Tier II-41 | 2.650 | 26/08/2012 | 548478 | 7618768 | **Feature L:** Close-up of an example of the vegetation growing on the S slope of the Tier II facility, plant density is approximately 1 plant/3 m^2. |
| 42 |  | 2012-C2-Tier II-42 | 2.560 | 26/08/2012 | 548511 | 7618761 | **Feature C:** View NNE of linear depression at the crest of the landfill crest. (12 m x 0.10 - 0.50 m x 0.10 m) |
| 43 |  | 2012-C2-Tier II-43 | 2.440 | 26/08/2012 | 548511 | 7618773 | **Feature C:** View SSW of linear depression at the crest of the landfill crest. (12 m x 0.10 - 0.50 m x 0.10 m) |
| 45 |  | 2012-C2-Tier II-45 | 2.440 | 26/08/2012 | 548478 | 7618768 | **Feature L:** View W of small vegetation growing on the S slope of the landfill. |
| 46 |  | 2012-C2-Tier II-46 | 9.280 | 26/08/2012 | 548507 | 7618761 | Panoramic view WNW - NNE of the landfill surface from the SE corner. |
| 47 |  | 2012-C2-Tier II-47 | 11.700 | 26/08/2012 | 548521 | 7618810 | Panoramic view SSW - WNW of the landfill surface from the NE corner. |
| 48 |  | 2012-C2-Tier II-48 | 12.800 | 26/08/2012 | 548560 | 7618828 | Panoramic view ESE - SSW of the landfill surface from the NW corner. |
| 49 |  | 2012-C2-Tier II-49 | 12.000 | 26/08/2012 | 548446 | 7618780 | Panoramic view NNE - ESE of the landfill surface from the SW corner. |
| **Soil Sampling** | | | | | | | |
| 1 |  | 2012-C2-Tier II-1 | 2.35 | 25/08/2012 | 548556 | 76118738 | **MW-1:** Close-up of open soil test pit |
| 2 |  | 2012-C2-Tier II-2 | 2.360 | 25/08/2012 | 548556 | 76118738 | **MW-1:** Close-up of closed soil test pit |
| 3 |  | 2012-C2-Tier II-3 | 2.570 | 25/08/2012 | 548526 | 7618731 | **MW-2:** Close-up of open soil test pit |
| 4 |  | 2012-C2-Tier II-4 | 2.510 | 25/08/2012 | 548526 | 7618731 | **MW-2:** Close-up of closed soil test pit |
| 5 |  | 2012-C2-Tier II-5 | 2.400 | 25/08/2012 | 548509 | 7618853 | **MW-3:** Close-up of open soil test pit |
| 6 |  | 2012-C2-Tier II-6 | 2.320 | 25/08/2012 | 548509 | 7618853 | **MW-3:** Close-up of closed soil test pit |
| 7 |  | 2012-C2-Tier II-7 | 2.340 | 25/08/2012 | 548412 | 7618797 | **MW-4:** Close-up of open soil test pit |
| 8 |  | 2012-C2-Tier II-8 | 2.350 | 25/08/2012 | 548412 | 7618797 | **MW-4:** Close-up of closed soil test pit |

## 6.8 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and evaluation of the analytical data for the 2012 Tier II Disposal Facility samples are presented in Tables XXIII and XXIV hereafter. Certificates of Analysis and results of field duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

### Table XXIII: Tier II Disposal Facility Summary Table for Soil Analytical Data

| Sample # | Location | 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] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW1-A | MW1 | 0-15 | 2.5 | 2.9 | 0.9 | <0.5 | 2.5 | 6.0 | 0.1 | 0.7 | <0.5 | <0.05 | <10 | <10 | 29.0 | 29.0 |
| C2-12-MW1-B | | 40-50 | 5.7 | 5.2 | 1.6 | <0.5 | 4.3 | 13.0 | 4.0 | 1.0 | <0.5 | <0.05 | <10 | 17.0 | 52.0 | 69.0 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW2-A | MW2 | 0-15 | 5.7 | 6.5 | 2.1 | <0.5 | 11.7 | 15.0 | 6.9 | 1.3 | <0.5 | <0.05 | <10 | <10 | 47.0 | 47.0 |
| C2-12-MW2-A-D | | 0-15 | 5.4 | 6.6 | 2.0 | <0.5 | 9.5 | 15.0 | 6.4 | 1.4 | <0.5 | <0.05 | <10 | <10 | 47.0 | 47.0 |
| C2-12-MW2-B* | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| C2-12-MW3-A | MW3 | 0-15 | 9.3 | 8.2 | 2.5 | <0.5 | 10.9 | 16.0 | 8.4 | 1.4 | <0.5 | <0.05 | <10 | <10 | 162.0 | 162.0 |
| C2-12-MW3-B | | 40-50 | 13.1 | 10.9 | 3.2 | <0.5 | 6.2 | 13.0 | 7.8 | 1.8 | <0.5 | <0.05 | <10 | <10 | 11.0 | 11.0 |
| C2-12-MW4-A | MW4 | 0-15 | 16.7 | 5.9 | 2.0 | <0.5 | 7.1 | 20.0 | 5.9 | 1.3 | <0.5 | <0.05 | <10 | <10 | 119.0 | 119.0 |
| C2-12-MW4-B | | 40-50 | 8.3 | 10.1 | 4.3 | <0.5 | 7.0 | 21.0 | 11.1 | 1.8 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |

*****Sample C2-12-MW2-B was not analyzed please refer to Section 1.4

Table XXIV: Evaluation of 2012 Soil Analytical Data – Tier II Disposal Facility

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all sample locations. Concentrations ranged from 2.5 – 16.7 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of copper was detected at the surface of MW4, a downgradient location. All values were below CCME guidelines. |
| Nickel (Ni) | Nickel was detected at all sample locations. Results were consistent at upgradient and downgradient locations with concentrations ranging from 2.9 – 10.9 mg/kg. The highest concentration was detected at depth at MW3, a downgradient sample. All values were below CCME guidelines. |
| Cobalt (Co) | Cobalt was detected at all sample locations. Concentrations ranged from 0.9 – 4.3 mg/kg. Concentrations were slightly higher at downgradient sample locations The highest concentration of cobalt was detected at depth at MW4, a downgradient sample. All values were below CCME guidelines. |
| Cadmium (Cd) | Cadmium was below the method detection limit at all sampling locations. |
| Lead (Pb) | Lead was detected at all sample locations. Concentrations ranged from 2.5 – 10.9 mg/kg. Concentrations were slightly higher at downgradient sample locations. The highest concentration of lead was detected at surface at MW3, a downgradient location. All values were below CCME guidelines. |
| Zinc (Zn) | Zinc was detected at all sample locations. Concentrations ranged from 6 – 21 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of zinc was detected at depth MW4, a downgradient sample. All values were below CCME guidelines. |
| Chromium (Cr) | Chromium was detected at all sample locations. Concentrations ranged from 0.1 – 11.1 mg/kg. Concentrations were slightly higher at downgradient sample locations. The highest concentration of chromium was detected at depth at MW4, a downgradient sample. All values were below CCME guidelines. |
| Arsenic (As) | Arsenic was detected at all sample locations. Concentrations ranged from 0.7 – 1.8 mg/kg. Concentrations were slightly higher at downgradient sample locations. The highest concentration of arsenic was detected at two locations at depth MW3 and MW4 both downgradient locations. All values were below CCME guidelines. |
| Mercury (Hg) | Mercury was below the method detection limit at all sampling locations. |
| PCBs | PCBs were below the method detection limit at all sampling locations. |
| TPH | TPH was detected at all sampling locations at surface and depth with the exception of MW4 where TPH was not detected at depth. Detected TPH concentrations ranged from 11 – 162 mg/kg with the highest concentration detected at the surface of MW3. All TPH concentrations are below standard DEW Line remediation criterion for TPH concentrations in soil. |

## 6.9 GROUNDWATER SAMPLE ANALYTICAL DATA

The groundwater chemical analysis results and evaluation for the analytical data for the 2012 Tier II Disposal Facility samples are presented in Tables XXV and XXVI hereafter. Certificates of Analysis and results for groundwater samples collected as part of the QA/QC program are presented in Appendix C, at the end of this report.

