Environment

Defence Construction Canada

# FOX-3 Dewar Lakes
# Baseline Landfill Monitoring

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**Project Number:**

60263377 (0171-000-00)

**Date:**

January 24, 2013

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# 1. FOX-3 Dewar Lakes

## 1.1 Introduction

FOX-3 Dewar Lakes is a land-locked site located in central Baffin Island, roughly 10 kilometres (km) south of the confluence of the MacBeth River and the Dewar Lakes system. The nearest community is Clyde River, approximately 220 km to the northeast. The site is generally comprised of three areas: the Upper Site/Station Area including the West Landfill Area to the west of the Upper Site; the Airstrip Area/Lower Site located adjacent to the MacBeth River; and the Middle Site, located along the access road between the Upper and Lower Sites. The access road connecting the Upper and Lower sites is approximately six km long.

FOX-3 has been converted to a North Warning System (NWS) Long Range Radar site, and NWS now has the property reserve on the site. Because of ongoing facilities use, most of the infrastructure was not demolished, and remedial activities were not completed within operational areas.

Site investigations were carried out at FOX-3 in 1989, 1990, 1992, 2002 and 2006 as part of an assessment of the environmental status of DEW Line installations. The engineering component of the assessment was completed by AECOM and the environmental component by the Environmental Sciences Group (ESG). Input on traditional land use was provided by Nunavut Tunngavik Incorporated (NTI). Design requirements for landfill closures were based on the geophysical and geotechnical investigations completed by AECOM and EBA Engineering Consultants Ltd. (EBA), and the environmental data provided by ESG.

The environmental cleanup and demolition of facilities commenced in 2009 and was completed in the summer of 2011. The cleanup included the remediation of two existing landfills as well as the construction of two new engineered facilities: a Non-Hazardous Waste Landfill for the disposal of site debris and demolition waste, and a Tier II Disposal Facility for the disposal of contaminated soil. The existing landfills and new landfills, as shown on the overall site plan, Figure FOX-3.1, include:

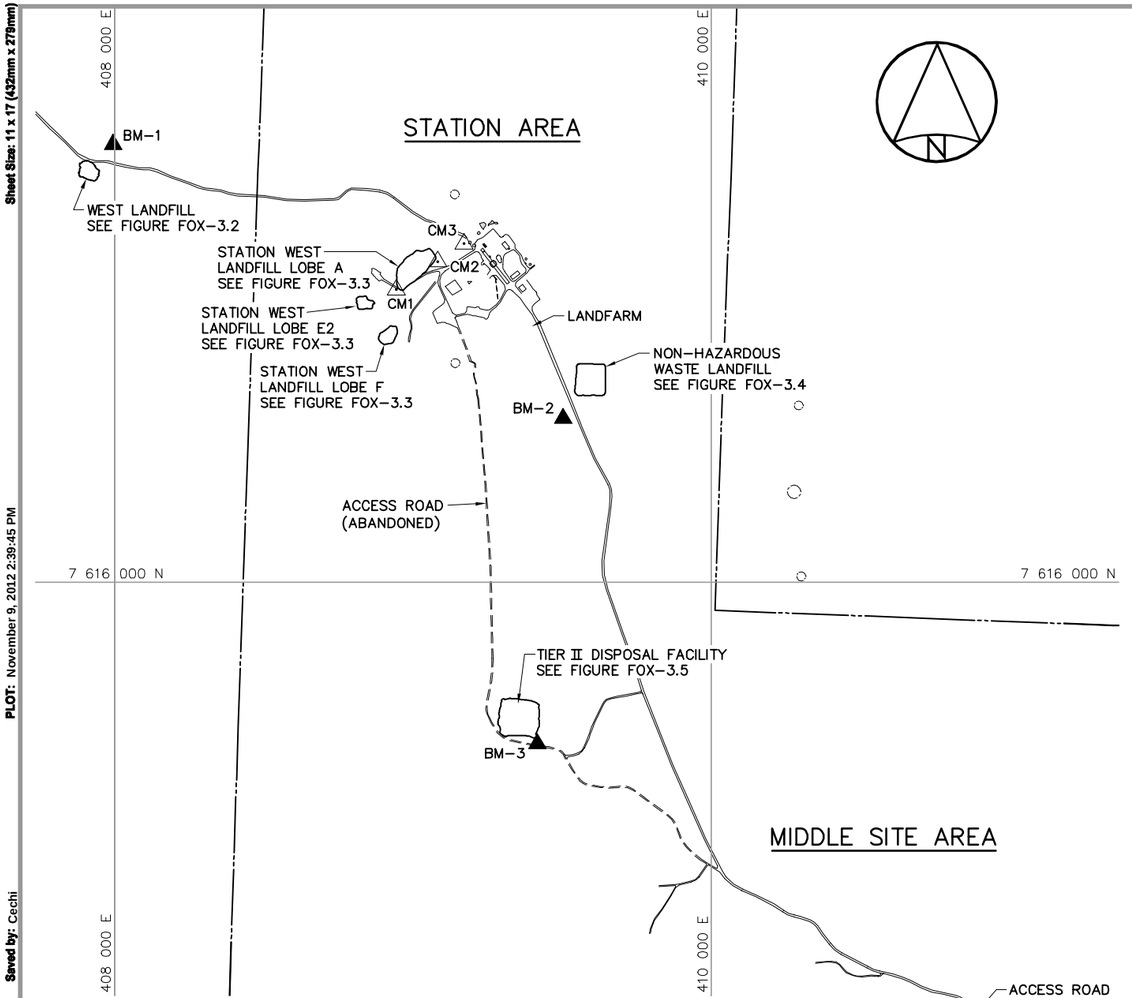
- West Landfill
- Station West Landfill
- Non-Hazardous Waste Landfill
- Tier II Disposal Facility

