THE COLLECTION OF LANDFILL MONITORING DATA AT THE FORMER CAM-1 DEW LINE SITE

Jenny Lind Island, Nunavut

FINAL REPORT– 2013 SEASON

(O/Ref.: CD3654) (Y/Ref.: DLC MON (Kitik 13)

DEFENCE CONSTRUCTION CANADA

January 2014

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January 2014

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NT/NU

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1 INTRODUCTION

1.1 LOCATION AND SITE FEATURES

The CAM-1 Jenny Lind Island DEW Line site is located on the east central side of Jenny Lind Island within the Queen Maud Gulf in Nunavut. The geographical coordinates are 68º 40' 17" N and 101º 43' 39" W. The site is located approximately 140 kilometres southeast of the community of Ikaluktutiak (Cambridge Bay).

The CAM-1 site is a former auxiliary radar site within the original DEW Line system that was operated until the early 1990s, when it was decommissioned and replaced with a remotely operated Short Range Radar (SRR) station as part of the North American Aerospace Defence Modernization Program. CAM-1A, was constructed approximately 12 kilometers west of the site. The environmental cleanup and demolition of facilities commenced in 2007 and was completed in summer of 2009.

Liquid and solid waste materials from the environmental cleanup remain in a temporary storage area near the shoreline. These materials are scheduled to be removed from the CAM-1 site in fall of 2013.

The clean-up included the closure and remediation of eight existing landfills, the construction of a landfill for the disposal of non-hazardous wastes generated from demolition and collection of site debris (NHWLF) as well as the construction of a second facility to contain Tier II soils. Monitoring activities were carried out at the following landfill areas, as shown on the overall site plan (Figure CAM-1.1) at the end of this section:

- Borrow Area North Landfill
- Northeast Landfill
- Station West Landfill
- Non-Hazardous Waste Landfill
- Tier II Soil Disposal Facility
- Southeast Landfill
- Station East Landfill
- Main Landfill
- USAF Landfill
- East Landing Landfill

In accordance with the NTI-DND Cooperation Agreement, landfill monitoring is carried out following the site clean-up. Table I hereafter provides a synopsis of field activities performed during the 2013 Landfill Monitoring Program at CAM-1 – Jenny Lind Island.

Table I: 2013 Monitoring Requirements for CAM-1 Landfills

Landfill	Visual Inspection	Soil Sampling	Groundwater Sampling	Thermal Monitoring
Borrow Area North Landfill	✓			
Northeast Landfill	✓			
Station West Landfill	✓			
Non-Hazardous Waste Landfill	✓			
Tier II Soil Disposal Facility	✓	✓	✓	✓
Southeast Landfill	✓			
Station East Landfill	✓			
Main Landfill	✓			
USAF Landfill	✓			
East Landing Landfill	✓			

1.2 OBJECTIVES AND SCOPE OF WORK

The objective of the DCC Landfill Monitoring Program is to collect sufficient information to assess the landfill's performance from geotechnical and environmental perspectives. DCC has specified the requirements for the Landfill Monitoring Program in the document *Terms of Reference (ToR) – Consulting Services for the Collection of Landfill Monitoring Data – PIN-2 Cape Young, PIN-4 Byron Bay, CAM-1 Jenny Lind Island, DEW LINE SITES, NUNAVUT, KITIKMEOT REGION, DCC PROJECT #: DLC MON(KITIK13)*, April 18, 2013. (ToR, reference A).

The scope of work for the Landfill Monitoring Program is defined in the ToR and in Biogenie's accepted proposal dated June 2013 (reference B) that was submitted to DCC. The scope of work generally includes the following activities:

- Landfill Monitoring for each of the CAM-1 Landfills
- Visual inspection
- Soil and groundwater sampling (Tier II Soil Disposal Facility)
- Thermal monitoring (DCC Tier II Soil Disposal Facility)
- Create photographic record
- Draft and Final reports

1.3 REPORT FORMAT

This report describes the work carried out in August 2013 at ten landfill sites at CAM-1 Jenny Lind Island. Results from soil and groundwater sampling, thermal monitoring, and visual inspection of the sites are also presented in the formats described in the ToR. 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 the report.

The report is organized with a separate chapter for each of the landfill areas. Each chapter contains all relevant information gathered for that landfill during the 2013 Landfill Monitoring Program. The following information is provided for each landfill:

- Visual inspection check-list
- Visual inspection drawing mark-up
- A selection of visual inspection photos
- Thermal monitoring summary (where applicable)
- Summary of 2013 soil analytical data (where applicable)
- Summary of 2013 groundwater analytical data (where applicable)
- Monitoring well development/sampling reports (where applicable)

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

1.4 PROJECT REFERENCES

The following references are specifically relevant to the 2013 Landfill Monitoring activities:

A. *Terms of Reference – Consulting Services for the Collection of Landfill Monitoring Data – PIN-2 Cape Young, PIN-4 Byron Bay, CAM-1 Jenny Lind Island - DEW LINE SITES, NUNAVUT, KITIKMEOT REGION, DCC PROJECT #: DLC MON(KITIK13)*, April 18, 2013.

B. Technical Proposal – The Collection of Landfill Monitoring Data for the DEW Line Sites: *PIN-2 Cape Young, PIN-4 Byron Bay, CAM-1 Jenny Lind Island, DEW LINE SITES, Nunavut, Kitikmeot Region. Project Ref 6121-150,* June 2013.

C. *Post-Field Progress Report, CAM-1 Landfill Monitoring 2013*, August, 2013.

N

387 500 E

389 000 E

390 500 E

7 620 500 N

7 619 000 N

ACCESS ROAD

A6

A5

A4

NORTHEAST LANDFILL
SEE FIGURE CAM–1.3

BM–1

BORROW AREA NORTH LANDFILL
SEE FIGURE CAM–1.2

STATION AREA

A3

BM–2

STATION WEST LANDFILL
SEE FIGURE CAM–1.4

NON–HAZARDOUS WASTE LANDFILL
SEE FIGURE CAM–1.5

TIER II DISPOSAL FACILITY
SEE FIGURE CAM–1.6

A10

BM–4

STATION EAST LANDFILL
SEE FIGURE CAM–1.8a

BM–3

A9

A8

STATION MAIN LANDFILL
SEE FIGURE CAM–1.8b

SOUTHEAST LANDFILL
SEE FIGURE CAM–1.7

A7

CLOSED LANDFARM

A2

APPROXIMATE LIMIT OF
DND RESERVE BOUNDARY

ACCESS ROAD

USAF LANDFILL
SEE FIGURE CAM–1.9

AIRSTRIP AREA

AIRSTRIP

CM101

FORMER SUMMER
WATER SUPPLY
LAKE

EAST LANDING LANDFILL
SEE FIGURE CAM–1.10

JENNY

A1

BEACH AREA

LEGEND

- CM101 — SURVEY CONTROL MONUMENT
- BM–1 — PERMANENT BENCHMARK LOCATION (4)
- COMMEMORATIVE PLAQUE LOCATION
- APPROXIMATE LOCATION OF PROPERTY BOUNDARY
- BODY OF WATER
- A1 — AERIAL PHOTOGRAPH

0 150m 300m 450m 600m 750m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

LOCATION PLAN

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
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MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 15,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1A-PL	PAGE PL

FIGURE CAM-1.1

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2 OUTLINE AND METHODOLOGY

2.1 FIELD PROGRAM STAFF

The 2013 on-site field program at CAM-1 Jenny Lind Island took place on August 16, 2013. Biogenie sub-contracted Sila Remediation Inc. from Igloolik, Nunavut to perform the field work. The Sila field program was executed by Mr. Andrew Passalis and four local Inuit representatives.

The team was made up of the following individuals:

- Andrew Passalis, Project Engineer
- Kaylene Epilon, Field Technician
- John Henry Etegak, Field Technician
- Benjamin Kaniak, Field Technician
- Joe Koaha, Wildlife Monitor

2.2 2013 WEATHER CONDITIONS

Seasonally warm weather conditions were observed during the CAM-1 Jenny Lind Island monitoring event with daytime temperatures ranging between 4-6ºC. Skies were generally overcast throughout the monitoring period with light to moderate winds out of the northwest ranging between 10-20 km/h. Precipitation was not observed during the monitoring period.

2.3 VISUAL INSPECTION

Data and information collected during the visual inspection of the CAM-1 landfills are included in the visual inspection datasheets. These data sheets include such inspection data 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 the present report for each landfill. Some photos are provided for supplemental purposes only and do not warrant placement on the Figures (i.e., they are not specifically referenced in the report or within the tables).

The photos were taken with a Sony DSC-TX5 10.2 megapixel (MP) digital camera. Full resolution digital jpg copies are furnished on a DVD-ROM appended with the final 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.

2.4 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
- CCME Subsurface Assessment Handbook for Contaminated Sites, March 1994, EPC-NCSRP-48E (http://www.ccme.ca/publications/ceqg_rcqe.html)

For the 2013 monitoring event, 4 soil-sampling stations were visited. One surface sample (0-15 cm depth below surface) and one 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 2013 sampling.

As specified in the ToR, the following soil sampling procedures were adhered to:

- Where required, the soil samples were collected from locations between two to four meter radius of the monitoring wells
- Blind field duplicates (10 %) were collected for Quality Assurance and Quality Control purposes
- Duplicate samples (10 %) were also taken and sent to a second laboratory for quality control purposes
- An additional ten percent 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-1 during the August, 2013 field program.

Table II: Summary of Soil Sampling at CAM-1 – August 2013

Landfill Site	**Soil Sample Locations**			
Tier II Disposal Facility	MW-5	MW-6	MW-7	MW-8

Notes:
Soil samples annotated as "MW" were collected as per the ToR between 2-4 metres from monitoring wells.
All soil samples were collected from two depths (0-15 cm and 40-50 cm). For 2013 sampling, total no. of soil samples = 11 samples (4 locations x 2 depths + 1 QA/QC + 1 (Inter-laboratory comparison) + 1 for Owner's Representative (ESG Archives))

2.5 GROUNDWATER SAMPLING

The 2013 field program included the monitoring of 4 locations at CAM-1. All four wells at the Tier II Soil Disposal Facility were dry at the time of monitoring and consequently could not be sampled. A summary of the status of the monitoring wells and the attempts made are summarized in Table III.

In sampled wells, no sign of free phase hydrocarbon product was detected. Monitoring Well Development and Sampling Record forms are included in appropriate sections of this report.

Table III: Summary of Groundwater Sampling at CAM-1 – August 2013

Landfill Site	**Groundwater Sample Locations**			
Tier II Soil Disposal Facility	MW-5 (dry)	MW-6 (dry)	MW-7 (dry)	MW-8 (dry)

Notes:
All monitoring wells were inspected and found to be in good condition with no significant concerns identified.

2.6 THERMAL MONITORING

All thermistors at the Tier II Soil Disposal Facility were inspected and found to be in good condition with no significant concerns identified. Data from all thermistors was successfully retrieved and all analogues/thermocouples were observed to be functioning properly at the time of inspection. Internal memories were reset and clocks were synchronized using the Prolog software.

Specific detailed information regarding temperature data is contained in the report section on the Tier II Soil Disposal Facility. Raw data retrieved directly from the dataloggers were provided to DCC with the field progress report on September 4th, 2013. The manual thermal monitoring data is presented in tabular form on the thermistor inspection sheets for each landfill

2.7 FIELD NOTES AND DATA

Field notes from the 2013 landfill monitoring program, including soil and water sampling are included in Appendix B for reference. Notes were written on waterproof field sheet and in field books and the notes 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 Oregon 300 GPS device, which included a combination of continuous tracks and discrete waypoints. Data packages collected from the individual vertical thermistors were downloaded directly to a field laptop computer.

2.8 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
- All samples were stored in chilled coolers/refrigerators throughout the field program and chilled coolers during subsequent transfer to the respective laboratory.

Chains of Custody (COC) forms were completed by the Project Engineer after sample collection. The samples were refrigerated prior to off-site shipment by First Air Cargo directly to Maxxam (via Yellowknife) and Exova in Edmonton and ESG, via Ottawa to Kingston, Ontario where they were checked in by laboratory representatives. All analysis was completed as specified on COC forms.

2.9 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 were sent to Maxxam
- 10% Interlab Duplicate Samples were sent to Exova (looking for variation in procedures causing significant difference in analytical result). Results for both the blind duplicates and the interlab duplicates can be found in Appendix C, as actual values and relative percent differences
- 10% Archival Samples to ESG (soils).

Maxxam has QA/QC measures for sample analysis. Maxxam QC samples will typically be introduced into the analytical stream on a batch basis, normally comprising 20% – 30% of the total sample throughput. A batch size of 15 – 20 typically includes one of each control standard, reference standard, surrogate spike, duplicate sample, and method blank. A control sample is a blank matrix fortified with analyte of interest and carried through all analytical steps to monitor lab performance (recovery & basis) on clean matrix. A reference sample is a sample with predetermined certified characteristics that undergoes the same processing as samples used to evaluate accuracy of procedure. A surrogate spike is an organic compound with similar chemical composition and behaviour in the analytical process used to monitor recovery in each sample. A duplicate sample occurs when client samples are analyzed in duplicate to monitor reproducibility in analysis and preparation. Finally, a method blank is a blank sample matrix carried through the same procedure as the samples, and is used to monitor for process contamination.

Exova follows similar in-house QA/QC procedures. Maxxam and Exova QA/QC reports can be found in Appendix C.

3 BORROW AREA NORTH LANDFILL

3.1 BACKGROUND AND MONITORING PROGRAM

The Borrow Area North Landfill is located along the road heading north of the station area, approximately 500 m north of the former station infrastructure pad. The landfill is located within a relatively flat lying area that historically had been used for material borrow. The landfill has three regrade areas, including engineered cover, encompasses a footprint of approximately 9,300 m^2 with the final cover extending approximately 0.75 m to 1.0 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Borrow Area North Landfill was classified as low potential environmental risk, except for Lobe 3 which was classified at a moderate potential environmental risk due to the presence of surface soil contamination. The remediation consisted of regrading with the placement of additional granular fill at all lobes.

The long term monitoring plan consists of visual monitoring and collection of soil samples. The 2013 monitoring of this landfill was limited to a visual inspection to assess overall landfill performance.

3.2 VISUAL INSPECTION REPORT

The visual inspection of the Borrow Area North Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table IV of this report.

Settlement

Indications of minor settlement were noted at two locations, consisting of a 1m by 1 m localized depression on the south side slope of Lobes 1 & 2 (Feature A), and a linear 4 m by 1 m depression on the northwest side slope of Lobe 3 (Feature B). Both features were noted to be consistent with the previous 2012 inspection.

BANLF-4: (left) View looking north at minor depression on south corner of Lobes 1&2 (Feature A).
BANLF-9: (right) View looking north-northwest at linear depression on northwest crest of Lobe 3 (Feature B)

Erosion

One area of minor erosion was noted on the southeast side slope and along the toe of Lobes 4 & 5 regrade (Feature C). The erosion consisted of fines washing along approximately 4 m of the side slope and along 25 linear meters of the adjoining toe of slope. Erosion along the toe appears to be the result of seasonal ponding bordering the southeast side of the lobe and was consistent with the previous 2011 and 2012 inspections, whereas the minor erosion on the side slope appears recent to the 2013 inspection. The area southeast of the lobe was dry at the time of the 2013 inspection. The erosion along the side slope and toe areas appears to be self-armouring with an acceptable severity rating.

BANLF-29: View looking southwest at minor erosion (Feature C on southeast side slope and toe of Lobes 4&5.

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 on the landfill.

Staining

Two areas of discoloration (staining) were noted during the 2013 inspection, including one relatively small area on the north side slope of the Lobe 4 & 5 regrade (Feature E) and a larger area associated with a wetted area immediately east of Lobe 3 (Feature D). There were no odours noted with either area at the time of the 2013 inspection and observations at both areas were consistent with the previous 2011 and 2012 inspections.


BANLF-17: (left) View looking south at rust coloured staining southeast of Lobe 3 (Feature D).
BANLF-22: (right) View looking southeast at minor staining on north side slope of Lobes 4&5 (Feature E).

Seepage Points
No areas of seepage were noted at the landfill.

Debris
Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments
There is no monitoring instrumentation installed at this landfill.

Other Features of Note
Ponding was noted along the northeast side of Lobe 3 during the 2013 inspection. This area was consistent with findings from the 2002 site investigation and 2010, 2011 and 2012 landfill inspections and included observations of rust-colored staining in wetted areas along the toe of the lobe. Direct seepage from the landfill was not observed.

One partially infilled continuous tension crack was noted on the northeast corner of Lobes 4 & 5 (Feature F). The crack was noted to extend approximately 10 m in a northeast-southwest direction approximately 1 m below the crest and varied between 2-3 mm in width. The crack was not noted during the previous 2012 inspection.


BANLF-25: (left) View east-southeast at crack extending across northeast corner of Lobes 4&5 (Feature F)
BANLF-26: (right) View of tension crack on northeast corner of Lobes 4&5 (Feature F)

The tension crack noted on the southeast side slope of Lobes 4 & 5 during the previous 2012 inspection was not noted during the 2013 inspection.

Discussion

The Borrow Area North Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table IV: Visual Inspection Checklist / Report – Borrow Area North Landfill

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

SITE NAME: CAM-1 – Jenny Lind Island
LANDFILL DESIGNATION: Borrow Area North Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 16, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Borrow Area North Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE IV: CAM-1 JENNY LIND ISLAND, BORROW AREA NORTH LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.2 (Lobes 1&2 - S side slope)	1 m	1 m	0.1 m	Isolated (<1%)	Localized depression on side slope	BANLF-4, 5	Acceptable	Cover and slopes appear stable.
		FEATURE B See Figure CAM-1.2 (Lobe 3 - NW side slope)	4 m	1 m	0.1 m	Isolated (<1%)	Minor lineal depression	BANLF-10, 11	Acceptable	Cover and slopes appear stable.
Erosion	Yes	FEATURE C See Figure CAM-1.2 (Lobes 4&5 - SE side)	4 - 25 m	2 m	0.05 m	Isolated (<2%)	Minor washing of fines along side slope and toe of lobe	BANLF-29, 30, 31	Acceptable	Seasonal ponding and surface runoff from lobe. Cover and slopes appear stable.
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	Yes	FEATURE D See Figure CAM-1.2 (Lobe 3 - E side)	18 m	6 m	Unknown	N/A	Rust coloured staining east of Lobe 3	BANLF-16, 17	Acceptable	Result of seasonal ponding. Not in contact with landfill.
		FEATURE E See Figure CAM-1.2 (Lobes 4&5 - N side)	5 m	1 - 3 m	Unknown	Isolated (<1%)	Minor staining of cover material on side slope	BANLF-22	Acceptable	No significant change from previous monitoring event.
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	Yes	FEATURE F See Figure CAM-1.2 (Lobes 4&5- NE corner - New Obs.)	10 m	2- 3 mm	Unknown	Isolated (<1%)	Single continous tension crack	BANLF-24, 25, 26	Acceptable	Partially infilled.
		See Figure CAM-1.2 (Lobe 3 - E and NE sides)	Varies	Varies	Unknown	N/A	Water ponding along toe	BANLF-6,14, 17	Acceptable	Ponding consistent with observations prior to landfill regrading and 2011/12 inspections. Slopes appear stable.
Additional Photos	Yes	See Figure CAM-1.2 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

3.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Borrow Area North Landfill has been completed as per the ToR and is included as Table V below.

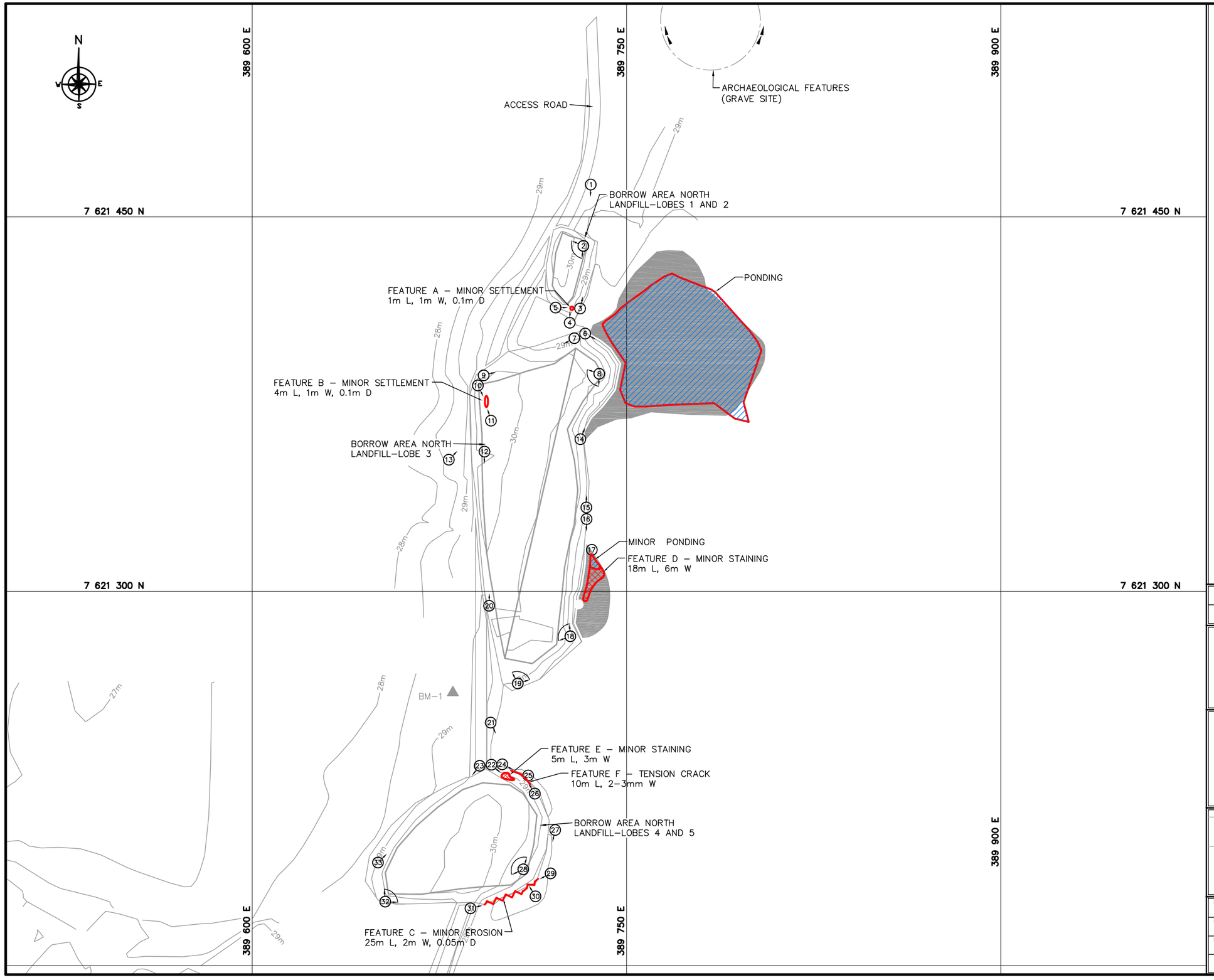
Table V: Preliminary Stability Assessment – Borrow Area North Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

3.4 LOCATION PLAN

The Location Plan for the Borrow Area North Landfill has been completed as per the ToR and is presented in Figure CAM-1.2.



LEGEND

- BM–1 — PERMANENT BENCHMARK LOCATION (1)
- 6 — APPROX. PHOTOGRAPHIC VIEWPOINT
- BODY OF WATER
- MINOR SETTLEMENT (NTS)
- STAINING (NTS)
- PONDING (NTS)
- MINOR EROSION (NTS)
- TENSION CRACK (NTS)

0 15m 30m 45m 60m 75m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

BORROW AREA NORTH LANDFILL

SITE REMEDIATION SOLUTIONS

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MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,500	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1B-PL	PAGE PL

FIGURE CAM-1.2

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3.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Borrow Area North Landfill has been completed as per the ToR and is included as Table VI hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table VI: Landfill Visual Inspection Photo Log – Borrow Area North Landfill

Photo (BANLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
Lobes 1 & 2						
1	DSC09915	4,314	16/08/2013	389735	7621462	View looking south at BANLF - Lobes 1&2
2	DSC09917	1,363	16/08/2013	389732	7621437	Panoramic view looking south to west-northwest across BANLF - Lobes 1&2
3	DSC09918	4,462	16/08/2013	389731	7621413	View looking north along east toe of BANLF - Lobes 1&2
4	DSC09920	4,339	16/08/2013	389727	7621408	View looking north at minor depression on southeast corner of Lobes 1&2 (1m L, 1m W, 0.1m D) - FEATURE A
5	DSC09921	4,298	16/08/2013	389722	7621413	View looking east at minor depression on southeast corner of Lobes 1&2 (1m L, 1m W, 0.1m D) - FEATURE A
Lobe 3						
6	DSC09922	4,382	16/08/2013	389733	7621402	View looking southeast at ponded area along northeast toe of BANLF- Lobe 3
7	DSC09923	4,379	16/08/2013	389728	7621400	View looking southwest along north toe of BANLF - Lobe 3
8	DSC09924	1,368	16/08/2013	389738	7621387	Panoramic view looking south to northwest from the northeast corner across BANLF - Lobe 3
9	DSC09925	4,418	16/08/2013	389693	7621385	View looking northeast along north toe of BANLF - Lobe 3
10	DSC09927	4,324	16/08/2013	389692	7621383	View looking south-southeast at linear depression on northwest crest of BANLF - Lobe 3 (4m L, 1m W, 0.1m D) - FEATURE B
11	DSC09928	4,344	16/08/2013	389695	7621369	View looking north-northwest at linear depression on northwest crest of BANLF - Lobe 3 (4m L, 1m W, 0.1m D) - FEATURE B
12	DSC09929	4,404	16/08/2013	389693	7621356	View looking south along west side slope of BANLF - Lobe 3.
13	DSC09930	4,341	16/08/2013	389678	7621353	View northeast at west side slope of BANLF - Lobe 3
14	DSC09931	4,292	16/08/2013	389731	7621360	View looking northeast at seasonal ponded area on northeast corner of BANLF - Lobe 3
15	DSC09932	4,423	16/08/2013	389733	7621332	View looking north along east toe of BANLF - Lobe 3
16	DSC09933	4,292	16/08/2013	389733	7621330	View of minor staining along east toe of BANLF - Lobe 3 (18m L, 6m W) - FEATURE D
17	DSC09934	4,404	16/08/2013	389735	7621316	View looking south at minor ponding and rust coloured staining in wetted area southeast of BANLF - Lobe 3 (18m L, 6m W) - FEATURE D
18	DSC09935	1,347	16/08/2013	389727	7621282	Panoramic view looking southwest to north from the southeast corner across BANLF - Lobe 3
19	DSC09936	1,343	16/08/2013	389706	7621263	Panoramic view looking northwest to northeast from the south end across BANLF - Lobe 3
20	DSC09937	4,443	16/08/2013	389695	7621293	View looking north along west side of BANLF - Lobe 3
Lobes 4 & 5						
21	DSC09939	4,449	16/08/2013	389695	7621247	View looking southeast at minor staining on north side of BANLF - Lobes 4&5
22	DSC09940	4,346	16/08/2013	389695	7621231	View looking southeast at stained minor staining (5m L, 1-3m W) north side slope of BANLF - Lobes 4&5 - FEATURE E
23	DSC09941	4,287	16/08/2013	389692	7621230	View looking southwest along west toe of BANLF - Lobes 4&5
24	DSC09942	4,403	16/08/2013	389700	7621230	View east-southeast at start of crack extending across northeast corner of BANLF - Lobes 4&5 (10m L, 2-3 mm W) - FEATURE F
25	DSC09943	4,341	16/08/2013	389710	7621226	View of tension crack on northeast corner of BANLF - Lobes 4&5 (10m L, 2-3 mm W) - FEATURE F
26	DSC09944	4,412	16/08/2013	389713	7621219	View northwest at end of crack extending across northeast corner of BANLF - Lobes 4&5 (10m L, 2-3 mm W) - FEATURE F
27	DSC09946	4,290	16/08/2013	389721	7621206	View looking south-southwest along east side of BANLF - Lobes 4&5

Photo (BANLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
28	DSC09947	1,230	16/08/2013	389708	7621188	Panoramic view looking southwest to north from southeast corner across BANLF - Lobes 4&5
29	DSC09948	4,355	16/08/2013	389715	7621185	View looking southwest at minor erosion on southeast side slope of BANLF - Lobes 4&5 (25m L, 2m W, 0.05m D) - FEATURE C
30	DSC09949	4,352	16/08/2013	389712	7621178	View looking northwest at minor erosion on southeast side slope of BANLF - Lobes 4&5 (25m L, 2m W, 0.05m D) - FEATURE C
31	DSC09950	4,278	16/08/2013	389689	7621173	View looking northeast at minor erosion on southeast side slope of BANLF - Lobes 4&5 (25m L, 2m W, 0.05m D) - FEATURE C
32	DSC09951	1,035	16/08/2013	389653	7621175	Panoramic view looking north to east from southwest corner across BANLF - Lobes 4&5
33	DSC09952	4,246	16/08/2013	389650	7621191	View looking northeast along west toe of BANLF - Lobes 4&5

4 NORTHEAST LANDFILL

4.1 BACKGROUND AND MONITORING PROGRAM

The Northeast Landfill is located immediately to the northwest of the former pallet line, approximately 400 m of the former station infrastructure pad. The landfill is located within a relatively flat lying area west of the service road extending north of the station. The landfill has two regrade areas, including engineered cover, encompasses a footprint of approximately 3,900 m^2 with the final cover extending approximately 0.75 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Northeast Landfill was classified as low potential environmental risk. The remediation consisted of regrading with the placement of additional granular fill at all lobes.