### Table XXV: Tier II Disposal Facility Summary Table for Groundwater Analytical Data

| Sample # | Location | Groundwater Elevation (masl) | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [µg/L] | PHC(F1) | PHC(F2) | PHC(F3) | TPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | $C_6$-$C_{10}$ | $C_{10}$-$C_{16}$ | $C_{16}$-$C_{34}$ | $C_6$-$C_{34}$ |
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW1 | MW1 | 12.5* | 0.011 | 0.05 | 0.013 | 0.000102 | 0.003 | 18.4 | 0.007 | 0.005 | <0.000025 | <0.01 | <0.1 | 0.2 | <0.1 | 0.2 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW2 | MW2 | 12.6* | 0.019 | 0.14 | 0.007 | 0.000071 | 0.004 | 10.3 | 0.165 | 0.006 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| C2-12-MW3 | MW3 | 12.4* | 0.018 | 0.06 | 0.003 | 0.000043 | 0.004 | 0.978 | 0.020 | 0.007 | <0.000025 | <0.01 | <0.1 | <0.1 | 0.2 | 0.2 |
| C2-12-MW4 | MW4 | 12.4* | 0.015 | 0.03 | 0.002 | 0.000104 | 0.001 | 26.0 | 0.348 | 0.005 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |

*masl values are to be considered within +/- 3 m as elevations were not provided in the TOR and masl was measured with a handheld GPS

# Table XXVI: Evaluation of 2012 Groundwater Analytical Data – Tier II Disposal Facility

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all monitoring well locations, concentrations ranged from 0.011 – 0.019 mg/L with the highest concentration occurring at MW2. Results were consistent at upgradient and downgradient locations. |
| Nickel (Ni) | Nickel was detected at all monitoring well locations, concentrations ranged from 0.03 – 0.14 mg/L with the highest concentration occurring at MW2. Results are consistent at upgradient and downgradient locations. |
| Cobalt (Co) | Cobalt was detected at all monitoring locations, concentrations ranged from 0.002 – 0.013 mg/L with the highest concentration occurring at the upgradient sample MW1. Results were consistent at upgradient and downgradient locations. |
| Cadmium (Cd) | Cadmium was detected at all monitoring well locations, concentrations ranging from 0.000043 – 0.000104 mg/L with the highest concentration occurring at MW4. |
| Lead (Pb) | Lead was detected at all monitoring well locations, concentrations ranged from 0.001 – 0.004 mg/L with the highest concentration occurring at MW3. Results were consistent at upgradient and downgradient locations. |
| Zinc (Zn) | Zinc was detected at all monitoring well locations, concentrations ranged from 0.978 – 26.0 mg/L, with the highest concentration occurring at MW4. Results were consistent at upgradient and downgradient locations. |
| Chromium (Cr) | Chromium was detected at all monitoring well locations, concentrations ranged from 0.007 – 0.348 mg/L, with the highest concentration occurring at MW4. Results were consistent at upgradient and downgradient locations. |
| Arsenic (As) | Arsenic was detected at all monitoring well locations, concentrations ranged from 0.05 – 0.007 mg/L, with the highest concentration occurring at MW4. Results were consistent at upgradient and downgradient locations. |
| Mercury (Hg) | Mercury was not detected at any monitoring well locations |
| PCBs | Mercury was not detected at any monitoring well locations |
| TPH | TPH was detected at two locations, MW1 the upgradient location and MW3, a downgradient location. TPH concentrations were 0.2 mg/L at both locations. Free Phase was not detected at either of these locations during sampling. |

## 6.10 MONITORING WELL SAMPLING / INSPECTION LOGS

The monitoring well sampling logs for MW-1 to MW-4 are presented in this section.

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 25-Aug-12 | Time: | 9:50 AM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | Tier II Disposal Facility | | |
| Monitoring Well ID: | MW1 | | |
| Sample Number: | 12-C2-MW1 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 50.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 112.5 | Measurement method: (meter, tape, etc.) | Interface Meter |
| Static water level (cm) = (below ground surface) | 62.5 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 215.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 102.5 | | |
| Static volume of water in well (mL) = | 2013.0 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 3000 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 6.92 | | |
| Final Conductivity (uS/cm) = | 5120 | | |
| Final Temperature (°C) = | 4.9 | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 25-Aug-12 | Time: | 9:10 AM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | Tier II Disposal Facility | | |
| Monitoring Well ID: | MW2 | | |
| Sample Number: | 12-C2-MW2 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 20.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 57.0 | Measurement method: (meter, tape, etc.) | Interface Meter |
| Static water level (cm) = (below ground surface) | 37.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 178.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 121.0 | | |
| Static volume of water in well (mL) = | 2375.8 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 3500 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 7.11 | | |
| Final Conductivity (uS/cm) = | 7010 | | |
| Final Temperature (°C) = | 5.1 | | |
| | | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 25-Aug-12 | Time: | 8:30 AM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | Tier II Disposal Facility | | |
| Monitoring Well ID: | MW3 | | |
| Sample Number: | 12-C2-MW3 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 54.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 80.0 | Measurement method: (meter, tape, etc.) | Interface Meter |
| Static water level (cm) = (below ground surface) | 26.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 190.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 110.0 | | |
| Static volume of water in well (mL) = | 2159.8 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 3000 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 9.62 | | |
| Final Conductivity (uS/cm) = | 6710 | | |
| Final Temperature (°C) = | 5.3 | | |
| | | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 25-Aug-12 | Time: | 10:05 AM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | Tier II Disposal Facility | | |
| Monitoring Well ID: | MW4 | | |
| Sample Number: | 12-C2-MW4 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 70.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 134.0 | Measurement method: (meter, tape, etc.) | Interface Meter |
| Static water level (cm) = (below ground surface) | 64.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 223.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 89 | | |
| Static volume of water in well (mL) = | 1747.5 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 2500 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 7.34 | | |
| Final Conductivity (uS/cm) = | 7160 | | |
| Final Temperature (°C) = | 5 | | |
| | | | |

# 7 NON-HAZARDOUS WASTE LANDFILL (NHWL)

## 7.1 SUMMARY

During the 2012 monitoring event of the Non-Hazardous Waste Landfill at CAM-2 Gladman Point soil and groundwater samples were collected at 4 locations (1 upgradient and 3 downgradient), and a visual inspection was conducted to identify and assess erosional features on the facility.