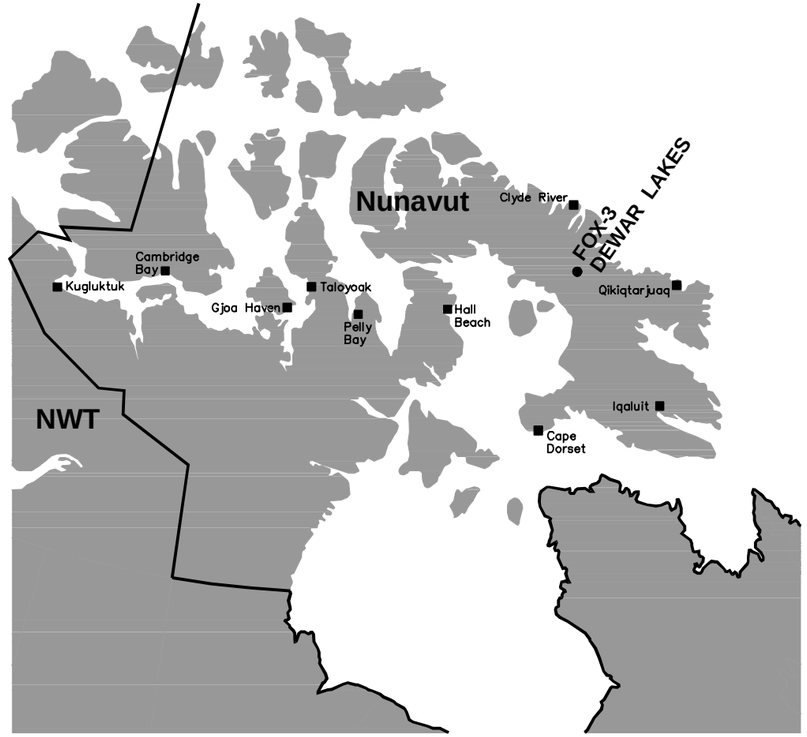
In accordance with the NTI-DND Cooperation Agreement, landfill monitoring is carried out following cleanup of the site. The landfills where monitoring is required are listed above and identified in Figure FOX-3.1. They are described in further detail below. The monitoring schedule for the FOX-3 Dewar Lakes site is provided in Table 1.1. Bolded italicised rows indicate the monitoring events completed internally by the DEW Line Clean-up project team.

This report has been prepared as a summary of the baseline assessment work carried out at FOX-3 Dewar Lakes, and includes site investigation information as well as sample analytical data collected during environmental cleanup. Soil and groundwater sampling was done by ESG, with analytical work completed by Queen's University and the Royal Military College laboratories in Kingston, Ontario. The final construction inspection of the landfills was carried out by AECOM.

The following sections provide an overview of the site biophysical environment and traditional land use activities, site background conditions, the general monitoring, and the basis for evaluation of monitoring results.