The long term monitoring plan consists of visual monitoring and collection of soil samples. The 2013 monitoring of this landfill includes a visual inspection to assess overall landfill performance.

4.2 VISUAL INSPECTION REPORT

The visual inspection of the Northeast Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table VII of this report.

Settlement
An indication of minor settlement was noted at one location, consisting of a linear depression on the north inside corner of Lobes 1 & 3 regrade (Feature A). The feature consisted of 2 separate depressions, measuring 0.8-2m long, 1-2m wide and between 0.1-0.2m deep. This feature appears relatively consistent with the previous 2011 and 2012 inspections.

Erosion
One area of minor erosion was noted on the north side slope of Lobes 1 &3 regrade (Feature C). The erosion extended 3.5 m along the side slope in a north-south direction and was 0.15 m wide and 0.05 m deep. The erosion along the side slope appears to be self-armouring with an acceptable severity rating. The erosion was not noted during the previous 2012 inspection.

NELF-14: (left) View looking south at minor settlement on inside side slope of Lobes 1&3 (Feature A).
NELF-15: (right) View looking northeast at minor erosion along west side slope of Lobes 1&3 (Feature C).

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 on the landfill.

Staining
Evidence of staining was not noted.

Seepage Points
No areas of seepage were noted at the landfill.

Debris
Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments
There is no monitoring instrumentation installed at this landfill.

Other Features of Note
One 4 m by 4 m area of uneven side slope was noted on the northwest corner of the Lobes 1&3 regrade (Feature B). A similar notation was made in the 2010, 2011 and 2012 inspection reports. The uneven slope does not appear to be associated with settlement or erosion.

Discussion
The Northeast Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table VII: Visual Inspection Checklist / Report – Northeast Landfill

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

SITE NAME: CAM-1 – Jenny Lind Island
LANDFILL DESIGNATION: Northeast Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 16, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Northeast Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE VII: CAM-1 JENNY LIND ISLAND, NORTHEAST LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.3 (Lobes 1 & 3 - N side slope)	0.8 - 2.0 m	1 - 2 m	0.1 - 0.2 m	Isolated (<1%)	Minor settlement on inside corner slope	NELF-12, 13, 14	Acceptable	Two depressions. Slopes appear stable.
Erosion	No	FEATURE C See Figure CAM-1.3 (Lobes 1&3 -W side slope - New Obs.)	3.5 m	0.15 m	0.05 m	Isolated (<1%)	Minor erosion	NELF-15	Acceptable	Washing of fines in cover material. Self armouring.
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	Yes	FEATURE B See Figure CAM-1.3 (Lobes 1&3 - NW corner side slope)	4 m	4 m	N/A	Isolated (<1%)	Uneven side slope	NELF- 20	N/A	N/A
Additional Photos	Yes	See Figure CAM-1.3 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

4.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for the Northeast Landfill has been completed as per the ToR and is included as Table VIII below.

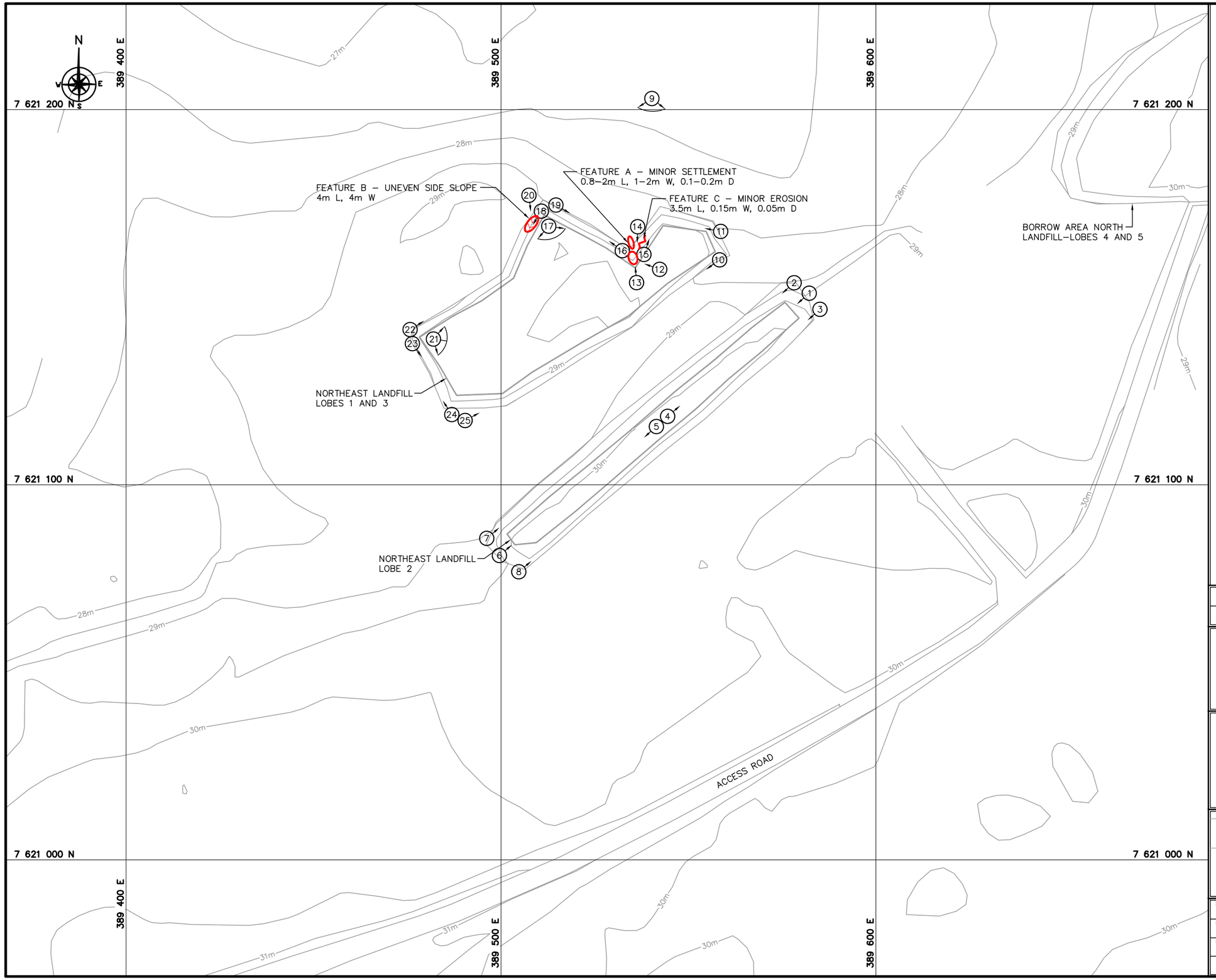
Table VIII: Preliminary Stability Assessment – Northeast Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

4.4 LOCATION PLAN

The Location Plan for the Northeast Landfill has been completed as per the ToR and is presented in Figure CAM-1.3.



LEGEND

- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- UNEVEN SIDE SLOPE (NTS)
- MINOR EROSION (NTS)

0 10m 20m 30m 40m 50m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

NORTHEAST LANDFILL

SITE REMEDIATION SOLUTIONS

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Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1C-PL	PAGE PL

FIGURE CAM-1.3

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4.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Northeast Landfill has been completed as per the ToR and is included as Table IX hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table IX: Landfill Visual Inspection Photo Log – Northeast Landfill

Photo (NELF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
Lobe 2						
1	DSC09953	4,420	16/08/2013	389583	7621151	View looking southwest along centerline of NE Landfill - Lobe 2
2	DSC09954	4,305	16/08/2013	389579	7621153	View looking southwest along west toe of NE Landfill - Lobe 2
3	DSC09955	4,406	16/08/2013	389584	7621147	View looking southwest along east toe of NE Landfill - Lobe 2
4	DSC09956	4,278	16/08/2013	389544	7621118	View looking northeast along centerline of NE Landfill - Lobe 2
5	DSC09957	4,331	16/08/2013	389542	7621116	View looking southwest along centerline of NE Landfill - Lobe 2
6	DSC09958	4,321	16/08/2013	389500	7621081	View looking northeast along centerline of NE Landfill - Lobe 2
7	DSC09959	4,371	16/08/2013	389496	7621085	View looking northeast along west toe of NE Landfill - Lobe 2
8	DSC09960	4,372	16/08/2013	389505	7621077	View looking northeast along east toe of NE Landfill - Lobe 2
Lobes 1 & 3						
9	DSC09961	820	16/08/2013	389540	7621202	Panoramic view looking southeast to southwest from north of NE Landfill - Lobes 1&3
10	DSC09962	4,359	16/08/2013	389558	7621160	View looking southwest along east toe of NE Landfill - Lobes 1&3
11	DSC09963	4,350	16/08/2013	389558	7621168	View looking west along north toe of NE Landfill - Lobes 1&3
12	DSC09964	4,327	16/08/2013	389541	7621157	View looking northwest at minor settlement on inside side slope (0.8-2m L x 1-2m W x 0.1-0.2m D) - FEATURE A
13	DSC09965	4,403	16/08/2013	389536	7621155	View looking north at minor settlement on inside side slope (0.8-2m L x 1-2m W x 0.1-0.2m D) - FEATURE A
14	DSC09966	4,301	16/08/2013	389535	7621169	View looking south at minor settlement on inside side slope (0.8-2m L x 1-2m W x 0.1-0.2m D) - FEATURE A
15	DSC09967	4,323	16/08/2013	389538	7621162	View looking northeast at minor erosion along west side slope of NE Landfill - Lobes 1&3 (3.5m L, 0.15m W, 0.05m D) - FEATURE C
16	DSC09968	4,404	16/08/2013	389533	7621162	View looking northwest along north toe of NE Landfill - Lobes 1&3
17	DSC09969	1,468	16/08/2013	389513	7621169	Panoramic view looking east to southwest from north side across NE Landfill - Lobes 1&3
18	DSC09970	4,278	16/08/2013	389514	7621175	View looking southwest along west toe of NE Landfill - Lobes 1&3
19	DSC09971	4,363	16/08/2013	389510	7621173	View looking southeast along north toe of NE Landfill - Lobes 1&3
20	DSC09972	4,313	16/08/2013	389507	7621177	View looking south at uneven side slope on northwest corner of NE Landfill - Lobes 1&3 (4m L, 4m W) - FEATURE B
21	DSC09973	1,380	16/08/2013	389481	7621139	Panoramic view looking northeast to southeast from southwest corner across NE Landfill - Lobes 1&3
22	DSC09974	4,365	16/08/2013	389476	7621140	View looking northeast along west toe of NE Landfill - Lobes 1&3
23	DSC09975	4,342	16/08/2013	389476	7621139	View looking southeast along south toe of NE Landfill - Lobes 1&3
24	DSC09976	4,386	16/08/2013	389487	7621118	View looking northwest along south toe of NE Landfill - Lobes 1&3
25	DSC09977	4,402	16/08/2013	389489	7621118	View looking northeast along east toe of NE Landfill - Lobes 1&3

5 STATION WEST LANDFILL

5.1 BACKGROUND AND MONITORING PROGRAM

The Station West Landfill is located approximately 175 m west of the Non-Hazardous Waste Landfill. The landfill forms a slight topographic high within a relatively flat lying area west of the former station infrastructure pad. The landfill has a single regrade area encompassing a footprint of approximately 2,400 m^2 with the final cover extending approximately 0.75 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Station West Landfill was classified as moderate potential environmental risk. The remediation consisted of excavation of Tier II contaminated soil, removal of debris and regrading with the placement of additional granular fill.

The long term monitoring plan consists of visual monitoring and collection of soil samples. The 2013 monitoring of this landfill includes a visual inspection to assess overall landfill performance.

5.2 VISUAL INSPECTION REPORT

The visual inspection of the Station West Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table X of this report.

Settlement

Indications of minor settlement were noted in three general areas (Features A, B and C) on the landfill surface, including: five relatively small sized (round and linear) depressions situated on the east side slope (Feature A); three small depressions on the north cover and northwest side slope areas (Feature B); and a moderate sized uneven area on the southwest corner of the landfill (Feature C). All three features have an acceptable severity rating. All areas of settlement were noted to be relatively consistent with the previous 2011 and 2012 inspections.

SWLF-6: (left) View looking northeast at minor depressions on side slope (Feature A).
SWLF-11 (right) View looking west at erosion from seasonal ponding on northeast side (Features A and E).

Erosion

Two areas (Features D and E) of minor erosion were noted on the surface, side slopes and/or margins of the Station West Landfill during the 2013 inspection. Feature D consisted of a shallow linear runoff feature extending down the east side slope, whereas Feature E consisted of a larger area extending along the north margin of the landfill where seasonal ponding has resulted in minor erosion along the toe and side slope. Both areas appear stable and have an acceptable severity rating. Observations appear consistent with the previous 2011 and 2012 inspections.

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 on the landfill.

Staining

Four localized areas of rust-colored staining were noted on the south cover area of the landfill (Feature F). The stains range in size from 2-4 m long and 0.2-0.3 m wide. The pair of parallel stains on the south central cover area was not noted during the previous 2012 inspection, whereas the two stained areas located on the southwest cover area appear consistent from the previous inspection.

SWLF 23: (left) View looking east at linear stain on surface (Feature F).
SWLF 32: (right) View looking southeast at two areas of staining on south cover (Feature F).

Seepage Points

No areas of seepage were noted at the landfill.

Debris

Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments

There is no monitoring instrumentation installed at this landfill.

Other Features of Note

Parallel and single tension cracks were noted on the southeast corner of the landfill (Feature G). The cracks were somewhat discontinuous along the side slope and ranged in length from 4 to 15 m long, and were typically 2 to 10 mm wide. The magnitude and frequency of cracks on the southeast corner appears to have increased from findings noted during the previous 2012 inspection. Other features include continuous single and parallel parabolic orientated tension cracks on the northeast side slope (Feature

H). The cracks ranged in length from 2 to 11 m long and 3 to 5 mm in width. This area of the landfill is bordered by localized seasonal ponding and also shows indications of minor settlement (Feature A) and minor erosion (Feature E). These features appear relatively consistent with findings from the previous 2012 inspection. One new single tension crack (Feature I) was noted on the east side slope of the landfill. The crack was orientated along the side slope approximately 1m above the toe, was 1.5m in length and was ranged between 1-2mm wide. Based on observations made during the 2013 inspection, the landfill surface appears stable and has an acceptable severity rating.

SWLF-28: (left) Tension crack on south side slope (Feature G)
SWLF-5: (right) Single crack extending 1 m up from northeast toe (Feature I)

Discussion

The Station West Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table X: Visual Inspection Checklist / Report – Station West Landfill

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

SITE NAME: CAM-1 – Jenny Lind Island
LANDFILL DESIGNATION: Station West Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 16, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Station West Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE X: CAM-1 JENNY LIND ISLAND, STATION WEST LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.4 (E side slope)	0.2 - 2 m	0.1 - 0.2 m	0.05 - 0.1 m	Isolated (<1%)	Minor depressions	WLF-2 - 4, 6 - 8, 11	Acceptable	Side slope appears stable.
		FEATURE B See Figure CAM-1.4 (NW side slope & N cover)	0.7 - 1.5 m	0.1 - 0.3 m	0.05 - 0.1 m	Isolated (<1%)	Minor depressions	WLF-15	Acceptable	Cover and slopes appear stable.
		FEATURE C See Figure CAM-1.4 (SW corner)	5 m	5 m	0.05 - 0.15 m	Isolated (<2%)	Uneven surface	WLF-19	Acceptable	Cover appears stable.
Erosion	Yes	FEATURE D See Figure CAM-1.4 (E side slope)	2 m	0.1 m	0.05 m	Isolated (<1%)	Minor erosion	WLF-2, 3	Acceptable	Washing of fines in cover material
		FEATURE E See Figure CAM-1.4 (NE corner)	6 m	4 m	0.05 - 0.1 m	Isolated (<2%)	Minor erosion	WLF-9, 11, 12	Acceptable	Washing of fines on slope from seasonal ponding
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	Yes	FEATURE F See Figure CAM-1.4 (S cover -4 areas - 2 New Obs)	2 - 4 m	0.2 - 0.4 m	Unknown	Isolated (<1%)	Linear rust coloured stains	WLF-23, 24, 32	Acceptable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	Yes	FEATURE G See Figure CAM-1.4 (Tension Cracks - SE corner)	4 - 15 m	2 - 10 mm	Unknown	Isolated (<1%)	Parallel and single tension cracks on side slope	WLF-25 - 28	Acceptable	Discontinuous crack extending around southeast corner of landfill.
		FEATURE H See Figure CAM-1.4 (Tension Cracks - NE side slope)	2 - 11 m	3 - 5 mm	Unknown	Isolated (<1%)	Continuous single and parallel tension cracks on side slope	WLF-9, 10	Acceptable	Mostly infilled. Parabolic orientated cracks adjacent to seasonal ponding.
		FEATURE I See Figure CAM-1.4 (Tension Cracks - E side slope - New Obs.)	1.5 m	1 - 2 mm	Unknown	Isolated (<1%)	Single tension crack on side slope	WLF-5	Acceptable	On side slope 1 m above toe
Additional Photos	Yes	See Figure CAM-1.4 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

5.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Station West Landfill has been completed as per the ToR and is included as Table XI below.

Table XI: Preliminary Stability Assessment – Station West Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.

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

5.4 LOCATION PLAN

The Location Plan for the Station West Landfill has been completed as per the ToR and is presented in Figure CAM-1.4.

7 621 000 N

7 620 900 N

389 000 E

389 100 E

FEATURE B – MINOR DEPRESSIONS
0.7–1.5m L, 0.1–0.3m W, 0.05–0.1m D

FEATURE H – TENSION CRACKS
2–11m L, 3–5mm

FEATURE E – MINOR EROSION/SETTLEMENT
6m L, 4m W, 0.05–0.1m D

FEATURE A – MINOR DEPRESSIONS
0.2–2m L, 0.1–0.5m W, 0.05–0.1m D

EQUIPMENT TRACKS/RUTS

FEATURE I – TENSION CRACKS
1.5m L, 1–2mm W

FEATURE D – MINOR EROSION
2m L, 0.1m W, 0.05m D

STATION WEST LANDFILL

FEATURE F – STAINING
2–4m L, 0.2–0.4m W

FEATURE C – UNEVEN SURFACE
5m L, 5m W, 0.05–0.15m D

FEATURE G – TENSION CRACKS
4–15m L, 2–10mm W

26m

24m

LEGEND

- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- STAINING (NTS)
- EQUIPMENT TRACKS/RUTS (NTS)
- UNEVEN SIDE SLOPE (NTS)
- MINOR EROSION (NTS)
- TENSION CRACK(s) (NTS)

0 5m 10m 15m 20m 25m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

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COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

STATION WEST LANDFILL

SITE REMEDIATION SOLUTIONS

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4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 500	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1D-PL	PAGE PL

FIGURE CAM-1.4

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5.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Station West Landfill has been completed as per the ToR and is included as Table XII hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table XII: Landfill Visual Inspection Photo Log – Station West Landfill

Photo (SWLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC09978	1,208	16/08/2013	389053	7620922	Panoramic view looking southwest to northwest from east side across Station West Landfill
2	DSC09979	4,332	16/08/2013	389057	7620929	View looking northwest at localized depressions (0.15-2m L, 0.1-0.2m W, 0.05-0.1m D) - FEATURE A; and minor erosion (2m L, 0.1m W, 0.05m D) - FEATURE D on east side slope of Station West Landfill
3	DSC09980	4,340	16/08/2013	389052	7620935	View of localized depression (2m L, 0.2m W, 0.05m D) - FEATURE A; and minor erosion (2m L, 0.1m W, 0.05m D) - FEATURE D on east side slope of Station West Landfill
4	DSC09981	4,394	16/08/2013	389056	7620938	View looking southwest at localized depressions (0.15-2m L, 0.1-0.2m W, 0.05-0.1m D) - FEATURE A; and minor erosion (2m L, 0.1m W, 0.05m D) - FEATURE D on east side slope of Station West Landfill
5	DSC09982	4,343	16/08/2013	389050	7620939	Single crack extending 1 m up from northeast toe (1.5m L, 3mm W) - FEATURE I
6	DSC09983	4,356	16/08/2013	389042	7620938	View looking northeast at minor depressions on side slope (2m L, 0.1m W, 0.05m D) - FEATURE A
7	DSC09984	4,408	16/08/2013	389046	7620943	View looking northwest at erosion from seasonal ponding on northeast side of Station West Landfill (6m L, 4m W, 0.05m D) - FEATURE E with minor depression (0.5m L, 0.5m W, 0.05m D) – FEATURE A. Start of single tension crack (15m L, 3-10 mm W) - FEATURE H
8	DSC09985	4,394	16/08/2013	389034	7620952	View east at minor linear depression on top slope on northeast corner of Station West Landfill (1.0m L, 0.3m W, 0.1m D) - FEATURE A
9	DSC09986	4,388	16/08/2013	389045	7620947	View looking northwest at erosion from seasonal ponding on northeast side of Station West Landfill (6m L, 4m W, 0.05m D) - FEATURE E with parallel tension cracks (2-5m L, 3-5mm W) and start of single tension crack (11m L, 3-5 mm W) - FEATURE H
10	DSC09987	4,397	16/08/2013	389039	7620955	Single crack extending across northeast side slope (2-5m L, 2-5 mm W) - FEATURE H
11	DSC09988	4,455	16/08/2013	389043	7620963	View looking west at erosion from seasonal ponding on northeast side of Station West Landfill (6m L, 4m W, 0.05m D) - FEATURE E with minor settlement (3m L, 0.3-0.5m W, 0.05-0.1m D) - FEATURE A and parabolic crack along top of slope (7m L, 2-3mm W) - FEATURE H
12	DSC09989	4,380	16/08/2013	389032	7620964	View looking southeast at erosion from seasonal ponding on northeast side of Station West Landfill (6m L, 4m W, 0.05m D) with minor settlement (3m L, 0.3-0.5m W, 0.05-0.1m D) - FEATURE E
13	DSC09990	4,422	16/08/2013	389030	7620962	View looking west-southwest along north side slope of Station West Landfill
14	DSC09991	1,154	16/08/2013	389030	7620956	Panoramic view looking southwest to east from north side across Station West Landfill
15	DSC09992	4,400	16/08/2013	389027	7620958	View looking south at isolated depression 2m in from crest on north side of Station West Landfill (1m L, 0.1-0.15m W, 0.05m D) - FEATURE B
16	DSC09993	4,355	16/08/2013	389013	7620956	View looking south-southwest along west side slope of Station West Landfill
17	DSC09994	4,300	16/08/2013	389014	7620944	View looking southwest at heavy equipment tracks west of Station West Landfill
18	DSC09995	4,431	16/08/2013	389009	7620950	View looking east at small depression on west side slope of Station West Landfill (0.4m L, 0.3m W, 0.05m D) - FEATURE B
19	DSC09996	4,337	16/08/2013	389010	7620921	View looking west at uneven surface on southwest corner of Station West Landfill (5m L, 5m W, 0.05-0.15m D) - FEATURE C
20	DSC09997	1,092	16/08/2013	389004	7620920	Panoramic view looking northeast to southeast from southwest corner across Station West Landfill
21	DSC09998	4,392	16/08/2013	389001	7620917	View looking southeast along south side slope of Station West Landfill

Photo (SWLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
22	DSC09999	4,247	16/08/2013	388999	7620920	View looking north-northeast along west side slope of Station West Landfill
23	DSC00001	4,287	16/08/2013	389013	7620925	View looking east at linear stain on surface of Station West Landfill (2.5m L, 0.3m W) - FEATURE F
24	DSC00002	4,347	16/08/2013	389022	7620915	View looking southwest at rust coloured staining on southwest cover of Station West Landfill (2m L, 0.4m W) - FEATURE F
25	DSC00003	4,281	16/08/2013	389021	7620906	View looking east-southeast at parallel cracks on south side slope of Station West Landfill (15m L, 2-10mm W) - FEATURE G
26	DSC00004	4,331	16/08/2013	389028	7620905	Tension crack on south side slope of Station West Landfill (15m L, 2-10mm W) - FEATURE G
27	DSC00005	4,281	16/08/2013	389031	7620905	View looking east-northeast at parallel cracks extending along south toe of Station West Landfill (4-6m L, 2-10mm W) - FEATURE G
28	DSC00006	4,319	16/08/2013	389034	7620902	Tension crack on south side slope of Station West Landfill (15m L, 2-10mm W) - FEATURE G
29	DSC00007	4,364	16/08/2013	389043	7620901	View looking southwest at parallel cracks on south side slope of Station West Landfill (15m L, 2-10mm W) - FEATURE G
30	DSC00008	1,148	16/08/2013	389040	7620905	Panoramic view looking northwest to northeast from south side across Station West Landfill
31	DSC00009	4,186	16/08/2013	389043	7620887	View looking north at area with cracks on south side slope of Station West Landfill
32	DSC00010	4,360	16/08/2013	389033	7620922	View looking southeast at two areas of staining on cover of Station West Landfill (2m L, 0.2m W) - FEATURE F

6 NON-HAZARDOUS WASTE LANDFILL

6.1 BACKGROUND AND MONITORING PROGRAM

The Non-Hazardous Waste Landfill (NHWLF) is located immediately adjacent the former station infrastructure pad. The landfill is bound to the southwest by the former pad and southeast by the access road leading north from the former station area. The landfill, including granular cover, encompasses a footprint of approximately 5,850 m^2 with the final cover extending between 1 to 3.5 m above the surrounding grade. This landfill was constructed for the disposal of non-hazardous wastes, site debris and DCC Tier I and Type A hydrocarbon impacted soil. Landfill materials are contained by a granular perimeter berm and cover. Four groundwater monitoring wells are installed at the landfill perimeter.

