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

Cape Young, Nunavut

FINAL REPORT– 2013 SEASON

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

DEFENCE CONSTRUCTION CANADA

January 2014

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SITE REMEDIATION SOLUTIONS

Biogénie

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2014-01-22
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NT/NU

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1 INTRODUCTION

1.1 LOCATION AND SITE FEATURES

The PIN-2 Cape Young Distant Early Warning (DEW) Line site is located on the mainland of Nunavut along the coast of Dolphin and Union Strait at 68^{o} 55' 58" north latitude and 116^{o} 55' 45" west longitude. The site is approximately 150 km north of Kugluktuk (formerly Coppermine) and 465 km west of the community of Ikaluktutiak (Cambridge Bay).

PIN-2 was originally an auxiliary station within the original DEW Line system that was decommissioned in 1993. A remotely operated North Warning System (NWS) Short Range Radar (SRR) station has been constructed approximately 8 km to the southwest, along with two 88 m^3 POL tanks located at the beach area. The environmental clean-up and demolition of facilities commenced in 2009 and was completed during the summer of 2011, with the exception of the airstrip hangar.

The clean-up included the closure and remediation of seven 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 PIN-2.1) at the end of this section:

- Airstrip Landfill
- USAF Landfill
- Station West Landfill
- Tier II Soil Disposal Facility
- Airstrip South Landfill
- Pallet Line West Landfill
- Non-Hazardous Waste Landfill
- South Landfill - East
- South Borrow Landfill

In accordance with the Nunavut Tunngavik Incorporated - Department of National Defence (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 PIN-2 – Cape Young.

Table I: 2013 Monitoring Requirements for PIN-2 Landfills

Landfill	Visual Inspection	Soil Sampling	Groundwater Sampling	Thermal Monitoring
Airstrip Landfill	✓			
USAF Landfill	✓			
Station West Landfill	✓			
Tier II Soil Disposal Facility	✓	✓	✓	✓
Airstrip South Landfill	✓			
Pallet Line West Landfill	✓			
Non-Hazardous Waste Landfill	✓			
South Landfill - East	✓			
South Borrow 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 PIN-2 Landfills
- Visual inspection
- Soil and groundwater sampling (Tier II Soil Disposal Facility)
- Thermal monitoring (DCC Tier II Soil Disposal Facility)
- Creation of a photographic record
- Draft and Final reports

The range of the report, limitation of responsibilities as well as the detailed procedures for the use of this report are presented in Appendix A.

1.3 REPORT FORMAT

This report describes the work carried out in August 2013 at nine landfill sites at PIN-2 Cape Young. 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.

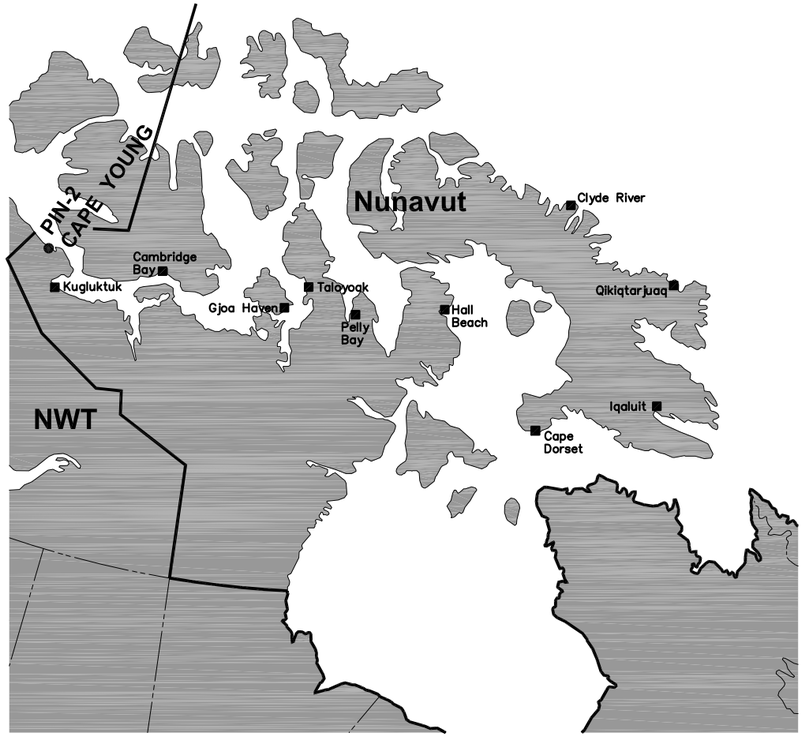
1.4 PROJECT REFERENCES

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, PIN-2 Landfill Monitoring 2013*, August 2013.



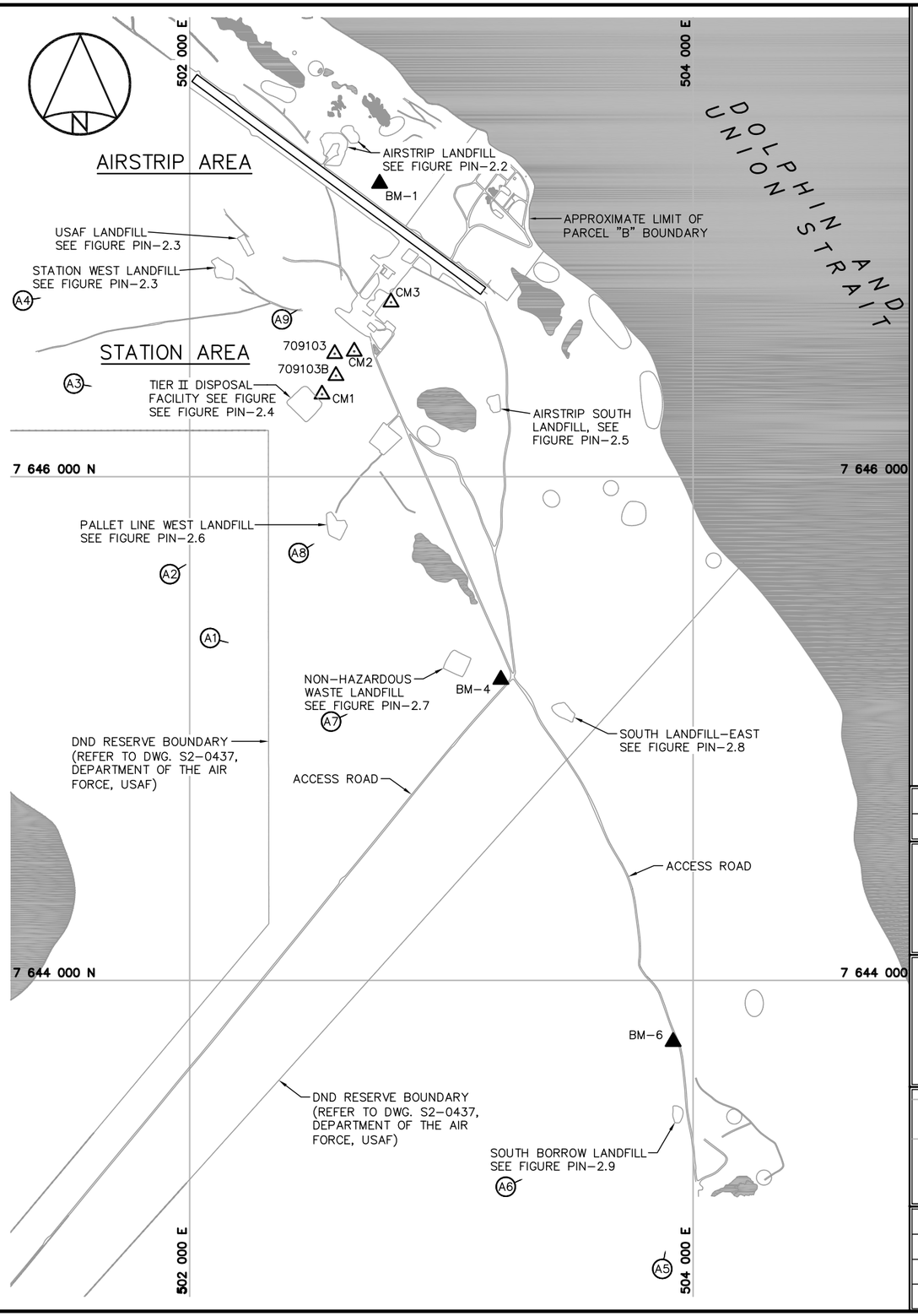
LOCATION OF CAPE YOUNG WITHIN NUNAVUT TERRITORY

SCALE: NTS

SURVEY CONTROL MONUMENTS				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
CM1	7 646 327.029	502 525.754	13.804	PIN-2 BASELINE STA. 0+00
CM2	7 646 497.473	502 653.662	13.993	PIN-2 BASELINE STA. 7+00
CM3	7 646 692.507	502 799.974	14.534	PIN-2 BASELINE STA. 15+00
709103	7 646 487.974	502 576.191	13.790	GEODETIC BENCHMARK
709103B	7 646 400.920	502 581.212	13.954	GEODETIC BENCHMARK

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

PERMANENT BENCHMARK (AS-BUILT)				
NO.	UTM COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
BM-1	7 647 164.203	502 754.676	14.398	25mm DIA. STEEL PIPE
BM-4	7 645 194.471	503 236.108	17.189	25mm DIA. STEEL PIPE
BM-6	7 643 756.513	503 920.587	13.296	25mm DIA. STEEL PIPE



LEGEND

- CM1 — SURVEY CONTROL MONUMENT (5)
- BM-1 — PERMANENT BENCHMARK LOCATION (3)
- ARCHAEOLOGICAL FEATURES
- APPROXIMATE LOCATION OF PROPERTY BOUNDARY
- BODY OF WATER
- A1 — AERIAL PHOTOGRAPH

0m 200m 400m 600m 800m 1000m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14-01-09	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

LOCATION PLAN

SITE REMEDIATION SOLUTIONS

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MEASUREMENT UNIT	SCALE:	DATE (month-year):
Metre	1 : 20,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2A-PL	PAGE PL

FIGURE PIN-2.1

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2 OUTLINE AND METHODOLOGY

2.1 FIELD PROGRAM STAFF

The 2013 on-site field program at PIN-2 Cape Young took place on August 17, 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 5 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
- Susie Koaha, Field Technician
- Benjamin Kaniak, Field Technician
- Joe Koaha, Wildlife Monitor

2.2 2013 WEATHER CONDITIONS

Seasonally warm weather conditions were observed during the PIN-2 Cape Young monitoring event with daytime temperatures ranging between 6-7ºC. Skies were mixed with periods of sun and cloud throughout the monitoring period with light to moderate winds out of the northwest ranging between 5-15 km/h. Precipitation was not observed during the monitoring period.

2.3 VISUAL INSPECTION

Data and information collected during the visual inspection of the PIN-2 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 (0-10 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 PIN-2 during the August, 2013 field program.

Table II: Summary of Soil Sampling at PIN-2 – August 2013

Landfill Site	Soil Sample Locations			
Tier II Disposal Facility	MW-1	MW-2	MW-3	MW-4

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 four locations at PIN-2. One of the four wells at the Tier II Soil Disposal Facility (MW-1) was found to contain insufficient water 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 PIN-2 – August 2013

Landfill Site	Groundwater Sample Locations			
Tier II Soil Disposal Facility	MW-1 (dry)	MW-2	MW-3	MW-4

Notes:
For 2013 sampling, total no. of water samples = 7 samples (3 monitoring well samples + 1 blind duplicate + 1 inter-laboratory duplicate + 1 field blank) + 1 travel blank.

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 with the exception of VT-1, where all communication failed due to extremely low battery levels. All analogues/thermocouples were observed to be functioning properly at the time of inspection. Batteries were replaced in all datalogger units as specified in the TOR and 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 in August 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 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 D.

3 AIRSTRIP LANDFILL

3.1 BACKGROUND AND MONITORING PROGRAM

The Airstrip Landfill is located 600 m north of the station on the northwest side of the airstrip. The landfill has two regrade areas, including granular fill cover encompassing a footprint of approximately 8,800 m^2 with the final cover extending approximately 1.0 m to 2.5 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the Airstrip Landfill was classified as low potential environmental risk. The remediation consisted of excavation of the Tier II soil contamination and the two remaining contaminated soil areas were included in the regraded areas. All visible debris was removed. The landfill was regraded with the placement of additional granular fill at all lobes.

The long term monitoring plan consists of visual inspection, and the periodic 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 Airstrip Landfill was conducted on August 17, 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 settlement were not noted at the landfill.

Erosion
During the assessment, no existing erosion was noted at the landfill.

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 at the landfill.

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

Debris
Evidence of exposed debris was not noted at the landfill, however three small pieces of surface debris (Feature A) were noted between the two lobes (see below).

Presence/Condition of Monitoring Instruments

There is no monitoring instrumentation installed at this landfill.

Other Features of Note

As noted above, three small pieces of miscellaneous metal debris (strapping) were noted on the gravel surface between the lobes (Feature A). The debris did not appear to be related to the landfill regrades.

ALF-25: (left) Miscellaneous metal debris on surface between Lobe A and Lobes E & F
ALF-28: (right) View southeast at miscellaneous metal debris on surface between Lobe A and Lobes E & F

Discussion

The Airstrip 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 – Airstrip Landfill

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

SITE NAME: PIN-2 – Cape Young
LANDFILL DESIGNATION: Airstrip Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: Airstrip Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE IV: PIN-2, CAPE YOUNG - AIRSTRIP 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:	Yes	FEATURE A See Figure PIN-2.2 (Between Lobes A and E&F - New Obs.)	0.3 m	0.03 m	Surface	Isolated	Miscellaneous metal debris - surface	ALF-25 to 28	Acceptable	Three small pieces of metal debris located between lobes
Additional Photos	Yes	See Figure PIN-2.2 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.

3.3 PRELIMINARY STABILITY ASSESSMENT

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

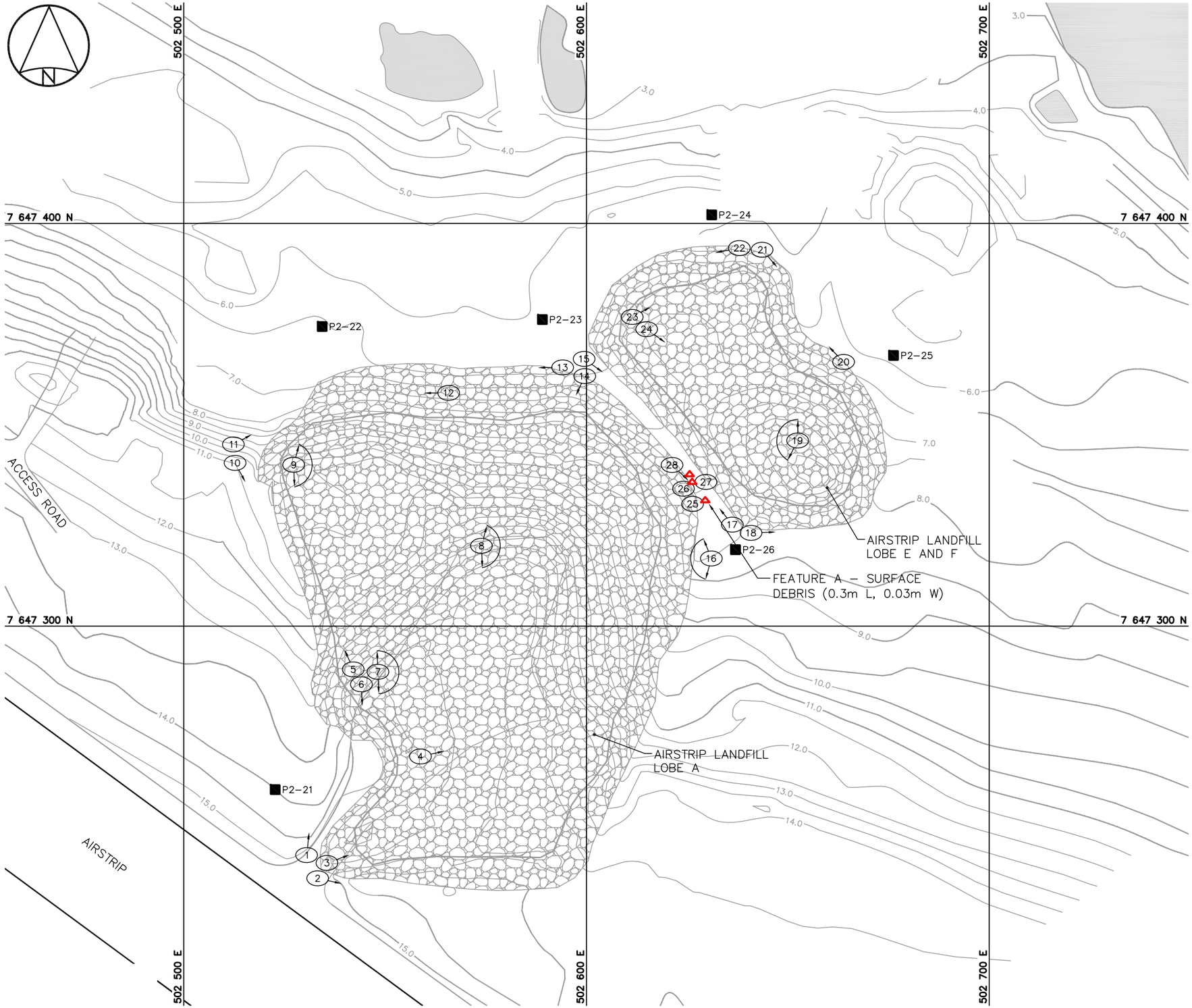
Table V: Preliminary Stability Assessment – Airstrip Landfill

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	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

3.4 LOCATION PLAN

The Location Plan for the Airstrip Landfill has been completed as per the TOR and is presented in Figure PIN-2.2.



LEGEND

- MONITORING SOIL SAMPLE LOCATION (6)
- APPROX. PHOTOGRAPHIC VIEWPOINT
- BODY OF WATER
- DEBRIS (NTS)

0m 10m 20m 30m 40m 50m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14-01-22	P.L.	A.P.	A.L.