## STATION AREA




LOCATION OF DEWAR LAKES WITHIN NUNAVUT TERRITORY
SCALE: NTS

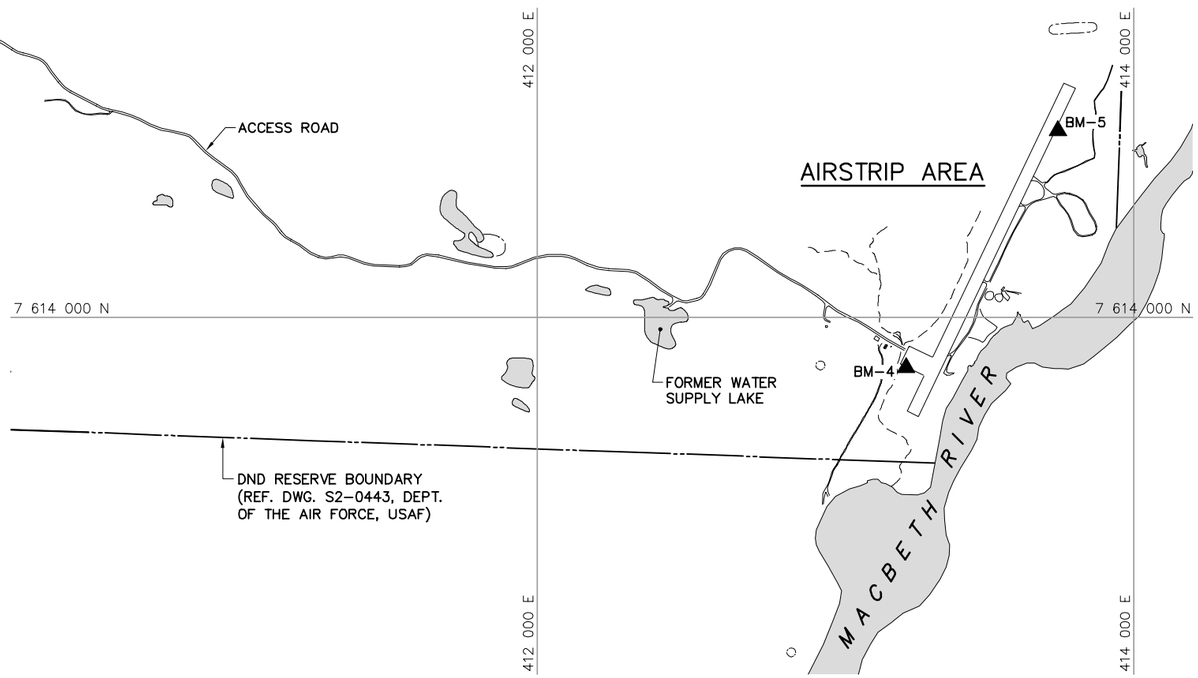
GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

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

## MIDDLE SITE AREA




| SURVEY CONTROL MONUMENTS | | | | |
|---|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
| | NORTHING | EASTING | | |
| CM1 | 7 616 981.903 | 408 942.460 | 513.650 | FOX-3 BASELINE STA. 0+00 |
| CM2 | 7 617 076.152 | 409 081.577 | 517.980 | FOX-3 BASELINE STA. 5+51.73 |
| CM3 | 7 617 135.904 | 409 169.961 | 518.382 | FOX-3 BASELINE STA. 9+01.38 |

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

| PERMANENT BENCHMARK (AS-BUILT) | | | | |
|---|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
| | NORTHING | EASTING | | |
| BM-1 | 7 617 469.460 | 407 993.870 | 415.600 | 25mm DIA. STEEL PIPE |
| BM-2 | 7 616 550.650 | 409 501.940 | 498.460 | 25mm DIA. STEEL PIPE |
| BM-3 | 7 615 460.150 | 409 415.750 | 423.900 | 25mm DIA. STEEL PIPE |
| BM-4 | 7 613 831.660 | 413 235.290 | 177.680 | 25mm DIA. STEEL PIPE |
| BM-5 | 7 614 625.710 | 413 744.760 | 186.730 | 25mm DIA. STEEL PIPE |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 200 400 m SCALE 1:20000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