A PCB concentration of 123 mg/kg was detected at depth at MW5, at this concentration the soil is classified as hazardous. MW5 is the upgradient monitoring well location and therefore it is unlikely that the NHWL is the source as well as PCBs were not detected at any other location at site cross contamination is very unlikely. No relatively high metal concentrations were detected at the NWHL. TPH was detected at all sampling locations and in all samples with the exception of the depth sample at MW5 and MW6. Detectable TPH concentrations ranged from 25 to 1366 mg/kg with the highest concentration detected at the surface of the MW3. All detected TPH was primarily in the F3 fraction. Although relatively high, currently all TPH readings are below the standard site criteria of 2500 mg/kg and are therefore acceptable.

A relatively high concentration of chromium was detected at the MW7 monitoring well, at 1.02 mg/L the concentration was significantly higher than results from other wells sampled at the NHWL . A TPH concentration of 1.2 mg/L was detected at MW8. PCBs were not detected in any groundwater samples.

The NHWL has experienced slight changes since the 2010 monitoring program, including slight increases in settlement and small increases in erosion. Currently there are no erosional features with significant or unacceptable severity ratings. The erosion features on the southern slope of the Landfill are the most severe observed at the CAM-2 site however, they pose little to no concern for the near future as the erosion channels are self-armouring and have changed little in a three year period. The overall performance of the NHWL is considered acceptable

## 7.2 VISUAL INSPECTION REPORT

The visual inspection of the NHWL was conducted on August 27, 2012. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XXVII of this

report. Please refer to Figure CAM-2.6 for the location of photographs and erosional features at the NHWL.

Weather Conditions at the Time of the Visual Inspection

At the time of the visual inspection of the NHWL, the temperature was approximately 8°C; skies were clear and sunny with a light wind of approximately 10 km/hr. The precipitation from earlier in the morning stopped by noon, giving way to clear skies.

Settlement

Settlement indications were noted at six areas, three previously identified (Features A, B and C), and three new observations (Features I, J and M). Feature A, a subtle depression on the south slope of the Landfill, has decreased in size since the 2010 monitoring program, potentially due to the relatively high rates of erosion and deposition on the south slope of the Facility. Feature B consists of two depressions on the side slope below the southwest corner of the Landfill. Depressions have remained relatively consistent since the 2010 observations and consequently, the 2009 monitoring program (as indicated by the 2010 monitoring report). Feature C, comprised of subtle depressions on the north side slope of the NHWL, observed small changes in size from the 2010 monitoring program and the addition of a third depression adjacent to the previously observed depressions. Feature I, on the northern slope at the northwest corner of the Landfill, consists of a small linear depression. Feature J, located along the northern toe at its approximate midpoint, consists of a minor depression and associated tension crack. Feature M, located on the southern slope of the Landfill, consists of a small depression associated with large cobble, which may have inhibited proper compaction at this location.

Previously observed indications of settlement have shown little change since the 2010 monitoring program. While the newly observed depressions are all minor, all areas of settlement have an acceptable severity rating.

Erosion

Erosion is most prominent on the southern slope of the NHWL, with five prominent erosion channels (Feature D), extending from the Landfill surface to the toe. The channels are self-armouring and have experienced relatively small increases in depth and width since 2010. A sixth relatively small erosion channel was observed on the southern slope of the Landfill which was not previously reported. Feature D has an acceptable severity rating.

Feature F, a minor erosion channel on the eastern slope of the Landfill, is barely discernible, only apparent due to the small deposit of sediment at the Landfill toe. Feature F has an acceptable

severity rating. The minor erosion extending along the eastern toe of the Landfill, Feature E, remains consistent with previous observations and has an acceptable severity rating.

Frost Action

Evidence of frost action was not noted.

Evidence of Burrowing Animals

Indications of burrowing animals were not noted.

Re-establishment of Vegetation

Evidence of vegetation was not noted.

Staining

Areas of staining were not observed at the time of the monitoring program.

Seepage Points

There was no seepage observed at this Landfill.

Debris

Feature G (partially exposed metal rod) was removed by the Field Technician. Unfortunately, no picture was taken prior to removal.

Presence/Condition of Monitoring Instruments

All monitoring well installations were found to be in good condition at the Landfill.

Other Features of Note

At the time of the 2012 monitoring program, Feature H was no longer visible, while three new tension cracks were observed on the slopes of the Landfill, Feature J, K and L. Feature J, a small tension crack, is associated with a minor depression along the northern toe of the Landfill. Feature K, a discontinuous partially in-filled tension crack, extends for 6 m on the east slope of the Landfill. Feature L, a discontinuous tension crack on the south slope of the Landfill, extends the length of the slope at the approximate middle of the slope. All features are considered to have an acceptable severity rating.

Table XXVII: Visual Inspection Checklist / Report – NHWL

DEW LINE CLEANUP: POST-CONSTRUCTION - LANDFILL MONITORING
VISUAL INSPECTION CHECKLIST
**INSPECTION REPORT – PAGE 1 of 2**

| |
|---|
| **SITE NAME**: CAM-2 Gladman Point |
| **LANDFILL DESIGNATION**: NHWL (New Landfill) |
| **DATE OF INSPECTION**: August 27, 2012 |
| **DATE OF PREVIOUS INSPECTION**: August 13-14, 2010 |
| **INSPECTED BY**: B. MacKay |
| **REPORT PREPARED BY**: B. MacKay |
| **LANDFILL MONITORING EVENT #:** 7 |
| **The inspector/reporter represents to the best of his/her knowledge that the following statements and observations are true and correct and to the best of the preparer's actual knowledge, no material facts have been suppressed or misstated.** |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes | Feature A See Figure CAM-2.6 (south west corner) | 3 | 0.2 | 0.05 | Occasional | Linear depressions (three locations) | 47 | Acceptable | Subtle depressions on south slope of landfill, has decreased in size since the 2010 inspection, potentially due to the relatively high rates of erosion and deposition on the south slope of the facility. |
| | | Feature B See Figure CAM-2.6 (south east corner) | 0.2 - 0.3 | 0.2 | 0.05 | | Isolated depressions | 29, 30 | Acceptable | Two depressions on the side slope below the south west corner of the landfill. Depressions have increased in length and width but decreased in depth, potentially due to erosion forces on the side slope. |
| | | Feature C See Figure CAM-2.6 (north east and north west corners) | 0.75 - 2 | 0.05 - 0.8 | 0.05 - 0.2 | | Linear depressions (three locations) | 12, 13, 17 | Acceptable | Subtle depressions on north side slope of NHWLF, observed small changes in size from the 2010 investigation and the addition of a third depression adjacent to the previously observed depressions. |
| | | Feature I See Figure CAM-2.6 (north west corner) | 1 | 0.3 | 0.1 | | Linear depressions (three locations) | 11 | Acceptable | New Observation: Subtle depressions located on the north side slope at the north west corner. |
| | | Feature J See Figure CAM-2.6 (north slope middle) | 1 | 0.75 | 0.05 - 0.2 | | Isolated depressions | 15 | Acceptable | New Observation: Subtle depressions located along the toe of the north slope at the approximate mid point. Small tension crack is associated with this feature. |
| | | Feature M See Figure CAM-2.6 (south west corner) | 0.3 | 0.2 | 0.15 | | Depressions | 48, 49, 50 | Acceptable | New Observation: Small depression associated with a large cobble on the south slope of the landfill at the south west corner, 1 m from the crest of the landfill. |
| Erosion | Yes | Feature D See Figure CAM-2.6 (6 areas on south slope) | 10 | Variable, 0.1 - 2.0 | 0.02 - 0.25 | Occasional | Minor surficial erosion | 31 - 39 | Acceptable | Minor erosion noted on downgradient side slope of landfill. Cover appears stable with minor increases in depth and width from 2010 (and consequently 2009). However, 2012 has seen the addition of a very minor sixth erosion channel not previously observed. |
| | | Feature E See Figure CAM-2.6 (extending along east toe) | 25 | 0.1 - 0.2 | 0.05 | | Minor surficial erosion | 22 | Acceptable | Runoff channel along toe of landfill, appears relatively stable in size since the 2010 investigation. Self-armouring. |
| | | Feature F See Figure CAM-2.6 (east slope) | 10 | 0.1 - 0.2 | 0.05 | | Minor surficial erosion | 23 | Acceptable | Minor erosion noted on lower east side slope of landfill. Self-armouring. |