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COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

AIRSTRIP LANDFILL

SITE REMEDIATION SOLUTIONS

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Metre	1 : 1,000	JANUARY 2014
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PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2B-PL	PAGE PL

FIGURE PIN-2.2

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3.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Airstrip 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 – Airstrip Landfill

Photo (ALF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
LOBE A						
1	P213_347	4,338	17/08/2013	502532	7647243	View looking north along west side of Airstrip Landfill - Lobe A
2	P213_348	4,384	17/08/2013	502534	7647238	View looking east along south side of Airstrip Landfill - Lobe A
3	P213_349	4,303	17/08/2013	502535	7647241	View looking northeast at southwest corner of Airstrip Landfill - Lobe A
4	P213_350	4,473	17/08/2013	502558	7647268	View looking east across south cover of Airstrip Landfill - Lobe A
5	P213_351	4,319	17/08/2013	502542	7647288	View north-northwest along northwest crest of Airstrip Landfill - Lobe A
6	P213_352	4,406	17/08/2013	502543	7647287	View looking south along west side of Airstrip Landfill - Lobe A
7	P213_353	1,409	11/09/2013	502546	7647288	Panoramic view looking north to south across Airstrip Landfill - Lobe A
8	P213_354	1,468	11/09/2013	502574	7647319	Panoramic view looking north to south across east cover of Airstrip Landfill - Lobe A
9	P213_357	1,221	09/10/2013	502526	7647340	Panoramic view looking north to south across north cover of Airstrip Landfill - Lobe A
10	P213_358	4,395	17/08/2013	502512	7647342	View looking south-southeast along west toe of Airstrip Landfill - Lobe A
11	P213_359	4,330	17/08/2013	502513	7647344	View looking east-northeast along northwest toe of Airstrip Landfill - Lobe A
12	P213_360	4,348	17/08/2013	502567	7647357	View looking west along north side slope of Airstrip Landfill - Lobe A
13	P213_361	4,250	17/08/2013	502595	7647364	View looking west along north toe of Airstrip Landfill - Lobe A
14	P213_362	4,409	17/08/2013	502600	7647363	View looking southwest at northeast corner of Airstrip Landfill - Lobe A
15	P213_363	4,305	17/08/2013	502600	7647365	View looking southeast between Lobes A and E&F of Airstrip Landfill
16	P213_364	1,050	11/09/2013	502631	7647317	Panoramic view looking south-southwest to north-northwest at east side of Airstrip Landfill - Lobe A
LOBES E & F						
17	P213_365	4,432	17/08/2013	502637	7647324	View looking northwest along west side slope of Airstrip Landfill - Lobes E & F
18	P213_366	4,261	17/08/2013	502639	7647324	View looking east along south toe of Airstrip Landfill - Lobes E & F
19	P213_367	1,164	11/09/2013	502653	7647346	Panoramic view looking southwest to north across cover of Airstrip Landfill - Lobes E & F
20	P213_368	4,341	17/08/2013	502662	7647365	View looking northwest along east side of Airstrip Landfill - Lobes E & F
21	P213_369	4,450	17/08/2013	502642	7647394	View looking southeast along east side of Airstrip Landfill - Lobes E & F
22	P213_370	4,306	17/08/2013	502639	7647394	View looking west-southwest along north side of Airstrip Landfill - Lobes E & F
23	P213_371	4,444	17/08/2013	502612	7647376	View looking east-northeast along north crest of Airstrip Landfill - Lobes E & F
24	P213_372	4,438	17/08/2013	502613	7647375	View looking southeast across cover of Airstrip Landfill - Lobes E & F
25	P213_373	4,337	17/08/2013	502629	7647331	Miscellaneous metal debris on surface between Lobe A and Lobes E & F – FEATURE A
26	P213_374	4,228	17/08/2013	502626	7647335	Miscellaneous metal debris on surface between Lobe A and Lobes E & F – FEATURE A
27	P213_375	4,287	17/08/2013	502625	7647337	Miscellaneous metal debris on surface between Lobe A and Lobes E & F – FEATURE A
28	P213_376	4,328	17/08/2013	502622	7647340	View looking southeast at miscellaneous metal debris on surface between Lobe A and Lobes E & F – FEATURE A

4 USAF LANDFILL

4.1 BACKGROUND AND MONITORING PROGRAM

The USAF Landfill is located approximately 500 m northwest of the main Station Area with a connecting road to the Station Area. The landfill was constructed with a liner over the landfill surface during operation and closure in 1993. The landfill consists of two cells and was subsequently covered with additional granular fill encompassing a footprint of approximately 2,500 m^2 with the final cover extending approximately 1.0 m above the surrounding grade.

The surface of the landfill and the immediate surrounding area are relatively flat with surface runoff potential low with slight troughs to the northeast and southwest. Based on an assessment of the USAF Landfill as a contaminant source, the potential for migration, and downgradient receptors, the landfill was classified as a low potential environmental risk. Accordingly, surface and partially exposed debris was removed, and the landfill was regraded with additional granular fill.

The long term monitoring plan consists of visual inspection, and the periodic 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 USAF Landfill was conducted on August 17, 2013. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table VII of this report.

Settlement
Indications of settlement were not noted at the landfill.

Erosion
During the assessment, no existing erosion was noted at the landfill.

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
There were no other features of note at the landfill.

Discussion
The USAF 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 – USAF Landfill

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

SITE NAME: PIN-2 – Cape Young
LANDFILL DESIGNATION: USAF Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: USAF Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE VII: PIN-2, CAPE YOUNG - USAF 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	Not Observable	N/A	Not Observable	N/A
Erosion	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Frost Action	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Animal Burrows	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Vegetation	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Staining	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Vegetation Stress	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Seepage Points	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Debris Exposed	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Presence/Condition of Monitoring Instruments	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Other Features of Note:	No	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure PIN-2.3 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 USAF Landfill has been completed as per the TOR and is included as Table VIII below.

Table VIII: Preliminary Stability Assessment – USAF Landfill

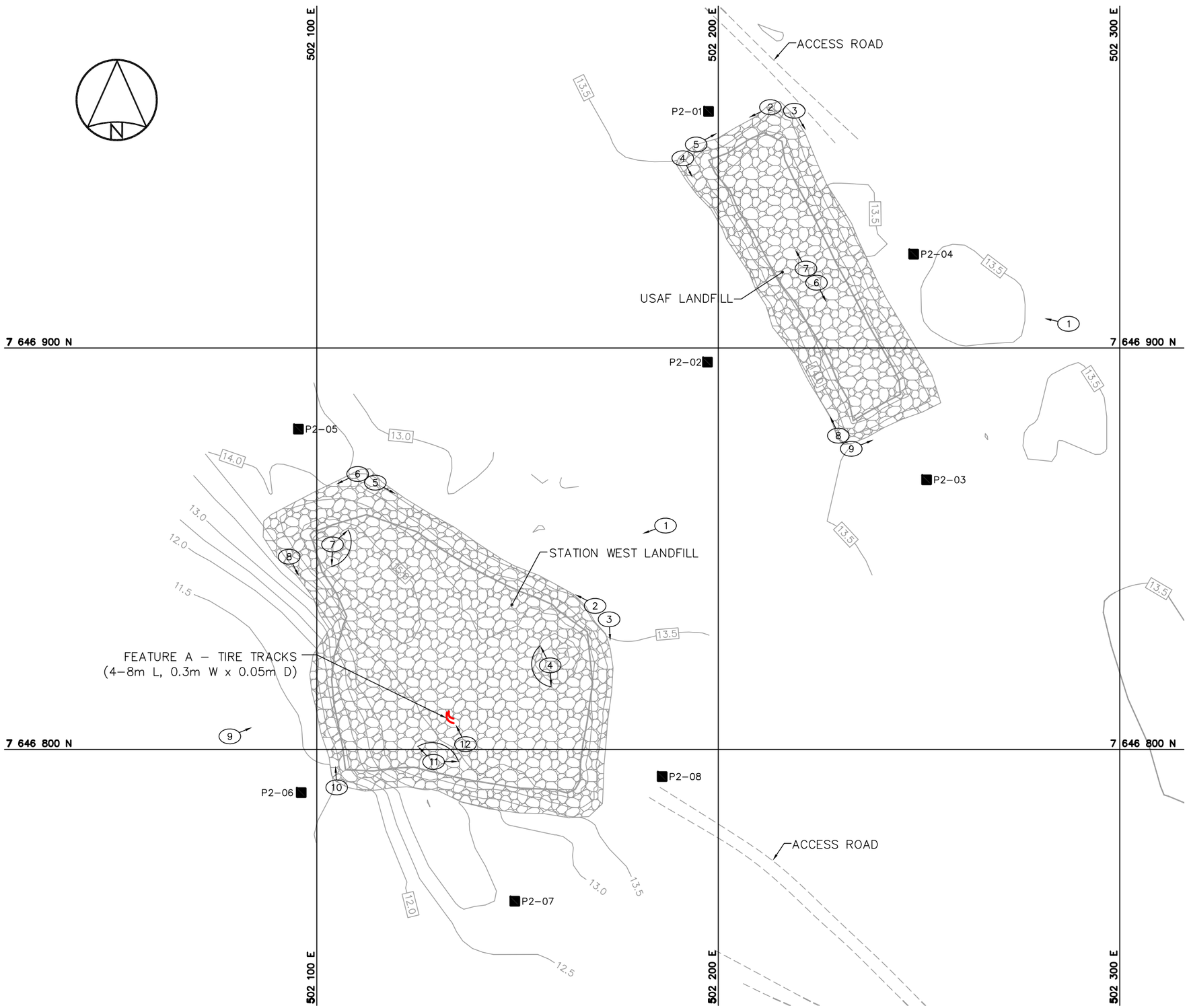
Feature	Severity Rating	Extent
Settlement	Not observed	None
Erosion	Not observed	None
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris exposure	Not observed	None
Overall Landfill Performance	**Acceptable**	

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

4.4 LOCATION PLAN

The Location Plan for the USAF Landfill has been completed as per the TOR and is presented in Figure PIN-2.3.



LEGEND

- MONITORING SOIL SAMPLE LOCATION (8)
- (2) APPROX. PHOTOGRAPHIC VIEWPOINT
- TIRE TRACKS NTS

0m 10m 20m 30m 40m 50m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14-01-22	P.L.	A.P.	A.L.

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Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

USAF LANDFILL AND STATION WEST 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_200_203	DRAWING NO: CD3654_200_203-PIN-2C-PL	PAGE PL

FIGURE PIN-2.3

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4.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the USAF 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 – USAF Landfill

Photo (USAF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_326	4,274	17/08/2013	502287	7646906	View looking west-northwest at east side of USAF Landfill
2	P213_327	4,282	17/08/2013	502215	7646960	View looking southwest along north side of USAF Landfill
3	P213_328	4,359	17/08/2013	502217	7646960	View looking south-southeast along east side of USAF Landfill
4	P213_329	4,322	17/08/2013	502191	7646947	View looking south-southeast along west side of USAF Landfill
5	P213_330	4,310	17/08/2013	502193	7646949	View looking northeast along north side of USAF Landfill
6	P213_331	4,388	17/08/2013	502224	7646917	View looking southeast across south cover of USAF Landfill
7	P213_332	4,346	17/08/2013	502223	7646919	View looking northwest across north cover of USAF Landfill
8	P213_333	4,413	17/08/2013	502231	7646878	View looking north-northwest along west side of USAF Landfill
9	P213_334	4,434	17/08/2013	502233	7646875	View looking northeast along south side of USAF Landfill

5 STATION WEST LANDFILL

5.1 BACKGROUND AND MONITORING PROGRAM

The Station West Landfill is located approximately 100 m southwest of the USAF Landfill. There is a minor trail heading southeast from the landfill, but no road exists that connects the landfill to the Station Area. The landfill consists of four lobes of buried debris, complete with granular fill cover encompassing a footprint of 4,900 m^2 and extending approximately 1.0 m above the surrounding area.

Based on an assessment of the Station West Landfill as a contaminant source, the potential for migration, and down gradient receptors, the landfill was classified as a low potential environmental risk. Accordingly, surface and partially exposed debris was removed, and the landfill was regraded with 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 17, 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 settlement were not noted at the landfill.

Erosion
During the assessment, no existing erosion was noted at the landfill.

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 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

One set of vehicle tracks (shallow ruts) was noted on the south central cover of the landfill; Feature A. The ruts measured 4-8 m L, 0.3 m W and 0.05 m D. There were no other features of note at the landfill.

SWLF-12: View of vehicle tracks on south cover
(4-8 m L, 0.3 m W, 0.05 m D) - FEATURE A

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: PIN-2 – Cape Young
LANDFILL DESIGNATION: Station West Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 &12, 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: PIN-2, CAPE YOUNG
Landfill: Station West Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE X: PIN-2, CAPE YOUNG - STATION WEST 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:	Yes	FEATURE A See Figure PIN-2.3 (S central crest - New Obs.)	4 - 8 m	0.3 m	0.05 m	Isolated	Vehicle tracks	SWLF-11, 12	Acceptable	N/A
Additional Photos	Yes	See Figure PIN-2.3 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**									

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.

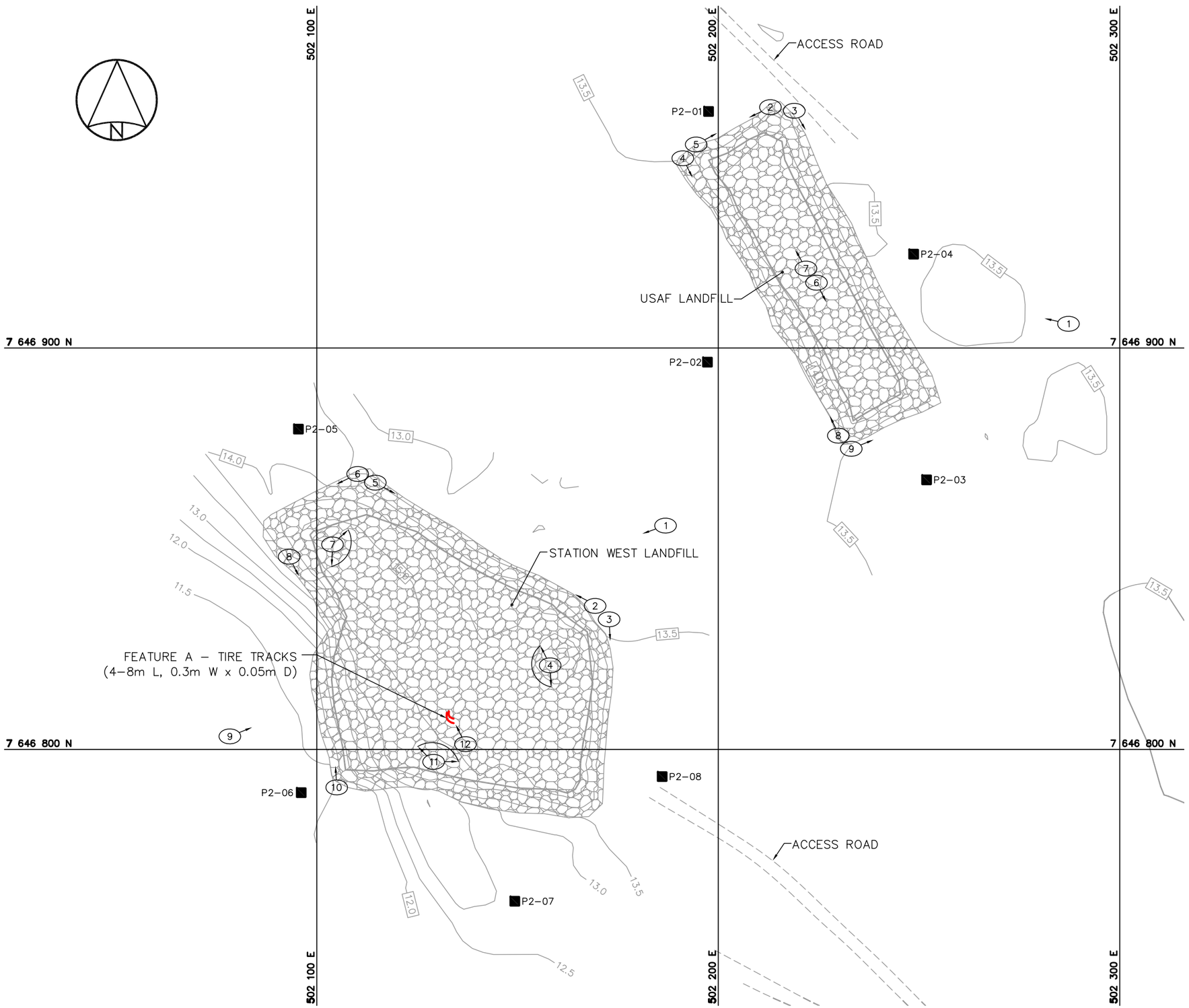
Table XI: Preliminary Stability Assessment – Station West Landfill

Feature	Severity Rating	Extent
Settlement	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

5.4 LOCATION PLAN

The Location Plan for the Station West Landfill has been completed as per the TOR and is presented in Figure PIN-2.3.



LEGEND

- MONITORING SOIL SAMPLE LOCATION (8)
- (2) APPROX. PHOTOGRAPHIC VIEWPOINT
- TIRE TRACKS NTS

0m 10m 20m 30m 40m 50m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14-01-22	P.L.	A.P.	A.L.

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COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

USAF LANDFILL AND 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 : 1,000	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2C-PL	PAGE PL

FIGURE PIN-2.3

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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	P213_335	4.329	17/08/2013	502187	7646854	View looking west-southwest at northeast side of Station West Landfill
2	P213_336	4.367	17/08/2013	502171	7646835	View looking northwest along northeast side of Station West Landfill
3	P213_337	4.434	17/08/2013	502172	7646834	View looking south along east side of Station West Landfill
4	P213_338	1.393	11/09/2013	502158	7646821	Panoramic view looking south to north-northwest across cover of Station West Landfill
5	P213_339	4.392	17/08/2013	502114	7646867	View looking southeast along northeast side of Station West Landfill
6	P213_340	4.437	17/08/2013	502111	7646868	View looking southwest along north side of Station West Landfill
7	P213_341	1.494	11/09/2013	502103	7646852	Panoramic view looking northeast to south across cover from northwest corner of Station West Landfill
8	P213_342	4.390	17/08/2013	502093	7646849	View looking southeast along northwest toe of Station West Landfill
9	P213_343	4.357	17/08/2013	502079	7646804	View looking east-northeast at west side of Station West Landfill\
10	P213_344	4.308	17/08/2013	502105	7646791	View looking north along west side of Station West Landfill
11	P213_345	1.121	11/09/2013	502131	7646797	Panoramic view looking northwest to east across south cover of Station West Landfill
12	P213_346	4.400	17/08/2013	502137	7646802	View of vehicle tracks on south cover area of Station West Landfill (4-8 m L, 0.3 m W, 0.05 m D) - FEATURE A

6 TIER II SOIL DISPOSAL FACILITY

6.1 BACKGROUND AND MONITORING PROGRAM

The facility is located 300 m southwest of the Station Area.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 11,000 m^2 with the final cover extending between 5.5-7.0 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 PIN-2.4.

Soil at all stations was sampled as specified. Inspection and monitoring was carried out at each of the monitoring wells as per the TOR. Monitoring well MW-1 was dry at the time of sampling and consequently was not sampled.

6.2 VISUAL INSPECTION REPORT

The visual inspection of the Tier II Soil Disposal Facility was conducted on August 17, 2013. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XIII of this report.

Settlement

An indication of minor settlement was noted at two proximate locations along the southwest crest of the facility cover (Feature A), consisting of two isolated depression measuring 0.25-1.0 m long, 0.2-0.25 m wide and 0.1-0.15 m in depth. This feature has an acceptable severity rating. Indications of settlement in this area were not noted during the previous 2012 inspection.


Tier II-45 (left): View south at minor depression on southwest crest (0.25 m L, 0.25 m W, 0.15 m D) - FEATURE A
Tier II-47: (right) View northwest at linear depression on southwest crest (1 m L, 0.2 m W, 0.1 m D) - FEATURE A

Erosion

Evidence of minor surface erosion was noted at two locations on the southwest and southeast facing slopes (Features B and C) of the facility. Both locations consisted of shallow surface erosion that extended from the crest down slope between 7 to 25 m (Feature B) and 6 m (Feature C) in length, ranged between 0.1-0.5m in width and ranged between 0.02 to 0.1 m deep. The areas affected appear to be self-armouring and have an acceptable severity rating. Overall, the facility cover appears stable. Both features were not noted during the previous 2012 inspection.


Tier II-42: (left) View south-southwest at minor erosion on southwest side slope (25 m L, 0.3-0.5 m W, 0.02-0.05 m D) - FEATURE B
Tier II-24: (right) View northwest at minor erosion on southeast side slope (6 m L, 0.1-0.25 m W, 0.05 m D) - 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
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 XIII: 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: PIN-2 Cape Young
LANDFILL DESIGNATION: Tier II Soil Disposal Facility (New Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: Tier II Disposal Facility
Designation: New Landfill\
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XIII: PIN-2, CAPE YOUNG - 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 PIN-2.4 (SW crest - New Obs.)	0.25 - 1 m	0.2 - 0.25 m	0.1 - 0.15 m	Isolated	Minor depressions	Tier II-44 - 48	Acceptable	Linear and oval shaped depressions
Erosion	Yes	FEATURE B See Figure PIN-2.4 (SW side slope- New Obs.)	7 - 25 m	0.2 - 0.5 m	0.02 - 0.1 m	Isolated	Minor erosion	Tier II-41 - 43	Acceptable	Washing of fines, self armouring. Slope appears stable.
		FEATURE C See Figure PIN-2.4 (SE side slope- New Obs.)	6 m	0.1 - 0.25 m	0.05 m	Isolated	Minor erosion	Tier II-23, 24	Acceptable	Washing of fines, self armouring. 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	Yes	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 PIN-2.4 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.

6.3 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 XIV hereafter.