The long term monitoring plan consists of visual monitoring, and periodic collection of soil and groundwater samples. The 2013 monitoring of this landfill includes visual inspection to assess overall landfill performance.

6.2 VISUAL INSPECTION REPORT

The visual inspection of the NHWLF was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XIII of this report.

Settlement
One area of minor settlement (Feature A) was noted on the southwest cover of the landfill, consisting of an isolated depression measuring 1.5 m long, 0.3-0.5 m wide and 0.1 m deep. This feature was consistent with finding noted during the previous 2012 inspection.

Erosion
Evidence of erosion was 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
There was no seepage point observed at this landfill.

Debris
Four areas of partially exposed black geotextile material were noted on the northeast, east and west sides of the landfill surface (Feature B). This feature appears unchanged from the previous 2010/11 inspections with the exception of one new partially exposed piece of geotextile that was noted on the west cover area. There was no other indication of debris at the landfill.

NHWLF-9: View looking north at exposed geotextile material on west cover area (Feature B)

Presence/Condition of Monitoring Instruments
All monitoring well installations were found to be in good condition at the landfill.

Other Features of Note
There was no other feature noted.

Discussion
The NHWLF performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XIII: Visual Inspection Checklist / Report – NHWLF

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

SITE NAME: CAM-1 Jenny Lind Island
LANDFILL DESIGNATION: NHWLF (New Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 17, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Non-Hazardous Waste Landfill
Designation: New Landfill
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XIII: CAM-1 JENNY LIND ISLAND, NON-HAZARDOUS WASTE LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	No	FEATURE A See Figure CAM-1.5 (SW cover)	1.5 m	0.3 - 0.5 m	0.1 m	Isolated (<1%)	Minor depression	NHWLF-22	Acceptable	Cover appears stable
Erosion	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	Yes	FEATURE B See Figure CAM-1.5 (NE, E and W cover - 1 New Obs.)	0.1 - 0.3 m	0.1 - 0.2 m	Unknown	Isolated (<1%)	Exposed pieces of geotextile material	NHWLF-3 - 5, 8,9,14-17	Acceptable	N/A
Presence/Condition of Monitoring Instruments	Yes	See Figure CAM-1.5 (S, NE, N and NW)	N/A	N/A	N/A	N/A	MW-01 to -04	NHWLF-1, 13, 21	N/A	All monitoring wells appear in good condition.
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure CAM-1.5 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

6.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for NHWLF has been completed as per the ToR and is included as Table XIV hereafter.

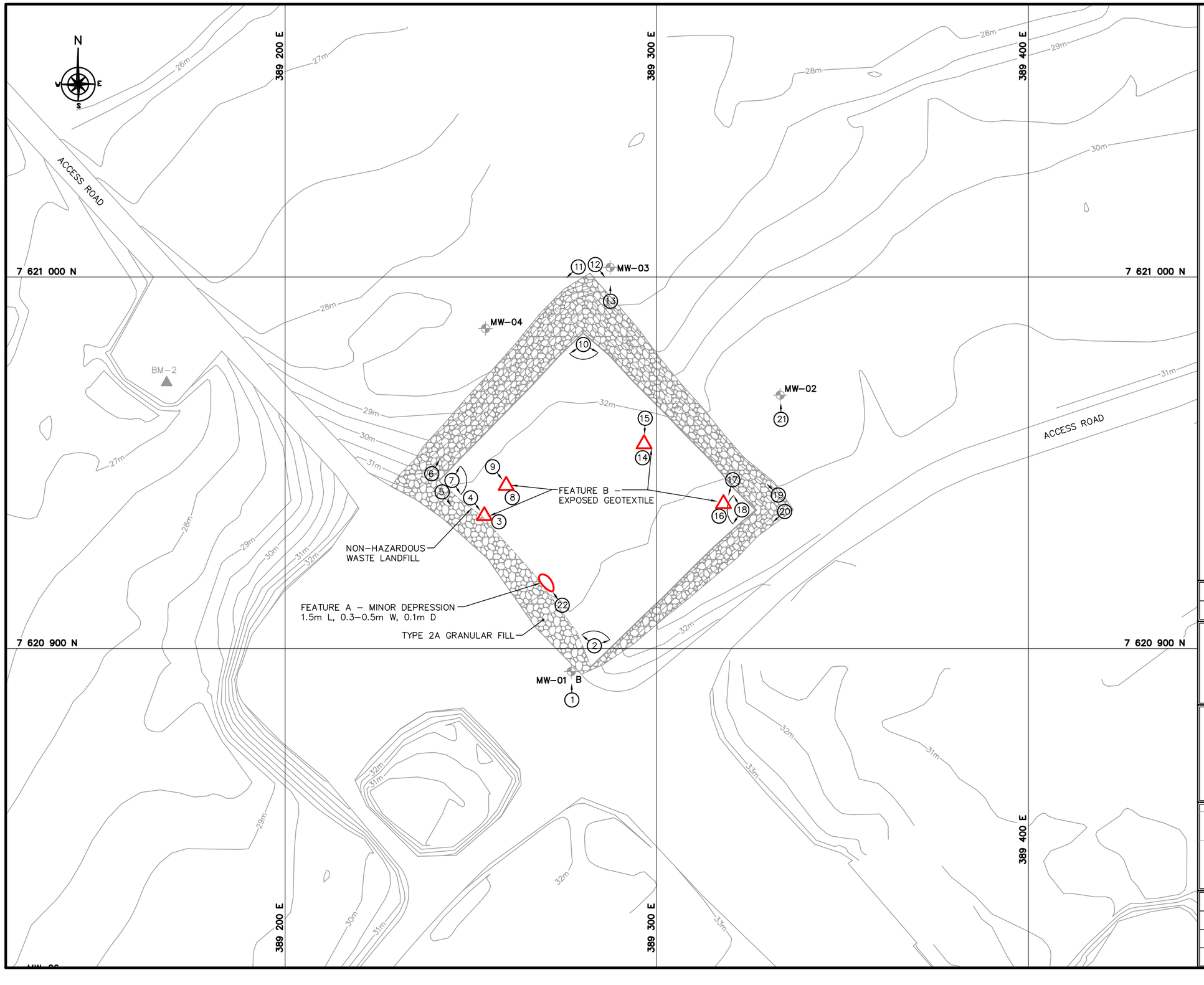
Table XIV: Preliminary Stability Assessment – NHWLF

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Not observed	None
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**	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

6.4 LOCATION PLAN

The Location Plan for the NHWLF has been completed as per the ToR and is presented in Figure CAM-1.5.



LEGEND

- BM–2 — PERMANENT BENCHMARK LOCATION (1)
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- 6 — APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- EXPOSED GEOTEXTILE (NTS)

0 10m 20m 30m 40m 50m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

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COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

NON-HAZARDOUS WASTE LANDFILL

SITE REMEDIATION SOLUTIONS

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Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1E-PL	PAGE PL

FIGURE CAM-1.5

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6.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Non-Hazardous Waste Landfill has been completed as per the ToR and is included as Table XV hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table XV: Landfill Visual Inspection Photo Log – NHWLF

Photo (NHWLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC09888	4,464	16/08/2013	389277	7620886	View looking north-northwest at metal debris piled near MW-1
2	DSC09891	1,211	16/08/2013	389283	7620901	Panoramic view looking northeast to southeast from south corner across NHWLF
3	DSC09892	4,363	16/08/2013	389253	7620936	Exposed geotextile material on west cover area of NHWLF - FEATURE B
4	DSC09893	4,315	16/08/2013	389251	7620939	View looking southeast at exposed geotextile material on west cover area of NHWLF - FEATURE B
5	DSC09894	4,288	16/08/2013	389242	7620943	View looking southeast along southwest side of NHWLF
6	DSC09895	4,317	16/08/2013	389240	7620946	View looking northeast along northwest side slope of NHWLF
7	DSC09896	1,103	16/08/2013	389243	7620945	Panoramic view looking northwest to northeast from west corner across NHWLF.
8	DSC09897	4,391	16/08/2013	389261	7620943	Exposed geotextile material on west cover area of NHWLF - FEATURE B
9	DSC09898	4,375	16/08/2013	389257	7620947	View looking southeast at exposed geotextile material on west cover area of NHWLF - FEATURE B
10	DSC09901	1,160	16/08/2013	389280	7620982	Panoramic view looking southeast to southwest from north corner across NHWLF
11	DSC09902	4,387	16/08/2013	389280	7621003	View looking southwest along northwest toe of NHWLF
12	DSC09903	4,260	16/08/2013	389283	7621003	View looking southeast along northeast toe of NHWLF
13	DSC09904	4,399	16/08/2013	389287	7620994	View of MW-3 at north toe of NHWLF
14	DSC09906	4,359	16/08/2013	389296	7620956	Exposed geotextile material on northeast cover area of NHWLF - FEATURE B
15	DSC09907	4,428	16/08/2013	389297	7620962	View looking south at exposed geotextile material on northeast cover area of NHWLF - FEATURE B
16	DSC09908	4,393	16/08/2013	389318	7620939	Exposed geotextile material on east cover area of NHWLF - FEATURE B
17	DSC09909	4,420	16/08/2013	389320	7620944	View looking southwest at exposed geotextile material on east cover area of NHWLF - FEATURE B
18	DSC09910	1,215	16/08/2013	389324	7620937	Panoramic view looking southwest to northwest from east corner across NHWLF. Note exposed geotextile material in foreground.
19	DSC09911	4,360	16/08/2013	389334	7620940	View looking northwest along northeast side slope of NHWLF
20	DSC09912	4,391	16/08/2013	389335	7620937	View looking southwest along southeast side slope of NHWLF
21	DSC09913	4,331	16/08/2013	389333	7620962	View of MW-2 on northeast side of NHWLF
22	DSC09914	4,328	16/08/2013	389274	7620912	View northwest at minor depression on south edge of NHWLF (1.5m L, 0.3-0.5m W, 0.1m D) - FEATURE A

7 TIER II SOIL DISPOSAL FACILITY

7.1 BACKGROUND AND MONITORING PROGRAM

The Tier II Soil Disposal Facility is constructed on the west side of the access road, southwest of the former station infrastructure pad. The landfill was constructed with a double containment system consisting of a geomembrane liner system and the placement of sufficient surface fill to promote freezing of the landfill contents. The facility encompasses a footprint of approximately 8,900 m^2 with the final cover extending between 6-7.5 m above the surrounding grade.

Four groundwater monitoring wells are installed at the landfill perimeter, and four thermistors are installed within the landfill footprint to monitor freeze back conditions.

The long term monitoring plan consists of visual monitoring, collection of soil and groundwater samples and monitoring of subsurface ground temperatures.

The 2013 monitoring of this landfill includes visual inspection to verify for evidence of settlement or erosion, collection of soil and groundwater samples to monitor for the presence of leachate and retrieval of data from the thermistors. Locations of groundwater monitoring wells, soil samples and thermistor installations are identified on Figure CAM-1.6.

Soil at all stations was sampled as specified. Detectable concentrations of PHC F3 fraction were noted at one surface sample location, MW-5 (surface – 51 mg/kg). Inspection and monitoring was carried out at each of the monitoring wells as per the ToR. All monitoring well locations were dry at the time of sampling and consequently were not sampled.

7.2 VISUAL INSPECTION REPORT

The visual inspection of the Tier II Soil Disposal Facility was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XVI of this report.

<u>Settlement</u>
An indication of minor settlement was noted at a single location near the northwest crest of the landfill cover (Feature A), consisting of an isolated linear depression measuring 1.2 m long, 0.25 m wide and 0.1 m in depth. Indications of settlement in this area were not noted during the previous 2012 inspection.

Tier II-24: View looking northeast at minor depression below west crest (Feature A).

Erosion

Evidence of minor surface erosion was noted at two locations on the northwest facing slope (Feature B) of the facility. Both locations consisted of shallow surface erosion that extended between 7 to 10 m down slope from the crest, ranged between 0.1-0.3m in width and were 0.03m deep. The areas affected appear to be self-armouring and have an acceptable severity rating. Overall, the facility cover appears stable. Recent observations indicate the two erosion areas have not significantly changed from the previous 2012 inspection.

Frost Action

Indications of frost action were not noted.

Evidence of Burrowing Animals

Indications of burrowing animals were not noted.

Re-establishment of Vegetation

Indications of vegetation were not noted.

Staining

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

Seepage Points

Evidence of seepage was not noted

Debris

Evidence of exposed debris was not noted.

Presence/Condition of Monitoring Instruments

All monitoring well and thermistor installations were found to be in good condition at the facility.

Other Features of Note

There were no other features of note.

Discussion

The Tier II Soil Disposal Facility performance with respect to containment of the debris within the landfill is rated as acceptable. Visual inspection report, including supporting photos and drawing, is presented in the following pages.

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

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

SITE NAME: CAM-1 Jenny Lind Island
LANDFILL DESIGNATION: Tier II Soil Disposal Facility (New Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 16-17, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Tier II Disposal Facility
Designation: New Landfill
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XVI: CAM-1 JENNY LIND ISLAND, TIER II DISPOSAL FACILITY

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.6 (W crest - New Obs.)	1.2 m	0.25 m	0.1 m	Isolated (<1%)	Linear depression below crest	Tier II -24	Acceptable	Cover appears stable.
Erosion	Yes	FEATURE B See Figure CAM-1.6 (NW side slope)	7-10 m	0.1 - 0.3 m	0.03 m	Isolated (<1%)	Minor erosion	Tier II-21, 22, 23	Acceptable	Slope appears stable. Minor washing of fines.
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	Yes	See Figure CAM-1.6	N/A	N/A	N/A	N/A	VT-1 to -4 MW-05 to -08	Tier II-1 to 5, 9, 25 Tier II-5W, 6W, 7W, 8W	N/A	All locations in good condition. Monitored and sampled in 2011.
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure CAM-1.6 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no features of note.
Overall Landfill Performance:	**Acceptable**									

7.3 PRELIMINARY STABILITY ASSESSMENT

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

Table XVII: Preliminary Stability Assessment – Tier II Soil Disposal Facility

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

7.4 LOCATION PLAN

The Location Plan for the Tier II Soil Disposal Facility has been completed as per the ToR and is included in the following page as Figure CAM-1.6.

N

389 000 E

389 100 E

389 200 E

7 620 800 N

7 620 700 N

MW–01 B

MW–06

MW–07

MW–08

MW–05 B

VT–1

VT–2

VT–3

VT–4

BM–3

FEATURE B – MINOR EROSION
7–10m L, 0.1–0.3m W, 0.03m D

FEATURE A – MINOR DEPRESSION
1.2m L, 0.25m W, 0.1m D

TIER II DISPOSAL FACILITY

TYPE 2A GRANULAR FILL

ACCESS ROAD

25m 26m 27m 28m 29m 30m 31m 32m 33m 36m

LEGEND

- BM–3 — PERMANENT BENCHMARK LOCATION (1)
- COMMEMORATIVE PLAQUE LOCATION
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- VERTICAL THERMISTOR LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- 6 — APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- MINOR EROSION (NTS)

0 10m 20m 30m 40m 50m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–24	PAR	VERIF.	APPR.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

TIER II DISPOSAL FACILITY

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1F-PL	PAGE PL

FIGURE CAM-1.6

G:\CD3654\2013\FINAL\CAM-1\CD3654_210_213-CAM-1F-PL.dwg, PL, 2014-01-24 1:59:04 PM

7.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Tier II Soil Disposal Facility has been completed as per the ToR and is included as Table XVIII hereafter. The Photographic Record contains only an index of photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

Table XVIII: Landfill Visual Inspection Photo Log – Tier II Soil Disposal Facility

Photo (Tier II-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC09825	4,409	16/08/2013	389088	7620740	View looking south at VT-1 on southwest corner of Tier II DF
2	DSC09829	4,405	16/08/2013	389100	7620758	View northeast at VT-2 on central cover of Tier II DF. VT-3 in background
3	DSC09830	4,365	16/08/2013	389099	7620763	View southeast at VT-2 on central cover of Tier II DF. VT-4 in background
4	DSC09834	4,332	16/08/2013	389121	7620743	View north-northeast at VT-4 on east cover of Tier II DF
5	DSC09838	4,312	16/08/2013	389140	7620768	View north-northwest at VT-3 on northeast cover of Tier II DF. MW-06 in background
6	DSC09845	4,392	16/08/2013	389138	7620774	View of datalogger and thermistor montoring equipment at VT-3
7	DSC09846	4,265	16/08/2013	389144	7620771	View looking northwest at VT-3 located on east cover of Tier II DF
8	DSC09847	4,391	16/08/2013	389145	7620765	View looking south-southeast at MW-05 located on southeast side of Tier II DF
9	DSC09849	1,179	16/08/2013	389146	7620771	Panoramic view looking northwest to south from northeast corner of Tier II DF
10	DSC09850	4,291	16/08/2013	389164	7620775	View looking southwest along east side slope of Tier II DF
11	DSC09851	4,321	16/08/2013	389163	7620777	View looking northwest along north side slope of Tier II DF
12	DSC09852	4,474	16/08/2013	389175	7620776	View looking southwest along east toe of Tier II DF
13	DSC09853	4,327	16/08/2013	389175	7620778	View looking northwest along north toe of Tier II DF
14	DSC09854	4,367	16/08/2013	389162	7620826	View looking southwest at north side of Tier II DF
15	DSC09855	4,280	16/08/2013	389099	7620821	View looking southwest along west toe of Tier II DF
16	DSC09856	4,415	16/08/2013	389102	7620822	View looking southeast along north toe of Tier II DF
17	DSC09857	4,336	16/08/2013	389103	7620808	View looking southwest along west side slope of Tier II DF
18	DSC09858	4,343	16/08/2013	389105	7620809	View looking southeast along north side slope of Tier II DF
19	DSC09861	1,282	16/08/2013	389113	7620787	Panoramic view looking east to southwest from north corner across Tier II DF
20	DSC09862	4,437	16/08/2013	389113	7620783	View looking northwest at minor erosion on northwest side slope of Tier II DF (7m L, 0.2m W, 0.03m D) - FEATURE B
21	DSC09863	4,398	16/08/2013	389097	7620790	View looking southeast at minor erosion on northwest side slope of Tier II DF (7m L, 0.2m W, 0.03m D) - FEATURE B
22	DSC09864	4,417	16/08/2013	389092	7620788	View looking southeast at minor erosion on northwest side slope of Tier II DF (10m L, 0.3m W, 0.03m D) - FEATURE B
23	DSC09865	4,282	16/08/2013	389109	7620779	View looking northwest at minor erosion on northwest side slope of Tier II DF (10m L,0.3m W, 0.03m D) - FEATURE B
24	DSC09866	4,388	16/08/2013	389102	7620770	View looking northeast at minor depression below crest on west side of Tier II DF (2m L, 0.3m W, 0.1m D) - FEATURE A
25	DSC09870	1,205	16/08/2013	389084	7620738	Panoramic view looking northeast to southeast from west corner across Tier II DF. VT-1 visible on right
26	DSC09871	4,306	16/08/2013	389072	7620731	View looking northeast along west side of Tier II DF
27	DSC09872	4,468	16/08/2013	389071	7620733	View looking southeast along south side of Tier II DF
28	DSC09873	4,334	16/08/2013	389056	7620730	View looking northeast along west toe of Tier II DF
29	DSC09874	4,392	16/08/2013	389055	7620732	View looking southeast along south toe of Tier II DF
30	DSC09875	4,450	16/08/2013	389035	7620792	View looking southeast at west side of Tier II DF
31	DSC09876	4,366	16/08/2013	389073	7620691	View looking northeast at south side of Tier II DF
32	DSC09877	4,312	16/08/2013	389128	7620688	View looking northwest along south toe of Tier II DF
33	DSC09878	4,250	16/08/2013	389130	7620690	View looking northeast along east toe of Tier II DF

Photo (Tier II-)	Filename	Size (KB)	Date	Vantage Point		Caption
34	DSC09879	4,340	16/08/2013	389121	7620701	View looking northwest along south side slope of Tier II DF
35	DSC09880	4,312	16/08/2013	389124	7620702	View looking northeast along east side slope of Tier II DF
36	DSC09883	4,449	16/08/2013	389119	7620716	View looking south-southeast down slope on south corner of Tier II DF
37	DSC09884	1,342	16/08/2013	389117	7620720	Panoramic view looking west to northeast from south corner across Tier II DF
38	DSC09887	945	16/08/2013	389184	7620731	Panoramic view looking southwest to northwest from east of Tier II DF
Soil Sampling						
5W	DSC09843	4,304	16/08/2013	389154	7620726	Sampling location C113-5W located upgradient of Tier II DF
MW5	DSC09844	4,369	16/08/2013	389153	7620721	View north-northeast at C113-5W soil sample location
6W	DSC09836	4,294	16/08/2013	389133	7620816	Sampling location C113-6W located downgradient of Tier II DF
MW6	DSC09837	4,382	16/08/2013	389136	7620820	View southwest at C113-6W soil sample location
7W	DSC09832	4,374	16/08/2013	389069	7620782	Sampling location C113-7W located downgradient of Tier II DF
MW7	DSC09833	4,398	16/08/2013	389068	7620787	View south at C113-7W soil sample location
8W	DSC09827	4,371	16/08/2013	389048	7620730	Sampling location C113-8W located downgradient of Tier II DF
MW8	DSC09828	4,313	16/08/2013	389043	7620730	View east at C113-8W soil sample location

7.6 THERMAL MONITORING DATA

All thermistors at the Tier II Soil Disposal Facility were inspected and found to be in good condition with no significant concerns identified. Data from all thermistors was successfully retrieved. Analogues/thermocouples at all locations were observed to be functioning properly at the time of the inspection. Further review of the downloaded data identified no significant errors in temperature readings during the recording period. All clocks exhibited slight drifts and were synchronized using the Prolog software.

Good to excellent battery levels were noted at all locations with no battery replacements anticipated for the 2014 monitoring period.

7.7 LANDFILL TEMPERATURE DATA FROM DATALOGGERS

Manual resistive and temperature data readings were collected from the thermistor strings as per the ToR. Manual readings and inspection results for each thermistor are presented on the Thermistor Annual Maintenance Reports included in the report. A complete datalogger RAW data set for 2012-2013 period has been forwarded to DCC as per the ToR.

Table XIX presented below contains the manual thermistor readings.

Table XIX: CAM-1 THERMAL MONITORING DATA

Thermistor	Bead	Ohms	Temperature	Thermistor	Bead	Ohms	Temperature
VT-1	1	11.573	7.3646	VT-3	1	12.034	6.2346
	2	13.134	4.4903		2	13.248	4.3331
	3	15.051	1.7364		3	15.461	1.2487
	4	17.037	-0.6898		4	17.056	-0.6567
	5	18.166	-1.2957		5	18.248	-1.9643
	6	19.683	-3.4344		6	19.847	-3.5616
	7	20.65	-4.4334		7	20.930	-4.6667
	8	21.59	-5.2703		8	22.02	-5.5780
	9	22.560	-6.082		9	22.76	-6.2135
	10	23.42	-6.7813		10	23.65	-6.9205
	11	24.17	-7.3593		11	24.42	-7.5691
	12	24.86	-7.8821		12	25.05	-8.0165
	13	25.44	-8.3253		13	25.67	-8.4654
	14	25.9	-8.6621		14	26.23	-8.8933
	15	26.48	-9.0972		15	26.74	-9.2791
	16	26.81	-9,3104		16	26.93	-9.3646
VT-2	1	12.342	5.4085	VT-4	1	12.209	5.7279
	2	12.258	5.4085		2	12.275	5.7104
	3	12.128	5.9899		3	12.129	6.0274
	4	12.376	4.8272		4	12.319	5.6505
	5	12.527	4.8319		5	13.895	3.3293
	6	12.532	5.2588		6	15.923	0.5856
	7	12.081	6.1288		7	17.307	-1.0008
	8	13.121	4.4903		8	18.226	-1.9978
	9	15.162	1.5932		9	19.527	-3.3239
	10	17.081	-0.1718		10	21.36	-5.0757
	11	18.249	-1.9978		11	22.57	-6.1324
	12	19.364	-3.1416		12	23.29	-6.7131
	13	20.9	-4.65		13	24.08	-7.3292
	14	22.06	-5.6799		14	-	-
	15	22.99	-6.4683		15	-	-
	16	23.78	-7.1122		16	-	-

7.8 SOIL SAMPLE ANALYTICAL DATA

The soil chemical analysis results and the evaluation of analytical data for the 2013 Tier II Soil Disposal Facility samples are presented in Tables XX and XXI below. Field and inter-laboratory duplicates collected as part of the QA/QC program are presented in Appendix C at the end of this report.