| Checklist Item | Present (Yes/No) | Location | Length (m) | Width (m) | Depth (m) | Extent | Description | Photographic Record | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Frost Action | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Staining | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | None | N/A | N/A | Not Observed | N/A |
| Debris Exposed | No | Feature G | N/A | N/A | Unknown | Isolated <1% | Partially exposed metal rod at toe of landfill | N/A | Acceptable | Removed by field assistants. |
| Presence/Condition of Monitoring Instruments | Yes | See Figure CAM-2.6 MW-5 to MW-8 | N/A | N/A | N/A | None | Steel protective casings | 52, 53, 54, 59 | Acceptable | All monitoring wells in good condition. |
| Other Features of Note | Yes | Feature J See Figure CAM-2.6 (north slope middle) | 1 | 2 mm | Unknown | Occasional | Small tension crack | 16 | Acceptable | New Observation: Small tension crack associated with depression on the north slope of the landfill. |
| | | Feature K See Figure CAM-2.6 (east slope) | 6 | 0.01 - 0.1 | | | Tension crack | 24, 25 | Acceptable | New Observation: Discontinuous partially in filled tension crack on the east slope of the landfill. |
| | | Feature L See Figure CAM-2.6 (south slope) | 50 | 0 - 0.05 | | | Tension crack | 40-43 | Acceptable | New Observation: Discontinuous tension crack that extends the length of the south slope of the landfill running parallel to the toe at the approximate middle of the slope. |
| Additional Photos | Yes | See Figure CAM-2.6 and Photographic Record | N/A | N/A | N/A | N/A | General Photographic Record | N/A | Not Observed | General photos for documentation, no features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

## 7.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for NHWL has been completed as per the TOR and is included as Table XXVIII hereafter.

Table XXVIII: Preliminary Stability Assessment – NHWL

| Feature | Severity Rating | Extent |
|---|---|---|
| Settlement | Acceptable | Occasional |
| Erosion | Acceptable | Occasional |
| Frost Action | Not observed | None |
| Staining | Not observed | None |
| Vegetation Stress | Not observed | None |
| Seepage/Ponded Water | Not observed | None |
| Debris Exposure | Acceptable | Isolated |
| **Overall Landfill Performance** | **Acceptable** | |

## 7.4 LOCATION PLAN

The Location Plan for the NHWL has been completed as per the TOR and is included in the following page as Figure CAM-2.6 Gladman Point – NHWL.

Figure 5 : CAM-2.6 Gladman Point – NHWL

## 7.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the NHWL has been completed as per the TOR and is included in the following pages as Table XXIX. The Photographic Record only contains an index and “thumbnail” photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

# Table XXIX: Landfill Visual Inspection Photo Log – NHWL

| Photo (2012-C2-) | Thumbnail | Filename | Size (KB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **General Photos** | | | | | | | |
| 2 |  | 2012-C2-NHWL-2 | 0.544 | Aug 27,2012 | 548672 | 7618384 | Panoramic N - E of the SW corner of the landfill, taken from MW-8 |
| 8 |  | 2012-C2-NHWL-8 | 2.830 | Aug 27,2012 | 548675 | 7618474 | View E of N slope of landfill, taken from the NW corner. |
| 9 |  | 2012-C2-NHWL-9 | 2.630 | Aug 27,2012 | 548675 | 7618474 | View S of the W slope of the landfill, taken from the NW corner |
| 10 |  | 2012-C2-NHWL-10 | 15.200 | Aug 27,2012 | 548691 | 7618464 | Panoramic E - S of the landfill surface taken from the top NW corner. |
| 11 |  | 2012-C2-NHWL-11 | 2.540 | Aug 27,2012 | 548690 | 7618464 | **Feature I:** Close-up of linear depression 1 m from the N crest at the NW corner. (1 m x 0.3 m x 0.10 m) |
| 12 |  | 2012-C2-NHWL-12 | 2.540 | Aug 27,2012 | 548695 | 7618467 | **Feature C:** Close-up of depression on the N side slope of the NHWL (0.75 m x 0.75 m x 0.10 m) |
| 13 |  | 2012-C2-NHWL-13 | 2.440 | Aug 27,2012 | 548695 | 7618468 | **Feature C:** Close-up of linear depression on the N side slope of the NHWL located 1 m below the depression in the previous photograph (2 m x 0.05 - 0.20 m x 0.05 m) |
| 14 |  | 2012-C2-NHWL-14 | 2.460 | Aug 27,2012 | 548695 | 7618468 | **Feature C:** View N from landfill crest of linear depressions on the N side slope of the NWHL (1 - 2 m x 0.05 - 0.75 m x 0.05 - 0.1 m) |
| 15 |  | 2012-C2-NHWL-15 | 2.530 | Aug 27,2012 | 548712 | 7618478 | **Feature J:** Close-up of depression 4 m from the N toe mid-way between the NW and NE corners. (1 m x 0.75 m x 0.05 - 0.20 m) |
| 16 |  | 2012-C2-NHWL-16 | 2.820 | Aug 27,2012 | 548712 | 7618478 | **Feature J:** Small tension crack observed 0.10 m below the depression. (1 m x 0.002 m) |
| 17 |  | 2012-C2-NHWL-17 | 2.400 | Aug 27,2012 | 548734 | 7618475 | **Feature C:** Depression located 2 m below the N crest at the NE corner, depression appears to have increased in size from 2010. (2 m x 0.8 m x 0.05 - 0.20 m). |
| 18 |  | 2012-C2-NHWL-18 | 2.640 | Aug 27,2012 | 548744 | 7618485 | View S of the E slope of the landfill, taken from the NE corner |
| 19 |  | 2012-C2-NHWL-19 | 2.640 | Aug 27,2012 | 548744 | 7618485 | View W of N slope of landfill, taken from the NE corner. |
| 20 |  | 2012-C2-NHWL-20 | 8.610 | Aug 27,2012 | 548737 | 7618474 | Panoramic view S - W of the landfill surface taken from the NE corner. |
| 21 |  | 2012-C2-NHWL-21 | 2.510 | Aug 27,2012 | 548740 | 7618460 | View S of the E landfill crest, Feature H a tension crack 0.4 m from the E crest, was not observed this year. |
| 22 |  | 2012-C2-NHWL-22 | 2.570 | Aug 27,2012 | 548750 | 7618459 | **Feature E:** View N of minor erosion along the E toe of the landfill. (25 m x 0.1 - 0.2 m x 0.05 m) |
| 23 |  | 2012-C2-NHWL-23 | 2.500 | Aug 27,2012 | 548741 | 7618465 | **Feature F:** View E of a minor erosion channel on the E slope, taken 11 m SSE of the NE corner. (10 m x 0.1 - 0.20 x 0.05 m) |
| 24 |  | 2012-C2-NHWL-24 | 2.390 | Aug 27,2012 | 548752 | 7618435 | **Feature K:** View N of a tension crack on the E side slope of the landfill, located 25 m SSE of the NE corner. (6 m x 0.01 - 0.1). |
| 25 |  | 2012-C2-NHWL-25 | 2.000 | Aug 27,2012 | 548752 | 7618435 | **Feature K:** Close-up of a tension crack on the E side slope of the landfill, located 25 m SSE of the NE corner. (6 m x 0.01 - 0.01 m). |
| 26 |  | 2012-C2-NHWL-26 | 2.700 | Aug 27,2012 | 548760 | 7618411 | View N of E landfill slope/toe, taken from the SE corner of the landfill |
| 27 |  | 2012-C2-NHWL-27 | 2.470 | Aug 27,2012 | 548760 | 7618411 | View W of S landfill slope/toe, several erosion channels are visible extending from the crest to the toe of the landfill. Taken from the SE corner of the landfill. |
| 28 |  | 2012-C2-NHWL-28 | 7.750 | Aug 27,2012 | 548749 | 7618426 | Panoramic view W - N of the landfill surface taken from the SE corner. |
| 29 |  | 2012-C2-NHWL-29 | 2.160 | Aug 27,2012 | 548751 | 7618425 | **Feature B:** View SE at two small depressions (potholes) noted below southeast top corner of landfill (0.20 - 0.30 m x 0.20 m x 0.05 m) |
| 30 |  | 2012-C2-NHWL-30 | 2.520 | Aug 27,2012 | 548750 | 7618422 | **Feature B:** Close-up of small depressions (potholes) noted below southeast top corner of landfill (0.20 - 0.30 m x 0.20 m x 0.05 m) |
| 31 |  | 2012-C2-NHWL-31 | 2.440 | Aug 27,2012 | 548749 | 7618421 | **Feature D:** View from the S from the top of the landfill of two erosion channels that extend to the landfill toe, approximately 1 m W of SE corner (10 m x 0.2 m x 0.05 - 0.15 m) |