**LOCATION PLAN**
FIGURE FOX-3.1

AECOM

**Table 1.1: Monitoring Schedule – FOX-3 Dewar Lakes**

| No. Of Years After Construction | Monitoring Event Number | Year |
|---|---|---|
| ***Prior to and during**** | ***Baseline*** | ***1990, 1992, 2002, 2006 & 2009-2011*** |
| ***1**** | ***1*** | ***2012*** |
| 2 | 2 | 2013 |
| 3 | 3 | 2014 |
| 4 | 4 | 2015 |
| 5 | 5 | 2016 |
| 7 | 6 | 2018 |
| 10 | 7 | 2021 |
| 15 | 8 | 2026 |
| 25 | 9 | 2036 |

* Monitoring events completed by the DEW Line Clean-up project team.

## 1.2 Background

### 1.2.1 Geology and Background Geochemical Conditions

The Upper Site is located on the crest of a large hill, at an elevation of 525 metres above sea level (m.a.s.l.), while the Lower Site is at an elevation of approximately 180 m.a.s.l in the MacBeth River valley. Terrain at the Upper and Middle Sites, and West Landfill Area is described as the “bedrock uplands”; it is bedrock controlled, and is mostly rolling, with some steeper sections. Bouldery till overlies bedrock, with frequent bedrock outcropping in the Middle Site area. In particular, a well-defined diabase dyke outcrop runs northwest-southeast within the Middle Site area, partially following the road. Surficial terrain in the bedrock uplands is comprised of bouldery till. There has been some frost-sorting of granular material, resulting in partially developed patterned ground with separation of boulders and finer-grained material. Finer-grained material located amongst concentrated boulder areas is predominantly silty sand.

The Lower Site terrain is dominated by glaciofluvial, glaciolacustrine, and alluvial deposits within a former glacial outwash valley, which now comprises the MacBeth River basin. There is a fairly steep drop in terrain at the transition between the bedrock uplands and the river valley. Glaciofluvial and alluvial deposits are comprised of stratified sand and gravel, while glaciolacustrine deposits are finer-grained (sand and silt). Solifluction lobes were noted along bedrock uplands at the steep transition to the river valley, as well as in areas of steeper grade in the bedrock uplands.

Soil samples were collected in locations removed from site activities within appropriate terrain units to establish background geochemical conditions in areas investigated at the site. Sample results are presented in Table 1.2. Inorganic element concentrations were well below criteria for all analytes.

### 1.2.2 Biophysical Environment

The Dewar Lakes DEW Line site is situated near the Macbeth River in central Baffin Island. Mean annual precipitation is 243.5 millimetres (mm); 98.6 mm is received as rain and 144.9 mm as snow. On average, 73 days per year have measurable precipitation and most of the moisture falls from June to October. Mean annual wind speed is 18.4 km per hour. Winds are relatively constant throughout the year. Climate normals for the site, from 1961 to 1990, are provided in Table 1.3.

The landscape is characterized by rolling hills, separated by broad intervening depressions which form natural drainage sheds within the landscape. Dewar Lakes is located on a dry, bedrock-controlled hill with intermittent

vegetation and coarse textured soil. Vegetation cover on the hill is sparse (up to 10%), dominated by purple saxifrage, and mountain avens associated with kobresia, sedges and Arctic poppy. Valley bottoms and ponds or small lakes generally contain more soil of finer texture. Margins of these water bodies and adjacent meadows usually support a near complete cover of sedges, grasses, cotton grass, rush and saxifrage. Vegetative cover at the bedrock uplands is generally low, typically about 25%, and restricted to the areas of finer-grained surficial material. Vegetation is lusher in the river valley, up to 100% in some areas.

During the 2006 site investigation, caribou, arctic fox, arctic hare, and arctic wolves were observed, and evidence of lemmings was noted. Important summer and denning areas occur to the east of Dewar Lakes, along the east coast of Baffin Island and bears are known to occur at the station.

Polar bears, wolves, caribou, a grizzly bear and a wolverine were seen at site during the site investigation and over the course of construction. Other terrestrial mammals in the area include arctic fox, arctic ground squirrel, arctic hare, collard lemming and brown lemming.

During the site investigations, arctic char were present in the river, and char fry were observed in the creeks that discharged into the river in the Lower Site area.

Avifauna noted includes snow buntings, ravens, and peregrine falcons. The falcons have been observed nesting along an outcrop north of the Petroleum, Oil and Lubricant (POL) line in the Middle Site area. A variety of other avifauna such as loons, Snow Geese, and Tundra Swans may be seen at site.