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

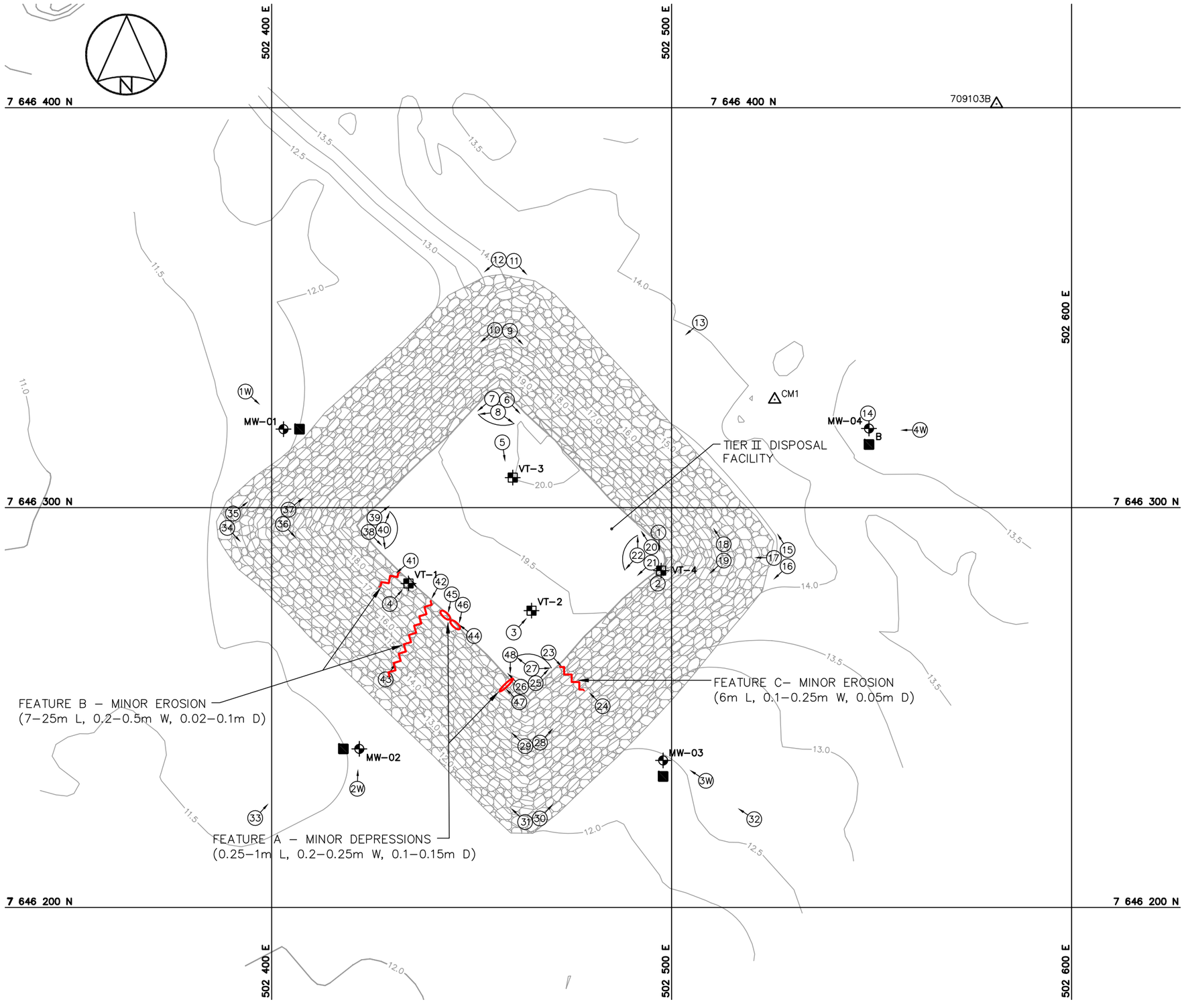
Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Acceptable	Isolated
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris exposure	Not observed	None
Overall Landfill Performance	**Acceptable**	

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

6.4 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 PIN-2.4.



LEGEND

- MONITORING WELL LOCATION (3)
- BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- MINOR EROSION (NTS)

0m 10m 20m 30m 40m 50m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14-01-22	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, 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:	VERIFIED BY:	APPROVED BY:
P. LÉGARÉ	A. PASSALIS	A. LECLAIR P. Eng.
PROJECT NO:	DRAWING NO:	PAGE
CD3654_200_203	CD3654_200_203-PIN-2D-PL	PL

FIGURE PIN-2.4

G:\CD3654\2013\FINAL\PIN-2\CD3654_200_203-PIN-2D-PL.dwg, PL, 2014-01-22 2:51:52 PM

6.5 PHOTOGRAPHIC RECORDS

The Photographic Record for the Tier II Soil Disposal Facility has been completed as per the TOR and is included as Table 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 – Tier II Soil Disposal Facility

Photo (Tier II-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_174	4,395	17/08/2013	502497	7646292	View looking southeast at VT-4
2	P213_176	4,384	17/08/2013	502496	7646283	Downloading data at VT-4
3	P213_183	4,360	17/08/2013	502461	7646270	View looking northeast at VT-2
4	P213_184	4,394	17/08/2013	502430	7646277	View looking northeast at VT-1
5	P213_187	4,401	17/08/2013	502458	7646316	View looking south-southeast at VT-3
6	P213_188	4,348	17/08/2013	502459	7646327	View looking southeast along northeast crest of Tier II DF
7	P213_189	4,297	17/08/2013	502456	7646327	View looking southwest along northwest crest of Tier II DF
8	P213_190	1,495	11/09/2013	502456	7646325	Panoramic view looking southeast to west from north corner of Tier II DF
9	P213_191	4,406	17/08/2013	502459	7646344	View looking southeast along northeast side slope of Tier II DF
10	P213_192	4,283	17/08/2013	502457	7646344	View looking southwest along northwest side slope of Tier II DF
11	P213_193	4,315	17/08/2013	502460	7646362	View looking southeast along northeast toe of Tier II DF
12	P213_194	4,299	17/08/2013	502458	7646362	View looking southwest along northwest toe of Tier II DF
13	P213_195	4,306	17/08/2013	502506	7646345	View looking southwest at northeast side of Tier II DF
14	P213_198	4,350	17/08/2013	502550	7646322	Water sampling at MW-04
15	P213_199	4,379	17/08/2013	502529	7646287	View looking northwest along northeast toe of Tier II DF
16	P213_200	4,443	17/08/2013	502529	7646288	View looking southwest along southeast toe of Tier II DF
17	P213_201	4,407	17/08/2013	502527	7646287	View west up east corner slope of Tier II DF
18	P213_202	4,270	17/08/2013	502513	7646288	View looking northwest along northeast side slope of Tier II DF
19	P213_203	4,430	17/08/2013	502513	7646290	View looking southwest along southeast side slope of Tier II DF
20	P213_204	4,368	17/08/2013	502495	7646287	View looking northwest along northeast crest of Tier II DF
21	P213_205	4,408	17/08/2013	502495	7646289	View looking southwest along southeast crest of Tier II DF
22	P213_206	1,437	11/09/2013	502493	7646288	Panoramic view looking southwest to north from east corner of Tier II DF
23	P213_207	4,305	17/08/2013	502470	7646263	View looking southeast at minor erosion on southeast side slope (6m L, 0.1-0.25m W, 0.05m D) - FEATURE C
24	P213_208	4,314	17/08/2013	502482	7646251	View looking northwest at minor erosion on southeast side slope (6m L, 0.1-0.25m W, 0.05m D) - FEATURE C
25	P213_209	4,371	17/08/2013	502465	7646256	View looking northeast along southeast crest of Tier II DF
26	P213_210	4,349	17/08/2013	502463	7646255	View looking northwest along southwest crest of Tier II DF
27	P213_211	1,471	11/09/2013	502464	7646258	Panoramic view looking northwest to east from south corner of Tier II DF
28	P213_212	4,422	17/08/2013	502466	7646241	View looking northeast along southeast side slope of Tier II DF
29	P213_213	4,348	17/08/2013	502464	7646241	View looking northwest along southwest side slope of Tier II DF
30	P213_214	4,409	17/08/2013	502466	7646222	View looking northeast along southeast toe of Tier II DF
31	P213_215	4,410	17/08/2013	502464	7646222	View looking northwest along southwest toe of Tier II DF
32	P213_216	4,309	17/08/2013	502520	7646222	View looking northwest at southeast side of Tier II DF. MW-03 in center
33	P213_217	4,451	17/08/2013	502396	7646223	View looking northeast at southwest side of Tier II DF. MW-02 in center

Photo (Tier II-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
34	P213_218	4,423	17/08/2013	502390	7646296	View looking southeast along southwest toe of Tier II DF
35	P213_219	4,342	17/08/2013	502390	7646297	View looking northeast along northwest toe of Tier II DF
36	P213_220	4,310	17/08/2013	502403	7646297	View looking southeast along southwest side slope of Tier II DF
37	P213_221	4,258	17/08/2013	502404	7646298	View looking northeast along northwest side slope of Tier II DF
38	P213_222	4,291	17/08/2013	502425	7646295	View looking southeast along southwest crest of Tier II DF
39	P213_223	4,401	17/08/2013	502426	7646297	View looking northeast along northwest crest of Tier II DF
40	P213_224	1,345	11/09/2013	502427	7646295	Panoramic view looking northeast to south from west corner of Tier II DF
41	P213_225	4,269	17/08/2013	502433	7646287	View looking southwest at minor erosion on southwest side slope (7m L, 0.2-0.5m W, 0.05-0.1m D) - FEATURE B
42	P213_226	4,262	17/08/2013	502441	7646281	View looking south-southwest at minor erosion on southwest side slope (25m L, 0.3-0.5m W, 0.02-0.05m D) - FEATURE B
43	P213_227	4,324	17/08/2013	502429	7646258	View looking north-northeast at minor erosion on southwest side slope (25m L, 0.3-0.5m W, 0.02-0.05m D) - FEATURE B
44	P213_228	4,277	17/08/2013	502450	7646269	View looking northwest at minor depression on southwest crest (0.25m L, 0.25m W, 0.15m D) - FEATURE A
45	P213_229	4,318	17/08/2013	502445	7646278	View looking south at minor depression on southwest crest (0.25m L, 0.25m W, 0.15m D) - FEATURE A
46	P213_231	4,327	17/08/2013	502448	7646276	View looking south at minor depression on southwest crest (0.25m L, 0.25m W, 0.10m D) - FEATURE A
47	P213_232	4,375	17/08/2013	502461	7646252	View looking northwest at linear depression on southwest crest (1m L, 0.2m W, 0.1m D) - FEATURE A
48	P213_233	4,451	17/08/2013	502460	7646262	View looking south at linear depression on southwest crest (1m L, 0.2m W, 0.1m D) - FEATURE A
Soil Sampling						
1W	P213_185	4,413	17/08/2013	502400	7646325	Sampling location P213-1W located upgradient of Tier II DF
MW1	P213_186	4,416	17/08/2013	502394	7646329	View looking southeast at MW-01 located upgradient of Tier II DF
2W	P213_181	4,409	17/08/2013	502419	7646235	Sampling location P213-2W located downgradient of Tier II DF
MW2	P213_182	4,372	17/08/2013	502420	7646230	View looking north MW-02 located downgradient of Tier II DF
3W	P213_179	4,405	17/08/2013	502502	7646235	Sampling location P213-3W located downgradient of Tier II DF
MW3	P213_180	4,441	17/08/2013	502508	7646232	View looking northwest at MW-03 located downgradient of Tier II DF
4W	P213_196	4,409	17/08/2013	502555	7646320	Sampling location P213-4W located downgradient of Tier II DF
MW4	P213_197	4,317	17/08/2013	502562	7646320	View looking west at MW-04 located downgradient of Tier II DF

6.6 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 with the exception of VT-1, where all communication failed due to extremely low battery levels. All analogues/thermocouples were observed to be functioning properly at the time of inspection. Batteries were replaced in all datalogger units as specified in the TOR and internal memories were reset and clocks were synchronized using the Prolog software.

Analogues/thermocouples at the remaining thermistor locations were observed to be functioning properly at the time of the inspection. Further review of the downloaded data identified no apparent errors in temperature readings. All clocks exhibited slight drifts and were synchronized using the Prolog software.

No battery replacements or maintenance is anticipated for the 2014 monitoring period. Checklist/Report has been completed as per the TOR and is included as Table XXI of this report.

6.7 LANDFILL TEMPERATURE DATA FROM DATALOGGERS

Manual resistive and temperature data readings were collected from the thermistor strings as per the TOR, with the exception of VT-1 where low battery conditions were observed. Attempts to reprogram the datalogger were unsuccessful at the time of the inspection due to an invalid sample rate. 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 periods has been forwarded to DCC as per the TOR. Table XVI presented below contains the manual thermistor readings.

Table XVI: Thermal monitoring data – Tier II Soil Disposal Facility

Thermistor	Bead	Ohms	Temperature	Thermistor	Bead	Ohms	Temperature
VT-1	1	9.555	10.8425	VT-3	1	9.621	10.6990
	2	10.049	9.7944		2	10.411	9.0625
	3	10.758	8.3874		3	11.978	6.1951
	4	11.972	6.2053		4	14.272	2.6816
	5	14.104	2.9166		5	16.505	-0.1762
	6	16.098	0.3111		6	17.040	-0.7966
	7	16.60	-0.288		7	18.524	-2.4093
	8	17.783	-1.6229		8	19.806	-3.6901
	9	19.313	-3.2089		9	20.94	-4.7481
	10	20.27	-4.131		10	21.59	-5.3259
	11	20.91	-4.7209		11	22.26	-5.9016
	12	21.6	-5.3347		12	22.48	-6.0864
	13	22.05	-5.7233		-	-	-
	14	22.49	-6.0948		-	-	-
	15	22.73	-6.294		-	-	-
	16	22.91	-6.4419		-	-	-
VT-2	1	9.514	10.9322	VT-4	1	9.9219	10.0603
	2	9.792	10.3322		2	10.502	8.8831
	3	9.904	10.0959		3	12.129	5.9414
	4	11.200	7.5622		4	14.440	2.4496
	5	12.899	4.7004		5	16.399	-0.0506
	6	15.971	0.4660		6	17.965	-1.8194
	7	16.369	-0.0149		7	18.776	-2.6688
	8	16.784	-0.5025		8	20.05	-3.9234
	9	17.906	-1.7559		9	20.690	-4.5204
	10	18.904	-2.7991		10	21.26	-5.0350
	11	19.869	-3.7507		11	21.47	-5.2207
	12	20.76	-4.5845		12	21.97	-5.6549
	13	21.32	-5.0883		13	22.18	-5.8339
	-	-	-		14	22.41	-6.0278
	-	-	-		15	22.65	-6.2279
	-	-	-		16	22.75	-6.3105

6.8 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 XVII and XVIII 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 XVII: 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]	TPH [mg/kg]
Downgradient Groundwater Samples																
P213-1WA	Tier II MW-01	0-10	2.5	0.25	3.9	1.9	6.2	2.8	<0.050	3.7	23	<0.01	<12	<10	<50	<50
P213-1WB		40-50	4.5	0.21	3.9	1.4	6.2	2.8	<0.050	4.0	12	<0.01	<12	<10	<50	<50
P213-2WA	Tier II MW-02	0-10	1.9	0.20	4.9	1.2	7.0	1.9	<0.050	4.4	<10	<0.018	<24	<20	<100	<100
P213-2WB		40-50	4.4	0.13	5.2	1.5	5.6	2.6	<0.050	4.5	11	<0.01	<12	<10	<50	<50
P213-3WA	Tier II MW-03	0-10	2.7	0.22	4.7	1.8	<5.0	3.3	<0.050	3.7	22	<0.01	<12	<10	<50	<50
P213-3WB		40-50	2.7	0.11	5.6	1.9	<5.0	3.0	<0.050	4.0	14	<0.01	<12	<10	<50	<50
Upgradient Groundwater Samples																
P213-4WA	Tier II MW-04	0-10	1.5	<0.10	3.9	1.1	<5.0	2.4	<0.050	2.6	<10	<0.01	<12	<10	<10	<50
P213-4WB		40-50	4.1	0.13	5.2	2.2	<5.0	6.1	<0.050	3.8	13	<0.01	<12	<10	<50	<50

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})
* - Detection limit raised due to high moisture content in sample.

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

Parameter	2013
Copper	Detectable concentrations were noted at two monitoring locations, MW-01 situated upgradient and MW-02 situated downgradient on the southwest side of the facility. Concentrations ranged between 5.6-7.0 mg/kg with concentrations at the remaining two locations less than 5.0 mg/kg. The most elevated concentration was observed at downgradient location MW-02 at surface.
Nickel	Detectable concentrations were noted at all sample locations, ranging between 2.6-4.5 mg/kg with a mean of 3.8. The most elevated concentrations were observed at downgradient location MW- 02 (surface – 4.4 mg/kg, depth – 4.5 mg/kg). Concentrations at the upgradient location and remaining downgradient locations ranged between 2.6-4.0 mg/kg.
Cobalt	Concentrations in the samples ranged between 1.1-2.2 mg/kg with detectable concentrations noted at all sample locations. The highest concentration was noted at downgradient location MW-04 (depth – 2.2 mg/kg). Detectable concentrations at all other locations ranged between 1.1-1.9 mg/kg.
Lead	Concentrations ranged between 1.9-6.1 mg/kg with a mean of 3.1. Trace concentrations were observed at all locations with the highest concentrations noted at downgradient locations MW-03 (surface – 3.3 mg/kg, depth – 3.0 mg/kg) and MW-04 (depth – 6.1 mg/kg). Detectable concentrations at all other locations ranged between 1.9-2.8 mg/kg.
Zinc	Detectable concentrations were noted at all but two downgradient surface locations (MW-02 and MW-04). Detectable concentrations ranged between 11-23 mg/kg with the most elevated concentrations observed at upgradient location MW-01 (surface – 23 mg/kg) and downgradient location MW-03 (surface – 22 mg/kg). All other samples reported concentrations between 11-14 mg/kg.
Chromium	Concentrations ranged between 3.9-5.6 mg/kg with a mean of 4.7. The highest concentrations were generally noted at downgradient depth locations, MW-02 (depth – 5.2 mg/kg), MW-03 (depth – 5.6 mg/kg) and MW-04 (depth – 5.2 mg/kg). Concentrations at all other locations ranged between 3.9-4.9 mg/kg.
Arsenic	Detectable concentrations were noted at all sample locations, ranging between 1.5-4.5 mg/kg with a mean of 3.0. The most elevated concentrations were observed at upgradient location MW-01 (depth – 4.5 mg/kg), downgradient location MW-02 (depth – 4.4 mg/kg) and downgradient location MW-04 (depth – 4.1 mg/kg). Concentrations at the remaining downgradient locations ranged between 1.5-2.7 mg/kg.
Mercury	All reported concentrations were less than the method detection limit (0.05 mg/kg).
PCBs	All reported concentrations were less than the method detection limit (0.01 mg/kg). Detection limits were raised for P213-2WA due to high moisture content.
TPH	All reported concentrations were less than the method detection limit (10 mg/kg). Detection limits were raised for P213-2WA due to high moisture content.

6.9 GROUNDWATER SAMPLE ANALYTICAL DATA

The groundwater chemical analysis results and evaluation of analytical data for the 2013 Tier II Disposal Facility samples are presented in Tables XIX and XX. As noted above, MW-01 (upgradient location) contained insufficient sample volume at the time of monitoring and consequently no groundwater samples were collected at this location. Certificates of analysis and groundwater samples collected as part of the QA/QC program are presented in Appendix C.