Table XX: Soil Chemical Analysis Results – Tier II Soil Disposal Facility

Sample Name	Sample Location	Depth Below Grade (cm)	Parameters														
			As [mg/kg]	Cd [mg/kg]	Cr [mg/kg]	Co [mg/kg]	Cu [mg/kg]	Pb [mg/kg]	Hg [mg/kg]	Ni [mg/kg]	Zn [mg/kg]	PCBs [mg/kg]	PHC(F1) [mg/kg]	PHC(F2) [mg/kg]	PHC(F3) [mg/kg]	PHC(F4) [mg/kg]	TPH [mg/kg]
C113 - 5WA	**Tier II MW-5**	0-15	2.5	<0.10	2.5	<1.0	<5.0	11,0	<0.050	1.7	14	<0.010	<12	<10	51	<50	<150
C113 - 5WB		40-50	1.5	<0.10	3.2	1.1	<5.0	3.8	<0.050	2,0	<10	<0.010	<12	<10	<50	<50	<150
C113 - 6WA	**Tier II MW-6**	0-15	1.8	<0.10	2.8	<1.0	<5.0	5,0	<0.050	1.6	<10	<0.010	<12	<10	<50	<50	<150
Cam-1 / C113-6WA		0-15	1.6	0.04	3.3	1.4	2.7	<4.9	0.01	2.6	8	<0.1	<10	<50	<50	<100	<250
C113 - 6WB		40-50	7.4	<0.10	5.4	1.7	<5.0	4.8	<0.050	3.4	<10	<0.010	<12	<10	<50	<50	<150
C113 - 7WA	**Tier II MW-7**	0-15	3,0	<0.10	6.5	2.3	<5.0	5.8	<0.050	3.8	<10	<0.010	<12	<10	<50	<50	<150
C113 - 7WB		40-50	1.8	<0.10	4,0	1.4	<5.0	3.4	<0.050	2.3	<10	<0.010	<12	<10	<50	<50	<150
C113 - 8WA	**Tier II MW-8**	0-15	1.9	<0.10	3.1	1.2	<5.0	3.9	<0.050	2.2	<10	<0.010	<12	<10	<50	<50	<150
C113 - 8WB		40-50	2,0	<0.10	4.9	1.6	<5.0	3.8	<0.050	2.8	<10	<0.010	<12	<10	<50	<50	<150
C113 - BD1			2.3	<0.10	3.4	1,0	<5.0	4.7	<0.050	2.1	<10	<0.010	<12	<10	<50	<50	<150

PHC (F1): Petroleum hydrocarbon C_6 to C_{10}, does not include BTEX fractions

PHC (F2): Petroleum hydrocarbon $C_{>10}$ to C_{16}

PHC (F3): Petroleum hydrocarbon $C_{>16}$ to C_{34}

TPH: Total Petroleum Hydrocarbons (C_6 to C_{34})

Table XXI: Evaluation of 2013 Soil Analytical Data – Tier II Soil Disposal Facility

Parameter	2013
Copper	All reported concentrations were lower than the method detection limit (5 mg/kg).
Nickel	Detectable concentrations were noted at all sample locations, ranging between 1.6-3.8 mg/kg with a mean of 2.3. The highest concentrations were observed at downgradient locations at depth at MW-6 (3.4 mg/kg) and MW-8 (2.8 mg/kg) and at surface at MW-7 (3.6 mg/kg). Concentrations at the upgradient location and remaining downgradient locations ranged between 1.6-2.3 mg/kg.
Cobalt	Concentrations in the samples ranged between <1-2.3 mg/kg with a mean of 1.2 mg/kg and detectable concentrations noted at all but depth at two downgradient sample locations, including: MW-5 (surface) and MW-6 (surface). Trace concentrations were observed at all other locations with the highest concentration noted at downgradient location MW-7 (surface – 2.3 mg/kg). Detectable concentrations at all other locations ranged between 1.1-1.7 mg/kg.
Lead	Concentrations ranged between 3.4-11 mg/kg with a mean of 4.4. Trace concentrations were observed at all locations with the highest concentrations noted at upgradient location MW-5 (surface – 11 mg/kg) and downgradient location MW-7 (surface – 5.8 mg/kg). Detectable concentrations at all other locations ranged between 3.4-5.0 mg/kg.
Zinc	Detectable concentrations were noted at one upgradient sample location, MW-5 (surface – 14 mg/kg). All other samples reported concentrations lower than the method detection limit (10 mg/kg).
Chromium	Concentrations ranged between 2.5-6.5 mg/kg with a mean of 3.6. The highest concentrations were generally noted at downgradient locations, MW-6 (depth – 5.4 mg/kg) and MW-7 (surface – 6.5 mg/kg). Concentrations at all other locations ranged between 2.5-4.9 mg/kg.
Arsenic	Detectable concentrations were noted at all sample locations, ranging between 1.5-7.4 mg/kg with a mean of 2.0. The most elevated concentration was observed at downgradient location MW-6 (depth – 7.4 mg/kg) and MW-7 (surface – 3.0mg/kg). Concentrations at the upgradient location and remaining downgradient locations ranged between 1.5-2.5 mg/kg.
Mercury	All reported concentrations were lower than the method detection limit (0.05 mg/kg).
PCBs	All reported concentrations were lower than the method detection limit (0.01 mg/kg).
TPH	Detectable concentrations of PHC F3 fraction were noted at one surface sample location, MW-5 (surface – 51 mg/kg). All other reported concentrations were lower than the method detection limit (10 mg/kg)

7.9 GROUNDWATER SAMPLE ANALYTICAL DATA

As noted above, all monitoring wells at the Tier II Soil Disposal Facility were dry at the time of monitoring and consequently were not sampled during the 2013 field program.

Table XXII: Thermistor Annual Maintenance Report (VT-1 to VT-4)

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**8/16/2013**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**CAM-1**	Thermistor Location		**Tier II Disposal Facility**			
Thermistor Number:	**VT-1**	Inclination		**Vertical**			
Install Date:		First Date Event			Last Date Event		**8/16/2012**
Coordinates and Elevation	N	**7620734.0**	E	**389089.0**	Elev	**35.9**	
Length of Cable (m)	**11.7**	Cable Lead Above Ground (m)	**3.25**	Nodal Points			**16**
Datalogger Serial #	**07060015**			Cable Serial Number			

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	**8/14/2011**	
Battery Levels	Main **11.34 V**	Aux **13.14**

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	11.573	7.3646
2	13.134	4.4903
3	15.051	1.7364
4	17.037	-0.6898
5	18.166	-1.2957
6	19.683	-3.4344
7	20.65	-4.4334
8	21.59	-5.2703

Bead	ohms	Degrees C
9	22.56	-6.0820
10	23.42	-6.7813
11	24.17	-7.3593
12	24.86	-7.8821
13	25.44	-8.3253
14	25.90	-8.6621
15	26.48	-9.0972
16	26.81	-9.3104

Observations and Proposed Maintenance

Download thermistor data. File: Site_001_CAM-1_Aug_16_2013.
Reset clock and restart datalogger.

Table XXII: Thermistor Annual Maintenance Report (VT-1 to VT-4)

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**8/16/2013**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**CAM-1**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT-2**		Inclination		**Vertical**		
Install Date:			First Date Event			Last Date Event	**8/16/2012**
Coordinates and Elevation		N	**7620759.5**	E	**389105.5**	Elev	**36.5**
Length of Cable (m)	**11.7**		Cable Lead Above Ground (m)	**6.30**	Nodal Points		**16**
Datalogger Serial #	**07050030**				Cable Serial Number		**07050030**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	
Data Logger	**Yes**	**No**	
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	
Battery Installation Date	**xx/xx/2009**		
Battery Levels	Main **11.34 V**	Aux **12.41**	

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	12.342	5.4085
2	12.258	5.4085
3	12.128	5.9899
4	12.376	4.8272
5	12.527	4.8319
6	12.532	5.2588
7	12.081	6.1288
8	13.121	4.4903

Bead	ohms	Degrees C
9	15.16	1.5932
10	17.081	-0.1718
11	18.249	-1.9978
12	19.364	-3.1416
13	20.90	-4.6500
14	22.06	-5.6799
15	22.99	-6.4683
16	23.78	-7.1122

Observations and Proposed Maintenance

Download thermistor data. File: Site_001_07050030_Aug_16_2013.
Reset clock and restart datalogger.

Table XXII: Thermistor Annual Maintenance Report (VT-1 to VT-4)

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**8/16/2013**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**CAM-1**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT-3**		Inclination		**Vertical**		
Install Date:			First Date Event			Last Date Event	**8/16/2012**
Coordinates and Elevation		N	**7620735.5**	E	**389140.5**	Elev	**36.4**
Length of Cable (m)	**11.7**		Cable Lead Above Ground (m)	**3.30**	Nodal Points		**16**
Datalogger Serial #	**07050003**				Cable Serial Number		**07050003**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	
Data Logger	**Yes**	**No**	
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	
Battery Installation Date	**8/14/2011**		
Battery Levels	Main **11.34 V**	Aux	**13.26**

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	12.034	6.2346
2	13.248	4.3331
3	15.461	1.2487
4	17.056	-0.6567
5	18.248	-1.9643
6	19.847	-3.5616
7	20.93	-4.6667
8	22.02	-5.5780

Bead	ohms	Degrees C
9	22.76	-6.2135
10	23.65	-6.9205
11	24.42	-7.5691
12	25.05	-8.0165
13	25.67	-8.4654
14	26.23	-8.8933
15	26.74	-9.2791
16	26.93	-9.3646

Observations and Proposed Maintenance

Download thermistor data. File: Site_default_Aug_16_2013.
Reset clock and restart datalogger.

Table XXII: Thermistor Annual Maintenance Report (VT-1 to VT-4)

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**8/16/2013**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**CAM-1**		Thermistor Location		**Tier II Disposal Facility**		
Thermistor Number:	**VT-4**		Inclination		**Vertical**		
Install Date:			First Date Event			Last Date Event	**8/16/2012**
Coordinates and Elevation		N	**7620749.0**	E	**389124.5**	Elev	**36.7**
Length of Cable (m)	**9.2**	Cable Lead Above Ground (m)	**3.45**	Nodal Points			**13**
Datalogger Serial #	**07050006**			Cable Serial Number			**07050006**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	
Data Logger	**Yes**	**No**	
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	
Battery Installation Date	**8/14/2011**		
Battery Levels	Main **11.34 V**	Aux	**12.90**

Manual Ground Temperature Readings

Bead	ohms	Degrees C
1	12.209	5.7279
2	12.275	5.7104
3	12.129	6.0274
4	12.319	5.6505
5	13.895	3.3293
6	15.923	0.5856
7	17.307	-1.0008
8	18.226	-1.9978

Bead	ohms	Degrees C
9	19.53	-3.3239
10	21.36	-5.0757
11	22.57	-6.1324
12	23.29	-6.7131
13	24.08	-7.3292
14	-	-
15	-	-
16	-	-

Observations and Proposed Maintenance

Download thermistor data. File: Site_001_0705006_Aug_16_2013.
Reset clock and restart datalogger.

7.10 MONITORING WELL SAMPLING/INSPECTION LOGS (MW-5 TO MW-8)

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

2013 Monitoring Well Sampling Log (MW-5)

Site name:	CAM-1
Date of sampling event:	16-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-5
Facility:	Tier II Disposal Facility

Known Data	
Depth of installation* (m):	4.60
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.50

Measured Data			
Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	- (dry)
Well height above ground (m):	0.32	Depth to bottom (m):	1.58
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	-	Evidence of sludge:	no
Well volume of water (L):	-	Evidence of freezing/siltation:	frozen
Static water level* (m):	-		
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment: N/A

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

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	16-Aug-13
Sample Number - Water:		Sample Number - Soil:	C113-5WA
			C113-5WB
Sample Containers:		Sample Containers:	2x250mL glass/1xbag
			2x250mL glass/1xbag
Procedure/Equipment:		Procedure/Equipment:	Steel & Plastic Trowels
Water Description:		Soil Description:	Brown sand, with gravel, well graded, dry
Sampling Equipment Decontamination (Y/N):	N/A	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	-	Number Washes:	1
Number Rinses:	-	Number Rinses:	1

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

2013 Monitoring Well Sampling Log (MW-6)

Site name:	CAM-1
Date of sampling event:	16-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-6
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	4.65
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	- (dry)
Well height above ground (m):	0.57	Depth to bottom (m):	1.62
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	-	Evidence of sludge:	no
Well volume of water (L):	-	Evidence of freezing/siltation:	trace bentonite at base
Static water level* (m):	-		
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment:	N/A

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

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	16-Aug-13
Sample Number - Water:		Sample Number - Soil:	C113-6WA (BD1)
			C113-6WB
Sample Containers:		Sample Containers:	9x250mL glass/2xbag
			2x250mL glass/1xbag
Procedure/Equipment:		Procedure/Equipment:	Steel & Plastic Trowels
Water Description:		Soil Description:	Dark brown sand, some gravel, trace cobbles, dry
Sampling Equipment Decontamination (Y/N):	N/A	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	-	Number Washes:	1
Number Rinses:	-	Number Rinses:	1

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

2013 Monitoring Well Sampling Log (MW-7)

Site name:	CAM-1
Date of sampling event:	16-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-7
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	4.70
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	- (dry)
Well height above ground (m):	0.50	Depth to bottom (m):	1.49
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	-	Evidence of sludge:	no
Well volume of water (L):	-	Evidence of freezing/siltation:	frozen
Static water level* (m):	-		
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment: N/A

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

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	16-Aug-13
Sample Number - Water:		Sample Number - Soil:	C113-7WA
			C113-7WB
Sample Containers:		Sample Containers:	2x250mL glass/1xbag
			2x250mL glass/1xbag
Procedure/Equipment:		Procedure/Equipment:	Steel & Plastic Trowels
Water Description:		Soil Description:	brown sand, with gravel f-m grained, cobbles, dry
Sampling Equipment Decontamination (Y/N):	N/A	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	-	Number Washes:	1
Number Rinses:	-	Number Rinses:	1

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

2013 Monitoring Well Sampling Log (MW-8)

Site name:	CAM-1
Date of sampling event:	16-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-8
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	4.80
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.50

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	- (dry)
Well height above ground (m):	0.49	Depth to bottom (m):	1.57
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	-	Evidence of sludge:	no
Well volume of water (L):	-	Evidence of freezing/siltation:	frozen
Static water level* (m):	-		
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment: N/A

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

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	16-Aug-13
Sample Number - Water:		Sample Number - Soil:	C113-8WA
			C113-8WB
Sample Containers:		Sample Containers:	2x250mL glass/1xbag
			2x250mL glass/1xbag
Procedure/Equipment:		Procedure/Equipment:	Steel & Plastic Trowels
Water Description:		Soil Description:	Dark brown sand and gravel, f-med grained, trace cobbles, dry
Sampling Equipment Decontamination (Y/N):	N/A	Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	-	Number Washes:	1
Number Rinses:	-	Number Rinses:	1

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

8 SOUTHEAST LANDFILL

8.1 BACKGROUND AND MONITORING PROGRAM

The Southeast Landfill (SELF) area is located approximately 125 m to the southeast of the Tier II Soil Disposal Facility. The landfill has two separate regrade areas (labelled as Lobes 1 and 2), and including engineered cover, encompasses a footprint of approximately 2,900 m^2 with the final cover extending approximately 1.0 to 1.5 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Southeast Landfill was classified as low potential environmental risk. The remediation consisted of removal of surface debris and localized contaminated areas, and regrading with the placement of additional granular fill.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. The 2013 monitoring of this landfill was limited to a visual inspection to assess landfill performance. There is no instrumentation installed at this landfill.

8.2 VISUAL INSPECTION REPORT

The visual inspection of the Southeast Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XXII of this report.

Settlement
Indications of minor localized settlement were noted at two areas on the Southeast Landfill, including one linear depression on the north side slope of Lobe 2 (Feature A) and one oval-shaped depression near the crest on the east side of Lobe 1 (Feature B). Both features were previously noted and consistent with findings during the 2012 inspection. The settlement features have an acceptable severity rating.

Erosion
Evidence of minor erosion was noted on the southeast cover and side slope of Lobe 1 (Feature C). The erosion consisted of a narrow (5-7 cm wide) and shallow channel where fines had washed from the granular cover. The erosion extended approximately 15 m south-southeast from the north central area of the lobe to the southeast side slope and toe. This feature appears consistent with the previous 2012 inspection findings.

SELF-12: View looking northwest at minor erosion on cover of Lobe 1 (Feature C)

Frost Action
Indications of frost action were not noted.

Evidence of Burrowing Animals
Indications of burrowing animals were not noted.

Re-establishment of Vegetation
Evidence of vegetation was not noted on the landfill.

Staining
No areas of staining were noted at the landfill.

Seepage Points
Evidence of specific seepage points was not noted.

Debris
Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments
There are no monitoring instruments installed at this landfill.

Other Features of Note
A pair of shallow vehicle tracks/ruts was observed on the west corner of Lobe 1. The vehicle tracks/ruts extended 0.05 m in depth and covered less than 1% of the landfill surface. These vehicle tracks were consistent with the previous 2011 and 2012 inspection.

Discussion
The Southeast Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XXIII: Visual Inspection Checklist / Report – Southeast Landfill

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

SITE NAME: CAM-1 Jenny Lind Island
LANDFILL DESIGNATION: Southeast Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 17, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Southeast Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXIII: CAM-1 JENNY LIND ISLAND, SOUTHEAST LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.7 (N side slope - Lobe 2)	2.5 m	0.15 m	0.03 - 0.05 m	Isolated (<1%)	Minor depression	SELF-20, 21	Acceptable	Side slope appears stable.
		FEATURE B See Figure CAM-1.7 (SE crest - Lobe 1)	0.5 m	0.15 m	0.03 m	Isolated (<1%)	Minor depression	SELF-16	Acceptable	Cover appears stable.
Erosion	Yes	FEATURE C See Figure CAM-1.7 (E cover - Lobe 1)	15 m	0.05 - 0.07 m	0.01 - 0.03 m	Localized (<2%)	Minor erosion, washing of fines	SELF-11, 12	Acceptable	Cover and side slope appears stable
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	Yes	See Figure CAM-1.7 (W side slope - Lobe 1)	1 - 3 m	0.15 m	0.05 m	Isolated (<1%)	Vehicle ruts	SELF-4, 5	Acceptable	N/A
Additional Photos	Yes	See Figure CAM-1.7 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no features of note.
Overall Landfill Performance:	**Acceptable**									

8.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for the Southeast Landfill has been completed as per the ToR and is included as Table XXIV hereafter.

Table XXIV: Preliminary Stability Assessment – Southeast Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

8.4 LOCATION PLAN

The Location Plan for the Southeast Landfill has been completed as per the ToR and is presented in Figure CAM-1.7.

N

W E

S

389 200 E

389 250 E

389 300 E

7 620 600 N

7 620 550 N

ACCESS TRAIL

FEATURE A – MINOR DEPRESSION
2.5m L, 0.15m W, 0.03–0.05m D

SOUTHEAST
LANDFILL–LOBE 2

FEATURE B – SMALL DEPRESSION
0.5m L, 0.15m W, 0.03m D

SOUTHEAST
LANDFILL–LOBE 1

VEHICLE RUTS
1–3m L, 0.15m W, 0.05m D

FEATURE C – MINOR EROSION
15m L, 0.05–.07m W, 0.01–0.02m D

31m

30m

29m

28m

LEGEND

- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- VEHICULE RUTS
- MINOR EROSION (NTS)

0 5m 10m 15m 20m 25m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

SOUTHEAST LANDFILL

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 500	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1G-PL	PAGE PL

FIGURE CAM-1.7

G:\CD3654\2013\FINAL\CAM-1\CD3654_210_213-CAM-1G-PL.dwg, PL, 2014-01-24 1:59:51 PM

8.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Southeast Landfill has been completed as per the ToR and is included as Table XXV hereafter. The Photographic Record contains only an index of photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

Table XXV: Landfill Visual Inspection Photo Log – Southeast Landfill

Photo (SELF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
Lobe 1						
1	DSC00074	1,319	16/08/2013	389244	7620587	Panoramic view looking east to southwest from northwest corner across Lobe 1
2	DSC00075	4,340	16/08/2013	389242	7620591	View looking southwest along northwest toe of Lobe 1
3	DSC00076	4,405	16/08/2013	389243	7620591	View looking east-southeast along north toe of Lobe 1
4	DSC00077	4,294	16/08/2013	389213	7620562	View looking northwest at vehicle ruts on west side slope of Lobe 1 (1-3m L, 0.15m W, 0.05m D)
5	DSC00078	4,287	16/08/2013	389208	7620567	View looking southeast at vehicle ruts on west side slope of Lobe 1 (1-3m L, 0.15m W, 0.05m D)
6	DSC00079	4,391	16/08/2013	389207	7620563	View looking northeast along northwest toe of Lobe 1
7	DSC00080	4,406	16/08/2013	389207	7620562	View looking south along west toe of Lobe 1
8	DSC00081	925	16/08/2013	389209	7620538	Panoramic view looking north-northwest to east from south corner across Lobe 1
9	DSC00082	4,480	16/08/2013	389204	7620535	View looking north along west toe of Lobe 1
10	DSC00083	4,350	16/08/2013	389207	7620533	View looking northeast along southeast toe of Lobe 1
11	DSC00084	4,436	16/08/2013	389249	7620574	View looking southeast at minor erosion on cover of Lobe 1 (15m L, 0.05-0.07m W, 0.01-0.02m D) - FEATURE C
12	DSC00085	4,341	16/08/2013	389254	7620556	View looking northwest at minor erosion on cover of Lobe 1 (15m L, 0.05-0.07m W, 0.01-0.02m D) - FEATURE C
13	DSC00086	1,088	16/08/2013	389270	7620570	Panoramic view looking southwest to north from east corner across Lobe 1
14	DSC00087	4,233	16/08/2013	389271	7620566	View looking southwest along southeast toe of Lobe 1
15	DSC00088	4,181	16/08/2013	389266	7620583	View looking southwest from northeast side along centerline of Lobe 1
16	DSC00090	4,329	16/08/2013	389269	7620568	View looking southwest at minor depression near southeast crest of Lobe 1 (0.5m L, 0.15m W, 0.03m D) - FEATURE B
Lobe 2						
17	DSC00091	1,084	16/08/2013	389227	7620632	Panoramic view looking southeast to southwest from north corner across Lobe 2
18	DSC00092	4,377	16/08/2013	389226	7620634	View looking south-southwest along west toe of Lobe 2
19	DSC00093	4,310	16/08/2013	389226	7620635	View looking southeast along northeast toe of Lobe 2
20	DSC00094	4,369	16/08/2013	389231	7620632	View looking northwest at minor depression on north side slope of Lobe 2 (0.4m L, 0.15m W, 0.05m D) - FEATURE A
21	DSC00095	4,316	16/08/2013	389229	7620637	View looking south at minor depression on north side slope of Lobe 2 (0.4m L, 0.15m W, 0.05m D) - FEATURE A
22	DSC00096	4,386	16/08/2013	389242	7620624	View looking northwest along northeast toe of Lobe 2
23	DSC00097	4,253	16/08/2013	389242	7620623	View looking south along east toe of Lobe 2
24	DSC00098	4,456	16/08/2013	389242	7620609	View looking north along east toe of Lobe 2
25	DSC00099	4,325	16/08/2013	389242	7620608	View looking west along south toe of Lobe 2
26	DSC00100	1,325	16/08/2013	389238	7620611	Panoramic view looking southwest to northeast from south corner across Lobe 2

9 STATION EAST LANDFILL

9.1 BACKGROUND AND MONITORING PROGRAM

The Station East Landfill is located approximately 350 m east of the former station infrastructure pad and 75 m to the northeast of the Main Landfill. The landfill forms a slight topographic high within a relatively flat lying area east of the former station. The landfill has a single regrade area encompassing a footprint of approximately 2,400 m^2 with the final cover extending approximately 0.75 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Station East Landfill was classified as low potential environmental risk. The remediation consisted of removal of surface debris and regrading with the placement of additional granular fill.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. The 2013 monitoring of this landfill was limited to a visual inspection to assess landfill performance. There is no instrumentation installed at this landfill.

9.2 VISUAL INSPECTION REPORT

The visual inspection of the Station East Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XXIII of this report.

Settlement
Indications of minor settlement were noted in five localized areas (Feature A) on the north and southwest sides of the landfill surface and southwest side slope. The feature consisted of two shallow linear depressions near the north crest, one localized small depression on the north cover area, two elliptical depressions on the southwest cover and one linear depression on the southwest side slope. This feature has an acceptable severity rating. These depressions were consistent with findings from the previous 2012 inspection.

Erosion
One area of minor erosion was noted along the west margin of the landfill (Feature B). The erosion consisted of fines washing along approximately 3 linear meters of the toe of slope. Erosion appears to be the result of seasonal ponding along the west side of the lobe. This feature was dry at the time of the 2013 inspection and appears to be self-armouring with an acceptable severity rating. This feature was consistent with findings from the previous 2011 and 2012 inspections.

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 on the landfill.

Staining
No areas of staining were noted at the landfill.

Seepage Points
No areas of seepage were noted at the landfill.

Debris
Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments
There is no monitoring instrumentation installed at this landfill.

Other Features of Note
No other features were noted at the landfill.

Discussion
The Station East Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XXVI: Visual Inspection Checklist / Report – Station East Landfill

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

SITE NAME: CAM-1 – Jenny Lind Island
LANDFILL DESIGNATION: Station East Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 16-17, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Station East Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXVI: CAM-1 JENNY LIND ISLAND, STATION EAST LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.8 (N and SW cover and SW side slope)	0.4 - 4 m L	0.1 - 0.5 m	0.05 - 0.1 m	Occasional (<2%)	Minor depressions	ELF-9, 10, 13, 24-26	Acceptable	Cover appears stable.
Erosion	Yes	FEATURE B See Figure CAM-1.8 (W toe)	3 m	1.5 m	0.03 m	Isolated (<1%)	Minor erosion	ELF-3	Acceptable	Minor washing of fines along toe resulting from seasonal ponding
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure CAM-1.8 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no features of note.
Overall Landfill Performance:	**Acceptable**									

9.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Station East Landfill has been completed as per the ToR and is included as Table XXVII below.

Table XXVII: Preliminary Stability Assessment – Station East Landfill

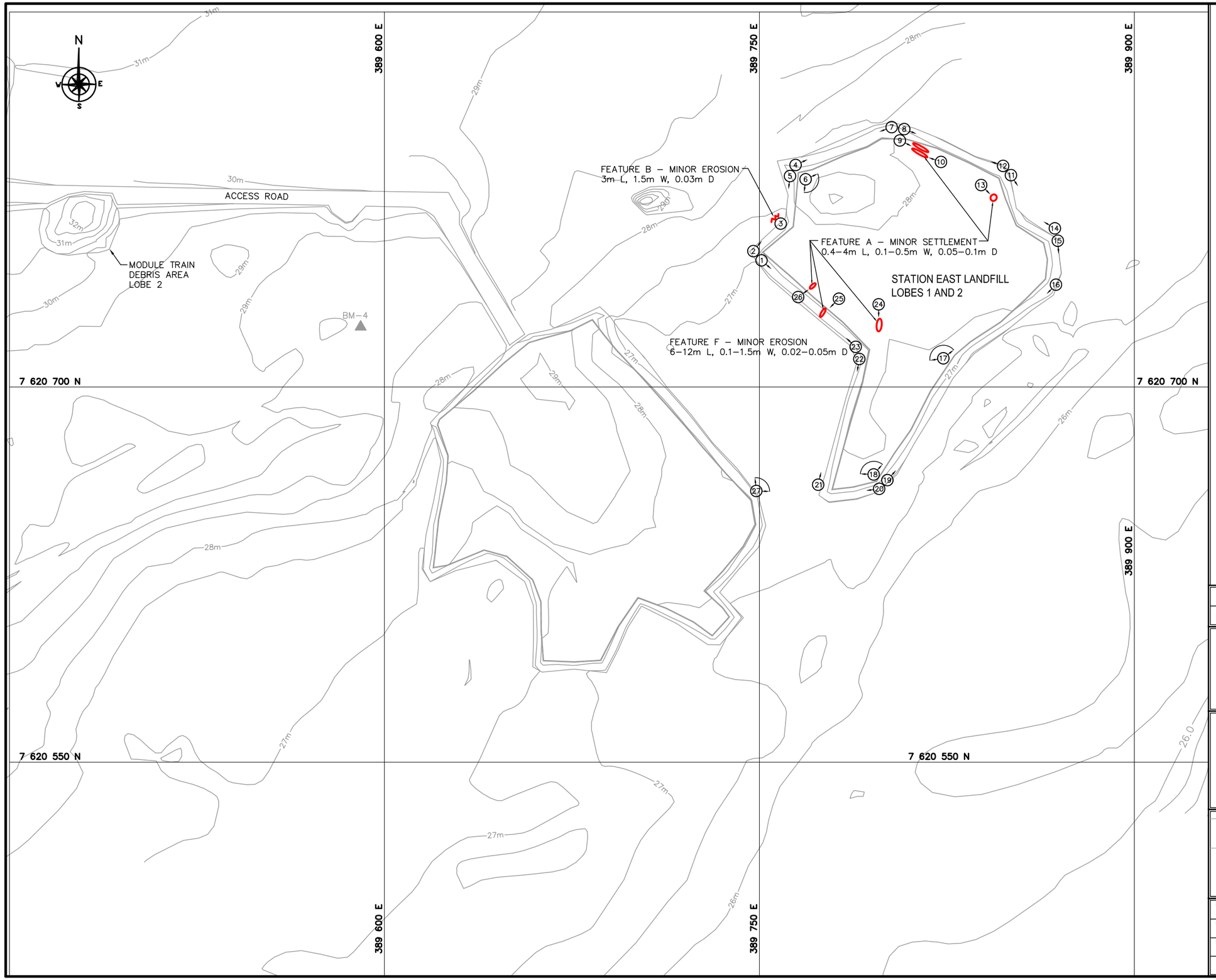
Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris exposure	Not observed	None
Overall Landfill Performance	**Acceptable**	

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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.