### 1.2.3 Traditional Land Use

The boundary of Auyuittuq National Park Reserve is located more than 150 km southeast of this station. No other ecological sites or special conservation land status are designated in this area. Caribou are harvested within Auyuittuq National Park and may be hunted in the vicinity of Dewar Lakes.

There are 10 identified archaeological sites containing a number of features in the region of the FOX-3 site. The features are represented by various tent rings, hearths, caches, a memorial cross, two graves, fox traps, inuksuk, and stone shelter. Five identified sites are in close proximity to the station and airstrip areas.

## Table 1.2: FOX-3 Dewar Lakes – Summary of Site Background Soil Analytical Data

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **F3-048** | | | 1990 | 0 | | 15.0 | | <1 | <10 | | 38 | 4.2 | <0.05 | <0.01 | <5 | | | |
| **F3-057** | | | 1990 | 0 | | 31.0 | | <1 | <10 | | 81 | 12 | <0.05 | <0.01 | <5 | | | |
| **06-6960/61** | | | | 10 | 36 | 22.0 | 8.5 | <1.0 | <10 | 52 | 56 | 12 | | | | | | |
| **6962** | | | | 10 | 13 | 20.0 | 8.3 | <1.0 | <10 | 50 | 51 | 4.2 | | | | | | |
| **6963** | 6962 | | | 35 | 18 | 18.0 | 8.2 | <1.0 | <10 | 49 | 52 | 4.5 | | | | | | |
| **6964** | | | | 0 | 32 | 25.0 | 13.0 | <1.0 | <10 | 57 | 57 | 7 | | | | | | |
| **6965** | 6964 | | | 40 | 39 | 25.0 | 9.8 | <1.0 | <10 | 65 | 75 | 5.4 | | | | | | |
| **6966** | | | | 0 | 18 | 18.0 | 7.9 | <1.0 | <10 | 43 | 51 | 5.8 | | | | | | |
| **6967** | 6966 | | | 40 | 35 | 29.0 | 10 | <1.0 | <10 | 51 | 73 | 4.9 | | | | | | |
| **6968** | | | | 20 | 29 | 22.0 | 9.6 | <1.0 | <10 | 53 | 63 | 10.0 | | | | | | |
| **6969** | | | | 10 | 28 | 22.0 | 9.2 | <1.0 | <10 | 53 | 56 | 8.4 | | | | | | |
| **06-6970/71** | | | | 0 | 36 | 28.0 | 10 | <1.0 | <10 | 57 | 76 | 7.9 | | | | | | |
| **6972** | 6970 | | | 50 | 45 | 30.0 | 14 | <1.0 | <10 | 73 | 87 | 10.0 | | | | | | |
| **6973** | | | | 0 | 18 | 19.0 | 7.8 | <1.0 | <10 | 46 | 53 | 3.6 | | | | | | |
| **6974** | 6973 | | | 50 | 27 | 25.0 | 11 | <1.0 | <10 | 57 | 64 | 5.6 | | | | | | |
| **6975** | | | | 0 | 16 | 17.0 | 7 | <1.0 | <10 | 40 | 51 | 3.1 | | | | | | |
| **6976** | 6975 | | | 30 | 26 | 21.0 | 8.4 | <1.0 | <10 | 54 | 66 | 3.1 | | | | | | |
| **6977** | | | | 0 | 37 | 29.0 | 12 | <1.0 | <10 | 68 | 84 | 6.2 | | | | | | |
| **6978** | | | | 0 | 38 | 29.0 | 11 | <1.0 | <10 | 59 | 84 | 22.0 | | | | | | |
| **6979** | 6978 | | | 50 | 48 | 27.0 | 12 | <1.0 | <10 | 64 | 77 | 14.0 | | | | | | |
| **06-6980/81** | | | | 10 | 36 | 26.0 | 10 | <1.0 | <10 | 64 | 72 | 11.0 | | | | | | |