| Photo (2012-C2-) | Thumbnail | Filename | Size (KB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **General Photos** | | | | | | | |
| 32 |  | 2012-C2-NHWL-32 | 2.590 | Aug 27,2012 | 548750 | 7618409 | **Feature D:** View from the S landfill toe of two erosion channels (10 m x 0.2 m x 0.05 - 0.15 m) |
| 33 |  | 2012-C2-NHWL-33 | 2.520 | Aug 27,2012 | 548740 | 7618418 | **Feature D:** View S from the top of the landfill of erosion channel that extend to the landfill toe (10 m x 0.2 - 2 m x 0.1 - 0.25 m) |
| 34 |  | 2012-C2-NHWL-34 | 2.640 | Aug 27,2012 | 548743 | 7618408 | **Feature D:** View from the S landfill toe erosion channel (10 m x 0.2 - 2 m x 0.1 - 0.25 m) |
| 35 |  | 2012-C2-NHWL-35 | 2.520 | Aug 27,2012 | 548740 | 7618418 | **Feature D:** Close-up of erosion a the crest of the landfill. |
| 36 |  | 2012-C2-NHWL-36 | 2.500 | Aug 27,2012 | 548738 | 7618419 | **Feature D:** Sixth channel not observed previously, view from the S crest of the landfill (10 m x 0.1 m x 0.02 - 0.05 m) |
| 37 |  | 2012-C2-NHWL-37 | 2.520 | Aug 27,2012 | 548739 | 7618406 | **Feature D:** View from the S landfill toe erosion channels(10 m x 0.1 m x 0 - 0.05 m) |
| 38 |  | 2012-C2-NHWL-38 | 2.460 | Aug 27,2012 | 548716 | 7618414 | **Feature D:** View from the S from the top of the landfill of erosion channel that extend to the landfill toe (10 m x 0.75 m x 0.05 m) |
| 39 |  | 2012-C2-NHWL-39 | 2.420 | Aug 27,2012 | 548718 | 7618401 | **Feature D:** View from the S landfill toe erosion channel (10 m x 0.75 m x 0.05 m) |
| 40 |  | 2012-C2-NHWL-40 | 2.430 | Aug 27,2012 | 548750 | 7618416 | **Feature L:** View W of discontinuous crack extending the length of the S side of the landfill. (60 m x 0 - 0.05 m) |
| 41 |  | 2012-C2-NHWL-41 | 2.520 | Aug 27,2012 | 548750 | 7618416 | **Feature L:** Close-up of tension crack extending the length of the S slope of the landfill |
| 42 |  | 2012-C2-NHWL-42 | 2.430 | Aug 27,2012 | 548740 | 7618413 | **Feature L:** Discontinuous crack extending the length of the S side of the landfill, taken 10 m W of photo 40 (60 m x 0 - 0.05 m) |
| 43 |  | 2012-C2-NHWL-43 | 2.430 | Aug 27,2012 | 548710 | 7618405 | **Feature L:** Discontinuous crack extending the length of the S side of the landfill, taken 20 m W of photo 42 (60 m x 0 - 0.05 m) |
| 44 |  | 2012-C2-NHWL-44 | 2.640 | Aug 27,2012 | 548690 | 7618399 | View N of the W landfill slope/toe, taken from the SW corner of the landfill |
| 45 |  | 2012-C2-NHWL-45 | 2.540 | Aug 27,2012 | 548690 | 7618399 | View E of the S landfill slope/toe, taken from the SW corner of the landfill |
| 46 |  | 2012-C2-NHWL-46 | 69.300 | Aug 27,2012 | 548700 | 7618412 | Panoramic view N - E |
| 47 |  | 2012-C2-NHWL-47 | 2.470 | Aug 27,2012 | 548700 | 7618412 | **Feature A:** View E of depression, reduced in size since last observation, (3 m x 0.2 m x 0.05 m) |
| 48 |  | 2012-C2-NHWL-48 | 2.520 | Aug 27,2012 | 548699 | 7618411 | **Feature M:** Small depression associated with large cobble 1 m from the crest of the SW corner on the S slope. (0.3 m x 0.2 m x 0.15 m) |
| 49 |  | 2012-C2-NHWL-49 | 2.650 | Aug 27,2012 | 548699 | 7618411 | **Feature M:** Close-up of depression on the S slope. |
| 50 |  | 2012-C2-NHWL-50 | 2.400 | Aug 27,2012 | 548699 | 7618411 | **Feature M:** View S from crest of landfill of depression. |
| 51 |  | 2012-C2-NHWL-51 | 2.590 | Aug 27,2012 | 548699 | 7618410 | View S of ponded water along the S toe of the landfill. |
| 52 |  | 2012-C2-NHWL-52 | 2.710 | Aug 27,2012 | 548675 | 7618378 | View NNW of MW-8 |
| 53 |  | 2012-C2-NHWL-53 | 2.650 | Aug 27,2012 | 548726 | 7618378 | View N of MW-7 |
| 54 |  | 2012-C2-NHWL-54 | 2.860 | Aug 27,2012 | 548762 | 7618384 | View N of MW-6, erosion visible on the S side slope of the landfill. |
| 55 |  | 2012-C2-NHWL-55 | 2.400 | Aug 27,2012 | 548723 | 7618438 | Close-up of metal wire found compacted into the landfill cap. |
| 56 |  | 2012-C2-NHWL-56 | 2.450 | Aug 27,2012 | 548723 | 7618438 | Close-up of removed metal wire found compacted into the landfill cap. |
| 57 |  | 2012-C2-NHWL-57 | 2.900 | Aug 27,2012 | 548693 | 7618465 | View NW of ponded water along the NW landfill toe |
| 58 |  | 2012-C2-NHWL-58 | 2.750 | Aug 27,2012 | 548693 | 7618465 | View NNE of ponded water between landfill toe and MW-5 |
| 59 |  | 2012-C2-NHWL-59 | 2.720 | Aug 27,2012 | 548696 | 7618501 | View S of MW-5 |