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

9.4 LOCATION PLAN

The Location Plan for the Station East Landfill has been completed as per the ToR and is presented in Figure CAM-1.8a.



LEGEND

- BM–4 — PERMANENT BENCHMARK LOCATION (1)
- 6 — APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- STAINING (NTS)
- MINOR EROSION (NTS)

0 15m 30m 45m 60m 75m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

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COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

STATION EAST LANDFILL

SITE REMEDIATION SOLUTIONS

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4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,500	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1Ha-PL	PAGE PL

FIGURE CAM-1.8a

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9.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Station East Landfill has been completed as per the ToR and is included as Table XXVIII hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table XXVIII: Landfill Visual Inspection Photo Log – Station East Landfill

Photo (ELF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC00047	4,376	16/08/2013	389749	7620755	View looking southeast along southwest toe of Station East Landfill
2	DSC00046	4,210	16/08/2013	389750	7620752	View looking north at minor erosion of fines along west toe of Station East Landfill (3m L, 1.5m W, 0.03m D) - FEATURE B
3	DSC00048	4,369	16/08/2013	389758	7620766	View of minor erosion of fines along west toe of Station East Landfill (3m L, 1.5m W, 0.03m D) - FEATURE B
4	DSC00049	4,350	16/08/2013	389764	7620788	View looking northeast along northwest toe of Station East Landfill
5	DSC00050	4,250	16/08/2013	389763	7620786	View looking south along west toe of Station East Landfill
6	DSC00051	978	16/08/2013	389768	7620784	Panoramic view looking northeast to south from west side across Station East Landfill
7	DSC00052	4,336	16/08/2013	389805	7620804	View looking southwest along northwest toe of Station East Landfill
8	DSC00053	4,307	16/08/2013	389807	7620804	View looking east-southeast along north toe of Station East Landfill
9	DSC00054	4,404	16/08/2013	389806	7620799	View looking east-southeast along north crest of Station East Landfill. Note linear depressions on right (4m L, 0.1-0.15m W, 0.05m D) – FEATURE A
10	DSC00055	4,374	16/08/2013	389821	7620791	View looking northwest at area of linear depressions on north side of Station East Landfill (4m L, 0.1-0.15m W, 0.05m D) - FEATURE A
11	DSC00056	4,453	16/08/2013	389850	7620786	View looking south-southeast along northeast toe of Station East Landfill
12	DSC00057	4,387	16/08/2013	389849	7620788	View looking northwest along north toe of Station East Landfill
13	DSC00058	4,311	16/08/2013	389839	7620780	View looking southeast at minor depression on northeast cover area of Station East Landfill (0.5m L, 0.5m W, 0.07 m D) - FEATURE A
14	DSC00059	4,373	16/08/2013	389868	7620762	View looking northwest along northeast toe of Station East Landfill
15	DSC00060	4,450	16/08/2013	389869	7620760	View looking south along east toe of Station East Landfill
16	DSC00061	4,434	16/08/2013	389869	7620742	View looking southwest along southeast toe of Station East Landfill
17	DSC00063	1,011	16/08/2013	389824	7620712	Panoramic view looking west to northeast from southeast side across Station East Landfill
18	DSC00064	862	16/08/2013	389796	7620665	Panoramic view looking west to northeast from south corner across Station East Landfill
19	DSC00065	4,380	16/08/2013	389800	7620663	View looking northeast along southeast side slope of Station East Landfill
20	DSC00066	4,307	16/08/2013	389799	7620661	View looking west along south toe of Station East Landfill
21	DSC00067	4,289	16/08/2013	389774	7620662	View looking north-northeast along west side slope of Station East Landfill
22	DSC00068	4,316	16/08/2013	389790	7620713	View looking south-southwest along west side slope of Station East Landfill
23	DSC00069	4,425	16/08/2013	389789	7620715	View looking northwest along southwest side slope of Station East Landfill
24	DSC00070	4,416	16/08/2013	389798	7620732	View looking south at linear depression on cover southwest side of Station East Landfill (1.0m L, 0.5m W, 0.05m D) - FEATURE A
25	DSC00071	4,292	16/08/2013	389781	7620735	View looking southwest at linear depression on side slope on southwest side of Station East Landfill (4m L, 0.4m W, 0.1m D) - FEATURE A
26	DSC00072	4,371	16/08/2013	389766	7620736	View looking northeast at linear depression on side slope on southwest side of Station East Landfill (0.4m L, 0.3m W, 0.05m D) - FEATURE A
27	DSC00036	927	16/08/2013	389749	7620659	Panoramic view looking northwest to northeast from southeast side across Station East Landfill

10 STATION MAIN LANDFILL

10.1 BACKGROUND AND MONITORING PROGRAM

The Main Landfill is located approximately 300 m east-southeast of the former station infrastructure pad and 75 m to the southwest of the Station East Landfill. The landfill forms a slight topographic high within a relatively flat lying area east of the former station. The landfill has a single regrade area encompassing a footprint of approximately 12,500 m^2 with the final cover extending approximately 0.75 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Main Landfill was classified as low potential environmental risk. The remediation consisted of regrading with the placement of additional granular fill.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. The 2013 monitoring of this landfill was limited to a visual inspection to assess landfill performance. There is no instrumentation installed at this landfill.

10.2 VISUAL INSPECTION REPORT

The visual inspection of the Main Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XXV of this report. Note that Features A and B are presented in the Station East Landfill observations.

Settlement

Indications of minor settlement were noted at five isolated locations on the northwest, southwest and south cover areas and on the northwest and east side slopes (Feature C). The linear shaped depressions ranged in size from 0.4 to 3 m in length, 0.15 to 0.7 m in width and 5 to 25 cm in depth. These features were noted during the previous 2012 inspection with the exception of one new linear depression located on the southwest cover, measuring 0.75 m long, 0.25 m wide and 5 cm deep.

MLF-34: View looking southwest at minor depression on south cover (Feature C).

Erosion

Indications of minor erosion were noted in three general areas (Features D, E and F) on the northwest, southwest and northeast margins of the landfill, ranging from 1.5 to 30 m in length. At each area, the erosion generally consisted of fines washing along the side slope and toe of slope and appear to be the result in part of localized seasonal ponding along the margins of the landfill. These features were dry at the time of the 2013 inspection and appear to be self-armouring with an acceptable severity rating. All three features appear to be relatively consistent with findings from the 2012 inspection, with the exception of an increase in magnitude of Feature D on the northwest corner of the landfill.

MLF-7: (left) View north at minor erosion on northwest corner (Feature D).
MLF-5: (right) View looking northeast at minor erosion along northwest side slope (Feature D).

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 on the landfill.

Staining

One moderate sized area of discoloured granular material was noted in the central cover area of the landfill (Feature G). The area measures approximately 25 m by 20 m with no evidence of seepage or ponding in the immediate area. This feature was consistent with observations reported in the previous 2012 inspection.

Seepage Points

No areas of seepage were noted at the landfill.

Debris

Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments

There is no monitoring instrumentation installed at this landfill.

Other Features of Note

No other features were noted at the landfill.

Discussion

The Station Main Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XXIX: Visual Inspection Checklist / Report – Main Landfill

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

SITE NAME: CAM-1 – Jenny Lind Island
LANDFILL DESIGNATION: Station Main Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 17, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: Main Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXIX: CAM-1 JENNY LIND ISLAND, MAIN LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE C See Figure CAM-1.8 (NW, SW and S cover, NW and E side slopes - 1 New Obs)	0.4 - 3 m	0.15- 0.7 m	0.05 - 0.25 m	Occasional (<1%)	Minor depressions	MLF-3, 23, 31, 32, 34	Acceptable	Cover and side slopes appear stable
Erosion	Yes	FEATURE D See Figure CAM-1.8 (NW side slope and corner)	4 - 25 m	0.3 - 0.5 m	0.03 - 0.15 m	Isolated (<1%)	Minor erosion along toe and northwest corner	MLF-4 - 9	Acceptable	Washing of fines from seasonal ponding. Slope appears stable
		FEATURE E See Figure CAM-1.8 (SW toe/side slope)	1.5 - 30 m	0.05 - 1 m	0.03 - 0.05 m	Isolated (<3%)	Minor erosion along toe and inside side slope	MLF-9, 12, 13, 15, 16	Acceptable	Washing of fines from seasonal ponding. Slope appears stable
		FEATURE F See Figure CAM-1.8 (NE side slope and toe)	6 - 12 m	0.1 - 1.5 m	0.02 - 0.05 m	Isolated (<1%)	Minor erosion on side slope and along toe	MLF-26, 28 - 30	Acceptable	Washing of fines from seasonal ponding. Slope appears stable
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	Yes	FEATURE G See Figure CAM-1.8 (Central cover)	25 m	20 m	Unknown	Isolated (<3%)	Slight discoloration of granular cover material	MLF-33	Acceptable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure CAM-1.8 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

10.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Main Landfill has been completed as per the ToR and is included as Table XXX below.

Table XXX: Preliminary Stability Assessment – Main Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Occasional
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.

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

10.4 LOCATION PLAN

The Location Plan for the Main Landfill has been completed as per the ToR and is presented in Figure CAM-1.8b.

N

ACCESS ROAD

MODULE TRAIN DEBRIS AREA LOBE 2

BM–4

FEATURE D – MINOR EROSION
4–25m L, 0.3–0.5m W, 0.03–0.15m D

FEATURE F – MINOR EROSION
6–12m L, 0.1–1.5m W, 0.02–0.05m D

FEATURE C – MINOR SETTLEMENT
0.4–3m L, 0.25–0.7m W, 0.05–0.25m D

FEATURE G – DISCOLORATION
25m L, 20m W

MAIN LANDFILL
LOBES 1 AND 2

FEATURE E – MINOR EROSION
1.5–30m L, 0.05–1m W, 0.03–0.05m D

389 600 E
389 750 E
389 900 E
7 620 700 N
7 620 550 N

LEGEND

- BM–4 — PERMANENT BENCHMARK LOCATION (1)
- 6 — APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- STAINING (NTS)
- MINOR EROSION (NTS)

0 15m 30m 45m 60m 75m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–24	PAR	VERIF.	APPR.

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COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

STATION MAIN LANDFILL

SITE REMEDIATION SOLUTIONS

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MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,500	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1Hb-PL	PAGE PL

FIGURE CAM-1.8b

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10.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Station Main Landfill has been completed as per the ToR and is included as Table XXXI hereafter. The Photographic Record contains only an index of photographs. Full sized photographs are contained in the Addendum DVD-ROM.

Table XXXI: Landfill Visual Inspection Photo Log – Main Landfill

Photo (MLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC00011	4,319	16/08/2013	389653	7620725	View looking east along northwest side slope of Main LF
2	DSC00012	4,446	16/08/2013	389651	7620724	View looking southwest along northwest side slope of Main LF
3	DSC00013	4,301	16/08/2013	389644	7620717	View looking southeast at minor depression on northwest side slope of Main LF (1.0mL, 0.2m W, 0.1m D) - FEATURE C
4	DSC00014	4,339	16/08/2013	389642	7620715	View looking southwest along northwest side slope of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (25m L, 0.4m W, 0.03m D) - FEATURE D
5	DSC00015	4,330	16/08/2013	389618	7620688	View looking northeast along northwest side slope of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (25m L, 0.4m W, 0.03m D) - FEATURE D
6	DSC00016	4,408	16/08/2013	389619	7620684	Erosion on northwest corner of Main LF (4m L,0.3-0.5m W, 0.1-0.15m D) - FEATURE D
7	DSC00017	4,299	16/08/2013	389619	7620678	View north at minor erosion on northwest corner of Main LF (4m L, 0.3-0.5m W, 0.1-0.15m D) - FEATURE D
8	DSC00018	4,445	16/08/2013	389622	7620681	View looking south along west toe of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (25m L, 0.5m W, 0.03m D) - FEATURE D
9	DSC00019	4,395	16/08/2013	389618	7620628	View looking north along west toe of Main LF
10	DSC00020	4,401	16/08/2013	389620	7620625	View looking east-northeast along southwest toe of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (30m L, 0.3m W, 0.03m D) - FEATURE E
11	DSC00021	1,260	16/08/2013	389621	7620629	Panoramic view looking north to southeast from west side across Main LF
12	DSC00022	4,448	16/08/2013	389643	7620627	View looking north at minor erosion on southwest side slope of Main LF (1.5m L, 0.05-0.5m W, 0.05m D) - FEATURE E
13	DSC00023	4,396	16/08/2013	389639	7620633	View looking southeast at minor erosion on southwest side slope of Main LF (1.5m L, 0.05-0.5m W, 0.05m D) - FEATURE E
14	DSC00024	4,319	16/08/2013	389658	7620620	View looking south along west toe of Main LF
15	DSC00025	4,451	16/08/2013	389655	7620623	View looking west along southwest toe of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (30m L, 0.3m W, 0.03m D) - FEATURE E
16	DSC00026	4,361	16/08/2013	389654	7620621	View looking northeast at minor erosion on southwest side slope of Main LF (2.5m L, 0.65-1m W, 0.03m D) - FEATURE E
17	DSC00027	1,153	16/08/2013	389666	7620593	Panoramic view looking northwest to east from south side across Main LF
18	DSC00028	4,323	16/08/2013	389687	7620588	View looking west along south side slope of Main LF
19	DSC00029	4,212	16/08/2013	389689	7620589	View looking northeast along southeast side slope of Main LF
20	DSC00030	4,370	16/08/2013	389702	7620612	View looking southwest along southeast toe of Main LF
21	DSC00031	4,376	16/08/2013	389704	7620612	View looking east-southeast along south toe of Main LF. Note deposition of gravel and cobbles along toe from seasonal ponding
22	DSC00032	4,303	16/08/2013	389748	7620595	View looking northwest along south side slope of Main LF
23	DSC00033	4,323	16/08/2013	389738	7620618	View looking west at minor depression on inside corner (3m L, 0.5m W, 0.05-0.25m D) - FEATURE C
24	DSC00034	4,268	16/08/2013	389736	7620622	View northeast along east side slope of Main LF
25	DSC00035	910	16/08/2013	389744	7620654	Panoramic view looking south to northwest from west side across Main LF
26	DSC00037	4,362	16/08/2013	389717	7620693	View looking northwest along northeast side slope of Main LF

Photo (MLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
27	DSC00038	4,451	16/08/2013	389719	7620692	View looking southeast along northeast side slope of Main LF
28	DSC00039	4,401	16/08/2013	389707	7620706	View looking northwest along northeast toe of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (12m L, 0.5-1.5m W, 0.02-0.05m D) - FEATURE F
29	DSC00040	4,307	16/08/2013	389687	7620727	View looking southeast along northeast toe of Main LF. Note minor erosion (fines washing) along toe from seasonal ponding (12m L, 0.5-1.5m W, 0.02-0.05m D) - FEATURE F
30	DSC00041	4,287	16/08/2013	389687	7620713	View looking northeast at minor erosion near northeast corner of Main LF (4m L, 0.2m W, 0.5m D) - FEATURE F
31	DSC00042	4,405	16/08/2013	389635	7620678	View looking northwest at minor depression on cover of Main LF (0.4m L, 0.15m W, 0.05m D) - FEATURE C
32	DSC00043	4,436	16/08/2013	389655	7620692	View looking southwest at minor depression on west cover of Main LF (0.75m L, 0.25m W, 0.05m D) - FEATURE C
33	DSC00044	4,348	16/08/2013	389662	7620670	View looking southeast at discolouration on central cover of Main LF (25m L, 20m W) - FEATURE G
34	DSC00045	4,362	16/08/2013	389663	7620635	View looking southwest at minor depression on west cover of Main LF (0.75m L, 0.25m W, 0.05m D) - FEATURE C

11 USAF LANDFILL

11.1 BACKGROUND AND MONITORING PROGRAM

The USAF Landfill is located approximately 550 m to the north of the west end of the airstrip, The landfill is located within a relatively flat lying area east of the main access road connecting the airstrip to the main station area. The landfill has two regrade areas, including engineered cover, encompasses a footprint of approximately 3,000 m^2 with the final cover extending approximately 0.5 to 0.75 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the USAF Landfill was classified as low potential environmental risk.

The remediation consisted of regrading with the placement of additional granular fill at all lobes. The long term monitoring plan consists of visual monitoring and collection of soil samples.

The 2013 monitoring of this landfill includes a visual inspection to assess landfill performance. There is no instrumentation installed at this landfill.

11.2 VISUAL INSPECTION REPORT

The visual inspection of the USAF Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XXXI of this report.

Settlement
Indications of settlement were not noted.

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 on the landfill.

Staining
No areas of staining were noted at the landfill.

Seepage Points
No areas of seepage were noted at the landfill.

Debris
Evidence of debris was not noted at the landfill.

Presence/Condition of Monitoring Instruments
There is no monitoring instrumentation installed at this landfill.

Other Features of Note
No other features were noted at the landfill.

Discussion

The USAF Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. Visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XXXII: Visual Inspection Checklist / Report – USAF Landfill

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

SITE NAME: CAM-1 Jenny Lind Island
LANDFILL DESIGNATION: USAF Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 15, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: USAF Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXXII: CAM-1 JENNY LIND ISLAND, MAIN LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Erosion	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure CAM-1.9 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note.
Overall Landfill Performance:	**Acceptable**									

11.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for USAF Landfill has been completed as per the ToR and is included as Table XXXIII hereafter.

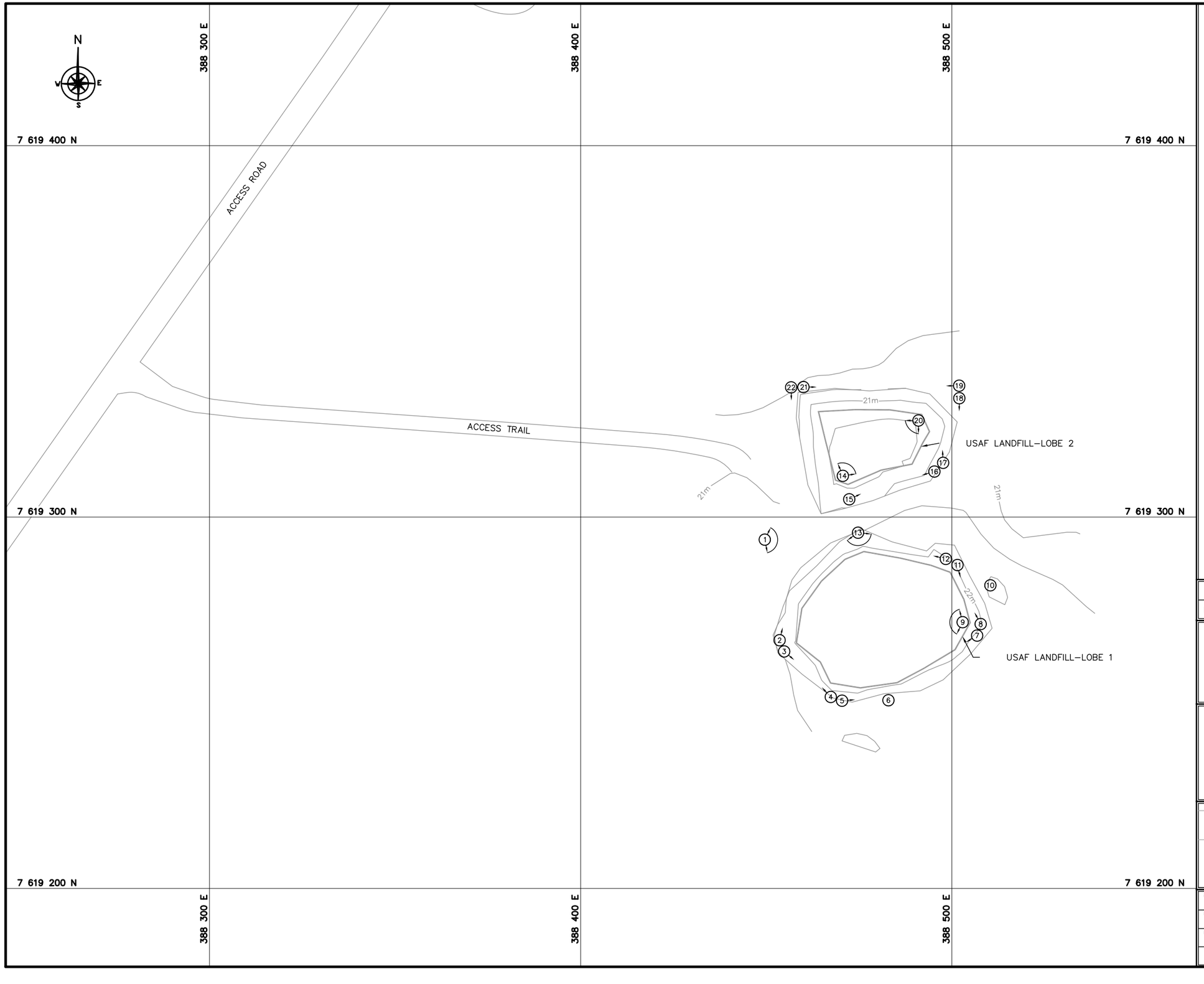
Table XXXIII: Preliminary Stability Assessment – USAF Landfill

Feature	Severity Rating	Extent
Settlement	Not observed	None
Erosion	Not observed	None
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

11.4 LOCATION PLAN

The Location Plan for the USAF Landfill has been completed as per the ToR and is presented in Figure CAM-1.9.



LEGEND

APPROX. PHOTOGRAPHIC VIEWPOINT

0 10m 20m 30m 40m 50m

NO.	VERSION	DATE	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

USAF LANDFILL

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 1,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_210_213	DRAWING NO: CD3654_210_213-CAM-1I-PL	PAGE PL

FIGURE CAM-1.9

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11.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the USAF Landfill has been completed as per the ToR and is included as Table XXXIV hereafter. The Photographic Record only contains an index of photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

Table XXXIV: Landfill Visual Inspection Photo Log – USAF Landfill

Photo (USAF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
Lobe 1						
1	DSC00101	996	16/08/2013	388450	7619294	Panoramic view looking northeast to south from west of USAF LF - Lobe 1
2	DSC00104	4,411	16/08/2013	388454	7619267	View looking north-northeast along west side slope of USAF LF - Lobe 1
3	DSC00105	4,391	16/08/2013	388454	7619265	View looking southeast along southwest side slope of USAF LF - Lobe 1
4	DSC00106	4,415	16/08/2013	388468	7619251	View looking northwest along southwest toe of USAF LF - Lobe 1
5	DSC00107	4,410	16/08/2013	388469	7619251	View looking east-northeast along south toe of USAF LF - Lobe 1
6	DSC00108	4,286	16/08/2013	388483	7619251	Corner marker post for USAF landfill located south of USAF LF - Lobe 1
7	DSC00109	4,384	16/08/2013	388507	7619269	View looking southwest along southeast side slope of USAF LF - Lobe 1
8	DSC00110	4,417	16/08/2013	388507	7619270	View looking northwest along east side slope of USAF LF - Lobe 1. Note landfill marker post on right of photo
9	DSC00111	1,194	16/08/2013	388504	7619272	Panoramic view looking southwest to northwest from east side of USAF LF - Lobe 1
10	DSC00112	4,390	16/08/2013	388510	7619282	Corner marker post for USAF landfill located east of USAF LF - Lobe 1
11	DSC00113	4,392	16/08/2013	388501	7619288	View looking south-southeast along east side slope of USAF LF - Lobe 1
12	DSC00114	4,442	16/08/2013	388499	7619288	View looking west-northwest along north toe of USAF LF - Lobe 1
13	DSC00115	1,607	16/08/2013	388475	7619296	Panoramic view looking east to southwest from north side of USAF LF - Lobe 1
Lobe 2						
14	DSC00116	1,240	16/08/2013	388470	7619311	Panoramic view looking northwest to east from southwest corner of USAF LF - Lobe 2
15	DSC00117	4,254	16/08/2013	388472	7619305	View looking east-northeast along south side slope of USAF LF - Lobe 2
16	DSC00118	4,299	16/08/2013	388496	7619313	View looking southwest along south side slope of USAF LF - Lobe 2
17	DSC00119	4,374	16/08/2013	388497	7619314	View looking north along east side slope of USAF LF - Lobe 2
18	DSC00120	4,308	16/08/2013	388502	7619332	View looking south along east side slope of USAF LF - Lobe 2
19	DSC00121	4,445	16/08/2013	388502	7619334	View looking west along north side slope of USAF LF - Lobe 2
20	DSC00122	1,342	16/08/2013	388491	7619326	Panoramic view looking south to west from northeast corner of USAF LF - Lobe 2
21	DSC00123	4,438	16/08/2013	388460	7619335	View looking east along north side slope of USAF LF - Lobe 2
22	DSC00124	4,402	16/08/2013	388458	7619335	View looking south along west toe of USAF LF - Lobe 2

12 EAST LANDING LANDFILL

12.1 BACKGROUND AND MONITORING PROGRAM

The East Landing Landfill is located approximately 200 m southeast of the beach SRR POL refuel tanks and ranges between 20 to 40 m from the ocean's edge. With cover material, the single regrade area of the landfill encompasses a footprint of approximately 2,200 m^2 with the final cover extending approximately 0.75 m to 3.0 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the East Landing Landfill was classified as low potential environmental risk. The remediation consisted of regrading with the placement of additional granular fill and erosion protection along the downgradient slope.

The long term monitoring plan consists of visual monitoring and periodic collection of soil samples. The 2013 monitoring of this landfill includes a visual inspection to assess landfill performance. There is no instrumentation installed at this landfill.

12.2 VISUAL INSPECTION REPORT

The visual inspection of the East Landing Landfill was conducted on August 16, 2013. The Visual Inspection Checklist/Report has been completed as per the ToR and is included as Table XXXIV of this report.

Settlement
An indication of minor settlement was noted at one location, consisting of a linear depression on the southwest side slope of the landfill (Feature A). The 1.5 m long by 0.3-0.6 m wide depression extended in an east-west direction and was 5-10 cm deep. This feature was consistent with observations noted during the previous 2012 inspection.

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
There is no seepage point observed at this landfill.

Debris
There was no debris noted.

Presence/Condition of Monitoring Instruments
There is no monitoring instrument installed at this landfill.

Other Features of Note

One partially infilled continuous tension crack was noted on the southeast cover area of the landfill (Feature B). The crack was noted to extend approximately 28 m in an east-west direction just north of the crest and varied between 10-30 mm in width. The magnitude (length and width) of the crack has noticeably increased from the previous 2012 inspection.