Table XIX: Groundwater Chemical Analysis Results – Tier II Soil Disposal Facility

Sample Name	Sample Location	Parameters													
		As [mg/L]	**Cd** [mg/L]	**Cr** [mg/L]	**Co** [mg/L]	**Cu** [mg/L]	**Pb** [mg/L]	**Hg** [µg/L]	**Ni** [mg/L]	**Zn** [mg/L]	**PCBs** [mg/L]	**PHC(F1)** [mg/L]	**PHC(F2)** [mg/L]	**PHC(F3)** [mg/L]	**TPH** [mg/L]
Downgradient Groundwater Samples															
P213-1W	Tier II MW-01	Insufficiant sample volume													
Upgradient Groundwater Samples															
P213-2W	Tier II MW-02	0,0012	0,000057	0,027	0,00038	0,0024	0,00037	<0.0050	0,015	0,013	<0.00005	<0.1	<0.1	<0.2	<0.2
P213-3W	Tier II MW-03	0,00083	0,00015	0,0027	<0.00030	0,0039	<0.00020	<0.0050	0,0071	0,0061	<0.00005	<0.1	<0.1	<0.2	<0.2
P213-4W	Tier II MW-04	0,0018	0,00012	0,011	0,00059	0,0032	0,0011	<0.0050	0,011	0,057	<0.00005				

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

Parameter	2010
Copper	Concentrations ranged between 0.0024-0.0039 mg/L, with the most elevated concentration noted at downgradient location MW-03.
Nickel	Concentrations ranged between 0.0071-0.0150 mg/L, with the highest concentration noted at downgradient location MW-02.
Cobalt	Concentrations ranged between <0.00030-0.00059 mg/L, with the most elevated concentration noted at downgradient location MW-04.
Cadmium	Concentrations ranged between 0.000057-0.000150 mg/L. The highest concentration was noted at MW-03.
Lead	Concentrations ranged between <0.0002-0.0011 mg/L, with the highest concentration noted at MW-04.
Zinc	Concentrations ranged between 0.0061-0.0570 mg/L, with the highest concentration noted at MW-04.
Chromium	Concentrations ranged between 0.0027-0.0270 mg/L, with the highest concentration observed at MW-02.
Arsenic	Concentrations ranged between 0.00083-0.00180 mg/L, with the highest concentration noted at MW-04.
Mercury	All reported concentrations were less than the method detection limit (0.005 µg/L).
PCBs	All reported concentrations were less than the method detection limit (0.00005 mg/L).
TPH	All reported concentrations were less than the method detection limit (0.2 mg/L).

Table XXI: Thermistor Annual Maintenance Report (VT-1)

DEFENCE CONSTRUCTION CANADA

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**2013-08-17**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**PIN-2**	Thermistor Location		**Tier II Disposal Facility**			
Thermistor Number:	**VT-1**	Inclination		**Vertical**			
Install Date:		First Date Event		**2009-08-01**	Last Date Event		**2012-08-11**
Coordinates and Elevation	N	**7646281.0**	E	**502434.2**	Elev	**19.1**	
Length of Cable (m)		Cable Lead Above Ground (m)	**3.25**	Nodal Points			**16**
Datalogger Serial #	**7040010**			Cable Serial Number			**VT-1**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	
Data Logger	**Yes**	**Yes**	Unable to reprogram settings
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	
Battery Installation Date	**2013-08-17**		
Battery Levels	Main **11.34**	Aux **13.38**	

Manual Ground Temperature Readings

Bead	ohms	Degrees C	Bead	ohms	Degrees C
1	9.555	10.8425	9	19.313	-3.2089
2	10.049	9.7944	10	20.27	-4.131
3	10.758	8.3874	11	20.91	-4.7209
4	11.972	6.2053	12	21.6	-5.3347
5	14.104	2.9166	13	22.05	-5.7233
6	16.098	0.3111	14	22.49	-6.0948
7	16.604	-0.288	15	22.73	-6.294
8	17.783	-1.6229	16	22.91	-6.4419

Observations and Proposed Maintenance

Batteries dead upon arrival - unable to communicate with computer (clock error). Replaced batteries and completed full memory dump - File: Site_096_i *_Aug_17_2013

Reset clock and memory however error indicating wrong time interval. Reset with standard programming.

Unable to reinstall datalogger, unable to read sensors.

Table XXI: Thermistor Annual Maintenance Report (VT-2)

DEFENCE CONSTRUCTION CANADA

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**2013-08-17**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**PIN-2**	Thermistor Location		**Tier II Disposal Facility**			
Thermistor Number:	**VT-2**	Inclination		**Vertical**			
Install Date:		First Date Event		**2009-08-01**	Last Date Event		**2012-08-11**
Coordinates and Elevation	N	**7646274.2**	E	**502465.0**		Elev	**19.2**
Length of Cable (m)		Cable Lead Above Ground (m)	**3.25**	Nodal Points			**13**
Datalogger Serial #	**7050024**			Cable Serial Number			**VT-2**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	Cover cracked, however still functional
Data Logger	**Yes**	**No**	
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	
Battery Installation Date	**2013-08-17**		
Battery Levels	Main **11.34 (11.34-old)**	Aux	**13.76 (13.63-old)**

Manual Ground Temperature Readings

Bead	ohms	Degrees C	Bead	ohms	Degrees C
1	9.514	10.9322	9	17.906	-1.7559
2	9.792	10.3322	10	18.904	-2.7991
3	9.904	10.0959	11	19.869	-3.7507
4	11.2	7.5622	12	20.76	-4.5845
5	12.899	4.7004	13	21.32	-5.0883
6	15.971	0.466	14	-	-
7	16.369	-0.0149	15	-	-
8	16.784	-0.5025	16	-	-

Observations and Proposed Maintenance

Downloaded thermistor data. File: Site_024_PIN-2_Aug_17_2013.

Reset clock and restart datalogger. Replaced batteries.

Table XXI: Thermistor Annual Maintenance Report (VT-3)

DEFENCE CONSTRUCTION CANADA

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**2013-08-17**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**PIN-2**	Thermistor Location		**Tier II Disposal Facility**			
Thermistor Number:	**VT-3**	Inclination		**Vertical**			
Install Date:		First Date Event		**2009-08-01**	Last Date Event		**2012-08-11**
Coordinates and Elevation	N	**7646307.5**	E	**502460.3**		Elev	**20.0**
Length of Cable (m)		Cable Lead Above Ground (m)	**2.15**	Nodal Points			**12**
Datalogger Serial #	**7050029**			Cable Serial Number			**VT-3**

Thermistor Inspection

	Good	Needs Maintenance
Casing	**Yes**	**No**
Cover	**Yes**	**No**
Data Logger	**Yes**	**No**
Cable	**Yes**	**No**
Beads	**Yes**	**No**
Battery Installation Date	**2013-08-17**	
Battery Levels	Main **11.34 (11.34-old)**	Aux **13.14 (13.26-old)**

Manual Ground Temperature Readings

Bead	ohms	Degrees C	Bead	ohms	Degrees C
1	9.621	10.699	9	20.94	-4.7481
2	10.411	9.0625	10	21.59	-5.3259
3	11.978	6.1951	11	22.26	-5.9016
4	14.272	2.6816	12	22.48	-6.0864
5	16.505	-0.1762	13	-	-
6	17.04	-0.7966	14	-	-
7	18.524	-2.4093	15	-	-
8	19.806	-3.6901	16	-	-

Observations and Proposed Maintenance

Downloaded thermistor data. File: Site_029_PIN-2_Aug_17_2013.

Reset clock and restarted datalogger. Replaced batteries.

Table XXI: Thermistor Annual Maintenance Report (VT-4)

DEFENCE CONSTRUCTION CANADA

Contractor Name:	**Sila Remediation Inc.**	Inspection Date:	**2013-08-17**
Prepared By:	**A.Passalis**		

Thermistor Information

Site Name:	**PIN-2**	Thermistor Location		**Tier II Disposal Facility**			
Thermistor Number:	**VT-4**	Inclination		**Vertical**			
Install Date:		First Date Event		**2009-08-01**	Last Date Event		**2012-08-11**
Coordinates and Elevation	N	**7646284.2**	E	**502497.4**		Elev	**19.9**
Length of Cable (m)		Cable Lead Above Ground (m)	**2.50**	Nodal Points			**16**
Datalogger Serial #	**7010044**			Cable Serial Number			**VT-4**

Thermistor Inspection

	Good	Needs Maintenance	
Casing	**Yes**	**No**	
Cover	**Yes**	**No**	
Data Logger	**Yes**	**No**	
Cable	**Yes**	**No**	
Beads	**Yes**	**No**	Intermittent bad readings from Bead 1 and Bead 9
Battery Installation Date	**2013-08-17**		
Battery Levels	Main **11.34 (11.34-old)**	Aux **13.75 (13.02-old)**	

Manual Ground Temperature Readings

Bead	ohms	Degrees C	Bead	ohms	Degrees C
1	9.9219	10.0603	9	20.69	-4.5204
2	10.502	8.8831	10	21.26	-5.035
3	12.129	5.9414	11	21.47	-5.2207
4	14.44	2.4496	12	21.97	-5.6549
5	16.399	-0.0506	13	22.18	-5.8339
6	17.965	-1.8194	14	22.41	-6.0278
7	18.776	-2.6688	15	22.65	-6.2279
8	20.05	-3.9234	16	22.75	-6.3105

Observations and Proposed Maintenance

Downloaded thermistor data. File: Site_044_PIN-2_Aug_17_2013.

Reset clock and restarted datalogger. Replaced batteries.

6.10 MONITORING WELL SAMPLING/INSPECTION LOGS (MW-1 TO MW-4)

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

2013 Monitoring Well Sampling Log (MW-1)

Site name:	PIN-2
Date of sampling event:	17-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-1
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	3.40
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.04

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	2.24
Well height above ground (m):	0.55	Depth to bottom (m):	2.30
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	0.06 (dry)	Evidence of sludge:	no
Well volume of water (L):	-	Evidence of freezing/siltation:	no
Static water level* (m):	-		
Length of screen collecting water (m):	-		

Development/Purging Information

Equipment:	N/A

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

Water Sampling		Soil Sampling	
Date & Time Collected:	-	Date and Time Collected:	17-Aug-13
Sample Number - Water:		Sample Number - Soil:	P213-1WA (BD1)
			P213-1WB
Sample Containers:		Sample Containers:	9x125mL glass/2xbag
			2x125mL glass/1xbag
Procedure/Equipment:		Procedure/Equipment:	Steel & Plastic Trowels
Water Description:		Soil Description:	Dark brown and broken rock, platey, trace organics, 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-2)

Site name:	PIN-2
Date of sampling event:	17-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-2
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	3.40
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.40

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.47
Well height above ground (m):	0.53	Depth to bottom (m):	2.93
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations

Depth of water (m):	1.46
Well volume of water (L):	1.66
Static water level* (m):	0.94
Length of screen collecting water (m):	1.46

Notes

Evidence of sludge:	no
Evidence of freezing/siltation:	

Development/Purging Information

Equipment: Dedicated waterra tubing and foot valve

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
17-Aug-13	2.0	2.4	6.9	345	69	Translucent, N/O

Water Sampling

Date & Time Collected:	17-Aug-13
Sample Number - Water:	P213-2W (BDW1)
Sample Containers:	6x500mL, 6x250mL amber
	3x200mL plastic, 3x100mL
	amber, 9x40mL vials
Procedure/Equipment:	Waterra tubing & foot valve Oakton PCD650 Mulitmeter, Hach 2100P Turbidimeter
Water Description:	Translucent, light grey, no odour
Sampling Equipment Decontamination (Y/N):	N/A
Number Washes:	-
Number Rinses:	-

Soil Sampling

Date and Time Collected:	17-Aug-13
Sample Number - Soil:	P213-2WA
	P213-2WB
Sample Containers:	2x125mL glass/1xbag
	2x125mL glass/1xbag
Procedure/Equipment:	Steel & Plastic Trowels
Soil Description:	Dark brown to brown/ grey rock with med gr. sand, damp
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

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

2013 Monitoring Well Sampling Log (MW-3)

Site name:	PIN-2
Date of sampling event:	17-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-3
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	3.40
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.40

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	2.04
Well height above ground (m):	0.46	Depth to bottom (m):	2.74
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations

Depth of water (m):	0.70
Well volume of water (L):	0.79
Static water level* (m):	1.58
Length of screen collecting water (m):	0.70

Notes

Evidence of sludge:	no
Evidence of freezing/siltation:	no

Development/Purging Information

Equipment: Dedicated waterra tubing and foot valve

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
17-Aug-13	0.8	3.7	6.5	514	247	Translucent, N/O

Water Sampling

Date & Time Collected:	17-Aug-13
Sample Number - Water:	P213-3W
Sample Containers:	2x500mL, 2x250mL amber
	200mL plastic, 100mL amber
	3x40mL vials
Procedure/Equipment:	Waterra tubing & foot valve Oakton PCD650 Mulitmeter, Hach 2100P Turbidimeter
Water Description:	Translucent, grey, no odour
Sampling Equipment Decontamination (Y/N):	N/A
Number Washes:	-
Number Rinses:	-

Soil Sampling

Date and Time Collected:	17-Aug-13
Sample Number - Soil:	P213-3WA
	P213-3WB
Sample Containers:	2x125mL glass/1xbag
	2x125mL glass/1xbag
Procedure/Equipment:	Steel & Plastic Trowels
Soil Description:	Dark brown rock, some f-med gr sand, with organics, dry
Sampling Equipment Decontamination (Y/N):	Y
Number Washes:	1
Number Rinses:	1

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

2013 Monitoring Well Sampling Log (MW-4)

Site name:	PIN-2
Date of sampling event:	17-Aug-13
Names of samplers:	Andrew Passalis
Monitoring well ID:	MW-4
Facility:	Tier II Disposal Facility

Known Data

Depth of installation* (m):	3.40
Length of screened section (m):	3.00
Depth to top of screen* (m):	0.40

Measured Data

Condition of well:	Good	Procedure/Equipment:	Interface Meter
Procedure/Equipment:	Measuring Tape	Depth to water surface (m):	1.66
Well height above ground (m):	0.54	Depth to bottom (m):	2.98
Diameter of well (m):	0.04	Free product thickness (mm):	-

Calculations		Notes	
Depth of water (m):	1.32	Evidence of sludge:	no
Well volume of water (L):	1.50	Evidence of freezing/siltation:	
Static water level* (m):	1.12		
Length of screen collecting water (m):	1.32		

Development/Purging Information

Equipment:	Dedicated waterra tubing and foot valve

Date & Time	Volume Removed (L)	Temperature (^{o}C)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Description of Water
17-Aug-13	2.0	3.0	6.9	778	105	Translucent, N/O

Water Sampling		Soil Sampling	
Date & Time Collected:	17-Aug-13	Date and Time Collected:	17-Aug-13
Sample Number - Water:	P213-4W	Sample Number - Soil:	P213-4WA
			P213-4WB
Sample Containers:	2x500mL, 2x250mL amber	Sample Containers:	2x125mL glass/1xbag
	200mL plastic, 100mL amber		2x125mL glass/1xbag
	3x40mL vials		
Procedure/Equipment:	Waterra tubing & foot valve Oakton PCD650 Mulitmeter, Hach 2100P Turbidimeter	Procedure/Equipment:	Steel & Plastic Trowels
Water Description:	Translucent, light grey, no odour	Soil Description:	Brown to light brown sand, with gravel, trace organics, 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

7 AIRSTRIP SOUTH LANDFILL

7.1 BACKGROUND AND MONITORING PROGRAM

The Airstrip South Landfill is located within a former borrow area southwest of the station and south of the airstrip. A geophysical survey identified an anomaly of buried debris 1,420 m^2 in size. The landfill, including granular cover, encompasses a footprint of approximately 2,800 m^2 with the final cover extending between 0.5 to 0.75 m above the surrounding grade.

The Airstrip South Landfill is classified as a low potential environmental risk. Contaminant source and pathways components were low due to the restricted potential for contaminant migration and low quantity of debris exposure. The receptors component was also low, due to low receptor sensitivity proximal to the landfill area. Accordingly, the landfill was remediated by excavating the Tier II soils, removing the surface debris and regrading the landfill with 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.

7.2 VISUAL INSPECTION REPORT

The visual inspection of the Airstrip South Landfill was conducted on August 17, 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 settlement were not noted at the landfill.

Erosion
During the assessment, no existing erosion was noted at the landfill.

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
There were no other features of note at the landfill.

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

Table XXII: Visual Inspection Checklist / Report – Airstrip South Landfill

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

SITE NAME: PIN-2 Cape Young
LANDFILL DESIGNATION: Airstrip South Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: Airstrip South Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXII: PIN-2, CAPE YOUNG - AIRSTRIP SOUTH 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 PIN-2.5 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.

7.3 PRELIMINARY STABILITY ASSESSMENT

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

Table XXIII: Preliminary Stability Assessment – Airstrip South 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

7.4 LOCATION PLAN

The Location Plan for the Airstrip South Landfill has been completed as per the TOR and is presented in Figure PIN-2.5.

503 100 E

503 175 E

503 250 E

7 646 300 N

7 646 225 N

14.0

15.0

16.0

P2–16

P2–15

P2–13

P2–14

5

6

4

1

3

2

ACCESS ROAD

AIRSTRIP SOUTH LANDFILL

APPROX. ACCESS ROAD

LEGEND

- MONITORING SOIL SAMPLE LOCATION (4)
- (4) APPROX. PHOTOGRAPHIC VIEWPOINT
- BODY OF WATER

0m 7.5m 15.0m 22.5m 30.0m 37.5m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–22	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

AIRSTRIP SOUTH LANDFILL

SITE REMEDIATION SOLUTIONS

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Quebec, (Quebec) CANADA G1P 2J7
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MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 750	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2E-PL	PAGE PL

FIGURE PIN-2.5

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7.5 PHOTOGRAPHIC RECORDS

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

Table XXIV: Landfill Visual Inspection Photo Log – Airstrip South Landfill

Photo (ASLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213-377	3,705	17/08/2013	503229	7646268	View looking north along east side of Airstrip South Landfill
2	P213-378	3,586	17/08/2013	503210	7646249	View looking northeast at south side of Airstrip South Landfill
3	P213-379	1,063	17/08/2013	503206	7646261	Panoramic view looking northwest to northeast from southwest corner of Airstrip South Landfill
4	P213-380	3,576	17/08/2013	503184	7646313	View looking east-northeast along north side of Airstrip South Landfill
5	P213-381	3,703	17/08/2013	503202	7646327	View looking south at north side of Airstrip South Landfill
6	P213-382	3,596	17/08/2013	503223	7646299	View south along east side of Airstrip South Landfill

8 PALLET LINE WEST LANDFILL

8.1 BACKGROUND AND MONITORING PROGRAM

The Pallet Line West Landfill is located approximately 330 m southwest of the main pallet line for the Station. There is a trail from the southwest corner of the pallet line leading to the regrade area. The overall area is very cobbly, with shallow bedrock. The landfill has one regrade area, including a granular fill cover encompassing a footprint of approximately 5,500 m^2 with the final cover extending approximately 0.75 m to 1.0 m above the surrounding grade.

The Pallet Line West Landfill is classified as a low potential environmental risk. Contaminant source was a high potential environmental risk due to presence of contaminated soil and surface debris. The pathways and receptors were low because of low potential for contaminant migration and lack of sensitive receptors nearby. Accordingly, the landfill was remediated by excavating the Tier II soils, removing the surface debris and regrading the landfill with 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 Pallet Line West Landfill was conducted on August 17, 2013. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XXV of this report.

Settlement
Indications of settlement were not noted at the landfill.

Erosion
During the assessment, no existing erosion was noted at the landfill.

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
There were no other features of note at the landfill.

Discussion
The Pallet Line 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 XXV: Visual Inspection Checklist / Report – Pallet Line West Landfill

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

SITE NAME: PIN-2 – Cape Young
LANDFILL DESIGNATION: Pallet Line West Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: Pallet Line West Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXV: PIN-2, CAPE YOUNG - PALLET LINE WEST 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 PIN-2.6 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**									

8.3 PRELIMINARY STABILITY ASSESSMENT

The Preliminary Stability Assessment for Pallet Line West Landfill has been completed as per the TOR and is included as Table XXVI below.