| Photo (2012-C2-) | Thumbnail | Filename | Size (KB) | Date | Vantage Point | | Caption |
|---|---|---|---|---|---|---|---|
| | | | | | Easting | Northing | |
| **Soil Sampling** | | | | | | | |
| 1 |  | 2012-C2-NHWL-1 | 2.430 | 24/08/2012 | 548672 | 7618384 | **MW-6:** Close-up of open soil test pit |
| 3 |  | 2012-C2-NHWL-3 | 2.340 | 24/08/2012 | 548672 | 7618384 | **MW-6:** Close-up of closed soil test pit |
| 4 |  | 2012-C2-NHWL-4 | 2.370 | 24/08/2012 | 548721 | 7618381 | **MW-7:** Close-up of open soil test pit |
| 5 |  | 2012-C2-NHWL-5 | 2.320 | 24/08/2012 | 548721 | 7618381 | **MW-7:** Close-up of closed soil test pit |
| 6 |  | 2012-C2-NHWL-6 | 2.380 | 24/08/2012 | 548756 | 7618383 | **MW-8:** Close-up of open soil test pit |
| 7 |  | 2012-C2-NHWL-7 | 2.370 | 24/08/2012 | 548756 | 7618383 | **MW-8:** Close-up of closed soil test pit |

## 7.6 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and evaluation of analytical data for the 2012 Non-Hazardous Waste Landfill samples are presented in Tables XXX and XXXI below. Certificates of Analysis and results for field duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

Table XXX: Non-Hazardous Waste Landfill Summary Table of Soil Analytical Data

| Sample # | Location | 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] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW5-A | MW-5 | 0-15 | 12.2 | 8.7 | 2.3 | <0.5 | 6.8 | 15 | 7.7 | 1.2 | <0.5 | <0.05 | <10 | <10 | 136.0 | 136.0 |
| C2-12-MW5-A-D | | 0-15 | 11.4 | 8.5 | 2.2 | <0.5 | 7.1 | 14 | 6.7 | 1.1 | <0.5 | <0.05 | <10 | <10 | 147.0 | 147.0 |
| C2-12-MW5-B | | 40-50 | 8.0 | 9.7 | 3.9 | <0.5 | 8.7 | 14 | 11.1 | 2.2 | <0.5 | 123 | <10 | <10 | <10 | <10 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW6-A | MW-6 | 0-15 | 3.6 | 3.1 | 0.7 | <0.5 | 1.8 | 6 | 3.0 | <0.5 | <0.5 | <0.05 | <10 | <10 | 133.0 | 133.0 |
| C2-12-MW6-B | | 40-50 | 6.2 | 9.0 | 3.8 | <0.5 | 9.9 | 21 | 10.0 | 1.8 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |
| C2-12-MW7-A | MW-7 | 0-15 | 11.1 | 18.4 | 3.8 | 0.7 | 4.6 | 11 | 8.1 | 2.2 | <0.5 | <0.05 | <10 | <10 | 306.0 | 306.0 |
| C2-12-MW7-B | | 40-50 | 8.2 | 10.9 | 3.8 | <0.5 | 8.9 | 16 | 11.9 | 2.6 | <0.5 | <0.05 | <10 | <10 | 195.0 | 195.0 |
| C2-12-MW8-A | MW-8 | 0-15 | 8.1 | 11.3 | 1.6 | <0.5 | 3.1 | 8 | 5.9 | 1.4 | <0.5 | <0.05 | <10 | 46.0 | 1320.0 | 1366.0 |
| C2-12-MW8-B | | 40-50 | 4.7 | 6.7 | 2.0 | <0.5 | 5.0 | 9 | 6.9 | 1.5 | <0.5 | <0.05 | <10 | <10 | 25.0 | 25.0 |

## Table XXXI: Evaluation of 2012 Soil Analytical Data – NHWL

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected at all sample locations. Concentrations ranged from 3.6 – 12.2 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of copper was detected at the surface of MW5, the upgradient location. All values were below CCME guidelines. |
| Nickel (Ni) | Nickel was detected at all sample locations. Results were consistent at upgradient and downgradient locations with concentrations ranging from 3.1 – 18.4 mg/kg. The highest concentration was detected at the surface of MW7, a downgradient sample. All values were below CCME guidelines. |
| Cobalt (Co) | Cobalt was detected at all sample locations. Concentrations ranged from 0.7 – 3.9 mg/kg. Concentrations were similar at upgradient and downgradient sample locations The highest concentration of cobalt was detected at the surface of MW5 the upgradient location. All values were below CCME guidelines. |
| Cadmium (Cd) | Cadmium was detected at MW7 at surface, at a concentration of 0.7 mg/kg. The concentration is below CCME guidelines. |
| Lead (Pb) | Lead was detected at all sample locations. Concentrations ranged from 1.8 – 9.9 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of lead was detected at depth at MW6, a downgradient location. All values were below CCME guidelines. |
| Zinc (Zn) | Zinc was detected at all sample locations. Concentrations ranged from 6 – 21 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of zinc was detected at depth MW6, a downgradient sample. All values were below CCME guidelines. |
| Chromium (Cr) | Chromium was detected at all sample locations. Concentrations ranged from 3.0 – 11.9 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of chromium was detected at depth at MW7, a downgradient sample. All values were below CCME guidelines. |
| Arsenic (As) | Arsenic was detected at all sample locations in all samples with the exception of the surface sample at MW6. Detected concentrations ranged from 1.1 – 2.6 mg/kg. Concentrations were similar at upgradient and downgradient sample locations. The highest concentration of arsenic was detected at depth at MW7. All values were below CCME guidelines. |
| Mercury (Hg) | Mercury was below the method detection limit at all sampling locations. |
| PCBs | PCBs were detected at depth at one sampling site, MW5 the upgradient location with a concentration of 123 mg/kg. PCBs are considered hazardous at this concentration in soil. |
| TPH | TPH was detected at all sampling locations at surface and depth with the exception of MW5 and MW6 m where TPH was not detected at depth. Detected TPH concentrations ranged from 25 – 1366 mg/kg with the highest concentration detected at the surface of MW8. Although relatively high at MW8, TPH concentrations are below standard DEW Line remediation criterion for TPH concentrations in soil. |

## 7.7 GROUNDWATER SAMPLE ANALYTICAL DATA

The groundwater chemical analysis results and evaluation of analytical data for the 2012 Non-Hazardous Waste Landfill samples are presented in Tables XXXII and XXXIII. Certificates of Analysis and results of groundwater samples collected as part of the QA/QC program are presented in Appendix C, at the end of this report.