ELLF-17: (left) View looking east-southeast at partially infilled tension crack on southeast cover (Feature B)
ELLF-19: (right) View of partially infilled tension crack on southeast cover (Feature B)

Discussion

The East Landing Landfill performance with respect to containment of the debris within the landfill is rated as acceptable. A visual inspection report, including supporting photos and drawing, is presented in the following pages.

Table XXXV: Visual Inspection Checklist / Report – East Landing Landfill

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

SITE NAME: CAM-1 Jenny Lind Island
LANDFILL DESIGNATION: East Landing Landfill (Regrade Landfill)
DATE OF INSPECTION: August 16, 2013
DATE OF PREVIOUS INSPECTION: August 15, 2012
INSPECTED BY: A. Passalis
REPORT PREPARED BY: A. Passalis
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.

LANDFILL VISUAL INSPECTION

Site Name: CAM-1 JENNY LIND ISLAND
Landfill: East Landing Landfill
Designation: Existing Regrade Area
Date Inspected: August 16, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXXV: CAM-1 JENNY LIND ISLAND, EAST LANDING LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure CAM-1.10 (SW side slope)	1.5 m	0.3 - 0.6 m	0.05 - 0.1 m	Isolated (<1%)	Minor depression	ELLF-21, 22	Acceptable	Side slope appear stable
Erosion	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Frost Action	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Other Features of Note:	Yes	FEATURE B See Figure CAM-1.10 (SE cover)	28 m	10-30 mm	Unknown	Isolated (<2%)	Continuous tension crack	ELLF-17 - 20	Acceptable	Crack has increased in width and in length from previous inspection. Partially infilled
Additional Photos	Yes	See Figure CAM-1.10 and Photographic Record	N/A	N/A	N/A	N/A	General Photographic Record	N/A	Not Observable	General photos for documentation, no additional features of note
Overall Landfill Performance:	**Acceptable**									

12.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for East Landing Landfill has been completed as per the ToR and is included as Table XXXVI hereafter.

Table XXXVI: Preliminary Stability Assessment – East Landing Landfill

Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Not observed	None
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
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: • Debris exposed in erosion channels or areas of differential settlement. • Liner exposed. • Slope failure.
Extent	**Description**
Isolated	Singular feature
Occasional	Features of note occurring at irregular intervals/locations
Numerous	Many features of note, impacted less than 50% of the surface area of the landfill
Extensive	Impacting greater than 50% of the surface area of the landfill

12.4 LOCATION PLAN

The Location Plan for the East Landing Landfill has been completed as per the ToR and is presented in Figure CAM-1.10.

N

388 150 E

388 200 E

388 250 E

7 618 250 N

7 618 200 N

FEATURE B – TENSION CRACK
28m L, 10–30mm W

FEATURE A – MINOR DEPRESSION
1.5m L, 0.3–0.6m W, 0.05–0.1m D

EAST LANDING LANDFILL
LOBES 4 AND 5

JENNY LIND BAY

LEGEND

- APPROX. PHOTOGRAPHIC VIEWPOINT
- BODY OF WATER
- MINOR SETTLEMENT (NTS)
- TENSION CRACK(s) (NTS)

0 5m 10m 15m 20m 25m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–24	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

CAM-1, JENNY LIND ISLAND, NUNAVUT

EAST LANDING LANDFILL

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, Suite 200
Quebec, (Quebec) CANADA G1P 2J7
Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 500	JANUARY 2014
DRAWN BY:	VERIFIED BY:	APPROVED BY:
P. LÉGARÉ	A. PASSALIS	A. LECLAIR P. Eng.
PROJECT NO:	DRAWING NO:	PAGE
CD3654_210_213	CD3654_210_213-CAM-1J-PL	PL

FIGURE CAM-1.10

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12.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the East Landing Landfill has been completed as per the ToR and is included as Table XXXVII hereafter. The Photographic Record contains only an index of photographs. Full-sized photographs are contained in the Addendum DVD-ROM.

Table XXXVII: Landfill Visual Inspection Photo Log – East Landing Landfill

Photo (ELLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	DSC00125	818	16/08/2013	388160	7618274	Panoramic view looking southeast to southwest from northwest of East Landing Landfill
2	DSC00126	4,142	16/08/2013	388148	7618244	View looking east along north toe of East Landing Landfill
3	DSC00127	4,462	16/08/2013	388148	7618244	View looking south along west toe of East Landing Landfill
4	DSC00128	4,331	16/08/2013	388156	7618233	View looking east along north crest of East Landing Landfill
5	DSC00129	4,289	16/08/2013	388155	7618233	View looking south along west crest of East Landing Landfill
6	DSC00130	4,446	16/08/2013	388152	7618218	View looking east along south crest of East Landing Landfill
7	DSC00131	4,263	16/08/2013	388151	7618219	View looking north along west crest of East Landing Landfill
8	DSC00132	4,332	16/08/2013	388138	7618209	View looking east-southeast along toe of rip rap bordering south side of East Landing Landfill
9	DSC00133	4,398	16/08/2013	388125	7618208	View looking northeast from southwest of East Landing Landfill
10	DSC00134	4,381	16/08/2013	388159	7618201	View looking east along south toe of East Landing Landfill
11	DSC00135	4,328	16/08/2013	388167	7618204	View looking northeast at rip rap erosion protection on south slope of East Landing Landfill
12	DSC00136	4,284	16/08/2013	388207	7618199	View northwest along south toe of East Landing Landfill
13	DSC00137	4,394	16/08/2013	388207	7618199	View north along east toe of East Landing Landfill
14	DSC00138	4,415	16/08/2013	388230	7618205	View looking west-northwest at east end of East Landing Landfill
15	DSC00139	4,221	16/08/2013	388217	7618229	View west-northwest along north toe of East Landing Landfill
16	DSC00140	1,123	16/08/2013	388203	7618221	Panoramic view looking south to northwest from northeast corner of East Landing Landfill
17	DSC00141	4,390	16/08/2013	388177	7618213	View looking east-southeast at partially infilled tension crack on southeast cover of East Landing Landfill (28m L, 10-30mm W) - FEATURE B
18	DSC00142	4,419	16/08/2013	388188	7618211	View of partially infilled tension crack on southeast cover of East Landing Landfill (28m L, 10-30mm W) - FEATURE B
19	DSC00143	4,374	16/08/2013	388190	7618211	View of partially infilled tension crack on southeast cover of East Landing Landfill (28m L, 10-30mm W) - FEATURE B
20	DSC00144	4,419	16/08/2013	388205	7618205	View looking west-northwest at partially infilled tension crack on southeast cover of East Landing Landfill (28m L, 10-30mm W) - FEATURE B
21	DSC00145	4,285	16/08/2013	388153	7618207	View looking east at minor depression on southwest side slope of East Landing Landfill (1.5m L, 0.3-0.6m W, 0.1m D) - FEATURE A
22	DSC00146	4,374	16/08/2013	388157	7618209	View looking south at minor depression on southwest side slope of East Landing Landfill (1.5m L, 0.3-0.6m W, 0.1m D) - FEATURE A
23	DSC00147	4,400	16/08/2013	388166	7618208	View looking east-southeast along south toe of East Landing Landfill

APPENDIX A

Range of the Report and Limitation of Responsibilities

SCOPE OF THE REPORT AND LIMITATION OF LIABILITY

A – Recipient and Use

This report ("Report") was prepared by Biogenie, a division of EnGlobe Corp., ("Biogenie") at the request and for the sole benefit of the Client ("Client"), and is intended to be used exclusively by the Client.

B –Site Conditions

Any description of the target site ("Site"), soil and/or groundwater included in the Report is only provided as an indication to the Client, and unless otherwise specifically mentioned in the Report such description shall not at any time and under any circumstances be used for purposes other than to gain a better understanding of the Site and to fulfil the requirements of the mandate assigned to Biogenie by the Client ("Mandate").

All information, including but not limiting the comprehensiveness of the data, charts, descriptions, drawings, tables, analysis results, compilations, and any conclusion and recommendation included in the Report, shall arise from the direct observation of the Site during a specific period, namely the fulfilment of the Mandate, and from the interpretation of such information and data available during the same period.

The content of the Report shall not apply in any way or to any part of the Site or to any parameter, material or analysis excluded from the Mandate.

Biogenie shall not be held responsible for the presence of any substance or material of a different nature, or of a similar nature but with different concentrations, as those indicated in the Report, and this in any part or parts of the Site excluded from the Mandate.

The content of the Report, including its conclusions and recommendations, shall not apply to any period preceding or following the Mandate. The physiochemical conditions of the Site, and the type and degree of contamination identified on the Site, may vary within a given period depending on a number of factors, especially the current activities taking place on the Site and/or on lands adjacent to the Site.

A review of the Report and/or changes in the parameters, conclusions and/or recommendations may prove to be necessary in the event of a change in the Site conditions or the discovery of pertinent information subsequent to the production of the Report.

C - Legislation, Regulations, Guidelines and Policies

The interpretation of the data and observations concerning the Site, as well as the conclusions and recommendations resulting from these, shall take into account the laws, regulations, standards, policies and/or guidelines applicable to the Project and that are in effect at the time of the fulfilment of the Mandate. In the event no current law, regulation, policy, guideline or standard applies to the project, Biogenie shall take into account proven environmental and professional rules and practices when drawing up the Report.

Any change in the legislation, regulations, standards, policies and/or guidelines applicable to the project may result in the need to review the Report and/or modify its parameters, conclusions and/or recommendations.

D – Use of Report

The Report is intended for the exclusive use of the Client and shall only be used for the purpose it was meant for.

The content of the Report and its conclusions and recommendations only apply to the Site and may not, at any time and under any circumstances, apply to any land adjacent to the Site or to any other land located in the vicinity of the Site.

Any reproduction in any form whatsoever and any distribution or use of the Report, in whole or in part, by a person other that the Client, is strictly forbidden without the prior written consent of Biogenie. Biogenie makes no declaration and pledges no responsibility towards any person other than the Client with regard to the content of the Report and the conclusions and recommendations expressed therein.

Biogenie is in no way responsible for any loss, fine or penalty, or for any expense, damage or other prejudice of any type whatsoever, sustained by a person other than the Client as a result of the unauthorized use of the Report.

No provision of the Report shall be construed as or considered to be a legal opinion of Biogenie’s.

APPENDIX B

Field Notes

AUGUST 14, 2013 · AC
6^{30} - 10^{30} TRAVEL YWG - YEG
21^{00} XTRA BAG, 3.25 FOOD

AUGUST 15, 2013 FA
6^{00} - 9^{30} TRAVEL YEG - Y2F
$42 FOOD

PICK UP MISC. @ CAN TIRE $15
FLY ON SUMMIT CHARTER TO CB
11^{30} - 3^{00} PICK UP BY WOLF
TRUCK RENTAL, GET EQUIPMENT,
FOOD, MEET W/ JOE/SUSIE, CREW
↳ 2/12 + 6 FOR LUNCHES/DINNER
JOE, KAYLEEN, BENJAMIN,
JOHN HENRY

PILOTS - JOSH, JEREMY.
↳ 6^{30} UNPACK, CHECK GEAR, EQUIP.
PREP BOTTLES FOR P.N. 2

AUGUST 16, 2012 5°C, overcast
WIND NW · 10-20,

7^{30} - 9^{00} PACK UP, LOAD PLANE

9^{00} - 10^{00} MOB FROM CB → CAM-1.

VT-1 V-S. WP-02

MW-8 S/up = 0.49.
bott/frozen 1.57 V-dry
TP - 3.5m W of MW-8
0-0.5 DK BROWN SAND + GRAVEL, P.G, DRY
F-med sand., tr. cbls.

Collect 2x1.25mL + 1BAG JARS @ SWA 0-10
SWB 40-50

CABLE ALSO SAYS VT-3.
VT-2, V-NE/SE. WP-03.
↳ MAP SAYS VT2

MW-7. S/up = 0.50. WP-05.
V-S, dry @ 1.49m
TP · 4m S of MW
Some soil., dry. 7WA 0-10
7WB 40-50

VT-4 WP-4 V- NNE

MW-6 WP-06,
Slup = 0.57 dry @ 1.62.
TP 3.2m NE of MW, V-SW.
-dk brown sand, some gravel, tr cbls, dry.
0-10 GWA + BD1 2 Bags 9 JARS
40-50 GWB 1 2 JARS

VT-3 WP-8.
MW-05 WP-9.
Slup = 0.32 Σ - dry @ 1.58.
TP- 3.5m SSW of MW
BRN SAND, WITH GRAVEL (F-CS), DRY.
SWA 0-10.
SWB 40-50

TIER II DF

WP 11 - NE TOP CRNR V-NW
V-SE MW-5, PAN NW-S ACROSS TOP

WP 12 - MID SLOPE V- SW/NW
WP 13 NE TOE V- SW/NW
14 V- SW @ N SIDE
15 NW TOE V- SW/SE
16 MID SLOPE V- SW/SE
17 NW TOP CRNR V- SW/SE
PAN SW-E.
18 M.N. EROS. TOP TO. ~3m Below Crest V-NW
19 BOTT V-SE 0.2W, 3cm
20 BOTT. OF 2ND MIN EROSION V-SE
21 TOP - V- 3cm ↓ V-NW. 10m L, 0.3m
22 depr. below crest 2m L, 0.3mW, 0.1 ↓
V- NE.
23 SW TOP CRNR - V - NE/SE
PAN S-N ACROSS TOP
24 MID SLOPE V- NE/SE
25 SW TOE V- NE/SE
27 - V-SE @ W FACE
28 V- NE @ S FACE
29 V- NW/NE @ SE TOE

SAME

WP 30 - MID SLOPE V- NW/NE
31 TOP SE CRNR V- NW/NE, V-S.
PAN NE/W
32 V-NW @ E FACE
33 PLAQUE - PAN N-SW

NHWLF.
35 V-N @ MW-1, ALSO METAL DEBRIS +Rebar ON ROCK.
36 V-NE/NW @ S TOP CRNR, PAN-E-NW
37 EXP GEOTEXTILE 10x20cm. V-SE
38 -SW CRNR, V- SE/NE PAN- S-N. (WOVEN)
39 EXP GEOTEX WOV + NON WOV-
5-10-15cm L x 5cm W., V-S.
40 V-SW/SE PAN- W-SE @ N CRNR
41 V-SW/SE ALSO MW-3 @ TOE
42 EXP WOVEN GEOTEX, 40x15cm.
V-S.
43. EXP NONWOVEN GEOTEX, 25x10cm
V-SW.
44. E CRNR, PAN N-SW.
45 E TOE, V-NW/SW.
46 - MID-OZ.
47 MIN. DEPRESSION 0.3-0.5 W
1.5m L [illegible]

BANLF LOBES 1+2
48 - V-S
49 - PAN NW-S. FROM NE CRNR
50 V-N ALONG E SIDE
51. V-N @ MIN SETTLEMENT (x2) ON-END 1m x 1m x 10cm ↓, V-E

LOBE 3
52 V- SE/SW-
53 PAN- NW-S.
54 V-ENE /S- @ NW TOP
55 V-SSE @ MIN DEPR. ON TOP CRNR
FEAT B. V-N. 4m L x 1m W x 10cm ↓
→ V-S ALONG SIDE SLOPE.
56 V-NE @ SIDE.
57 V-NE @ TOE (DRY AREA FROM SEASONAL PONDING)
58 V-N/S, ALONG SIDE
59 18m x 3m PONDING, MINOR STAINING SAME (SEASONAL) FEATURE D-
60 V-N @ FORMER PONDED AREA.
61 PAN NNE-SW. FROM SE CRNR
62 PAN NE-NW FROM S END
63 V-N.
64 V-N FROM RD.

LOBES 4+5

64 - V - SE FROM RD

65 V- SE @ MIN START, ON SIDE SLOPE
↳ FEATURE E SAME
V-SW. 5m L, 1-3m W -

66 START OF CRACK V- ESE. @ START

67 CLOSE UP. 2-3mm W.

68 END - WRAPS AROUND ~1m below crest
V-NW.

69 V- NW/S.

70 PAN NE - WSW.

71 V - SW @ NW @ SLOPE, FEAT. C
SAME AS 2012., WASHOUT OF FINES
SEASONAL PONDING ALONG TOE

72 V-ENE

73 PAN E-N. FROM SW CRNR

74 V - NE ALONG W SIDE

NELF. LOBE 2.

75 V- SW ALONG ℄, N, S. sides

76 V- NE/SW ALONG ℄

77 V- NE ALONG ℄, N, S sides.

NELF LOBES 1+3

78 PAN. SW-SE FROM N OF LOBE

79 - V-SW ALONG SIDE

80 V- WNW. (UNEVEN SIDE SLOPE)
10 - 15 ↓ VARIOUS

81 INSIDE CRNR V - NW/N/S/NE/NW
SAME ORDER, DEPRESSION 2 AREAS
TOP/TOE → 0.8m L, 1m W x 10↓
↳ 2 x 2 x 20↓
ALSO EROSION TO NE 3.5m L, 0.15 W x 5 cm↓

82 PAN SW-E. FROM NW CRNR, UNEVEN.
V- SW/~~SE~~ , V-S @ DEPRESSION BELOW
CREST - SAME x 15↓

83 PAN S-NE FROM SW CRNR
V- NE/SE ALONG TOE

84 V- NW/E/NE FROM SE TOE.

WEST LANDFILL

85 PAN N-SW ACROSS TOP.

86 V. NW ALONG TOE - SEASONAL PONDING
MINEROS. OF FINES

87 EROS/DEP. ON SLOPE 2m L, 10cm W, 5↓

88 V- NW/SW ALSO START OF CRACK, 1m u
from toe. 1-2mm W., 1.5m L. N/S di

89 V-NE @ 3 SMALL DEPRESSIONS ↓ SLOPE, FEAT. A

90 V-NW @ 5m DEPR. 50 x 50 x 5↓ NEAR TOE

91 V-E @ LIN. DEPR. BELOW CREST 1m x 0.3w x 10↓

92 // cracks 3-5mm W. , V-NW 2-5m L FEAT H. +closeup

93 V-E @ SEASONAL EROSION (SAME)

94 V-SE ALONG TOE ↗, PARABOLIC CRACKS NEAR TOP OF EROS. ~7m L 2-3~m W (SAME)

V-SW ALONG TOE, PAN W-SE

95 V-S @ MINOR DEPRESSION ON TOP 50 x 10 x 5-7↓

96 V-SSW ALONG TOE

97 V-SW @ RUTS IN TUNDRA

98 V-E @ 5m. DEPRESSION ON SLOPE 40 x 30 x 5↓

99 UNEVEN SURFACE ON CRNR, V-W PAN SE-N ACROSS TOP SAME

V-SE/NE ALONG TOE - WEST CRNR

100 V-E @ STAKING 2.5 x 0.3.

101 V-SW @ " 2 x 0.4.

102 Start of crack @ toe, cuts corner ~ Upto Landward Crest V-E

103 - 2-3 cracks // upto. 1cm W. 4-6m L

104 END V-WNW, PAN

105 PAN NE-WNW.

106 V-N @ S SIDE

107 V-SE @ STAKING 2 Spots N-S ORIENT 2m x 20 W.

MAIN LANDFILL

108 V-ENE / SW FROM RD

109 V-SE @ MIN SETT. ON SLOPE SAME 1 x 2 x 10↓

V-SW @ EROS FROM PONDING ON TOE

110 V-NE / EROS. @ CRNR. 4m x 30 x 10-15↓

V-S ALONG TOE x 2 MIN EROS.

111 V-N / ENE, PAN SE-N

112 V-N @ EROS ON INSIDE CRNR

113 V-S/W / NE @ EROS ON SLOPE 3m x 15 x 5↓

114 PAN. E-NW FROM SW CRNR

115 V-W/NE

116 V-SW/SE INSIDE TOE.

117 V-NW @ END.

118 V-W @ MIN SETT. 3m x 25 x 5↓

V-NE ALONG SIDE.

119 PAN NW-S FROM E CRNR
PAN E-N (EAST LF)
120 V NWISE ALONG E SIDE (121)
122 V V.SE @ NW @ EROS. (PARALLEL NE TOE)
124 V-NE @ EROSION ON SLOPE
4m L x 20 W x 5↓
125 MN. DEP V- NW. 40x15x 5↓
126 " " 50x40x 10↓ V-W.
127 V-SE @ STAINING (SAME)
128 V-SW @ DEPR. 75x25x5↓

EAST LANDFILL

129 V-NE/SE.
130 MIN EROS. @ TOE 3x1x0.03↓
V-NNE
131 V-NE/S / PAN S-NE
132 V-SW/SE 4.0-
133 V-SE/NW @ LIN DEPR. 25x10cmx5↓
134 V-SE/NW @ TOE.
135 MIN DEPR 40x40x10↓
136 V- NW/S
137 V-SW
138 PAN NE-SW

139 PAN NE-W, V-NE/W. ALONG TOE
140 V-N ALONG TO TOE
141 V-S/NW " "
142 MIN DEPR. V-SW. 1x0.5x5↓
143 LIN DEPR. ON SLOPE 4m L x 0.4m W x 10↓
144 V-NE 2 MIN DEPR. 40x30x5.

SELF - LOBE 1

145 PAN SW-E ACROSS TOP
V-SW/E ALONG TOE.
146 VEHICLE RUTS (SAME) V-SW/NE
V-NE/S DOWN TOE
147 PAN W/N FROM S END
V-N/NE ALONG TOE
148-149 MIN EROS 0.02↓ SAME.
V-SSE/NNW.
150 PAN N-SW. / V-SW ALONG TOE
151 V-SW ALONG @. SAME
152 V-SW @ SMALL DEPR. 0.5x0.15x.03

LOBE 2

154 PAN SW/SE, SSW/SE ALONG TOE
155 V-NW/S @ DEPR ON SLOPE
40x15x5↓

156 V-NW/S. ALONG TOE
157 V-N/ESE "
158 PAN NE-SW. FROM S END

USAF LANDFILL

159 PAN SE-NE @ LOBE 1+2
160 V-NNE/SW
161 V-NNE/SW
162 V-NW/WNW
~~163~~ CRNR MARKER N92x750 (6)
163 V-SW/NW, PAN N-SW
~~164~~ CRNR MARKER (9)
164 V-SSE/NW
165 PAN SW-E
166 PAN ~~WNE~~ NW-NE
V- ENE
167 V- SW/N
169 V. S/W.
170 PAN W-S
171 V- E/S.

EAST LANDING LANDFILL

172 PAN S-SW.
173 V-E/S @ TOE
174 NW CRNR V- E/S
175 SW CRNR V-E/N
176 - V-SE ALONG TOE
177 V - ENE @ CRNR @ RIDGE
178 - V-E ALONG TOE
179 V-NE @ BLDRS
180 V - WNW/N @ SE TOE
181 V-W @ E END - see track
→ V-W ALONG N TOE
182 PAN NW-SE.
183 V-E @ start of tension crack, p. infilled
184 1-3 cm wide (x2)
186 E END - V-W
187 depression near toe, V-E/S.
188 V-E ALONG UPPER TOE.

DEPART @ 5:30 - 6:15 TO CB
BACK @ HOTEL @ 6:45 pm.

APPENDIX C

Quality insurance/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 Biogenie 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 Maxxam for intra-laboratory analysis, with additional duplicate samples were sent to Exova for inter-laboratory comparison purposes. Both laboratories are situated in Edmonton, Alberta.

The relative percent difference (RPD) is used to evaluate the sample result variability. Average RPD values of less than 40% 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).

SOIL SAMPLES

In case of soil samples, one blind duplicate sample was submitted for intra- and inter-laboratory comparisons. Review of results indicated relatively minor differences in concentrations within the Maxxam and Exova metals and PHC results when duplicates were compared, and considered to be within acceptable limits. It should be noted that many of individual parameter concentrations were less than five times the MDL. One RPD value (47.6%) for nickel was noted to be outside the acceptable range when inter-laboratory duplicates were compared, however both reported results were less than five times the MDL. The soil chemical analysis results and the evaluation of analytical data for the 2013 QA/QC samples are presented in Table XXXVII below.

All of PCB concentrations were below the MDL in the intra- and inter laboratory samples.

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

GROUNDWATER SAMPLES

All monitoring wells at the Tier II Disposal Facility were reported as dry during the 2013 monitoring event and consequently no intra- or inter-laboratory samples were submitted for comparisons.

Table C-1: Relative Percent Difference - Duplicate Soil Sample

Sample Name	Sample Location	Depth Below Grade (cm)	Parameters													
			As [mg/kg]	Cd [mg/kg]	Cr [mg/kg]	Co [mg/kg]	Cu [mg/kg]	Pb [mg/kg]	Hg [mg/kg]	Ni [mg/kg]	Zn [mg/kg]	PCBs [mg/kg]	PHC (F1) [mg/kg]	PHC (F2) [mg/kg]	PHC (F3) [mg/kg]	TPH [mg/kg]
C113-6WA (Maxxam)	**Tier II MW-06**	0-10	1.8	<0.10	2.8	<1.0	<5.0	5	<0.050	1.6	<10	<0.01	<12	<10	<10	<10
C113-BD1 (Maxxam)	**Tier II MW-06**	0-10	2.3	<0.10	3.4	1	<5.0	4.7	<0.050	2.1	<10	<0.01	<12	<10	<10	<10
C113-6WA (Exova)	**Tier II MW-02**	0-10	1.6	0.04	3.3	1.4	2,7	<4.9	0.01	0.6	8	<0.1	<10	<50	<50	<50
Method Detection Limit (Maxxam)			1	0.1	1	1	5	1	0.05	1	10	0,01	12	10	10	10
Method Detection Limit (Exova)			0.2	0.01	0.5	0.1	1	5	0.01	0.5	1	0.1	10	50	50	50
Intra-Lab (% RPD)	**Tier II MW-02**	0-10	24.4	n/a	19.4	n/a	n/a	6.2	n/a	27	n/a	n/a	n/a	n/a	n/a	n/a
Inter-Lab (% RPD)		0-10	11.8	n/a	16.4	n/a	n/a	n/a	n/a	47.6	n/a	n/a	n/a	n/a	n/a	n/a

The symbol n/a indicates RPD can not be calculated.