Table XXVI: Preliminary Stability Assessment – Pallet Line West Landfill

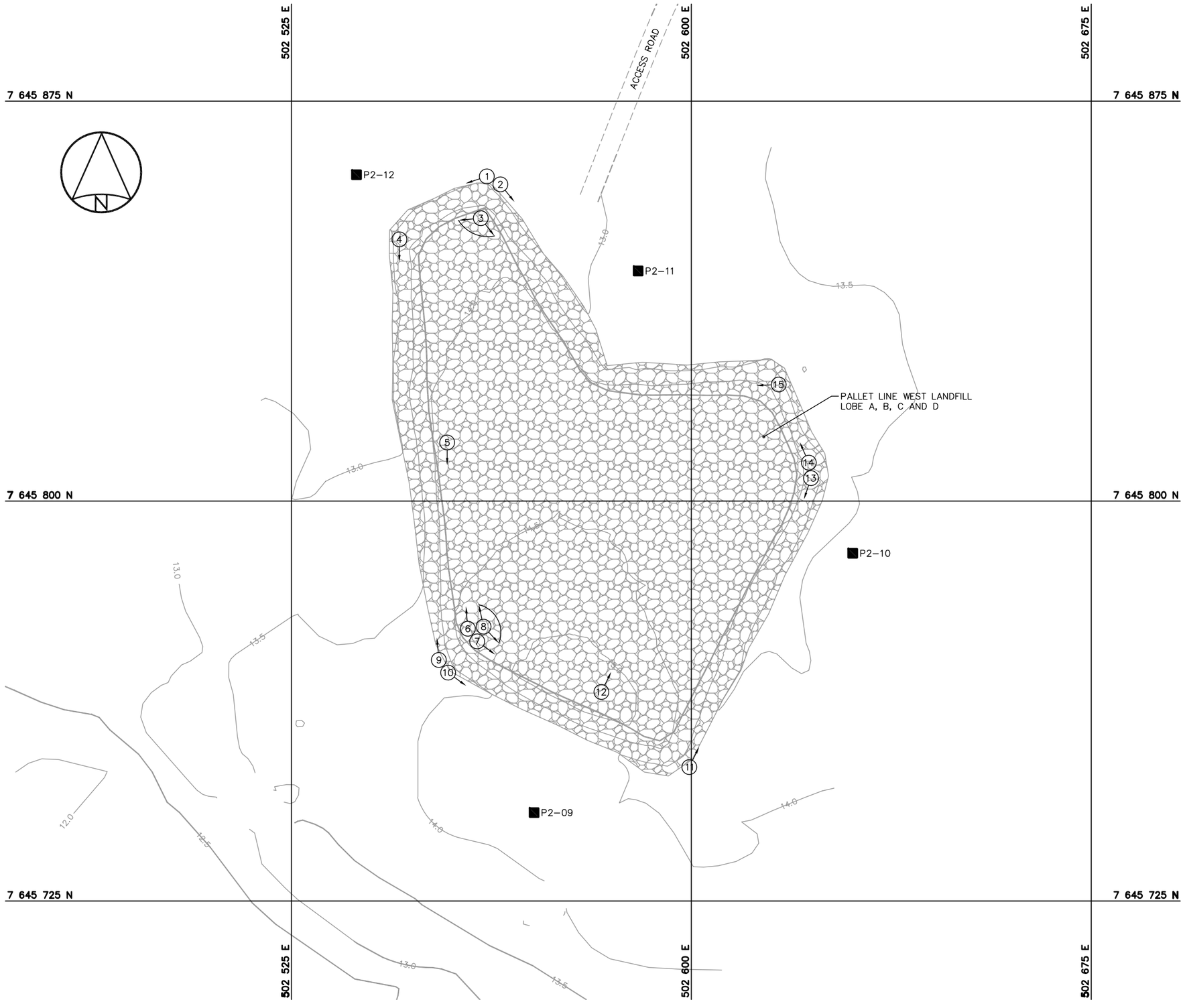
Feature	Severity Rating	Extent
Settlement	Not observed	None
Erosion	Not observed	None
Frost Action	Not observed	None
Staining	Not observed	None
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Not observed	None
Debris exposure	Not observed	None
Overall Landfill Performance	**Acceptable**	

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

8.4 LOCATION PLAN

The Location Plan for the Pallet Line West Landfill has been completed as per the TOR and is presented in Figure PIN-2.6.



LEGEND

- MONITORING SOIL SAMPLE LOCATION (6)
- (4) APPROX. PHOTOGRAPHIC VIEWPOINT

0m 7.5m 15.0m 22.5m 30.0m 37.5m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–22	P.L.	A.P.	A.L.

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Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

PALLET LINE WEST 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 : 750	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2F-PL	PAGE PL

FIGURE PIN-2.6

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8.5 PHOTOGRAPHIC RECORDS

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

Table XXVII: Landfill Visual Inspection Photo Log – Pallet Line West Landfill

Photo (PLW-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_310	4,373	17/08/2013	502562	7645860	View looking southwest along north side of Pallet Line West Landfill
2	P213_311	4,380	17/08/2013	502563	7645860	View looking southeast along northeast side of Pallet Line West Landfill
3	P213_312	1,204	11/09/2013	502560	7645854	Panoramic view looking southeast to west across north cover of Pallet Line West Landfill
4	P213_313	4,438	17/08/2013	502546	7645849	View looking south along west side of Pallet Line West Landfill
5	P213_314	4,459	17/08/2013	502554	7645811	View looking south along west crest of Pallet Line West Landfill
6	P213_316	4,409	17/08/2013	502559	7645775	View looking north along west crest of Pallet Line West Landfill
7	P213_317	4,383	17/08/2013	502559	7645775	View looking southeast along southwest crest of Pallet Line West Landfill
8	P213_318	1,220	11/09/2013	502560	7645776	Panoramic view looking north to southeast across cover from southwest corner of Pallet Line West Landfill
9	P213_319	4,371	17/08/2013	502553	7645771	View looking north along west toe of Pallet Line West Landfill
10	P213_320	4,277	17/08/2013	502554	7645769	View looking southeast along southwest toe of Pallet Line West Landfill
11	P213_321	4,347	17/08/2013	502599	7645750	View looking north-northeast along east toe of Pallet Line West Landfill
12	P213_322	4,384	17/08/2013	502583	7645764	View looking north-northeast across south cover of Pallet Line West Landfill
13	P213_323	4,348	17/08/2013	502622	7645805	View looking south-southwest along east side of Pallet Line West Landfill
14	P213_324	4,401	17/08/2013	502622	7645806	View looking north-northwest along northeast side of Pallet Line West Landfill
15	P213_325	4,377	17/08/2013	502616	7645821	View looking west along north side of Pallet Line West Landfill

9 NON-HAZARDOUS WASTE LANDFILL

9.1 BACKGROUND AND MONITORING PROGRAM

The Non-Hazardous Waste Landfill (NHWLF) is located near the intersection of the main station access road and the Harding River Road. The landfill, including granular cover, encompasses a footprint of approximately 6,900 m^2 with the final cover extending between 3.0 to 4.5 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.

9.2 VISUAL INSPECTION REPORT

The visual inspection of the NHWLF was conducted on August 17, 2013. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XXVIII of this report.

Settlement
One area of minor settlement (Feature A) was noted on the southwest crest of the landfill, consisting of an isolated depression measuring 1.5 m long, 0.2-0.3 m wide and 0.05 m deep. This feature was not observed during the previous 2012 inspection.

NHWLF-19: View northwest at minor linear depression on southwest crest (1.5 m L, 0.2-0.3 m W, 0.05 m D) - FEATURE A

Erosion

Evidence of minor surface erosion was noted at three locations on the southeast corner slope (Feature B) of the NHWLF. All locations consisted of shallow surface erosion that extended between 7 to 17 m down slope from the crest, ranged between 0.1-0.15m in width and were 0.05-0.07m deep. The areas affected appear to be self-armouring and have an acceptable severity rating. Overall, the landfill cover appears stable. This feature was not noted during the previous 2012 inspection.

NHWLF-26: (left) View northwest at minor erosion on southeast corner – FEATURE B
NHWLF-31 (right) View west-northwest at minor erosion on southeast corner (7-17 m L, 0.1-0.15 m W, 0.05-0.07 m D) - FEATURE B

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
Evidence of partially exposed or surface debris was not noted.

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 XXVIII: Visual Inspection Checklist / Report – NHWLF

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

SITE NAME: PIN-2 Cape Young
LANDFILL DESIGNATION: NHWLF (New Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: Non-Hazardous Waste Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXVIII: PIN-2, CAPE YOUNG - NON-HAZARDOUS WASTE LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure PIN-2.7 (SW crest - New Obs.)	1.5 m	0.2-0.3 m	0.05 m	Isolated	Minor depression	NHWLF-19, 20	Acceptable	Linear depression orientated perpendicular to crest.
Erosion	Yes	FEATURE B See Figure PIN-2.7 (SE side slope- New Obs.)	7 - 17 m	0.1 - 0.15 m	0.05 - 0.07 m	Isolated	Minor erosion	NHWLF-26-28, 31	Acceptable	Washing of fines, self armouring. 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	Yes	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 PIN-2.7 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**									

9.3 PRELIMINARY STABILITY ASSESSMENT

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

Table XXIX: Preliminary Stability Assessment – NHWLF

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

9.4 LOCATION PLAN

The Location Plan for the NHWLF has been completed as per the TOR and is presented in Figure PIN-2.7.

503 000 E

503 100 E

503 200 E

7 645 300 N

7 645 200 N

MW–08 B

MW–05

MW–06

MW–07

NON–HAZARDOUS WASTE LANDFILL

ADDITIONAL TYPE 2 GRANULAR FILL PLACEMENT

FEATURE A – MINOR DEPRESSION (1.5m L, 0.2–0.3m W, 0.05m D)

FEATURE B – MINOR EROSION (7–17m L, 0.1–0.15m W, 0.05–0.07m D)

LEGEND

- MONITORING SOIL SAMPLE LOCATION (4)
- MONITORING WELL LOCATION (3)
- BACKGROUND MONITORING WELL LOCATION (1)
- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- MINOR EROSION (NTS)

0m 10m 20m 30m 40m 50m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–22	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

NON-HAZARDOUS WASTE 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_200_203	DRAWING NO: CD3654_200_203-PIN-2G-PL	PAGE PL

FIGURE PIN-2.7

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9.5 PHOTOGRAPHIC RECORDS

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

Table XXX: Landfill Visual Inspection Photo Log – NHWLF

Photo (NHWLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_279	4,395	17/08/2013	503185	7645288	View looking west-southwest at east side of NHWLF
2	P213_280	4,432	17/08/2013	503118	7645280	View looking west-northwest along north toe of NHWLF
3	P213_281	4,398	17/08/2013	503119	7645278	View looking south along east toe of NHWLF
4	P213_282	4,328	17/08/2013	503099	7645272	View looking west-northwest along north crest of NHWLF
5	P213_283	4,343	17/08/2013	503100	7645270	View looking south along east crest of NHWLF
6	P213_284	1,250	11/09/2013	503098	7645270	Panoramic view looking south to northwest across cover from northeast corner of NHWLF
7	P213_285	1,240	09/10/2013	503055	7645292	Panoramic view looking east to southwest across cover from northwest corner of NHWLF
8	P213_286	4,389	17/08/2013	503054	7645294	View looking south along west crest of NHWLF
9	P213_287	4,295	17/08/2013	503056	7645294	View looking east along north crest of NHWLF
10	P213_288	4,424	17/08/2013	503045	7645311	View looking south-southwest along west toe of NHWLF
11	P213_289	4,357	17/08/2013	503051	7645313	View looking east along north toe of NHWLF
12	P213_290	4,216	17/08/2013	503097	7645332	View looking south-southwest at north side of NHWLF
13	P213_291	4,285	17/08/2013	502990	7645292	View looking east-southeast at west side of NHWLF
14	P213_292	4,281	17/08/2013	503007	7645238	View looking east-southeast along south toe of NHWLF
15	P213_293	4,392	17/08/2013	503007	7645240	View looking north along west toe of NHWLF
16	P213_294	4,414	17/08/2013	503032	7645247	View looking east-southeast along south crest of NHWLF
17	P213_295	4,391	17/08/2013	503032	7645249	View looking north along west crest of NHWLF
18	P213_296	1,368	11/09/2013	503034	7645249	Panoramic view looking north to southeast across cover from southwest corner of NHWLF
19	P213_297	4,353	17/08/2013	503035	7645243	View looking northwest at minor linear depression on southwest crest of NHWLF (1.5m L, 0.2-0.3m W, 0.05m D) - FEATURE A
20	P213_298	4,391	17/08/2013	503033	7645252	View looking south-southwest at minor linear depression on southwest crest of NHWLF (1.5m L, 0.2-0.3m W, 0.05m D) - FEATURE A
21	P213_299	4,414	17/08/2013	503078	7645226	View looking north-northeast along east crest of NHWLF
22	P213_300	4,324	17/08/2013	503077	7645225	View looking northwest along south crest of NHWLF
23	P213_301	1,380	11/09/2013	503076	7645227	Panoramic view looking west to northeast across crest from southeast corner of NHWLF
24	P213_302	4,359	17/08/2013	503084	7645207	View looking north along east toe of NHWLF
25	P213_303	4,324	17/08/2013	503082	7645206	View looking northwest along south toe of NHWLF
26	P213_304	4,327	17/08/2013	503083	7645205	View looking northwest at minor erosion on southeast corner of NHWLF (7-17m L, 0.1-0.15m W, 0.05-0.07m D) - FEATURE B
27	P213_305	4,359	17/08/2013	503077	7645221	View looking southeast at minor erosion on southeast corner of NHWLF (7-17m L, 0.1-0.15m W, 0.05-0.07m D) - FEATURE B
28	P213_306	4,348	17/08/2013	503080	7645225	View looking east-southeast at minor erosion on southeast corner of NHWLF (7-17m L, 0.1-0.15m W, 0.05-0.07m D) - FEATURE B
29	P213_307	4,278	17/08/2013	503031	7645175	View looking northeast at south side of NHWLF
30	P213_308	4,337	17/08/2013	503138	7645222	View looking northwest at east side of NHWLF
31	P213_309	4,444	17/08/2013	503103	7645212	View looking west-northwest at minor erosion on southeast corner of NHWLF (7-17m L, 0.1-0.15m W, 0.05-0.07m D) - FEATURE B

10 SOUTH LANDFILL - EAST

10.1 BACKGROUND AND MONITORING PROGRAM

The South Landfill - East is located 1.7 km south-southeast of the main station, 50 m to the east of the Station Access Road, south of the intersection with the Harding River Road. Soil surrounding the landfill has been largely removed to bedrock. The overall size of the landfill is 1,690 m^2.

The landfill has a single regrade area encompassing a footprint of approximately 4,000 m^2 with the final cover extending approximately 1.0 to 2.5 m above the surrounding grade. Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the South Landfill - East 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.

10.2 VISUAL INSPECTION REPORT

The visual inspection of the South Landfill - East was conducted on August 17, 2013. The Visual Inspection Checklist/Report has been completed as per the TOR and is included as Table XXXI of this report.

Settlement

An indication of minor settlement was noted at a single location (Feature A) on the northeast corner of the landfill. The feature consisted of a linear depression measuring 5 m long, 0.2-.3 m wide and 0.05 to 0.07 m deep. This feature has an acceptable severity rating. This depression was not noted during the previous 2012 inspection.

SLE-8: View east at minor depression on northeast corner
(5 m L, 0.2-0.3 m W, 0.05-0.07 m D) - FEATURE A

Erosion
One area of minor erosion was noted on the central cover area of the landfill (Feature B). The erosion consisted of fines washing along approximately 7 linear meters across the cover, measuring 0.1 m wide and 0.02 to 0.07 m deep. This feature appears to be self-armouring with an acceptable severity rating. This feature was not noted during the previous 2012 inspection.

SLE-19: View southeast at minor erosion on central cover area
(7m L, 0.1m W, 0.02-0.05m D) - FEATURE B

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 South Landfill - East 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 XXXI: Visual Inspection Checklist / Report – South Landfill - East

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

SITE NAME: PIN-2 – Cape Young
LANDFILL DESIGNATION: South Landfill - East (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: South Landfill - East
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXXI: PIN-2, CAPE YOUNG - SOUTH LANDFILL - EAST

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure PIN-2.8 (NE corner - New Obs.)	5 m	0.2-0.3 m	0.05-0.07 m	Isolated	Minor depression	SLE-8, 9	Acceptable	Linear depression.
Erosion	Yes	FEATURE B See Figure PIN-2.8 (Central cover - New Obs.)	7 m	0.1 m	0.02-0.07 m	Isolated	Minor erosion	SLE-19	Acceptable	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:	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not Observable	N/A
Additional Photos	Yes	See Figure PIN-2.8 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 South Landfill - East has been completed as per the TOR and is included as Table XXXII below.

Table XXXII: Preliminary Stability Assessment – South Landfill - East

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

10.4 LOCATION PLAN

The Location Plan for the South Landfill - East has been completed as per the TOR and is presented in Figure PIN-2.8.

503 425 E

503 500 E

503 575 E

7 645 100 N

7 645 025 N

17.0

16.5

17.5

18.0

18.5

P2–18

P2–19

P2–17

P2–20

ACCESS ROAD

FEATURE B– MINOR EROSION
(7m L, 0.1m W, 0.02–0.07m D)

SOUTH LANDFILL–EAST

FEATURE A – MINOR DEPRESSION
(5m L, 0.2–0.3m W, 0.05–0.07m D)

LEGEND

- MONITORING SOIL SAMPLE LOCATION (4)
- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- MINOR EROSION (NTS)

0m 7.5m 15.0m 22.5m 30.0m 37.5m

NO.	VERSION	DATE	PAR	VERIF.	APPR.
1	FINAL	14–01–22	P.L.	A.P.	A.L.

Construction de Défense Canada
Defence Construction Canada

COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

SOUTH LANDFILL - EAST

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 : 750	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2H-PL	PAGE PL

FIGURE PIN-2.8

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10.5 PHOTOGRAPHIC RECORDS

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

Table XXXIII: Landfill Visual Inspection Photo Log – South Landfill - East

Photo (SLE-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_258	737	11/09/2013	503471	7645014	Panoramic view looking northwest to east at south side of South Landfill – East
2	P213_259	4,390	17/08/2013	503518	7645029	View looking north-northeast along southeast side of South Landfill - East
3	P213_260	4,290	17/08/2013	503516	7645028	View looking northwest along south side of South Landfill - East
4	P213_261	1,105	11/09/2013	503512	7645035	Panoramic view looking west to northeast across cover from southeast corner of South Landfill - East
5	P213_262	1,370	11/09/2013	503519	7645053	Panoramic view looking south to northwest across cover from northeast corner of South Landfill - East
6	P213_263	4,396	17/08/2013	503528	7645056	View looking northwest along northeast side of South Landfill - East
7	P213_264	4,356	17/08/2013	503528	7645054	View looking south along east side of South Landfill - East
8	P213_265	4,284	17/08/2013	503521	7645054	View looking east at minor depression on northeast corner of South Landfill - East (5m L, 0.2-0.3m W, 0.05-0.07m D) - FEATURE A
9	P213_266	4,338	17/08/2013	503523	7645050	View looking northeast at minor depression on northeast corner of South Landfill - East (5m L, 0.2-0.3m W, 0.05-0.07m D) - FEATURE A
10	P213_267	4,356	17/08/2013	503484	7645100	View looking west along north side of South Landfill - East
11	P213_268	4,293	17/08/2013	503486	7645100	View looking southeast along northeast side of South Landfill - East
12	P213_269	4,366	17/08/2013	503481	7645083	View looking west along north crest of South Landfill - East
13	P213_270	4,331	17/08/2013	503483	7645083	View looking southeast along northeast crest of South Landfill - East
14	P213_272	1,108	11/09/2013	503455	7645076	Panoramic view looking northeast to southeast across cover from northwest corner of South Landfill – East
15	P213_273	4,376	17/08/2013	503439	7645084	View looking southeast along southwest side of South Landfill - East
16	P213_274	4,298	17/08/2013	503439	7645085	View looking east-northeast along north side of South Landfill - East
17	P213_275	4,405	17/08/2013	503480	7645070	View looking southeast across south cover of South Landfill - East
18	P213_277	4,416	17/08/2013	503479	7645071	View looking northwest across north cover of South Landfill - East
19	P213_278	4,311	17/08/2013	503487	7645064	View looking southeast at minor erosion on central cover area of South Landfill - East (7m L, 0.1m W, 0.02-0.07m D) - FEATURE B

11 SOUTH BORROW LANDFILL

11.1 BACKGROUND AND MONITORING PROGRAM

The South Borrow Landfill is located on the west side of the Station Access Road, at the northern tip of the South Borrow Area. Geophysical survey confirmed the presence of buried debris over an area of 1,060 m^2. The landfill has a single regrade area encompassing a footprint of approximately 2,000 m^2 with the final cover extending approximately 0.5 to 1.5 m above the surrounding grade. The tundra down gradient of the landfill is wet, with lush vegetation and a thick organic mat. There was standing water along the toe, particularly at the southwest and northwest corners.