### Table XXXII: Non-Hazardous Waste Landfill Summary Table for Groundwater Analytical Data

| Sample # | Location | Groundwater Elevation (masl) | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [µg/L] | PHC(F1) $C_6$-$C_{10}$ | PHC(F2) $C_{10}$-$C_{16}$ | PHC(F3) $C_{16}$-$C_{34}$ | TPH $C_6$-$C_{34}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW5 | MW5 | 13.6 | 0.015 | 0.03 | 0.003 | 0.000096 | 0.002 | 0.313 | 0.029 | 0.003 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| **Downgradient Samples** | | | | | | | | | | | | | | | | |
| C2-12-MW6 | MW6 | 11.6 | 0.025 | 0.04 | 0.003 | 0.000116 | 0.005 | 0.262 | 0.204 | 0.008 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| C2-12-MW6-D | | | 0.02 | 0.03 | 0.003 | 0.000075 | 0.003 | 0.225 | 0.103 | 0.008 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| FM12-MW7 | MW7 | 9 | 0.052 | 0.34 | 0.006 | <0.000160 | 0.003 | 0.292 | 1.02 | 0.015 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| FM12-MW8 | MW8 | 12 | 0.021 | 0.07 | 0.008 | 0.000372 | 0.002 | 0.123 | 0.018 | 0.008 | <0.000025 | <0.01 | <0.1 | <0.1 | 1.7 | 1.7 |

*masl values are to be considered within +/- 3 m as elevations were not provided in the TOR and masl was measured with a handheld GPS

## Table XXXIII: Evaluation of 2012 Groundwater Analytical Data – NHWL

| Parameter | Evaluation |
|---|---|
| Copper (Cu) | Copper was detected all monitoring well locations, concentrations ranged from 0.015 – 0.052 mg/L with the highest concentration occurring at MW7. Results were consistent at upgradient and downgradient locations. |
| Nickel (Ni) | Nickel was detected at all monitoring well locations, concentrations ranged from 0.03 – 0.34 mg/L with the highest concentration occurring at MW7. Results are consistent at upgradient and downgradient locations. |
| Cobalt (Co) | Cobalt was detected at all monitoring locations, concentrations ranged from 0.003 – 0.08 mg/L with the highest concentration occurring at MW8. Results were consistent at upgradient and downgradient locations. |
| Cadmium (Cd) | Cadmium was detected at all monitoring well locations with the exception of MW7, concentrations ranging from 0.000096 – 0.000372 mg/L with the highest concentration occurring at MW8. |
| Lead (Pb) | Lead was detected at all monitoring well locations, concentrations ranged from 0.002 – 0.005 mg/L with the highest concentration occurring at MW6. Results were consistent at upgradient and downgradient locations. |
| Zinc (Zn) | Zinc was detected at all monitoring well locations, concentrations ranged from 0.123 – 0.313 mg/L, with the highest concentration occurring at MW5 the upgradient location. Results were consistent at upgradient and downgradient locations. |
| Chromium (Cr) | Chromium was detected at all monitoring well locations, concentrations ranged from 0.018 – 1.02 mg/L, with the highest concentration occurring at MW7. Results were consistent at upgradient and downgradient locations. |
| Arsenic (As) | Arsenic was detected at all monitoring well locations, concentrations ranged from 0.003 – 0.015 mg/L, with the highest concentration occurring at MW7. Results were consistent at upgradient and downgradient locations. |
| Mercury (Hg) | Mercury was not detected at any monitoring well locations |
| PCBs | Mercury was not detected at any monitoring well locations |
| TPH | TPH was detected at one location MW8 a downgradient location at a concentration of 1.7 mg/L. Free Phase was not detected at this location during sampling. |

### 7.8 MONITORING WELL SAMPLING / INSPECTION LOGS

The monitoring well sampling logs for MW-5 to MW-8 are included in this section.

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 25-Aug-12 | Time: | 8:10 AM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | NHWL | | |
| Monitoring Well ID: | MW5 | | |
| Sample Number: | 12-C2-MW5 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 20.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 56.0 | Measurement method: (meter, tape, etc.) | Interface meter |
| Static water level (cm) = (below ground surface) | 36.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 151.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 95.0 | | |
| Static volume of water in well (mL) = | 1865.3 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 2500 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 7.21 | | |
| Final Conductivity (uS/cm) = | 4040 | | |
| Final Temperature (°C) = | 4.1 | | |
| | | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 24-Aug-12 | Time: | 7:50 PM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | NHWL | | |
| Monitoring Well ID: | MW6 | | |
| Sample Number: | 12-C2-MW6 | 12-C2-MW6-D | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 38.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 76.0 | Measurement method: (meter, tape, etc.) | Interface Meter |
| Static water level (cm) = (below ground surface) | 38.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 171.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 95.0 | | |
| Static volume of water in well (mL) = | 1865.3 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 3000 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 9.57 | | |
| Final Conductivity (uS/cm) = | 3564 | | |
| Final Temperature (°C) = | 3.8 | | |
| | | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 24-Aug-12 | Time: | 7:26 PM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | NHWL | | |
| Monitoring Well ID: | MW7 | | |
| Sample Number: | 12-C2-MW7 | | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 42.0 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 52.0 | Measurement method: (meter, tape, etc.) | Interface meter |
| Static water level (cm) = (below ground surface) | 10.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 150.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 98.0 | | |
| Static volume of water in well (mL) = | 1924.2 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 3000 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 9.52 | | |
| Final Conductivity (uS/cm) = | 8377 | | |
| Final Temperature (°C) = | 3.7 | | |
| | | | |

| Monitoring Well Sampling Record | | | |
|---|---|---|---|
| Site Name: | CAM-2 | Gladman Point | Nunavut |
| Date of Sampling Event | 24-Aug-12 | Time: | 7:11 PM |
| Names of Samplers: | Brandon MacKay | Dwayne Allukpik | Jay Evalik |
| | | | |
| Landfill Name: | NHWL | | |
| Monitoring Well ID: | MW8 | | |
| Sample Number: | 12-C2-MW8 | 12-C2-MW8 (Interlab) | |
| Condition of Well: | Good | | |
| | | | |
| **Measured Data** | | | |
| Well pipe height above ground (cm) = | 60.5 | | |
| Diameter of well (cm) = | 5 | | |
| Depth of well installation (cm) = (from ground surface) | 350 | | |
| Length screened section (cm) = | 200 | | |
| Depth to top of screen (cm) = (from ground surface) | 50 | | |
| | | | |
| Depth to water surface (cm) = (from top of pipe) | 65.5 | Measurement method: (meter, tape, etc.) | Interface meter |
| Static water level (cm) = (below ground surface) | 5.0 | | |
| Measured well refusal depth (cm) = (i.e. depth to frozen ground) | 127.0 | Evidence of sludge or siltation: | No evidence of sludge or siltation, probable freezing at well bottom |
| | | | |
| Thickness of water column (cm) = | 61.5 | | |
| Static volume of water in well (mL) = | 1207.5 | | |
| | | | |
| Free product thickness (mm) = | N/A | Measurement method: (meter, paste, etc.) | Interface meter |
| | | | |
| Purging: (Y/N) | Y | Purging/Sampling Equipment: | Waterra Tubing and Foot Valve |
| Volume Purged Water = | 1250 mL | | Oakton Turbidimeter T-100 |
| Decontamination required: (Y/N) | N - Dedicated waterra tubing | | WTW 3401 pH/conductivity meter |
| Number washes: | N/A | | |
| Number rinses: | N/A | | |
| | | | |
| Final pH = | 6.62 | | |
| Final Conductivity (uS/cm) = | 7034 | | |
| Final Temperature (°C) = | 4.5 | | |
| | | | |