APPENDIX D

Maxxam and Exova QA/QC Reports and Certificates of Analysis

Your Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Your C.O.C. #: A150034

Attention: ANTOINE VALLIERES
BIOGENIE INC.
4495, boul. Wilfrid-Hamel
bureau 200
QUEBEC, PQ
CANADA G1P 2J7

Report Date: 2013/08/26

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B373365
Received: 2013/08/19, 9:40

Sample Matrix: Soil
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS (MeOH extract)	9	2013/08/21	2013/08/23	AB SOP-00039	CCME, EPA 8260
CCME Hydrocarbons (F2-F4 in soil)	9	2013/08/21	2013/08/23	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Elements by ICPMS - Soils	3	2013/08/22	2013/08/22	AB SOP-00043	EPA 200.8
Elements by ICPMS - Soils	6	2013/08/22	2013/08/23	AB SOP-00043	EPA 200.8
Moisture	9	N/A	2013/08/22	AB SOP-00002	CCME PHC-CWS
Polychlorinated Biphenyls (1)	5	2013/08/23	2013/08/23	CAL SOP-00149	EPA 3550C, EPA 8082A
Polychlorinated Biphenyls (1)	4	2013/08/23	2013/08/24	CAL SOP-00149	EPA 3550C, EPA 8082A

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

James Ehizojie, B.Sc. Hon, EPt., Senior Project Manager
Email: JEhizojie@maxxam.ca
Phone# (780) 577-7139

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B373365
Report Date: 2013/08/26

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Sampler Initials: AP

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		HG2991	HG3191	HG3192	HG3193	HG3194	HG3195		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034	A150034	A150034		
	UNITS	**C113 - 5WA**	**C113 - 5WB**	**C113 - 6WA**	**C113 - 6WB**	**C113 - 7WA**	**C113 - 7WB**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	4.6	1.6	6.2	3.9	4.5	2.6	0.30	7105705

RDL = Reportable Detection Limit

Maxxam ID		HG3196	HG3197	HG3198	HG3198		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034		
	UNITS	**C113 - 8WA**	**C113 - 8WB**	**C113 - BD1**	**C113 - BD1 Lab-Dup**	**RDL**	**QC Batch**
Physical Properties							
Moisture	%	8.0	3.7	6.1	5.8	0.30	7105705

RDL = Reportable Detection Limit

Maxxam Job #: B373365
Report Date: 2013/08/26

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Sampler Initials: AP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HG2991	HG3191	HG3192	HG3193	HG3194	HG3195		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034	A150034	A150034		
	UNITS	**C113 - 5WA**	**C113 - 5WB**	**C113 - 6WA**	**C113 - 6WB**	**C113 - 7WA**	**C113 - 7WB**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	<10	10	7102711
F3 (C16-C34 Hydrocarbons)	mg/kg	51	<50	<50	<50	<50	<50	50	7102711
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	<50	50	7102711
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	Yes		7102711
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	104	101	103	105	105	117		7102711

RDL = Reportable Detection Limit

Maxxam ID		HG3196	HG3197	HG3198		
Sampling Date		2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034		
	UNITS	**C113 - 8WA**	**C113 - 8WB**	**C113 - BD1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	10	7102711
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	50	7102711
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	50	7102711
Reached Baseline at C50	mg/kg	Yes	Yes	Yes		7102711
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	108	103	111		7102711

RDL = Reportable Detection Limit

Maxxam Job #: B373365
Report Date: 2013/08/26

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HG2991	HG3191	HG3192	HG3193	HG3194		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034	A150034		
	UNITS	**C113 - 5WA**	**C113 - 5WB**	**C113 - 6WA**	**C113 - 6WB**	**C113 - 7WA**	**RDL**	**QC Batch**
Polychlorinated Biphenyls								
Aroclor 1016	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1221	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1232	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1242	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1248	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1254	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1260	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1262	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1268	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Total Aroclors	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Surrogate Recovery (%)								
NONACHLOROBIPHENYL (sur.)	%	84	86	87	85	78		7108064

RDL = Reportable Detection Limit

Maxxam ID		HG3195	HG3196	HG3197	HG3198		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034		
	UNITS	**C113 - 7WB**	**C113 - 8WA**	**C113 - 8WB**	**C113 - BD1**	**RDL**	**QC Batch**
Polychlorinated Biphenyls							
Aroclor 1016	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1221	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1232	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1242	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1248	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1254	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1260	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1262	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Aroclor 1268	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Total Aroclors	mg/kg	<0.010	<0.010	<0.010	<0.010	0.010	7108064
Surrogate Recovery (%)							
NONACHLOROBIPHENYL (sur.)	%	91	92	85	90		7108064

RDL = Reportable Detection Limit

Maxxam Job #: B373365
Report Date: 2013/08/26

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HG2991	HG3191	HG3192	HG3193	HG3194	HG3195		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034	A150034	A150034		
	UNITS	**C113 - 5WA**	**C113 - 5WB**	**C113 - 6WA**	**C113 - 6WB**	**C113 - 7WA**	**C113 - 7WB**	**RDL**	**QC Batch**
Elements									
Total Arsenic (As)	mg/kg	2.5	1.5	1.8	7.4	3.0	1.8	1.0	7106906
Total Cadmium (Cd)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	7106906
Total Chromium (Cr)	mg/kg	2.5	3.2	2.8	5.4	6.5	4.0	1.0	7106906
Total Cobalt (Co)	mg/kg	<1.0	1.1	<1.0	1.7	2.3	1.4	1.0	7106906
Total Copper (Cu)	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	7106906
Total Lead (Pb)	mg/kg	11	3.8	5.0	4.8	5.8	3.4	1.0	7106906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	7106906
Total Nickel (Ni)	mg/kg	1.7	2.0	1.6	3.4	3.8	2.3	1.0	7106906
Total Zinc (Zn)	mg/kg	14	<10	<10	<10	<10	<10	10	7106906

RDL = Reportable Detection Limit

Maxxam ID		HG3196	HG3197	HG3198		
Sampling Date		2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034		
	UNITS	**C113 - 8WA**	**C113 - 8WB**	**C113 - BD1**	**RDL**	**QC Batch**
Elements						
Total Arsenic (As)	mg/kg	1.9	2.0	2.3	1.0	7106906
Total Cadmium (Cd)	mg/kg	<0.10	<0.10	<0.10	0.10	7106906
Total Chromium (Cr)	mg/kg	3.1	4.9	3.4	1.0	7106906
Total Cobalt (Co)	mg/kg	1.2	1.6	1.0	1.0	7106906
Total Copper (Cu)	mg/kg	<5.0	<5.0	<5.0	5.0	7106906
Total Lead (Pb)	mg/kg	3.9	3.8	4.7	1.0	7106906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	0.050	7106906
Total Nickel (Ni)	mg/kg	2.2	2.8	2.1	1.0	7106906
Total Zinc (Zn)	mg/kg	<10	<10	<10	10	7106906

RDL = Reportable Detection Limit

Maxxam Job #: B373365
Report Date: 2013/08/26

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: CAM-1 JENNY LIND ISLAND
Sampler Initials: AP

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HG2991	HG3191	HG3192	HG3193	HG3194		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034	A150034		
	UNITS	**C113 - 5WA**	**C113 - 5WB**	**C113 - 6WA**	**C113 - 6WB**	**C113 - 7WA**	**RDL**	**QC Batch**
Volatiles								
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	7100533
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	103	102	102	102	101		7100533
4-BROMOFLUOROBENZENE (sur.)	%	93	94	92	94	92		7100533
D10-ETHYLBENZENE (sur.)	%	100	96	92	96	94		7100533
D4-1,2-DICHLOROETHANE (sur.)	%	97	100	103	98	96		7100533

RDL = Reportable Detection Limit

Maxxam ID		HG3195	HG3196	HG3197	HG3198		
Sampling Date		2013/08/16	2013/08/16	2013/08/16	2013/08/16		
COC Number		A150034	A150034	A150034	A150034		
	UNITS	**C113 - 7WB**	**C113 - 8WA**	**C113 - 8WB**	**C113 - BD1**	**RDL**	**QC Batch**
Volatiles							
(C6-C10)	mg/kg	<12	<12	<12	<12	12	7100533
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	102	104	102	103		7100533
4-BROMOFLUOROBENZENE (sur.)	%	93	95	93	95		7100533
D10-ETHYLBENZENE (sur.)	%	93	103	91	99		7100533
D4-1,2-DICHLOROETHANE (sur.)	%	105	93	110	99		7100533

RDL = Reportable Detection Limit

General Comments

Sample	HG2991-01: Sample was extracted from a jar with headspace for BTEX/F1.
Sample	HG3191-01: Sample was extracted from a jar with headspace for BTEX/F1.
Sample	HG3194-01: Sample was extracted from a jar with headspace for BTEX/F1.
Sample	HG3196-01: Sample was extracted from a jar with headspace for BTEX/F1.
Sample	HG3197-01: Sample was extracted from a jar with headspace for BTEX/F1.

Results relate only to the items tested.

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: CAM-1 JENNY LIND ISLAND

Quality Assurance Report

Maxxam Job Number: EYKB373365

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7100533	KE4	Matrix Spike	1,4-Difluorobenzene (sur.)	2013/08/22		116	%	60 - 140
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		93	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2013/08/22		103	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		95	%	60 - 140
			(C6-C10)	2013/08/22		129	%	60 - 140
		Spiked Blank	1,4-Difluorobenzene (sur.)	2013/08/23		98	%	60 - 140
			4-BROMOFLUOROBENZENE (sur.)	2013/08/23		93	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2013/08/23		95	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/23		101	%	60 - 140
			(C6-C10)	2013/08/23		98	%	60 - 140
		Method Blank	1,4-Difluorobenzene (sur.)	2013/08/22		100	%	60 - 140
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		93	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2013/08/22		99	%	60 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		99	%	60 - 140
			(C6-C10)	2013/08/22	<12		mg/kg	
		RPD	(C6-C10)	2013/08/22	NC		%	50
7102711	KN0	Matrix Spike	O-TERPHENYL (sur.)	2013/08/23		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/23		106	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/23		109	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/23		107	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2013/08/23		99	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/23		120	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/23		124	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/23		119	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2013/08/23		104	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/23	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2013/08/23	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2013/08/23	<50		mg/kg	
		RPD	F2 (C10-C16 Hydrocarbons)	2013/08/23	NC (1)		%	50
			F3 (C16-C34 Hydrocarbons)	2013/08/23	NC (1)		%	50
			F4 (C34-C50 Hydrocarbons)	2013/08/23	NC (1)		%	50
7105705	ABH	Method Blank	Moisture	2013/08/22	<0.30		%	
		RPD [HG3198-01]	Moisture	2013/08/22	5.0		%	20
7106906	SF3	Matrix Spike	Total Arsenic (As)	2013/08/23		92	%	75 - 125
			Total Cadmium (Cd)	2013/08/23		90	%	75 - 125
			Total Chromium (Cr)	2013/08/23		92	%	75 - 125
			Total Cobalt (Co)	2013/08/23		88	%	75 - 125
			Total Copper (Cu)	2013/08/23		88	%	75 - 125
			Total Lead (Pb)	2013/08/23		90	%	75 - 125
			Total Mercury (Hg)	2013/08/23		92	%	75 - 125
			Total Nickel (Ni)	2013/08/23		88	%	75 - 125
			Total Zinc (Zn)	2013/08/23		84	%	75 - 125
		QC Standard	Total Arsenic (As)	2013/08/23		124	%	50 - 150
			Total Chromium (Cr)	2013/08/23		103	%	41 - 159
			Total Cobalt (Co)	2013/08/23		104	%	75 - 125
			Total Copper (Cu)	2013/08/23		102	%	73 - 127
			Total Lead (Pb)	2013/08/23		104	%	54 - 146
			Total Nickel (Ni)	2013/08/23		110	%	61 - 139
			Total Zinc (Zn)	2013/08/23		106	%	72 - 128
		Spiked Blank	Total Arsenic (As)	2013/08/23		95	%	75 - 125
			Total Cadmium (Cd)	2013/08/23		92	%	75 - 125
			Total Chromium (Cr)	2013/08/23		91	%	75 - 125
			Total Cobalt (Co)	2013/08/23		92	%	75 - 125
			Total Copper (Cu)	2013/08/23		94	%	75 - 125
			Total Lead (Pb)	2013/08/23		96	%	75 - 125

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: CAM-1 JENNY LIND ISLAND

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB373365

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7106906 SF3	Spiked Blank	Total Mercury (Hg)	2013/08/23		93	%	75 - 125
		Total Nickel (Ni)	2013/08/23		93	%	75 - 125
		Total Zinc (Zn)	2013/08/23		92	%	75 - 125
	Method Blank	Total Arsenic (As)	2013/08/22	<1.0		mg/kg	
		Total Cadmium (Cd)	2013/08/22	<0.10		mg/kg	
		Total Chromium (Cr)	2013/08/22	<1.0		mg/kg	
		Total Cobalt (Co)	2013/08/22	<1.0		mg/kg	
		Total Copper (Cu)	2013/08/22	<5.0		mg/kg	
		Total Lead (Pb)	2013/08/22	<1.0		mg/kg	
		Total Mercury (Hg)	2013/08/22	<0.050		mg/kg	
		Total Nickel (Ni)	2013/08/22	<1.0		mg/kg	
		Total Zinc (Zn)	2013/08/22	<10		mg/kg	
	RPD	Total Arsenic (As)	2013/08/23	NC		%	35
		Total Cadmium (Cd)	2013/08/23	NC		%	35
		Total Chromium (Cr)	2013/08/23	10.1		%	35
		Total Cobalt (Co)	2013/08/23	NC		%	35
		Total Copper (Cu)	2013/08/23	NC		%	35
		Total Lead (Pb)	2013/08/23	NC		%	35
		Total Mercury (Hg)	2013/08/23	NC		%	35
		Total Nickel (Ni)	2013/08/23	NC		%	35
		Total Zinc (Zn)	2013/08/23	NC		%	35
7108064 SJ1	Matrix Spike	NONACHLOROBIPHENYL (sur.)	2013/08/23		82	%	30 - 130
		Aroclor 1260	2013/08/23		85	%	30 - 130
	Spiked Blank	NONACHLOROBIPHENYL (sur.)	2013/08/23		74	%	30 - 130
		Aroclor 1260	2013/08/23		83	%	30 - 130
	Method Blank	NONACHLOROBIPHENYL (sur.)	2013/08/23		68	%	30 - 130
		Aroclor 1016	2013/08/23	<0.010		mg/kg	
		Aroclor 1221	2013/08/23	<0.010		mg/kg	
		Aroclor 1232	2013/08/23	<0.010		mg/kg	
		Aroclor 1242	2013/08/23	<0.010		mg/kg	
		Aroclor 1248	2013/08/23	<0.010		mg/kg	
		Aroclor 1254	2013/08/23	<0.010		mg/kg	
		Aroclor 1260	2013/08/23	<0.010		mg/kg	
		Aroclor 1262	2013/08/23	<0.010		mg/kg	
		Aroclor 1268	2013/08/23	<0.010		mg/kg	
		Total Aroclors	2013/08/23	<0.010		mg/kg	
	RPD	Aroclor 1016	2013/08/23	NC		%	50
		Aroclor 1221	2013/08/23	NC		%	50
		Aroclor 1232	2013/08/23	NC		%	50
		Aroclor 1242	2013/08/23	NC		%	50
		Aroclor 1248	2013/08/23	NC		%	50
		Aroclor 1254	2013/08/23	NC		%	50
		Aroclor 1260	2013/08/23	NC		%	50
		Aroclor 1262	2013/08/23	NC		%	50
		Aroclor 1268	2013/08/23	NC		%	50
		Total Aroclors	2013/08/23	NC		%	50

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: CAM-1 JENNY LIND ISLAND

Quality Assurance Report (Continued)

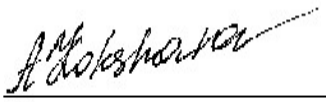
Maxxam Job Number: EYKB373365

reliable calculation.
(1) Detection limits raised due to high moisture content.

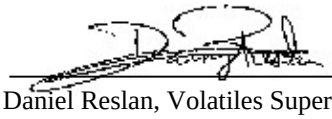
Validation Signature Page

Maxxam Job #: B373365

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anna Koksharova, Senior Analyst



Daniel Reslan, Volatiles Supervisor

Dina Tleugabulova, Ph.D., Scientific Specialist, Inorganics Department

Luba Shymushovska, Senior Analyst, Organic Department

Neel Sivaloganathan, Emergency Spill Response Manager

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
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www.maxxamanalytics.com

08/5890(4)

Chain of Custody

A150034

Page: 1 of 1

Invoice To:	C/O Report Address ☐
Company:	BIOGENIE / SILA REMEDIATION
Contact:	ANTOINE VALLIERES
Address:	4495 BLVD WILFRID HAMEL
	Prov: QC PC: G1P2J7
Contact #s:	Ph: 418-653-4422 EXT 5485 Cell:

Report To:	Same as Invoice ☒
	Prov: PC:
	Ph: Cell:

Report Distribution (E-Mail):
avallieres@biogenie-env.com
apassalis@mts.net

REGULATORY GUIDELINES:
- ☐ AT1
- ☒ CCME
- ☐ Regulated Drinking Water
- ☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #:	
Project # / Name:	2013 KITIKMEOT LFM
Site Location:	CAM-1 JENNY LIND ISLAND
Quote #:	B30371
Sampled By:	A PASSALIS

SERVICE REQUESTED:
- ☐ RUSH (Contact lab to reserve) Date Required:
- ☒ REGULAR (5 to 7 Days)

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: ~~BTEX F1-F4~~ F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	PCB's	Metals (As, Cd, Cr, Co, Cu, Pb, Ni, Zn, Hg)	WATER: ☐BTEX F1 ☐VOCs	☐BTEX F1-F2 ☐BTEX F1-F4	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	Mercury ☐ Total ☐ Dissolved	Other Analysis										HOLD - Do not Analyze	# of Containers Submitted
1	C113-5WA		SOIL	13/08/16	X						X	X																		3
2	C113-5WB				X						X	X																		3
3	C113-6WA				X						X	X																		3
4	C113-6WB				X						X	X																		3
5	C113-7WA				X						X	X																		3
6	C113-7WB				X						X	X																		3
7	C113-8WA				X						X	X																		3
8	C113-8WB				X						X	X																		3
9	C113-BD1				X						X	X																		3
10																														
11																														
12																														

RECEIVED IN YELLOWKNIFE
By: [signature]
2013 -08- 19 09:40
Temp: 6/5 8/7 7/4 ~~cme~~ ~~mme~~

Please indicate Filtered, Preserved or Both (F, P, F/P) → F/P

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
[signature] A.PASSALIS	13/08/19	
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

Page 12 of 12

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B373365		
Jenna Watt [signature]	20130820	1210	Custody Seal	Temperature	Ice
Lab Comments:			intact	5,4,4	present all
			intact	5,4,5	
			not intact	3,3,5	
			intact	4,4,4	

AB FCD-00331 Rev3 2010/05

Maxxam Analytics International Corporation o/a Maxxam Analytics

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Report Transmission Cover Page

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Contact & Affiliation	Address	Delivery Commitments
Antoine Vallieres Biogenie S.R.D.C. Inc.	4495 Wilfrid Hamel Suite 200 Quebec, Quebec G1P 2J7 Phone: (418) 653-4422 Fax: (418) 653-3583 Email: avallieres@biogenie-env.com	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (COC, Invoice) by Email - Single Report

Notes To Clients:

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Sample Custody

Bill To:	Biogenie S.R.D.C. Inc.	Project:	
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young
	G1P 2J7	LSD:	
Attn:	Antoine Vallieres	P.O.:	
Sampled By:	A. Passalis	Acct code:	
Company:	Biogenie		

Lot ID:	**953697**
Control Number:	B13191
Date Received:	Aug 21, 2013
Date Reported:	Aug 29, 2013
Report Number:	1850232

Sample Disposal Date: September 28, 2013

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the top of this page.

☐ Extend Sample Storage Until _____ (MM/DD/YY)

The following charges apply to extended sample storage:

Storage for an additional 30 days	$ 2.50 per sample
Storage for an additional 60 days	$ 5.00 per sample
Storage for an additional 90 days	$ 7.50 per sample

☐ Return Sample, collect, to the address below via:

- ☐ Greyhound
- ☐ DHL
- ☐ Purolator
- ☐ Other (specify) _____

Name _____
Company _____
Address _____
_____
Phone _____
Fax _____

Signature _____

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Analytical Report

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Reference Number	953697-1	953697-2
Sample Date	Aug 16, 2013	Aug 17, 2013
Sample Time	NA	NA
Sample Location		
Sample Description	Cam-1 / C113-6WA	Pin-2 / P213-1WA
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Hot Water Soluble						
Boron	Hot Water Soluble	mg/kg	1.42	7.08		0.2
Metals Strong Acid Digestion						
Mercury	Strong Acid Extractable	mg/kg	0.01	0.06		0.01
Antimony	Strong Acid Extractable	mg/kg	<0.2	<0.2		0.2
Arsenic	Strong Acid Extractable	mg/kg	1.6	2.6		0.2
Barium	Strong Acid Extractable	mg/kg	23	1350		1
Beryllium	Strong Acid Extractable	mg/kg	0.1	0.1		0.1
Cadmium	Strong Acid Extractable	mg/kg	0.04	0.26		0.01
Chromium	Strong Acid Extractable	mg/kg	3.3	7.2		0.5
Cobalt	Strong Acid Extractable	mg/kg	1.4	2.4		0.1
Copper	Strong Acid Extractable	mg/kg	2.7	8.1		1
Lead	Strong Acid Extractable	mg/kg	<4.9	<5.0		5
Molybdenum	Strong Acid Extractable	mg/kg	<1	<1		1
Nickel	Strong Acid Extractable	mg/kg	2.6	5.9		0.5
Selenium	Strong Acid Extractable	mg/kg	<0.3	0.3		0.3
Silver	Strong Acid Extractable	mg/kg	0.6	1.7		0.1
Thallium	Strong Acid Extractable	mg/kg	<0.05	<0.05		0.05
Tin	Strong Acid Extractable	mg/kg	4.1	3.6		1
Uranium	Strong Acid Extractable	mg/kg	0.5	1.8		0.5
Vanadium	Strong Acid Extractable	mg/kg	8.1	10.5		0.1
Zinc	Strong Acid Extractable	mg/kg	8	26		1
Physical and Aggregate Properties						
Moisture	Wet Weight @ 105°C	%	4.6	38.9		0.1
Mono-Aromatic Hydrocarbons - Soil						
Extraction Date			21-AUG-13	21-AUG-13		
Benzene	Dry Weight	mg/kg	<0.004	<0.004		0.004
Toluene	Dry Weight	mg/kg	<0.005	<0.005		0.005
Ethylbenzene	Dry Weight	mg/kg	<0.01	<0.01		0.01
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.02	<0.02		0.02
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10		10
F1 -BTEX	Dry Weight	mg/kg	<10	<10		10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date			21-Aug-13	21-Aug-13		
Silica Gel Cleanup			Done	Done		
F2c C10-C16	Dry Weight	mg/kg	<50	<50		50

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Analytical Report

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Reference Number	953697-1	953697-2
Sample Date	Aug 16, 2013	Aug 17, 2013
Sample Time	NA	NA
Sample Location		
Sample Description	Cam-1 / C113-6WA	Pin-2 / P213-1WA
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil - Continued						
F3c C16-C34	Dry Weight	mg/kg	<50	74		50
F4c C34-C50	Dry Weight	mg/kg	<100	<100		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100		100
% C50+		%	<5	<5		
Polychlorinated Biphenyls - Soil						
Aroclor 1016	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1221	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1232	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1242	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1248	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1254	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1260	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1262	Dry Weight	mg/kg	<0.1	<0.1		0.1
Aroclor 1268	Dry Weight	mg/kg	<0.1	<0.1		0.1
Total PCBs	Dry Weight	mg/kg	<0.1	<0.1		0.1
Polychlorinated Biphenyls - Soil - Surrogate						
Decachlorobiphenyl	Surrogate	%	150	150		50-150

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Analytical Report

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Reference Number	953697-3
Sample Date	Aug 17, 2013
Sample Time	NA
Sample Location	
Sample Description	Pin-2 / P213-2W
Matrix	Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Total						
Aluminum	Total	mg/L	0.48			0.02
Calcium	Total	mg/L	66.7			0.2
Iron	Total	mg/L	0.45			0.05
Magnesium	Total	mg/L	27.3			0.1
Manganese	Total	mg/L	0.014			0.005
Potassium	Total	mg/L	2.6			0.4
Silicon	Total	mg/L	2.10			0.05
Sodium	Total	mg/L	19.8			0.4
Sulfur	Total	mg/L	36.7			0.3
Mercury	Total	mg/L	<0.0001			0.0001
Antimony	Total	mg/L	<0.0002			0.0002
Arsenic	Total	mg/L	0.0009			0.0002
Barium	Total	mg/L	0.017			0.001
Beryllium	Total	mg/L	<0.0001			0.0001
Bismuth	Total	mg/L	<0.0005			0.0005
Boron	Total	mg/L	0.047			0.002
Cadmium	Total	mg/L	0.00006			0.00001
Chromium	Total	mg/L	0.0140			0.0005
Cobalt	Total	mg/L	0.0003			0.0001
Copper	Total	mg/L	0.003			0.001
Lead	Total	mg/L	0.0004			0.0001
Lithium	Total	mg/L	0.003			0.001
Molybdenum	Total	mg/L	0.016			0.001
Nickel	Total	mg/L	0.0079			0.0005
Selenium	Total	mg/L	0.0008			0.0002
Silver	Total	mg/L	<0.00001			0.00001
Strontium	Total	mg/L	0.110			0.001
Thallium	Total	mg/L	0.00006			0.00005
Tin	Total	mg/L	<0.001			0.001
Titanium	Total	mg/L	0.0128			0.0005
Uranium	Total	mg/L	0.0079			0.0005
Vanadium	Total	mg/L	0.0008			0.0001
Zinc	Total	mg/L	0.015			0.001
Zirconium	Total	mg/L	<0.001			0.001
Mono-Aromatic Hydrocarbons - Water						
Benzene		mg/L	<0.001			0.001

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Analytical Report

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Reference Number	953697-3
Sample Date	Aug 17, 2013
Sample Time	NA
Sample Location	
Sample Description	Pin-2 / P213-2W
Matrix	Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Water - Continued					
Toluene	mg/L	<0.001			0.001
Ethylbenzene	mg/L	<0.001			0.001
Total Xylenes (m,p,o)	mg/L	<0.002			0.002
Volatile Petroleum Hydrocarbons - Water					
F1 C6-C10	mg/L	<0.2			0.2
F1 -BTEX	mg/L	<0.2			0.2
Extractable Petroleum Hydrocarbons - Water					
F2 C10-C16	mg/L	<0.1			0.1
F3 C16-C34	mg/L	<0.1			0.1
F3+ C34+	mg/L	<0.1			0.1
Polychlorinated Biphenyls - Water					
Aroclor 1016	ug/L	<0.1			0.1
Aroclor 1221	ug/L	<0.1			0.1
Aroclor 1232	ug/L	<0.1			0.1
Aroclor 1242	ug/L	<0.1			0.1
Aroclor 1248	ug/L	<0.1			0.1
Aroclor 1254	ug/L	<0.1			0.1
Aroclor 1260	ug/L	<0.1			0.1
Aroclor 1262	ug/L	<0.1			0.1
Aroclor 1268	ug/L	<0.1			0.1
Total PCBs	ug/L	<0.1			0.1
Polychlorinated Biphenyls - Water - Surrogate					
Decachlorobiphenyl Surrogate	%	91			50-150

Approved by:

Randy Neumann, BSc
General Manager

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Quality Control

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Hot Water Soluble

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	0.012	-0.01	0.02	yes
Date Acquired:	August 22, 2013				
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**	**Passed QC**
Boron	mg/kg	1.59	1.07	2.05	yes
Date Acquired:	August 22, 2013				
Boron	mg/kg	0.10	0.09	0.11	yes
Date Acquired:	August 22, 2013				