Based on existing information regarding this landfill as a source of contamination, its potential migration pathways and receptors, the South Borrow 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.

11.2 VISUAL INSPECTION REPORT

The visual inspection of the South Borrow Landfill was conducted on August 17, 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 two locations, consisting of pothole type depression on the north and east sides of the landfill (Feature A). The depressions ranged in size from 0.5 to 0.6 m long, 0.25 to 0.5 m wide and 0.1 m deep. This feature was not observed during the previous 2012 inspection.


SBLF-3: (left) View west at minor depression on north side slope (0.5m L, 0.5m W, 0.1m D) - FEATURE A
SBLF-21: (right) View west at localized pothole on east crest (0.6 m L, 0.25 m W, 0.1 m D) - FEATURE A

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
Evidence of minor staining was noted within a wetted area along the southwest toe of the landfill (Feature B). The staining was limited to a 10 m long by 0.2 to 1.0 m wide area. A non-hydrocarbon sheen was also noted in an isolated area along the toe. The area of staining was consistent with observations made during the previous 2012 inspection.


SBLF-15: (left) View northwest at staining in ponded area on southwest corner (10 m L, 0.2-1 m W) - FEATURE B
SBLF-16: (right) View of non-hydrocarbon sheen on water at southwest toe (10 m L, 0.2-1 m W) - FEATURE B

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
As noted above, areas of ponding were noted along the northwest and southwest corners of the landfill. These ponded areas do not appear to be influencing the performance of the landfill regrade at this time.

Discussion
The South Borrow 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 XXXIV: Visual Inspection Checklist / Report – South Borrow Landfill

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

SITE NAME: PIN-2 Cape Young
LANDFILL DESIGNATION: South Borrow Landfill (Regrade Landfill)
DATE OF INSPECTION: August 17, 2013
DATE OF PREVIOUS INSPECTION: August 11 & 12, 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: PIN-2, CAPE YOUNG
Landfill: South Borrow Landfill
Designation: Existing Regrade Area
Date Inspected: August 17, 2013
Inspected by: Andrew Passalis, P.Eng.

Signature: 

TABLE XXXIV: PIN-2, CAPE YOUNG - SOUTH BORROW LANDFILL

Checklist Item	Present (Yes/No)	Location	Length	Width	Depth	Extent	Description	Photographic Record	Severity Rating	Additional Comments
Settlement	Yes	FEATURE A See Figure PIN-2.9 (N and E sides - New Obs.)	0.5 - 0.6 m	0.25 - 0.5 m	0.1 m	Isolated	Minor depressions	SBLF-3, 4, 20, 21	Acceptable	Pothole type
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	Yes	FEATURE B See Figure PIN-2.9 (SW toe - New Obs.)	10 m	0.2 - 1 m	Unknown	Isolated	Rust coloured staining in ponded area along toe	SBLF-15, 16	Acceptable	Non-hydrocarbon sheen noted on water
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 PIN-2.9	7 - 20 m	5 m	Unknown	N/A	Ponded areas on north and southwest sides	SBLF-1, 5, 7, 15	Not Observable	Not influencing landfill regrade performance.
Additional Photos	Yes	See Figure PIN-2.9 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 South Borrow Landfill has been completed as per the TOR and is included as Table XXXV hereafter.

Table XXXV: Preliminary Stability Assessment – South Borrow Landfill

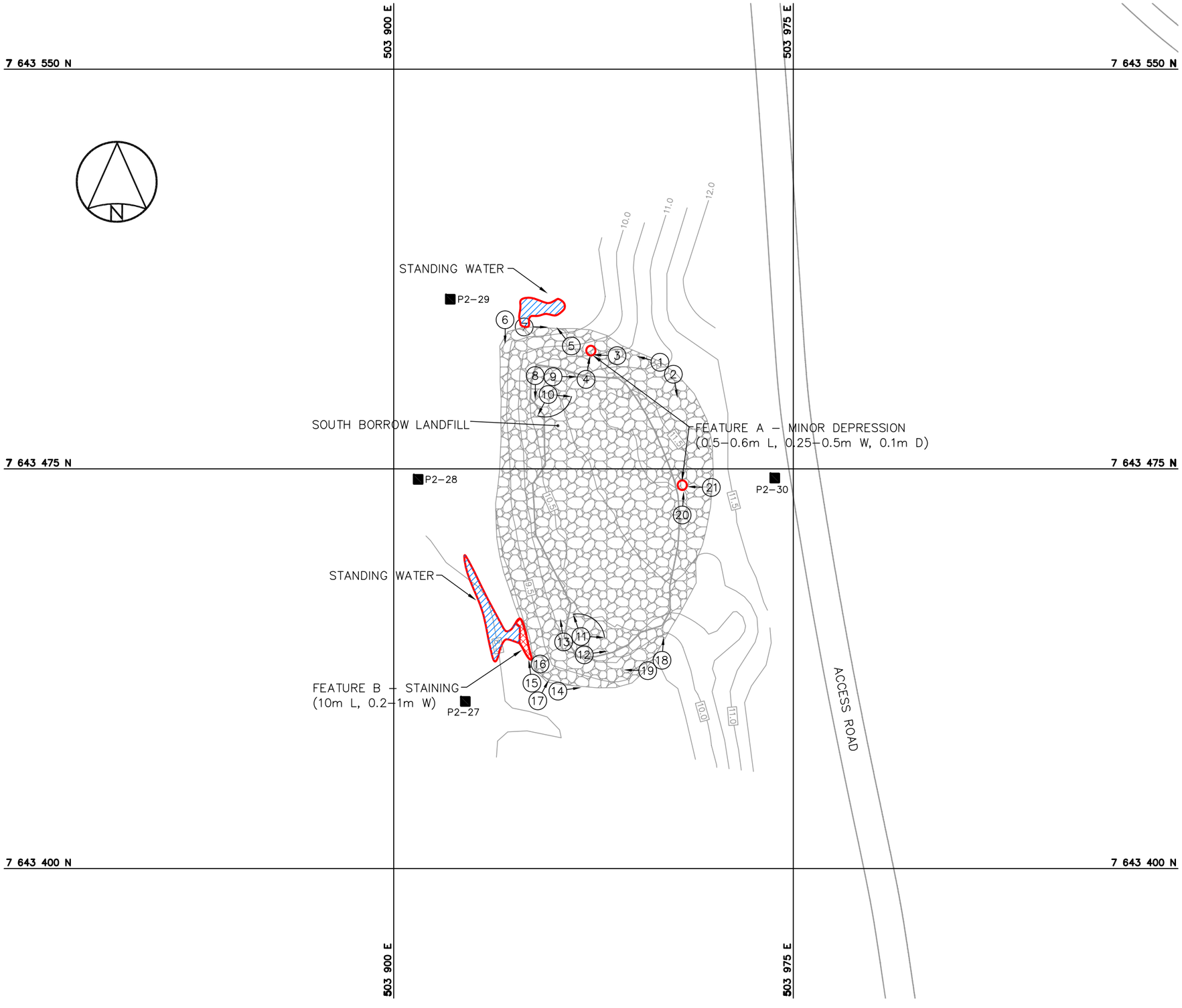
Feature	Severity Rating	Extent
Settlement	Acceptable	Isolated
Erosion	Not observed	None
Frost Action	Not observed	None
Staining	Acceptable	Isolated
Vegetation Stress	Not observed	None
Seepage/Ponded Water	Acceptable	Isolated
Debris exposure	Not observed	None
Overall Landfill Performance	**Acceptable**	

Performance/ Severity Rating	Description
Acceptable	Noted features are of little consequence. The landfill is performing as designed. Minor deviations in environmental or physical performance may be observed, such as isolated areas of erosion, settlement.
Marginal	Physical/environmental performance appears to be deteriorating with time. Observations may include an increase in size or number of features of note, such as differential settlement, erosion or cracking. No significant impact on landfill stability to date, but potential for failure is assessed as low or moderate.
Significant	Significant or potentially significant changes affecting landfill stability, such as significant changes in slope geometry, significant erosion or differential settlement; scarp development. The potential for failure is assessed as imminent.
Unacceptable	Stability of landfill is compromised to the extent that ability to contain waste materials is compromised. Examples may include: • 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 South Borrow Landfill has been completed as per the TOR and is presented in Figure PIN-2.9.



LEGEND

- MONITORING SOIL SAMPLE LOCATION (4)
- APPROX. PHOTOGRAPHIC VIEWPOINT
- MINOR SETTLEMENT (NTS)
- STAINING (NTS)
- PONDING (NTS)

0m 7.5m 15.0m 22.5m 30.0m 37.5m

NO.	VERSION	DATE	P.L.	A.P.	A.L.
1	FINAL	14–01–22	PAR	VERIF.	APPR.

Construction de Défense Canada
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COLLECTION OF LANDFILL MONITORING DATA

PIN-2, CAPE YOUNG, NUNAVUT

SOUTH BORROW LANDFILL

SITE REMEDIATION SOLUTIONS

Biogenie, a division of EnGlobe Corp.
4495 Wilfrid-Hamel blvd, Suite 200
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Phone : 418-653-4422 www.biogenie-env.com

MEASUREMENT UNIT	SCALE:	DATE (month–year):
Metre	1 : 750	JANUARY 2014
DRAWN BY: P. LÉGARÉ	VERIFIED BY: A. PASSALIS	APPROVED BY: A. LECLAIR P. Eng.
PROJECT NO: CD3654_200_203	DRAWING NO: CD3654_200_203-PIN-2I-PL	PAGE PL

FIGURE PIN-2.9

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11.5 PHOTOGRAPHIC RECORDS

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

Table XXXVI: Landfill Visual Inspection Photo Log – South Borrow Landfill

Photo (SBLF-)	Filename	Size (KB)	Date	Vantage Point		Caption
				Easting	Northing	
1	P213_235	4,328	17/08/2013	503950	7643495	View looking west-northwest along north side of South Borrow Landfill
2	P213_236	4,325	17/08/2013	503952	7643494	View looking south along east side of South Borrow Landfill
3	P213_237	4,358	17/08/2013	503942	7643496	View looking west at minor depression on north side slope of South Borrow Landfill (0.5m L, 0.5m W, 0.1m D) - FEATURE A
4	P213_238	4,395	17/08/2013	503936	7643493	View looking north at minor depression on north side slope of South Borrow Landfill (0.5m L, 0.5m W, 0.1m D) - FEATURE A
5	P213_239	4,299	17/08/2013	503933	7643497.8	View looking northwest at ponded water on northwest corner of South Borrow Landfill
6	P213_240	4,340	17/08/2013	503921	7643502	View looking south along west toe of South Borrow Landfill
7	P213_241	4,311	17/08/2013	503923	7643501.8	View looking east along north toe of South Borrow Landfill
8	P213_242	4,447	17/08/2013	503927	7643491.8	View looking south along west crest of South Borrow Landfill
9	P213_243	4,392	17/08/2013	503928	7643492.1	View looking east along north crest of South Borrow Landfill
10	P213_244	1,446	11/09/2013	503928	7643490.2	Panormamic view looking east to south across cover from northwest corner of South Borrow Landfill
11	P213_245	1,574	11/09/2013	503934	7643442.9	Panormamic view looking north to east across cover from southwest corner of South Borrow Landfill
12	P213_246	4,343	17/08/2013	503935	7643440.4	View looking east along south crest of South Borrow Landfill
13	P213_247	4,272	17/08/2013	503933	7643441.6	View looking north along west crest of South Borrow Landfill
14	P213_248	4,390	17/08/2013	503930	7643433.1	View looking east along south toe of South Borrow Landfill
15	P213_249	4,405	17/08/2013	503926	7643434.9	View looking northwest at iron coloured staining in ponded area on southwest corner of South Borrow Landfill (10m L, 0.2-1m W) - FEATURE B
16	P213_250	4,272	17/08/2013	503927	7643437.9	View of non-hydrocarbon sheen on water at southwest toe of South Borrow Landfill (10m L, 0.2-1m W) - FEATURE B
17	P213_251	4,306	17/08/2013	503927	7643432	View looking northeast at southwest toe of South Borrow Landfill
18	P213_253	4,367	17/08/2013	503950.2	7643439.3	View looking north along east side of South Borrow Landfill
19	P213_254	4,408	17/08/2013	503946.9	7643437.6	View looking west along south side of South Borrown Landfill
20	P213_255	4,375	17/08/2013	503953.9	7643466.8	View looking north at localized pothole on east crest of South Borrow Landfill (0.6m L, 0.25m W, 0.1m D) - FEATURE A
21	P213_256	4,329	17/08/2013	503958.7	7643471.5	View looking west at localized pothole on east crest of South Borrow Landfill (0.6m L, 0.25m W, 0.1m D) - FEATURE A

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 17, 2013 6°C OVERCAST

800 LOAD GEAR, PERSONS
900 - 1100 CB - KUSLUKTUK
1115 - 1200 - TRUCK TO P.N.2.

INSTRUMENT
TIER II DT OAKTON PCD650
SOLINST INTERFACE 30M

WP 189 VT-4 NEW LOCKS
V-S.

MW-03 WP 190
SWL: 0.93 - 0.47 =
2.04 bott 2.74.
TP 2.0m S of MW.
DK BROWN GRAVEL (TRACE BR)
SOME F-C-MC SAND, DRY, OL
ORG.
3WA 0-10
B 40-50.

	3W	PURGE
T - 3.52 / 3.71	2x500AM	0.8L.
pH - 6.00 / 6.52	2x250Am	
Cond 0.667 / 0.514	3x40	
TURB. 247.	1x250 pb	

MW-04 WP 192.
SWL 0.88 - 0.34
= 1.66 bott 2.98.

SURVEY MON 193. NE SIDE
TP 4m SW of MW
BRN / LT BRN SAND, WITH GRAVEL
DAMP TR ORG @ 0-10
4WA 0-10
4WB 40-50
T - 3.8/3.3/3.0 TURB - 84.1/105.
pH - 7.02/6.94/6.91 PURGE = 2.0L.
cond - 729.3/774.1/777.9.

MW-01 WP 194
SWL: 0.87 - 0.32
= 2.24 bott 2.30
INSUFF. WATER.
TP 4.0m NNW of MW.
1WA 0-10 +BDI + INTER
1WB 30-40 BLDRS.
DK BRN SAND + BRKN ROCK, PLATEY, DRY
W/ORGANICS.

MW-02 WP 195

SWL 0.77-0.24

∑ 1.47 bott. 2.93

TP- 4m SW of MW.

T -6.6/7.9/8.4

pH- 6.90/6.93/6.94

Cond - 437.6/366.2/344.9

TURB- 98.1/72.4/69.1

TRANSL. LT GREY. NID

PURGED 2.0L

BDW1, 2W INTER + INTRA

0-50 DK BRN - BRN/GREY ROCK W/ MED GR SAND, DAMP, SOME ORG

2WA 0-10

2WB 40-50

VT-2 WP 196 V-E., VT-4 IN BKGND

VT-1 V-ENE WP 197

VT-3 V-S WP 200

TIER II DF

201 N CRNR V-SE/SW, PAN

202 MID SLOPE V-SE/SW

203 TOE V-SE/SW

204 V-SW @ S. DF.

205 E TOE V-NW/SW / UP SLOPE

206 MID SLOPE V-NW/SW

207 E CRNR V-NW/SW - PAN

208-209 V. SE/NW @ MN EROSN TOP 6m @ SLOPE. 25-10W, 5↓ WASHING SELF ARM.

210 S CRNR, V-NE/NW, PAN

211 MID SLOPE V-NE/NW

212 TOE V-NE/NW.

213 V-NW @ SE SIDE

214 V-NE @ SW SIDE

215 V-SE/NE @ TOE (W)

216 MID SLOPE V-SE/NE

217 W CRNR V-SE/NE/PAN.

218-219 MN EROSION STATION @ VT-1 20-50W, 5-10↓, 6-7ML. SELF ARM.

220 MN EROSION 30-50W-25↓, TOP-TOE., TURN SL. E.

221 SL. DEPR. @ CREST 25x25x15↓. V. NW/S.

223 LIN DEPR. 1mL x 20W x 10' V-NW/S

224 MN EROS. TOP-TOE 10-20W, SL. V-SW.

SOUTH BORROW LANDFILL

227 V-W/S @ NE CRNR

228 MID DEPR. 50x50x10' V-W/N.

229 V-NW @ PONDED AREA @ TOE.

230 V-S/E @ NW TOE

231 V-S/E, PAN SW-ENE, NW CRNR

232 PAN - E/NW, V-E/N

233 V-E/NNW, IRON STAINING @ TOE, SW CRNR ~10m ALONG, WET. SHEEN (BACT) @ SW CRNR V-NE/N.

234 V-NE/W @ SE CRNR

235 MIN. POTHOLE 60x25x10', V-N/E

236 V-SW ACROSS TOP.

SOUTH LANDFILL EAST

WP237 - PAN W-N. @ S SIDE

238 V-NNE/NW @ SE CRNR - PAN.

239 PAN - NW/SW / V-NW/SW.

240 V-~~SE~~ E/NE LIN DEPR. ON NE CRNR 5mL, 20-30W, 5-7'

241 NE TOE, V-WSW/SE.

242. V. WSW/SE TOP.

243 PAN. SE-ENE, V-SE/ENE

244 V-SE/NW ALONG CL.

245 MN EROS ON SURFACE 7mL, 10W, 2-5' V-SE.

NW LF

246 ~~PAN~~ V-W FROM ACCESS RD

247 V-NW/SW TOE(E)

248 E CRNR, V-NW/SW, PAN.

249 N CRNR, PAN. SW-SE V-SW/SE.

250 V. SW/SE @ TOE

251 V-SW @ N SIDE

252 V-SE @ W SIDE

253 V-SE/NE W-TOE

254 V-SE/NE W CRNR / PAN.

255 DEPR. @ CREST 1.5mL, 20-30W, 5' V-NW/SW.

257 V - NE/NW | PAN FROM E CRNR

258 V - NE/NW @ TOE

→ MIN. EROSION TOP - TOE N 3 1.0-1.5W

5-7↓ V - N/S ↓ 2ND @ 1/2 MID SLOPE - TOE

259 V - SE @ MIN EROSION TOP - TOE

10-15W - 5↓

260 V - NE @ S SIDE

261 V - NW @ E SIDE

262 V - NW @ MIN EROSION @ 259

PALLET LINE WEST LANDFILL

V -

263 V - WISE @ TOE

264 PAN W-SE ACROSS TOP.

265 V-S ALONG W SIDE

266 V-S MID W SIDE CREST

267 V-N/SE, PAN SE/N.

268 V-N ISE @ TOE

269 V-NNE.

270 V-N @ ℄

271 V-SW/NNW

272 V-NW.

USAF LANDFILL

1 273. V-NW @ E SIDE

2/3 274 V-SWISE @ NE CRNR

4/5 275 V-SE/NE @ NW CRNR

6/7 276 V-SE/NW ALONG ℄.

8/9 277 V-NW/NE FROM SW CRNR

ROUGH GRADED W/ RIP RAP. UNEVEN SIDES.

STATION WEST LANDFILL

1 278 V-SW

2/3 279 V-NW/S

4 280 PAN. N-SW. (263)

5/6 281 V-SE/W

7 282 PAN ISE-NE @ (357)

8 283 V-S ALONG W SIDE.