# 8 QUALITY ASSURANCE / QUALITY CONTROL

The Quality Assurance/Quality Control (QA/QC) program was implemented to monitor the quality of the analytical results. The main objective of this QA/QC program is to insure that sampling data and analysis results are complete, precise, exact, representative and comparable. The review consisted of evaluating sample collection/handling methodology, general laboratory comments, field (blind) duplicate samples, and inter-laboratory duplicate samples. Samples collected during the monitoring program were submitted to laboratories accredited by the Canadian Association for Environmental Analytical Laboratories (CAEAL).

All samples were collected following strict Biogénie sampling procedures. Samples were uniquely labelled and control was maintained through use of chain of custody forms. All samples were collected in laboratory supplied containers and preserved in insulated coolers. Appropriate QA/QC procedures were adhered to at all times.

Blind duplicate samples were submitted to AGAT for intra-laboratory analysis, with additional duplicate samples were sent to Maxxam for inter-laboratory comparison purposes.

The relative percent difference (RPD) is used to evaluate the sample result variability. Average RPD values of less than 100% for soil samples and 30% for groundwater samples are considered an indication of acceptable duplicate sample variability. For groundwater samples, an RPD of greater than 30% may reflect difference in sample turbidity or variance in the sample procedures. Individual RPD values greater than 50% are not considered to reflect acceptable variability. RPD values are not used to evaluate those compounds that are present at concentrations less than five times the method detection limit (MDL).

As discussed in Section 1.4, inter-laboratory samples were lost during transport and subsequently not analyzed.

## 8.1 SOIL SAMPLES

In case of soil samples, four blind duplicate samples were submitted for intra- and inter-laboratory comparisons. Review of blind duplicate results indicated very minor differences in the detected concentrations of the various parameters. All evaluated RPD values are within the acceptable ranges for metals, TPH and PCBs.

Overall, the soil sample results are coherent and within the same range of results for intra- laboratory samples; therefore the reliability of soil analytical results are considered as good.

Table XXXIV: Evaluation of 2012 Soil Analytical Data – QA/QC – Blind Duplicates

| Soil Sample Blind Duplicate Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample #** | **Location** | **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] | **PHC(F1)** $C_6$-$C_{10}$ | **PHC(F2)** $C_{10}$-$C_{16}$ | **PHC(F3)** $C_{16}$-$C_{34}$ | **TPH** $C_6$-$C_{34}$ |
| C2-12-2-A | C2-2 | 0-15 | 5.3 | 4.5 | 1.4 | <0.5 | 3.9 | 12 | 7.6 | 1.3 | <0.5 | <0.05 | <10 | 11 | 382 | 393 |
| C2-12-2-A-D | | 0-15 | 5.9 | 3.6 | 1.2 | <0.5 | 3.5 | 14 | 7.0 | 0.9 | <0.5 | <0.05 | <10 | <10 | 485 | 485 |
| C2-12-MW11-A | C2-11 | 0-15 | 4.2 | 5.7 | 1.7 | <0.5 | 3.6 | 10 | 6.8 | 0.6 | <0.5 | <0.05 | <10 | <10 | 130.0 | 130.0 |
| C2-12-MW11-A-D | | 0-15 | 5.7 | 4.9 | 1.4 | <0.5 | 3.0 | 12 | 6.6 | 0.7 | <0.5 | <0.05 | <10 | <10 | 210.0 | 210.0 |
| C2-12-MW2-A | MW-2 | 0-15 | 5.7 | 6.5 | 2.1 | <0.5 | 11.7 | 15.0 | 6.9 | 1.3 | <0.5 | <0.05 | <10 | <10 | 47.0 | 47.0 |
| C2-12-MW2-A-D | | 0-15 | 5.4 | 6.6 | 2.0 | <0.5 | 9.5 | 15.0 | 6.4 | 1.4 | <0.5 | <0.05 | <10 | <10 | 47.0 | 47.0 |
| C2-12-MW5-A | MW-5 | 0-15 | 12.2 | 8.7 | 2.3 | <0.5 | 6.8 | 15 | 7.7 | 1.2 | <0.5 | <0.05 | <10 | <10 | 136.0 | 136.0 |
| C2-12-MW5-A-D | | 0-15 | 11.4 | 8.5 | 2.2 | <0.5 | 7.1 | 14 | 6.7 | 1.1 | <0.5 | <0.05 | <10 | <10 | <10 | <10 |

## 8.2 GROUNDWATER SAMPLES

In case of groundwater samples, one blind duplicate sample was submitted for intra- and inter-laboratory comparisons. Review of results indicated relatively minor differences in concentrations within the blind duplicate results, with one parameter slightly outside the acceptable RPD range (Cadmium 49.5%). This difference may be attributed to variations in sample turbidity.

Overall, the soil sample results are coherent and within the same range of results for intra- laboratory samples; therefore the reliability of soil analytical results are considered as good.

Table XXXV: Evaluation of 2012 Groundwater Analytical Data – QA/QC

| Groundwater Blind Duplicate Analytical Results | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample #** | **Location** | **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] | **PHC(F1)** $C_6$-$C_{10}$ | **PHC(F2)** $C_{10}$-$C_{16}$ | **PHC(F3)** $C_{16}$-$C_{34}$ | **TPH** $C_6$-$C_{34}$ |
| C2-12-MW6 | MW-6 | 0.025 | 0.04 | 0.003 | 0.000116 | 0.005 | 0.262 | 0.204 | 0.008 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |
| C2-12-MW6-D | | 0.02 | 0.03 | 0.003 | 0.000075 | 0.003 | 0.225 | 0.103 | 0.008 | <0.000025 | <0.01 | <0.1 | <0.1 | <0.1 | <0.1 |

# SUMMARY

As of the 2012 monitoring program, all of the Landfills at CAM-2 Gladman Point are functioning as designed, with little change since the 2010 monitoring program. The Station Landfill has had slight increases in erosion and settlement from the 2010 monitoring program. The erosion channels on Lobe 2 are the largest observed at CAM-2 however, they appear to be self-armouring and remain at an acceptable severity rating. The West Landfill North and South have changed little in the way of erosional features since the 2010 monitoring program, with minor increases in settlement. The Tier II Disposal Facility saw a reduction in desiccation cracking (likely due to recent precipitation events at the time of monitoring), and little change in the stability of the Tier II Disposal Facility. All monitoring stations and equipment remain in good condition. The NHWL saw slight increases in settlement and erosion. Despite these increases, all features are of little impact to the Facility. As of 2012, plants have begun to colonize on Lobe 5 of the Station Landfill and the Tier II Disposal Facility.

# APPENDIX A

# Range of the Report and Limitation of Responsibilities

# APPENDIX B

# Field Notes

# APPENDIX C

# AGAT QA/QC Reports and Certificates of Analysis