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Mercury	ug/L	0	-0.07	0.13	yes
Antimony	ug/L	0.055	-0.1	0.2	yes
Arsenic	ug/L	0.021	-0.2	0.2	yes
Barium	ug/L	0.081	-1	1	yes
Beryllium	ug/L	-0.002	-0.1	0.1	yes
Cadmium	ug/L	-0.01	-0.01	0.01	yes
Chromium	ug/L	0.072	-0.5	0.5	yes
Cobalt	ug/L	0.055	-0.1	0.1	yes
Copper	ug/L	0.114	-0.6	1.2	yes
Lead	ug/L	0.007	-5.0	5.0	yes
Molybdenum	ug/L	0.051	-1.0	1.0	yes
Nickel	ug/L	0.214	-0.4	0.7	yes
Selenium	ug/L	-0.034	-0.3	0.3	yes
Silver	ug/L	0.029	-0.09	0.14	yes
Thallium	ug/L	-0.038	-0.04	0.04	yes
Tin	ug/L	4.548	0.0	7.2	yes
Uranium	ug/L	0.008	-0.5	0.5	yes
Vanadium	ug/L	0.038	-0.1	0.1	yes
Zinc	ug/L	0.013	-1	1	yes
Date Acquired:	August 22, 2013				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	mg/kg	0.05	0.04	10	0.03	yes
Antimony	mg/kg	<0.2	<0.2	20	0.4	yes
Arsenic	mg/kg	8.8	8.5	20	0.4	yes
Barium	mg/kg	343	336	20	2	yes
Beryllium	mg/kg	0.9	1.0	20	0.2	yes
Cadmium	mg/kg	0.42	0.39	20	0.02	yes
Chromium	mg/kg	26.4	24.4	20	1.1	yes
Cobalt	mg/kg	14.3	13.3	20	0.2	yes
Copper	mg/kg	32.9	31.9	20	2.2	yes
Lead	mg/kg	15.0	14.4	20	0.2	yes

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Quality Control

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	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Strong Acid Digestion - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Molybdenum	mg/kg	1.4	1.4	20	2.2	yes
Nickel	mg/kg	42.4	39.2	20	1.1	yes
Selenium	mg/kg	0.6	0.6	20	0.7	yes
Silver	mg/kg	0.3	0.3	20	0.22	yes
Thallium	mg/kg	0.25	0.24	20	0.11	yes
Tin	mg/kg	<1	<1	20	2.2	yes
Uranium	mg/kg	1.8	1.8	20	1.1	yes
Vanadium	mg/kg	51.9	48.6	20	0.2	yes
Zinc	mg/kg	85	83	20	2	yes
Date Acquired:	August 22, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	40.6	36.1	43.9	yes
Arsenic	mg/kg	39.4	36.7	44.3	yes
Barium	mg/kg	196	185	215	yes
Beryllium	mg/kg	19.1	17.4	22.2	yes
Cadmium	mg/kg	2.19	1.80	2.20	yes
Chromium	mg/kg	97.9	92.2	105.8	yes
Cobalt	mg/kg	21.4	18.5	22.5	yes
Copper	mg/kg	193	176.3	207.3	yes
Lead	mg/kg	19.9	18.6	21.8	yes
Molybdenum	mg/kg	188	172.6	215.4	yes
Nickel	mg/kg	97.6	90.6	107.4	yes
Selenium	mg/kg	38.5	36.1	42.9	yes
Silver	mg/kg	20.3	16.69	21.97	yes
Thallium	mg/kg	10.3	9.57	11.23	yes
Tin	mg/kg	191	171.9	201.9	yes
Uranium	mg/kg	94.7	90.3	108.0	yes
Vanadium	mg/kg	17.5	16.3	20.3	yes
Zinc	mg/kg	199	180	220	yes
Date Acquired:	August 22, 2013				
Mercury	mg/kg	0.40	0.15	0.42	yes
Antimony	mg/kg	0.8	0.3	1.1	yes
Arsenic	mg/kg	81.6	65.9	97.9	yes
Barium	mg/kg	236	213	270	yes
Beryllium	mg/kg	0.7	0.5	0.9	yes
Cadmium	mg/kg	1.83	1.50	2.64	yes
Chromium	mg/kg	33.0	27.4	39.2	yes
Cobalt	mg/kg	14.7	11.3	16.0	yes
Copper	mg/kg	191	147.1	207.1	yes
Lead	mg/kg	121	99.6	135.6	yes
Molybdenum	mg/kg	3.0	2.0	3.8	yes
Nickel	mg/kg	61.8	47.1	73.5	yes

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Quality Control

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Selenium	mg/kg	0.8	0.3	1.3	yes
Silver	mg/kg	0.9	0.25	1.15	yes
Thallium	mg/kg	0.31	0.26	0.40	yes
Tin	mg/kg	4.0	1.0	5.4	yes
Uranium	mg/kg	1.2	0.9	1.5	yes
Vanadium	mg/kg	40.0	33.6	44.8	yes
Zinc	mg/kg	451	317	485	yes

Date Acquired: August 22, 2013

Metals Total

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aluminum	mg/L	0.0018	-0.01	0.02	yes
Calcium	mg/L	-0.0048	-0.1	0.1	yes
Iron	mg/L	-0.0029	-0.01	0.02	yes
Magnesium	mg/L	-0.0097	-0.04	0.04	yes
Manganese	mg/L	-0.0011	-0.003	0.003	yes
Potassium	mg/L	-0.0953	-0.1	0.2	yes
Silicon	mg/L	0.0064	-0.03	0.04	yes
Sodium	mg/L	-0.0437	-0.1	0.2	yes
Sulfur	mg/L	-0.0303	-0.1	0.2	yes
Mercury	ug/L	0	-0.0380	0.0700	yes
Antimony	ug/L	0.0230976	-0.2	0.2	yes
Arsenic	ug/L	0.00994919	-0.2	0.2	yes
Barium	ug/L	0.0169143	-1	1	yes
Beryllium	ug/L	-0.00251547	-0.1	0.1	yes
Bismuth	ug/L	-0.0152473	-0.5	0.5	yes
Boron	ug/L	0.311167	-1	3	yes
Cadmium	ug/L	-5.77796e-005	-0.007	0.012	yes
Chromium	ug/L	0.0458267	-0.7	0.3	yes
Cobalt	ug/L	0.0017216	-0.1	0.1	yes
Copper	ug/L	0.0403309	-1	1	yes
Lead	ug/L	0.00747421	-0.1	0.1	yes
Lithium	ug/L	-0.00996145	-1	1	yes
Molybdenum	ug/L	0.0431713	-1	1	yes
Nickel	ug/L	-0.0971796	-0.5	0.5	yes
Selenium	ug/L	0.0295302	-0.2	0.2	yes
Silver	ug/L	0.0038103	-0.02	0.10	yes
Strontium	ug/L	0.0138145	-1	1	yes
Thallium	ug/L	-0.000331018	-0.05	0.05	yes
Tin	ug/L	-0.00094355	-1	1	yes
Titanium	ug/L	0.00187539	-0.5	0.5	yes
Uranium	ug/L	-0.0016126	-0.5	0.5	yes

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	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Total - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Vanadium	ug/L	0.00100184	-0.1	0.1		yes
Zinc	ug/L	0.835163	-0	1		yes
Zirconium	ug/L	0.0774549	-1	1		yes
Date Acquired:	August 21, 2013					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Aluminum	mg/L	<0.5	<0.5	15	0.03	yes
Calcium	mg/L	306	313	15	0.6	yes
Iron	mg/L	124	126	15	0.20	yes
Magnesium	mg/L	60.8	60.9	15	0.40	yes
Manganese	mg/L	1.0	1.1	15	0.010	yes
Potassium	mg/L	65	68	15	1.2	yes
Silicon	mg/L	10	11	15	0.10	yes
Sodium	mg/L	8430	8500	15	1.2	yes
Sulfur	mg/L	<8	<8	15	0.1	yes
Mercury	mg/L	<0.0001	<0.0001	10	0.0003	yes
Antimony	ug/L	<0.2	<0.2	15	0.4	yes
Arsenic	ug/L	1.9	1.7	15	0.4	yes
Barium	ug/L	44	39	15	2	yes
Beryllium	ug/L	<0.1	<0.1	15	0.2	yes
Bismuth	ug/L	<0.5	<0.5	15	1.1	yes
Boron	ug/L	82	74	15	4	yes
Cadmium	ug/L	0.009	0.007	15	0.022	yes
Chromium	ug/L	<0.5	<0.5	15	1.1	yes
Cobalt	ug/L	0.2	0.2	15	0.2	yes
Copper	ug/L	600	620	15	2	yes
Lead	ug/L	3.0	2.6	15	0.2	yes
Lithium	ug/L	29	25	15	2	yes
Molybdenum	ug/L	<1	<1	15	2	yes
Nickel	ug/L	1.7	1.6	15	1.1	yes
Selenium	ug/L	<0.2	<0.2	15	0.4	yes
Silver	ug/L	0.01	<0.01	15	0.22	yes
Strontium	ug/L	257	232	15	2	yes
Thallium	ug/L	<0.05	<0.05	15	0.11	yes
Tin	ug/L	2	<1	15	2	yes
Titanium	ug/L	<0.5	<0.5	15	1.1	yes
Uranium	ug/L	<0.5	<0.5	15	1.1	yes
Vanadium	ug/L	0.2	0.2	15	0.2	yes
Zinc	ug/L	14	13	15	2	yes
Date Acquired:	August 21, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aluminum	mg/L	3.76	3.46	4.30	yes
Calcium	mg/L	47.5	45.5	52.7	yes

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Quality Control

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	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Iron	mg/L	1.87	1.83	2.19	yes
Magnesium	mg/L	18.2	18.14	22.14	yes
Manganese	mg/L	0.479	0.442	0.538	yes
Potassium	mg/L	47.8	45.8	55.8	yes
Silicon	mg/L	1.95	1.81	2.21	yes
Sodium	mg/L	48.1	45.9	56.0	yes
Sulfur	mg/L	9.2	8.9	10.9	yes
Mercury	mg/L	0.0007	0.0006	0.0010	yes
Antimony	ug/L	11.0	9.7	12.7	yes
Arsenic	ug/L	10.6	9.6	12.6	yes
Barium	ug/L	61	54	68	yes
Beryllium	ug/L	5.2	4.7	6.6	yes
Bismuth	ug/L	29.3	24.8	34.4	yes
Boron	ug/L	112	102	139	yes
Cadmium	ug/L	0.577	0.473	0.781	yes
Chromium	ug/L	29.8	27.3	35.1	yes
Cobalt	ug/L	5.9	5.2	7.6	yes
Copper	ug/L	58	53	67	yes
Lead	ug/L	6.1	5.2	7.1	yes
Lithium	ug/L	60	53	77	yes
Molybdenum	ug/L	60	53	66	yes
Nickel	ug/L	29.1	26.2	35.2	yes
Selenium	ug/L	10	8.5	12.1	yes
Silver	ug/L	5.70	5.39	7.13	yes
Strontium	ug/L	61	54	69	yes
Thallium	ug/L	3.04	2.67	3.69	yes
Tin	ug/L	59	52	64	yes
Titanium	ug/L	30.5	26.6	35.7	yes
Uranium	ug/L	30.2	25.7	36.3	yes
Vanadium	ug/L	5.8	5.1	7.2	yes
Zinc	ug/L	54	49	67	yes
Zirconium	ug/L	61	53	67	yes
Date Acquired:	August 21, 2013				
Mercury	mg/L	0.0028	0.0026	0.0032	yes
Antimony	ug/L	39.5	36.8	42.6	yes
Arsenic	ug/L	39.3	37.7	44.7	yes
Barium	ug/L	198	184	212	yes
Beryllium	ug/L	19.0	17.4	22.2	yes
Bismuth	ug/L	102	92.2	109.8	yes
Boron	ug/L	382	343	436	yes
Cadmium	ug/L	2.06	1.915	2.205	yes
Chromium	ug/L	97.5	90.0	110.0	yes

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	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cobalt	ug/L	19.4	18.7	22.3	yes
Copper	ug/L	197	185	208	yes
Lead	ug/L	19.8	18.6	21.8	yes
Lithium	ug/L	194	173	222	yes
Molybdenum	ug/L	196	180	220	yes
Nickel	ug/L	96.8	90.0	110.0	yes
Selenium	ug/L	38.3	36.1	42.9	yes
Silver	ug/L	19.6	18.00	22.00	yes
Strontium	ug/L	198	182	212	yes
Thallium	ug/L	9.83	9.16	10.96	yes
Tin	ug/L	204	197	213	yes
Titanium	ug/L	98.6	91.5	106.3	yes
Uranium	ug/L	100	90.2	109.0	yes
Vanadium	ug/L	19.2	16.9	22.1	yes
Zinc	ug/L	196	186	219	yes
Date Acquired:	August 21, 2013				
Mercury	mg/L	0.0008	0.0007	0.0009	yes
Antimony	ug/L	11.8	10.8	13.2	yes
Arsenic	ug/L	12.0	10.8	13.2	yes
Barium	ug/L	62	54	66	yes
Beryllium	ug/L	6.1	5.2	6.5	yes
Bismuth	ug/L	30.8	27.0	33.0	yes
Boron	ug/L	122	108	132	yes
Cadmium	ug/L	0.631	0.501	0.699	yes
Chromium	ug/L	30.0	27.0	33.0	yes
Cobalt	ug/L	6.0	5.4	6.6	yes
Copper	ug/L	61	54	66	yes
Lead	ug/L	6.2	5.4	6.6	yes
Lithium	ug/L	60	53	66	yes
Molybdenum	ug/L	61	54	66	yes
Nickel	ug/L	29.9	27.0	33.0	yes
Selenium	ug/L	11.8	10.8	13.2	yes
Silver	ug/L	6.00	5.40	6.60	yes
Strontium	ug/L	60	54	66	yes
Thallium	ug/L	3.07	0.00	6.00	yes
Tin	ug/L	61	54	66	yes
Titanium	ug/L	29.5	27.0	33.0	yes
Uranium	ug/L	31.0	27.0	33.0	yes
Vanadium	ug/L	6.0	5.1	6.3	yes
Zinc	ug/L	61	54	66	yes
Zirconium	ug/L	62	54	66	yes
Date Acquired:	August 21, 2013				

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Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	ug/L	2.1	1.8	2.2	yes
Arsenic	ug/L	2.1	1.8	2.3	yes
Barium	ug/L	11	9	11	yes
Beryllium	ug/L	1.0	0.8	1.1	yes
Bismuth	ug/L	5.3	4.6	5.7	yes
Boron	ug/L	22	17	23	yes
Cadmium	ug/L	0.108	0.083	0.114	yes
Chromium	ug/L	5.2	4.6	5.4	yes
Cobalt	ug/L	1.0	0.9	1.1	yes
Copper	ug/L	10	9	11	yes
Lead	ug/L	1.1	0.9	1.1	yes
Lithium	ug/L	11	9	11	yes
Molybdenum	ug/L	10	9	11	yes
Nickel	ug/L	5.3	4.5	5.5	yes
Selenium	ug/L	2.0	1.6	2.2	yes
Silver	ug/L	1.06	0.90	1.10	yes
Strontium	ug/L	11	10	11	yes
Thallium	ug/L	0.55	0.48	0.57	yes
Tin	ug/L	10	9	11	yes
Titanium	ug/L	5.1	4.5	5.4	yes
Uranium	ug/L	5.2	4.7	5.7	yes
Vanadium	ug/L	1.1	0.8	1.1	yes
Zinc	ug/L	11	9	11	yes
Zirconium	ug/L	11	9	11	yes
Date Acquired:	August 21, 2013				
Aluminum	mg/L	19.4	18.80	20.60	yes
Calcium	mg/L	243	230.0	257.6	yes
Iron	mg/L	9.36	9.07	10.15	yes
Magnesium	mg/L	97.5	92.78	104.72	yes
Manganese	mg/L	2.44	2.260	2.560	yes
Potassium	mg/L	249	232.2	259.9	yes
Silicon	mg/L	10.3	9.48	10.74	yes
Sodium	mg/L	245	226.8	267.4	yes
Sulfur	mg/L	147	136.5	166.3	yes
Date Acquired:	August 21, 2013				
Aluminum	mg/L	3.88	3.46	4.44	yes
Calcium	mg/L	49.9	45.0	55.0	yes
Iron	mg/L	1.95	1.80	2.20	yes
Magnesium	mg/L	19.3	17.99	22.01	yes
Manganese	mg/L	0.498	0.449	0.551	yes
Potassium	mg/L	51.0	45.0	55.0	yes
Silicon	mg/L	2.08	1.92	2.22	yes

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Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Metals Total - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sodium	mg/L	51.1	45.0	55.0	yes
Sulfur	mg/L	9.7	9.0	11.0	yes
Date Acquired:	August 21, 2013				
Aluminum	mg/L	0.39	0.36	0.44	yes
Calcium	mg/L	4.8	4.6	5.6	yes
Iron	mg/L	0.19	0.18	0.22	yes
Magnesium	mg/L	1.88	1.84	2.18	yes
Manganese	mg/L	0.046	0.046	0.056	yes
Potassium	mg/L	5.1	4.5	5.5	yes
Silicon	mg/L	0.20	0.18	0.22	yes
Sodium	mg/L	5.1	4.7	5.5	yes
Sulfur	mg/L	2.8	2.8	3.2	yes
Date Acquired:	August 21, 2013				

Physical and Aggregate Properties

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Moisture	%	15.4	14.8	10	0.3	yes
Date Acquired:	August 22, 2013					

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-1.650	1.650	yes
Toluene	ng	0	-2.010	2.010	yes
Ethylbenzene	ng	0	-3.99	3.99	yes
m,p-Xylene	ng	0	-3.99	3.99	yes
o-Xylene	ng	0	-3.99	3.99	yes
Date Acquired:	August 21, 2013				

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	0.870	0.877	20	0.004	yes
Toluene	mg/kg	0.893	0.900	20	0.005	yes
Ethylbenzene	mg/kg	0.91	0.91	20	0.01	yes
m,p-Xylene	mg/kg	1.81	1.82	20	0.01	yes
o-Xylene	mg/kg	0.90	0.91	20	0.01	yes
Date Acquired:	August 21, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	1.31	1.063	1.438	yes
Toluene	mg/kg	1.30	1.063	1.438	yes
Ethylbenzene	mg/kg	1.29	1.06	1.44	yes
m,p-Xylene	mg/kg	2.61	2.12	2.88	yes
o-Xylene	mg/kg	1.30	1.06	1.44	yes
Date Acquired:	August 21, 2013				

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	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Mono-Aromatic Hydrocarbons - Water

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/L	0.025	0.026	20	0.002	yes
Toluene	mg/L	0.023	0.024	20	0.002	yes
Ethylbenzene	mg/L	0.024	0.025	20	0.002	yes
m,p-Xylene	mg/L	0.053	0.052	20	0.002	yes
o-Xylene	mg/L	0.027	0.026	20	0.002	yes
Date Acquired:	August 27, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	mg/L	0.046	0.042	0.058	yes
Toluene	mg/L	0.047	0.042	0.058	yes
Ethylbenzene	mg/L	0.047	0.042	0.058	yes
m,p-Xylene	mg/L	0.094	0.085	0.115	yes
o-Xylene	mg/L	0.047	0.042	0.058	yes
Date Acquired:	August 27, 2013				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	292.28	-1599	1599	yes
Date Acquired:	August 21, 2013				

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	20	20	20	4	yes
Date Acquired:	August 21, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	18	14	21	yes
Date Acquired:	August 21, 2013				

Volatile Petroleum Hydrocarbons - Water

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/L	0.7	0.6	0.8	yes
Date Acquired:	August 27, 2013				

Extractable Petroleum Hydrocarbons - Soil

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	249	232	30	20	yes
F3c C16-C34	mg/kg	1040	978	30	20	yes
F4c C34-C50	mg/kg	259	248	30	30	yes
F4c+ C50+	mg/kg	<100	<100	30	20	yes
Date Acquired:	August 21, 2013					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	93	79	121	yes
F3c C16-C34	mg/kg	132	122	158	yes

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Quality Control

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
Report To:	Biogenie S.R.D.C. Inc.	ID:	2013 Kitikmeot LFM	Control Number:	B13191
	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Extractable Petroleum Hydrocarbons - Soil - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
F4c C34-C50	mg/kg	193	170	230	yes
Date Acquired:	August 21, 2013				
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**	**Passed QC**
F2c C10-C16	mg/kg	86	70	130	yes
F3c C16-C34	mg/kg	108	70	130	yes
F4c C34-C50	mg/kg	85	70	130	yes
Date Acquired:	August 21, 2013				

Extractable Petroleum Hydrocarbons - Water

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2 C10-C16	mg/L	2.9	3.0	30	0.2	yes
F3 C16-C34	mg/L	10.4	10.2	30	0.2	yes
F3+ C34+	mg/L	2.8	3.1	30	0.2	yes
Date Acquired:	August 21, 2013					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2 C10-C16	mg/L	91.3	80.0	120.0		yes
F3 C16-C34	mg/L	135	120.0	160.0		yes
F3+ C34+	mg/L	317	310.0	350.0		yes
Date Acquired:	August 21, 2013					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2 C10-C16	mg/L	92	75	125		yes
F3 C16-C34	mg/L	99	75	125		yes
F3+ C34+	mg/L	85	75	125		yes
Date Acquired:	August 21, 2013					

Polychlorinated Biphenyls - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aroclor 1016	ug/mL	0	-0.3	0.3	yes
Aroclor 1221	ug/mL	0	-0.3	0.3	yes
Aroclor 1232	ug/mL	0	-0.3	0.3	yes
Aroclor 1242	ug/mL	0	-0.3	0.3	yes
Aroclor 1248	ug/mL	0	-0.3	0.3	yes
Aroclor 1254	ug/mL	0	-0.3	0.3	yes
Aroclor 1260	ug/mL	0	-0.3	0.3	yes
Aroclor 1262	ug/mL	0	-0.3	0.3	yes
Aroclor 1268	ug/mL	0	-0.3	0.3	yes
Date Acquired:	August 23, 2013				
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**	**Passed QC**
Aroclor 1248	ug/mL	90.00	80	120	yes

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Quality Control

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Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Polychlorinated Biphenyls - Soil - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Date Acquired: August 23, 2013					

Polychlorinated Biphenyls - Soil - Surrogate

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Decachlorobiphenyl	%	143.89	50	150	yes
Date Acquired: August 23, 2013					

Polychlorinated Biphenyls - Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Aroclor 1016	ug/mL	0	-0.3	0.3	yes
Aroclor 1221	ug/mL	0	-0.3	0.3	yes
Aroclor 1232	ug/mL	0	-0.3	0.3	yes
Aroclor 1242	ug/mL	0	-0.3	0.3	yes
Aroclor 1248	ug/mL	0	-0.3	0.3	yes
Aroclor 1254	ug/mL	0	-0.3	0.3	yes
Aroclor 1260	ug/mL	0	-0.3	0.3	yes
Aroclor 1262	ug/mL	0	-0.3	0.3	yes
Aroclor 1268	ug/mL	0	-0.3	0.3	yes
Date Acquired: August 22, 2013					
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**	**Passed QC**
Aroclor 1016	ug/mL	120.00	80	120	yes
Date Acquired: August 22, 2013					

Polychlorinated Biphenyls - Water - Surrogate

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Decachlorobiphenyl	%	78.5519	50	150	yes
Date Acquired: August 22, 2013					

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Methodology and Notes

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Company:	Biogenie				

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Boron in general soil	McKeague	*	Hot Water Soluble Boron - Azomethine -H Method, 4.61	22-Aug-13	Exova Edmonton
BTEX-CCME in Soil EDM	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	21-Aug-13	Exova Edmonton
BTEX-CCME in Soil EDM	US EPA	*	US EPA method, 8260B/5035	21-Aug-13	Exova Edmonton
BTEX-CCME in Water EDM	US EPA	*	US EPA method, 8260B/5035	22-Aug-13	Exova Edmonton
BTEX-CCME in Water EDM	US EPA	*	Volatile Organic Compounds by GCMS / Purge and Trap for Aqueous Samples, 8260B/5030B	22-Aug-13	Exova Edmonton
Mercury (Hot Block) in Soil	US EPA	*	Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	22-Aug-13	Exova Edmonton
Mercury (Total) in water	US EPA	*	Determination of Hg in Sediment by Cold Vapor Atomic Absorption Spec, 245.5	23-Aug-13	Exova Edmonton
Metals ICP-MS (Hot Block) in soil	SW-846	*	Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	22-Aug-13	Exova Edmonton
Metals ICP-MS (Total) in water	APHA/USEPA	*	Metals By Inductively Coupled Plasma/Mass Spectrometry, APHA 3125 B / USEPA 200.8	21-Aug-13	Exova Edmonton
Metals Trace (Total) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	21-Aug-13	Exova Edmonton
Moisture	Carter	*	Gravimetric Method with Oven Drying, 51.2	22-Aug-13	Exova Edmonton
PCB - Soil	US EPA	*	Polychlorinated Biphenyls (PCBs) by Gas Chromatography, 8082A	23-Aug-13	Exova Calgary
PCB - Water	US EPA	*	Polychlorinated Biphenyls (PCBs) by Gas Chromatography, 8082A	22-Aug-13	Exova Calgary
TEH-CCME in Soil (Shake) EDM	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	21-Aug-13	Exova Edmonton
TEH-CCME in Water EDM	MMCA	*	Petroleum Hydrocarbons in Water, A108.0	21-Aug-13	Exova Edmonton

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
McKeague	Manual on Soil Sampling and Methods of Analysis
SW-846	Test Methods for Evaluating Solid Waste
US EPA	US Environmental Protection Agency Test Methods

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Methodology and Notes

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Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Comments:

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Analytical Report

Bill To:	Biogenie S.R.D.C. Inc.	Project:		Lot ID:	**953697**
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	4495 Wilfrid Hamel Suite 200	Name:	Cam-1/Pin-2	Date Received:	Aug 21, 2013
	Quebec, QC, Canada	Location:	Jenny Lind ISL/Cape Young	Date Reported:	Aug 29, 2013
	G1P 2J7	LSD:		Report Number:	1850232
Attn:	Antoine Vallieres	P.O.:			
Sampled By:	A. Passalis	Acct code:			
Company:	Biogenie				

Petroleum Hydrocarbons in Soil

Batch Notes

1. The method used complies with the Reference Method for the Canada Wide Standards for Petroleum Hydrocarbons in Soil - Tier 1, April 2001, including Addendum 1, and is accredited for use in Exova.
2. Modifications of the method: See Notes and Methodology for nonconformances (if applicable).
3. Qualifications on results: See Notes and Methodology for nonconformances (if applicable).
4. Silica gel treatment is performed for fractions F2, F3, F4.
5. F1-BTEX: BTEX has been subtracted from the F1 fraction.
6. If analyzed, naphthalene has been subtracted from fraction F2 and selected PAHs have been subtracted from fraction F3.
7. F4HTGC is reported when more than 5% of the total carbon envelope elutes past C_{50}.
8. Exova does not routinely report Gravimetric Heavy Hydrocarbons (F4G or F4G-sg), F4HTGC through extended range high temperature GC is reported instead.
9. When both F4(C_{34}-C_{50}) and F4HTGC are reported, F4HTGC is the final F4 that is to be used for interpreting the CWS.
10. Quality criteria met for the batch: Data is reported in Quality Control Section of report (if requested).
    -nC_6 and nC_{10} response factors (RF) are within 30% of RF for toluene
    -nC_{10}, nC_{16} and nC_{34} RFs are within 10% of each other
    -nC_{50} RF is within 30% of the average RF for nC_{10}+nC_{16}+nC_{34}
    -linearity is within 15% for each of the calibrated carbon ranges
11. Batch data for analytical quality control are available on request.
12. Extraction and analysis holding times were met: See Notes and Methodology for nonconformances (if applicable).

Approved by:

Randy Neumann, BSc
General Manager