9 284 V-GE. W SIDE

10 285 V-N ALONG W SIDE

11 286 PAN E-NW ACROSS TOP

288 V- NNW @ VEHICLE TRACKS (TYP) 4-8mL x 0.3mW x2

AIRSTRIP LANDFILL - LOBE A

290 - V - N/E /NE · @ SW CRNR
291 - VE @ 240
292 V - NNW/S, PAN S-N
293 PAN. ~~NNE~~ SE
V - ~~ENE~~ SSE/E.
294 PAN ~~ENE~~ - S @ NW CRNR
295 V - SSE / E @ TOE
296 V - W -
297 V - W/SW / SSE
298 PAN. NW - S

LOBE E + F

299 V - NW / E
~~300~~ PAN N - SW @ 247
300 V - NW
302 V - SE/SW @ NE TOE
303 V - NE / SE AVOID G. - See tracks
↳ small metal debris etc.
all Surface - strapping
304/305 - 30 x 3cm, V - SE

LEAVE SITE @ 7:30pm

AIRSTRIP SOUTH LANDFILL

306 V - N - E SIDE
307 V - NE - S SIDE.
308 PAN. NW - NE - @ SW CRNR
309 V - ~~E~~ NE - N SIDE
V - S @ N SIDE
310
311. V - S - E SIDE.

NO PONDING

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 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 metal 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. Two RPD values (59.5%) for chromium and (45.8%) for nickel were noted to be outside the acceptable range when inter-laboratory duplicates were compared, however both reported results 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.

All of PHC and 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 as values that were outside the acceptable RPD were detected at very low concentrations.

GROUNDWATER SAMPLES

In case of groundwater samples, one blind duplicate sample was submitted for intra- and inter-laboratory comparisons. Review of results indicated a number of differences in concentrations within the Maxxam and Exova metals results when duplicates were compared, including several results that are outside the acceptable range, including intra-lab RPDs for Cadmium (45.2%), Chromium (157.6%), Copper (52.5%), Nickel (126.1%) and Zinc (47.6%) and inter-lab RPDs for Chromium (63.4%) and Nickel (62.0%).

The groundwater chemical analysis results and the evaluation of analytical data for the 2013 QA/QC samples are presented in Table XXXVIII below. All of PHC and PCB concentrations were below the MDL in the intra- and inter laboratory samples.

Overall, the groundwater 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.

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

Sample Name	Sample Location	Depth Below (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]
P213-1WA (Maxxam)	**Tier II MW-02**	0-10	2.5	0.25	3.9	1.9	6.2	2.8	<0.050	3.7	23	<0.01	<12	<10	<10	<10
P213-BD1 (Maxxam)	**Tier II MW-02**	0-10	2.5	0.26	3.8	1.7	6.1	2.5	<0.050	3.9	20	<0.01	<12	<10	<10	<10
P213-1WA (Exova)	**Tier II MW-02**	0-10	2.6	0.26	7.2	2.4	8.1	<5.0	0.060	5.9	26,000	<0.01	<10	<50	<50	<50
Method Detection Limit (Maxxam)			1.0	0.10	1.0	1.0	5.0	1.0	0.050	1.0	10	0.01	12	10	10	10
Method Detection Limit (Exova)			0.2	0.010	0.5	0.1	1.0	5.0	0.010	0.5	1	0.10	10	50	50	50
Intra-Lab (% RPD)	**Tier II MW-02**	0-10	0.0	3.9	2.6	11.1	1.6	11.3	n/a	5.3	14	n/a	n/a	n/a	n/a	n/a
Inter-Lab (% RPD)		0-10	3.9	3.9	59.5	23.3	26.6	n/a	n/a	45.8	12	n/a	n/a	n/a	n/a	n/a

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

Biogénie

Table C-2: Relative Percent Difference - Duplicate Groundwater Sample

Sample Name	Sample Location	Parameters									
		As [mg/L]	Cd [mg/L]	Cr [mg/L]	Co [mg/L]	Cu [mg/L]	Pb [mg/L]	Hg [mg/L]	Ni [mg/L]	Zn [mg/L]	PCBs [mg/L]
P213-2W (Maxxam)	**Tier II MW-02**	0.0012	0.000057	0.027	0.00038	0.0024	0.00037	<0.0050	0.015	0.013	<0.00005
P213-BDW1 (Maxxam)	**Tier II MW-02**	0.00084	0.000036	0.0032	<0.00030	0.0014	<0.00020	<0.0050	0.0034	0.008	<0.00005
P213-2W (Exova)	**Tier II MW-02**	0.0009	0.00006	0.014	0.0003	0.003	0.0004	<0.0001	0.0079	0.015	<0.0001
Method Detection Limit (Maxxam)		0.0002	0.000025	0.001	0.0003	0.0002	0.0002	0.000005	0.0005	0.003	0.00005
Method Detection Limit (Exova)		0.0002	0.00001	0.0005	0.0001	0.001	0.0001	0.0001	0.0005	0.001	0.0001
Intra-Lab (% RPD)	**Tier II MW-02**	35.3	45.2	157.6	n/a	52.6	n/a	n/a	126.1	47.6	n/a
Inter-Lab (% RPD)		28.6	5.1	63.4	23.5	22.2	7.8	n/a	62.0	14.3	n/a

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

APPENDIX D

Maxxam and Exova QA/QC Reports and Certificates of Analysis

Maxxam

Your Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Your C.O.C. #: A150036

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

Report Date: 2013/08/27

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B373411
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)	3	2013/08/21	2013/08/22	AB SOP-00039	CCME, EPA 8260
BTEX/F1 by HS GC/MS (MeOH extract)	6	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	9	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)	1	2013/08/23	2013/08/23	CAL SOP-00149	EPA 3550C, EPA 8082A
Polychlorinated Biphenyls (1)	8	2013/08/23	2013/08/24	CAL SOP-00149	EPA 3550C, EPA 8082A

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 in Water by HS GC/MS	1	N/A	2013/08/21	AB SOP-00039	CCME, EPA 8260C
BTEX/F1 in Water by HS GC/MS	5	N/A	2013/08/22	AB SOP-00039	CCME, EPA 8260C
Cadmium - low level CCME (Total)	5	2013/08/20	2013/08/26	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	1	2013/08/20	2013/08/27	AB SOP-00043	EPA 200.8
CCME Hydrocarbons (F2-F4 in water)	2	2013/08/21	2013/08/21	AB SOP-00040 AB SOP-00037	EPA3510C/CCME PHCCWS
CCME Hydrocarbons (F2-F4 in water)	4	2013/08/22	2013/08/22	AB SOP-00040 AB SOP-00037	EPA3510C/CCME PHCCWS
Mercury (Total)	6	2013/08/24	2013/08/24	EENVSOP-00031	EPA 245.1
Elements by ICP - Total	6	2013/08/26	2013/08/26	AB SOP-00042	EPA 200.7
Elements by ICPMS - Total	5	2013/08/26	2013/08/26	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	1	2013/08/26	2013/08/27	AB SOP-00043	EPA 200.8
Polychlorinated Biphenyls (1)	6	2013/08/23	2013/08/25	CAL SOP-00149	EPA 3510C, 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

Your Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Your C.O.C. #: A150036

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

Report Date: 2013/08/27

CERTIFICATE OF ANALYSIS

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

==========

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: 2

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		HG3142	HG3162	HG3163	HG3164	HG3165	HG3166		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213 - 1WA**	**P213 - 1WB**	**P213 - 2WA**	**P213 - 2WB**	**P213 - 3WA**	**P213 - 3WB**	**RDL**	**QC Batch**
Physical Properties									
Moisture	%	17	36	51	16	17	9.1	0.30	7105705

RDL = Reportable Detection Limit

Maxxam ID		HG3167	HG3173	HG3174		
Sampling Date		2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036		
	UNITS	**P213 - 4WA**	**P213 - 4WB**	**P213 - BD1**	**RDL**	**QC Batch**
Physical Properties						
Moisture	%	20	9.2	39	0.30	7105705

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HG3142	HG3162		HG3163	HG3163		HG3164		
Sampling Date		2013/08/17	2013/08/17		2013/08/17	2013/08/17		2013/08/17		
COC Number		A150036	A150036		A150036	A150036		A150036		
	UNITS	**P213 - 1WA**	**P213 - 1WB**	**RDL**	**P213 - 2WA**	**P213 - 2WA Lab-Dup**	**RDL**	**P213 - 2WB**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	10	<20 (1)	<20 (1)	20	<10	10	7102711
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	50	<100 (1)	<100 (1)	100	<50	50	7102711
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	50	<100 (1)	<100 (1)	100	<50	50	7102711
Reached Baseline at C50	mg/kg	Yes	Yes		Yes	Yes		Yes		7102711
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	90	107		115	106		128		7102711

RDL = Reportable Detection Limit
(1) Detection limits raised due to high moisture content.

Maxxam ID		HG3165	HG3166	HG3167	HG3173	HG3174		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213 - 3WA**	**P213 - 3WB**	**P213 - 4WA**	**P213 - 4WB**	**P213 - BD1**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	<10	<10	<10	<10	10	7102711
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	<50	<50	<50	63	50	7102711
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	7102711
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes		7102711
Surrogate Recovery (%)								
O-TERPHENYL (sur.)	%	106	113	111	105	98		7102711

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HG3142	HG3162		HG3163		HG3164		
Sampling Date		2013/08/17	2013/08/17		2013/08/17		2013/08/17		
COC Number		A150036	A150036		A150036		A150036		
	UNITS	**P213 - 1WA**	**P213 - 1WB**	**RDL**	**P213 - 2WA**	**RDL**	**P213 - 2WB**	**RDL**	**QC Batch**
Polychlorinated Biphenyls									
Aroclor 1016	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1221	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1232	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1242	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1248	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1254	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1260	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1262	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Aroclor 1268	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Total Aroclors	mg/kg	<0.010	<0.010	0.010	<0.018	0.018	<0.010	0.010	7108064
Surrogate Recovery (%)									
NONACHLOROBIPHENYL (sur.)	%	63	88		89		83		7108064

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HG3165	HG3166	HG3166	HG3167	HG3173		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213 - 3WA**	**P213 - 3WB**	**P213 - 3WB Lab-Dup**	**P213 - 4WA**	**P213 - 4WB**	**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.)	%	88	86	88	92	88		7108064

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HG3174		
Sampling Date		2013/08/17		
COC Number		A150036		
	UNITS	**P213 - BD1**	**RDL**	**QC Batch**
Polychlorinated Biphenyls				
Aroclor 1016	mg/kg	<0.010	0.010	7108064
Aroclor 1221	mg/kg	<0.010	0.010	7108064
Aroclor 1232	mg/kg	<0.010	0.010	7108064
Aroclor 1242	mg/kg	<0.010	0.010	7108064
Aroclor 1248	mg/kg	<0.010	0.010	7108064
Aroclor 1254	mg/kg	<0.010	0.010	7108064
Aroclor 1260	mg/kg	<0.010	0.010	7108064
Aroclor 1262	mg/kg	<0.010	0.010	7108064
Aroclor 1268	mg/kg	<0.010	0.010	7108064
Total Aroclors	mg/kg	<0.010	0.010	7108064
Surrogate Recovery (%)				
NONACHLOROBIPHENYL (sur.)	%	83		7108064

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HG3142	HG3162	HG3163	HG3164	HG3165	HG3166		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213 - 1WA**	**P213 - 1WB**	**P213 - 2WA**	**P213 - 2WB**	**P213 - 3WA**	**P213 - 3WB**	**RDL**	**QC Batch**
Elements									
Total Arsenic (As)	mg/kg	2.5	4.5	1.9	4.4	2.7	2.7	1.0	7106906
Total Cadmium (Cd)	mg/kg	0.25	0.21	0.20	0.13	0.22	0.11	0.10	7106906
Total Chromium (Cr)	mg/kg	3.9	3.9	4.9	5.2	4.7	5.6	1.0	7106906
Total Cobalt (Co)	mg/kg	1.9	1.4	1.2	1.5	1.8	1.9	1.0	7106906
Total Copper (Cu)	mg/kg	6.2	6.2	7.0	5.6	<5.0	<5.0	5.0	7106906
Total Lead (Pb)	mg/kg	2.8	2.8	1.9	2.6	3.3	3.0	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	3.7	4.0	4.4	4.5	3.7	4.0	1.0	7106906
Total Zinc (Zn)	mg/kg	23	12	<10	11	22	14	10	7106906

RDL = Reportable Detection Limit

Maxxam ID		HG3166	HG3167	HG3173	HG3174		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036		
	UNITS	**P213 - 3WB Lab-Dup**	**P213 - 4WA**	**P213 - 4WB**	**P213 - BD1**	**RDL**	**QC Batch**
Elements							
Total Arsenic (As)	mg/kg	2.6	1.5	4.1	2.5	1.0	7106906
Total Cadmium (Cd)	mg/kg	<0.10	<0.10	0.13	0.26	0.10	7106906
Total Chromium (Cr)	mg/kg	5.1	3.9	5.2	3.8	1.0	7106906
Total Cobalt (Co)	mg/kg	1.7	1.1	2.2	1.7	1.0	7106906
Total Copper (Cu)	mg/kg	<5.0	<5.0	<5.0	6.1	5.0	7106906
Total Lead (Pb)	mg/kg	2.7	2.4	6.1	2.5	1.0	7106906
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	7106906
Total Nickel (Ni)	mg/kg	3.5	2.6	3.8	3.9	1.0	7106906
Total Zinc (Zn)	mg/kg	12	<10	13	20	10	7106906

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HG3142	HG3142	HG3162		HG3163		
Sampling Date		2013/08/17	2013/08/17	2013/08/17		2013/08/17		
COC Number		A150036	A150036	A150036		A150036		
	UNITS	**P213 - 1WA**	**P213 - 1WA Lab-Dup**	**P213 - 1WB**	**RDL**	**P213 - 2WA**	**RDL**	**QC Batch**
Volatiles								
(C6-C10)	mg/kg	<12	<12	<12	12	<24 (1)	24	7100533
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	108	109	117		126		7100533
4-BROMOFLUOROBENZENE (sur.)	%	93	93	93		94		7100533
D10-ETHYLBENZENE (sur.)	%	86	88	103		94		7100533
D4-1,2-DICHLOROETHANE (sur.)	%	98	102	96		105		7100533

RDL = Reportable Detection Limit
(1) Detection limits raised due to high moisture content.

Maxxam ID		HG3164	HG3165	HG3166	HG3167	HG3173		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213 - 2WB**	**P213 - 3WA**	**P213 - 3WB**	**P213 - 4WA**	**P213 - 4WB**	**RDL**	**QC Batch**
Volatiles								
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	7100533
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	107	109	104	111	103		7100533
4-BROMOFLUOROBENZENE (sur.)	%	93	94	92	93	94		7100533
D10-ETHYLBENZENE (sur.)	%	100	98	98	99	96		7100533
D4-1,2-DICHLOROETHANE (sur.)	%	97	101	96	100	97		7100533

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HG3174		
Sampling Date		2013/08/17		
COC Number		A150036		
	UNITS	**P213 - BD1**	**RDL**	**QC Batch**
Volatiles				
(C6-C10)	mg/kg	<12	12	7100533
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	120		7100533
4-BROMOFLUOROBENZENE (sur.)	%	93		7100533
D10-ETHYLBENZENE (sur.)	%	102		7100533
D4-1,2-DICHLOROETHANE (sur.)	%	99		7100533

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		HG3914	HG3966	HG3967	HG3968		HG3969		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17		2013/08/17		
COC Number		A150036	A150036	A150036	A150036		A150036		
	UNITS	**P213-2W**	**P213-3W**	**P213-4W**	**P213-BDW1**	**RDL**	**P213-TB**	**RDL**	**QC Batch**
Low Level Elements									
Total Cadmium (Cd)	ug/L	0.057	0.15	0.12	0.036	0.025	<0.0050	0.0050	7094604

RDL = Reportable Detection Limit

Maxxam ID		HG3970		
Sampling Date		2013/08/17		
COC Number		A150036		
	UNITS	**P213-FB**	**RDL**	**QC Batch**
Low Level Elements				
Total Cadmium (Cd)	ug/L	<0.0050	0.0050	7094604

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HG3914	HG3914	HG3966		HG3967	HG3967		
Sampling Date		2013/08/17	2013/08/17	2013/08/17		2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036		A150036	A150036		
	UNITS	**P213-2W**	**P213-2W Lab-Dup**	**P213-3W**	**QC Batch**	**P213-4W**	**P213-4W Lab-Dup**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	7098278	<0.10	<0.10	0.10	7102955
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	7098278	<0.20	<0.20	0.20	7102955
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	7098278	<0.20	<0.20	0.20	7102955
Surrogate Recovery (%)									
O-TERPHENYL (sur.)	%	93	100	95	7098278	104	109		7102955

RDL = Reportable Detection Limit

Maxxam ID		HG3968	HG3969	HG3970		
Sampling Date		2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036		
	UNITS	**P213-BDW1**	**P213-TB**	**P213-FB**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon						
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	0.10	7102955
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	7102955
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	0.20	7102955
Surrogate Recovery (%)						
O-TERPHENYL (sur.)	%	93	106	93		7102955

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HG3914	HG3966	HG3967	HG3968	HG3969		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17	2013/08/17		
COC Number		A150036	A150036	A150036	A150036	A150036		
	UNITS	**P213-2W**	**P213-3W**	**P213-4W**	**P213-BDW1**	**P213-TB**	**RDL**	**QC Batch**
Polychlorinated Biphenyls								
Aroclor 1016	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1221	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1232	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1242	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1248	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1254	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1260	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1262	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Aroclor 1268	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Total Aroclors	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000050	7102221
Surrogate Recovery (%)								
NONACHLOROBIPHENYL (sur.)	%	109	94	91	92	83		7102221

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HG3970	HG3970		
Sampling Date		2013/08/17	2013/08/17		
COC Number		A150036	A150036		
	UNITS	**P213-FB**	**P213-FB Lab-Dup**	**RDL**	**QC Batch**
Polychlorinated Biphenyls					
Aroclor 1016	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1221	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1232	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1242	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1248	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1254	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1260	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1262	mg/L	<0.000050	<0.000050	0.000050	7102221
Aroclor 1268	mg/L	<0.000050	<0.000050	0.000050	7102221
Total Aroclors	mg/L	<0.000050	<0.000050	0.000050	7102221
Surrogate Recovery (%)					
NONACHLOROBIPHENYL (sur.)	%	96	96		7102221

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		HG3914	HG3966	HG3967	HG3968		HG3969		
Sampling Date		2013/08/17	2013/08/17	2013/08/17	2013/08/17		2013/08/17		
COC Number		A150036	A150036	A150036	A150036		A150036		
	UNITS	**P213-2W**	**P213-3W**	**P213-4W**	**P213-BDW1**	**RDL**	**P213-TB**	**RDL**	**QC Batch**
Elements									
Total Arsenic (As)	mg/L	0.0012	0.00083	0.0018	0.00084	0.00020	0.00021	0.00020	7114973
Total Cadmium (Cd)	mg/L	0.000057	0.00015	0.00012	0.000036	0.000025	<0.0000050	0.0000050	7114973
Total Chromium (Cr)	mg/L	0.027	0.0027	0.011	0.0032	0.0010	<0.0010	0.0010	7114973
Total Cobalt (Co)	mg/L	0.00038	<0.00030	0.00059	<0.00030	0.00030	<0.00030	0.00030	7114973
Total Copper (Cu)	mg/L	0.0024	0.0039	0.0032	0.0014	0.00020	<0.00020	0.00020	7114973
Total Lead (Pb)	mg/L	0.00037	<0.00020	0.0011	<0.00020	0.00020	<0.00020	0.00020	7114973
Total Nickel (Ni)	mg/L	0.015	0.0071	0.011	0.0034	0.00050	<0.00050	0.00050	7114973
Total Zinc (Zn)	mg/L	0.013	0.0061	0.057	0.0080	0.0030	<0.0030	0.0030	7114973
Low Level Elements									
Total Mercury (Hg)	ug/L	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	<0.0050	0.0050	7112091

RDL = Reportable Detection Limit

Maxxam ID		HG3970			HG3970		
Sampling Date		2013/08/17			2013/08/17		
COC Number		A150036			A150036		
	UNITS	**P213-FB**	**RDL**	**QC Batch**	**P213-FB Lab-Dup**	**RDL**	**QC Batch**
Elements							
Total Arsenic (As)	mg/L	<0.00020	0.00020	7115088	0.00025	0.00020	7115088
Total Cadmium (Cd)	mg/L	<0.0000050	0.0000050	7115088	<0.0000050	0.0000050	7115088
Total Chromium (Cr)	mg/L	<0.0010	0.0010	7115088	<0.010	0.010	7116146
Total Cobalt (Co)	mg/L	<0.00030	0.00030	7115088	<0.00030	0.00030	7115088
Total Copper (Cu)	mg/L	0.0073	0.00020	7115088	0.0070	0.00020	7115088
Total Lead (Pb)	mg/L	0.00035	0.00020	7115088	0.00033	0.00020	7115088
Total Nickel (Ni)	mg/L	<0.00050	0.00050	7115088	<0.00050	0.00050	7115088
Total Zinc (Zn)	mg/L	0.0060	0.0030	7115088	0.0059	0.0030	7115088
Low Level Elements							
Total Mercury (Hg)	ug/L	<0.0050	0.0050	7112091			

RDL = Reportable Detection Limit

Maxxam Job #: B373411
Report Date: 2013/08/27

BIOGENIE INC.
Client Project #: 2013 KITIKMEDT LFM
Site Location: PIN-2 CAPE YOUNG
Sampler Initials: AP

VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HG3914	HG3966		HG3967		HG3968		
Sampling Date		2013/08/17	2013/08/17		2013/08/17		2013/08/17		
COC Number		A150036	A150036		A150036		A150036		
	UNITS	**P213-2W**	**P213-3W**	**QC Batch**	**P213-4W**	**QC Batch**	**P213-BDW1**	**RDL**	**QC Batch**
Volatiles									
(C6-C10)	ug/L	<100	<100	7098288	<100	7099742	<100	100	7099894
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	101	100	7098288	99	7099742	102		7099894
4-BROMOFLUOROBENZENE (sur.)	%	102	101	7098288	97	7099742	96		7099894
D4-1,2-DICHLOROETHANE (sur.)	%	101	101	7098288	100	7099742	100		7099894

RDL = Reportable Detection Limit

Maxxam ID		HG3969	HG3970		
Sampling Date		2013/08/17	2013/08/17		
COC Number		A150036	A150036		
	UNITS	**P213-TB**	**P213-FB**	**RDL**	**QC Batch**
Volatiles					
(C6-C10)	ug/L	<100	<100	100	7099894
Surrogate Recovery (%)					
1,4-Difluorobenzene (sur.)	%	102	101		7099894
4-BROMOFLUOROBENZENE (sur.)	%	98	96		7099894
D4-1,2-DICHLOROETHANE (sur.)	%	100	103		7099894

RDL = Reportable Detection Limit

General Comments

Sample HG3914-01: Detection limits raised for total Cd due to sample matrix.

Sample HG3966-01: Detection limits raised for total Cd due to sample matrix.

Sample HG3967-01: Detection limits raised for total Cd due to sample matrix.

Sample HG3968-01: Detection limits raised for total Cd due to sample matrix.

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL) Comments

Sample HG3163-02 Polychlorinated Biphenyls: Detection limits raised due to high moisture content. Sample contained >50 wt% moisture.

Results relate only to the items tested.

Maxxam

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: PIN-2 CAPE YOUNG

Quality Assurance Report

Maxxam Job Number: EYKB373411

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7098278	YP3	Matrix Spike						
		[HG3966-02]	O-TERPHENYL (sur.)	2013/08/21		93	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/21		99	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/21		101	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/21		95	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2013/08/21		94	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/21		95	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/21		102	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/21		94	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2013/08/21		94	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/21	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2013/08/21	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2013/08/21	<0.20		mg/L	
		RPD [HG3914-02]	F2 (C10-C16 Hydrocarbons)	2013/08/21	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2013/08/21	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2013/08/21	NC		%	40
7098288	NM5	Matrix Spike	1,4-Difluorobenzene (sur.)	2013/08/21		97	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/21		103	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/21		99	%	70 - 130
			(C6-C10)	2013/08/21		79	%	70 - 130
		Spiked Blank	1,4-Difluorobenzene (sur.)	2013/08/22		94	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		103	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		102	%	70 - 130
			(C6-C10)	2013/08/22		81	%	70 - 130
		Method Blank	1,4-Difluorobenzene (sur.)	2013/08/22		97	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		100	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		101	%	70 - 130
			(C6-C10)	2013/08/22	<100		ug/L	
		RPD	(C6-C10)	2013/08/22	NC		%	40
7099742	YS5	Matrix Spike	1,4-Difluorobenzene (sur.)	2013/08/21		97	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/21		99	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/21		97	%	70 - 130
			(C6-C10)	2013/08/21		77	%	70 - 130
		Spiked Blank	1,4-Difluorobenzene (sur.)	2013/08/21		98	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/21		98	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/21		96	%	70 - 130
			(C6-C10)	2013/08/21		103	%	70 - 130
		Method Blank	1,4-Difluorobenzene (sur.)	2013/08/21		100	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/21		99	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/21		97	%	70 - 130
			(C6-C10)	2013/08/21	<100		ug/L	
		RPD	(C6-C10)	2013/08/21	NC		%	40
7099894	YS5	Matrix Spike	1,4-Difluorobenzene (sur.)	2013/08/21		97	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/21		99	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/21		96	%	70 - 130
			(C6-C10)	2013/08/21		86	%	70 - 130
		Spiked Blank	1,4-Difluorobenzene (sur.)	2013/08/22		102	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		102	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		98	%	70 - 130
			(C6-C10)	2013/08/22		108	%	70 - 130
		Method Blank	1,4-Difluorobenzene (sur.)	2013/08/22		101	%	70 - 130
			4-BROMOFLUOROBENZENE (sur.)	2013/08/22		97	%	70 - 130
			D4-1,2-DICHLOROETHANE (sur.)	2013/08/22		99	%	70 - 130
			(C6-C10)	2013/08/22	<100		ug/L	
		RPD	(C6-C10)	2013/08/22	31.0		%	40

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB373411

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7100533	KE4	Matrix Spike						
		[HG3162-01]	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 [HG3142-01]	(C6-C10)	2013/08/22	NC		%	50
7102221	SJ1	Matrix Spike	NONACHLOROBIPHENYL (sur.)	2013/08/24		79	%	30 - 130
			Aroclor 1260	2013/08/24		81	%	30 - 130
		Spiked Blank	NONACHLOROBIPHENYL (sur.)	2013/08/24		102	%	30 - 130
			Aroclor 1260	2013/08/24		105	%	30 - 130
		Method Blank	NONACHLOROBIPHENYL (sur.)	2013/08/24		91	%	30 - 130
			Aroclor 1016	2013/08/24	<0.000050		mg/L	
			Aroclor 1221	2013/08/24	<0.000050		mg/L	
			Aroclor 1232	2013/08/24	<0.000050		mg/L	
			Aroclor 1242	2013/08/24	<0.000050		mg/L	
			Aroclor 1248	2013/08/24	<0.000050		mg/L	
			Aroclor 1254	2013/08/24	<0.000050		mg/L	
			Aroclor 1260	2013/08/24	<0.000050		mg/L	
			Aroclor 1262	2013/08/24	<0.000050		mg/L	
			Aroclor 1268	2013/08/24	<0.000050		mg/L	
			Total Aroclors	2013/08/24	<0.000050		mg/L	
		RPD [HG3970-03]	Aroclor 1016	2013/08/25	NC		%	40
			Aroclor 1221	2013/08/25	NC		%	40
			Aroclor 1232	2013/08/25	NC		%	40
			Aroclor 1242	2013/08/25	NC		%	40
			Aroclor 1248	2013/08/25	NC		%	40
			Aroclor 1254	2013/08/25	NC		%	40
			Aroclor 1260	2013/08/25	NC		%	40
			Aroclor 1262	2013/08/25	NC		%	40
			Aroclor 1268	2013/08/25	NC		%	40
			Total Aroclors	2013/08/25	NC		%	40
7102711	KN0	Matrix Spike						
		[HG3164-01]	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	

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB373411

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7102711	KN0	RPD [HG3163-01]	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
7102955	YP3	Matrix Spike						
		[HG3968-02]	O-TERPHENYL (sur.)	2013/08/22		96	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/22		95	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/22		98	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/22		94	%	50 - 130
		Spiked Blank	O-TERPHENYL (sur.)	2013/08/22		93	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/22		96	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2013/08/22		101	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2013/08/22		96	%	70 - 130
		Method Blank	O-TERPHENYL (sur.)	2013/08/22		95	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2013/08/22	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2013/08/22	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2013/08/22	<0.20		mg/L	
		RPD [HG3967-02]	F2 (C10-C16 Hydrocarbons)	2013/08/22	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2013/08/22	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2013/08/22	NC		%	40
7105705	ABH	Method Blank	Moisture	2013/08/22	<0.30		%	
		RPD	Moisture	2013/08/22	5.0		%	20
7106906	SF3	Matrix Spike						
		[HG3166-01]	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
			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	

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: PIN-2 CAPE YOUNG

Quality Assurance Report (Continued)

Maxxam Job Number: EYKB373411

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7106906	SF3	Method Blank	Total Zinc (Zn)	2013/08/22	<10		mg/kg	
		RPD [HG3166-01]	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						
		[HG3166-02]	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 [HG3166-02]	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
7112091	KG6	Matrix Spike	Total Mercury (Hg)	2013/08/24		94	%	85 - 115
		QC Standard	Total Mercury (Hg)	2013/08/24		88	%	85 - 115
		Spiked Blank	Total Mercury (Hg)	2013/08/24		97	%	85 - 115
		Method Blank	Total Mercury (Hg)	2013/08/24	<0.0050		ug/L	
		RPD	Total Mercury (Hg)	2013/08/24	NC		%	20
7114973	SF3	Matrix Spike	Total Arsenic (As)	2013/08/26		103	%	80 - 120
			Total Cadmium (Cd)	2013/08/26		104	%	80 - 120
			Total Chromium (Cr)	2013/08/26		98	%	80 - 120
			Total Cobalt (Co)	2013/08/26		97	%	80 - 120
			Total Copper (Cu)	2013/08/26		100	%	80 - 120
			Total Lead (Pb)	2013/08/26		96	%	80 - 120
			Total Nickel (Ni)	2013/08/26		98	%	80 - 120
			Total Zinc (Zn)	2013/08/26		100	%	80 - 120
		Spiked Blank	Total Arsenic (As)	2013/08/26		102	%	80 - 120
			Total Cadmium (Cd)	2013/08/26		99	%	80 - 120
			Total Chromium (Cr)	2013/08/26		101	%	80 - 120
			Total Cobalt (Co)	2013/08/26		99	%	80 - 120
			Total Copper (Cu)	2013/08/26		102	%	80 - 120
			Total Lead (Pb)	2013/08/26		98	%	80 - 120

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Quality Assurance Report (Continued)

Maxxam Job Number: EYKB373411

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7114973	SF3	Spiked Blank	Total Nickel (Ni)	2013/08/26		102	%	80 - 120
			Total Zinc (Zn)	2013/08/26		100	%	80 - 120
		Method Blank	Total Arsenic (As)	2013/08/26	0.00026, RDL=0.00020		mg/L	
			Total Cadmium (Cd)	2013/08/26	<0.0000050		mg/L	
			Total Chromium (Cr)	2013/08/26	<0.0010		mg/L	
			Total Cobalt (Co)	2013/08/26	<0.00030		mg/L	
			Total Copper (Cu)	2013/08/26	<0.00020		mg/L	
			Total Lead (Pb)	2013/08/26	<0.00020		mg/L	
			Total Nickel (Ni)	2013/08/26	<0.00050		mg/L	
			Total Zinc (Zn)	2013/08/26	<0.0030		mg/L	
		RPD	Total Arsenic (As)	2013/08/26	NC		%	20
			Total Chromium (Cr)	2013/08/26	NC		%	20
			Total Cobalt (Co)	2013/08/26	NC		%	20
			Total Copper (Cu)	2013/08/26	NC		%	20
			Total Lead (Pb)	2013/08/26	NC		%	20
			Total Nickel (Ni)	2013/08/26	NC		%	20
			Total Zinc (Zn)	2013/08/26	NC		%	20
7115088	SF3	Matrix Spike [HG3970-01]	Total Arsenic (As)	2013/08/26		98	%	80 - 120
			Total Cadmium (Cd)	2013/08/26		98	%	80 - 120
			Total Chromium (Cr)	2013/08/26		94	%	80 - 120
			Total Cobalt (Co)	2013/08/26		97	%	80 - 120
			Total Copper (Cu)	2013/08/26		98	%	80 - 120
			Total Lead (Pb)	2013/08/26		94	%	80 - 120
			Total Nickel (Ni)	2013/08/26		96	%	80 - 120
			Total Zinc (Zn)	2013/08/26		95	%	80 - 120
		Spiked Blank	Total Arsenic (As)	2013/08/26		100	%	80 - 120
			Total Cadmium (Cd)	2013/08/26		99	%	80 - 120
			Total Chromium (Cr)	2013/08/26		99	%	80 - 120
			Total Cobalt (Co)	2013/08/26		98	%	80 - 120
			Total Copper (Cu)	2013/08/26		100	%	80 - 120
			Total Lead (Pb)	2013/08/26		96	%	80 - 120
			Total Nickel (Ni)	2013/08/26		99	%	80 - 120
			Total Zinc (Zn)	2013/08/26		100	%	80 - 120
		Method Blank	Total Arsenic (As)	2013/08/26	0.00030, RDL=0.00020		mg/L	
			Total Cadmium (Cd)	2013/08/26	<0.0000050		mg/L	
			Total Chromium (Cr)	2013/08/26	<0.0010		mg/L	
			Total Cobalt (Co)	2013/08/26	<0.00030		mg/L	
			Total Copper (Cu)	2013/08/26	0.00027, RDL=0.00020		mg/L	
			Total Lead (Pb)	2013/08/26	<0.00020		mg/L	
			Total Nickel (Ni)	2013/08/26	<0.00050		mg/L	
			Total Zinc (Zn)	2013/08/26	<0.0030		mg/L	
		RPD [HG3970-01]	Total Arsenic (As)	2013/08/26	NC		%	20
			Total Cadmium (Cd)	2013/08/26	NC		%	20
			Total Chromium (Cr)	2013/08/26	NC		%	20
			Total Cobalt (Co)	2013/08/26	NC		%	20
			Total Copper (Cu)	2013/08/26	4.1		%	20
			Total Lead (Pb)	2013/08/26	NC		%	20
			Total Nickel (Ni)	2013/08/26	NC		%	20
			Total Zinc (Zn)	2013/08/26	NC		%	20
7116146	NC3	Matrix Spike [HG3970-01]	Total Chromium (Cr)	2013/08/26		97	%	80 - 120
		Spiked Blank	Total Chromium (Cr)	2013/08/26		98	%	80 - 120
		Method Blank	Total Chromium (Cr)	2013/08/26	<0.010		mg/L	
		RPD [HG3970-01]	Total Chromium (Cr)	2013/08/26	NC		%	20

BIOGENIE INC.
Attention: ANTOINE VALLIERES
Client Project #: 2013 KITIKMEDT LFM
P.O. #:
Site Location: PIN-2 CAPE YOUNG

Quality Assurance Report (Continued)

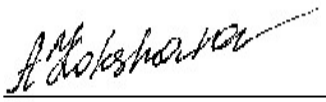
Maxxam Job Number: EYKB373411

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

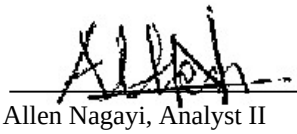
Validation Signature Page

Maxxam Job #: B373411

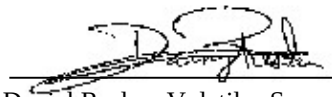
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



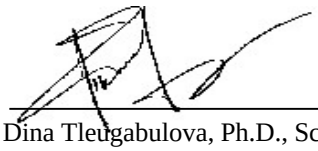
Anna Koksharova, Senior Analyst



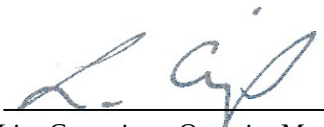
Allen Nagayi, Analyst II



Daniel Reslan, Volatiles Supervisor



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



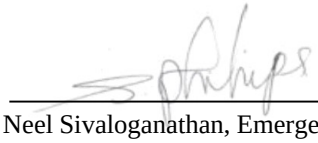
Lisa Cummings, Organics Manager

Validation Signature Page

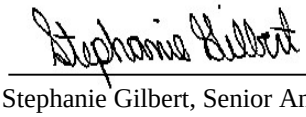
Maxxam Job #: B373411

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

Luba Shymushovska, Senior Analyst, Organic Department



Neel Sivaloganathan, Emergency Spill Response Manager



Stephanie Gilbert, Senior Analyst

==========

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.

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081890(4)

Chain of Custody A150036

Page: 1 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒	Report Distribution (E-Mail):
Company:	BIOGENIE/SILA REMEDIATION		avallieres@biogenie-env.com
Contact:	ANTOINE VALLIERES		apassalis@emts.net
Address:	4495 - BLVD WILFRID-HAMEL		
	Prov: QC PC: G1P 2J7	Prov: PC:	
Contact #s:	Ph: 418-653-4422 EXT 5485 Cell:	Ph: Cell:	

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: PIN-2 CAPE YOUNG
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, Ni, Pb, Zn, Hg)	WATER: ☐VOCs	☐BTEX F1	☐BTEX F1-F2	☐ Routine Water ☐ Turb ☐ F	☐ DOC	☐ TOC	Regulated Metals (CCME/AT1) Total	Dissolved	Mercury	☐ Total ☐ Dissolved	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	P213-1WA		SOIL	13/08/17	X						X	X													3
2	P213-1WB				X						X	X													3
3	P213-2WA				X						X	X													3
4	P213-2WB				X						X	X													3
5	P213-3WA				X						X	X													3
6	P213-3WB				X						X	X													3
7	P213-4WA				X						X	X													3
8	P213-4WB				X						X	X													3
9	P213-BD1				X						X	X													3
10																									
11																									
12																									

RECEIVED IN YELLOWKNIFE
By: [signature]
2013-08-19 09:40

Temp: 6/8/17 5 4 4

F/P

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

Relinquished By (Signature/Print): A.PASSALIS	Date (YY/MM/DD): 13/08/19	Time (24:00):
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Special Instructions:	# of Jars Used & Not Submitted	

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B373411
Jenna Walter	20130820	1210	
Lab Comments:	Custody Seal	Temperature	Ice
	intact	5,4,4	present all
	intact	5,4,5	
	not intact	3,3,5	
	intact	4,4,4	

Maxxam

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Chain of Custody

A150035

Page: 2 of 2

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒	Report Distribution (E-Mail):
Company:	BIOGENIE/SILA REMEDIATION		avallieres@biogenie-env.com
Contact:	ANTOINE VALLIÈRES		
Address:	4495 BLVD WILFRID-HAMEL		apassalis@ents.net
	Prov: QC PC: G1P 2J7	Prov: PC:	
Contact #s:	Ph: 418-653-4922 EXT 5485 Cell:	Ph: Cell:	

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: ~~PIN-2~~ 2013 KITIKMEOT LFM
Site Location: PIN-2 CAPE YOUNG
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	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	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: F1-F4	PCB's	TOTAL METALS (As, Cd, Cr, Co, Cu, Pb, Ni, Zn, Hg)	HOLD - Do not Analyze	# of Containers Submitted
1	P213-2W		GW	13/08/17														X	X	X		9
2	P213-3W																	X	X	X		9
3	P213-4W																	X	X	X		9
4	P213-BDW1																	X	X	X		9
5	P213-TB																	X	X	X		9
6	P213-FB																	X	X	X		9
7																						
8																						
9																						
10																						
11																						
12																						

RECEIVED IN YELLOWKNIFE
By: [signature] 09:40
2013 -08- 19

CME / HG3

Temp: 6 8 7 / 5 7 4

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

Relinquished By (Signature/Print): APASSALIS	Date (YY/MM/DD): 13/08/19.	Time (24:00):
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Special Instructions:	# of Jars Used & Not Submitted	

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #: B337341
Jenna Walter	20130820	1210	

Lab Comments:

Custody Seal	Temperature	Ice
intact 5, 4, 4		present all
intact 5, 4, 5		
not intact 3, 3, 5		
intact 4, 4, 4		

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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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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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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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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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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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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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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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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
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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Quality Control

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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

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	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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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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Company:	Biogenie				

Comments:

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Analytical Report

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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