| **6982** | | | | 10 | 47 | 33.0 | 15 | <1.0 | <10 | 75 | 83 | 7.7 | | | | | | |
| **6983** | 6982 | | | 50 | 40 | 31.0 | 15 | <1.0 | <10 | 73 | 77 | 13.0 | | | | | | |
| **6984** | | | | 10 | 39 | 28.0 | 23 | <1.0 | <10 | 66 | 63 | 14.0 | | | | | | |
| **6985** | | | | 10 | 47 | 34.0 | 15 | <1.0 | 11 | 76 | 84 | 19.0 | | | | | | |
| **6986** | | | | 10 | 34 | 57.0 | 16 | <1.0 | <10 | 62 | 160 | 8.2 | | | | | | |
| **6987** | | | | 10 | 36 | 36.0 | 13 | <1.0 | <10 | 61 | 77 | 8.8 | | | | | | |
| **6988** | | | | 10 | 36 | 28.0 | 11 | <1.0 | <10 | 57 | 65 | 12.0 | | | | | | |
| **6989** | 6988 | | | 40 | 38 | 31.0 | 13 | <1.0 | <10 | 59 | 71 | 14.0 | | | | | | |
| **06-6990/91** | | | | 10 | 50 | 38.0 | 14 | <1.0 | <10 | 66 | 76 | 12.0 | | | | | | |
| **00-6992** | 00-6990 | | | 40 | 53 | 38.0 | 15 | <1.0 | <10 | 67 | 70 | 17.0 | | | | | | |
| **00-6993** | | | | 10 | 24 | 22.0 | 9.5 | <1.0 | <10 | 47 | 52 | 4.9 | | | | | | |
| **00-6994** | | | | 0 | 29 | 28.0 | 10 | <1.0 | <10 | 59 | 68 | 5.4 | | | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **00-6995** | 00-6994 | | | 40 | 43 | 32.0 | 12 | <1.0 | <10 | 63 | 80 | 9.8 | | | | | | |
| **00-6996** | | | | 0 | 40 | 29.0 | 12 | <1.0 | <10 | 59 | 70 | 11.0 | | | | | | |
| **00-6997** | 00-6996 | | | 50 | 43 | 31.0 | 14 | <1.0 | <10 | 64 | 72 | 12.0 | | | | | | |
| **00-6998** | | | | 0 | 45 | 34.0 | 14 | <1.0 | <10 | 67 | 93 | 19.0 | | | | | | |
| **00-6999** | 00-6998 | | | 40 | 44 | 31.0 | 12 | <1.0 | <10 | 63 | 86 | 17.0 | | | | | | |
| **06-7000/01** | | | | 5 | 42 | 28.0 | 14 | <1.0 | <10 | 66 | 78 | 14.0 | | | | | | |
| **00-7002** | 00-7000 | | | 30 | 46 | 29.0 | 13 | <1.0 | <10 | 66 | 76 | 11.0 | | | | | | |
| **00-7003** | | | | 0 | 17 | 17.0 | 8 | <1.0 | <10 | 41 | 37 | 3.6 | | | | | | |
| **00-7004** | 00-7003 | | | 40 | 20 | 22.0 | 8.4 | <1.0 | <10 | 51 | 44 | 2.7 | | | | | | |
| **00-7005** | | | | 10 | 19 | 22.0 | 8.8 | <1.0 | <10 | 52 | 56 | 3.2 | | | | | | |
| **00-7006** | | | | 0 | 23 | 25.0 | 11 | <1.0 | <10 | 61 | 56 | 3.6 | | | | | | |
| **00-7007** | 00-7006 | | | 40 | 31 | 32.0 | 13 | <1.0 | <10 | 60 | 65 | 5.4 | | | | | | |
| **00-7008** | | | | 0 | 17 | 20.0 | 9 | <1.0 | <10 | 45 | 49 | 7.7 | | | | | | |
| **00-7009** | | | | 0 | 22 | 17.0 | 7.7 | <1.0 | <10 | 37 | 43 | 9.6 | | | | | | |
| **06-7010/11** | | | | 5 | 32 | 24.0 | 12 | <1.0 | <10 | 60 | 62 | 8.1 | | | | | | |
| **00-7012** | 00-7010 | | | 45 | 35 | 26.0 | 12 | <1.0 | <10 | 61 | 62 | 7.8 | | | | | | |
| **00-7013** | | | | 0 | 45 | 33.0 | 14 | <1.0 | <10 | 68 | 78 | 15.0 | | | | | | |
| **00-7014** | 00-7013 | | | 40 | 55 | 33.0 | 13 | <1.0 | <10 | 67 | 76 | 21.0 | | | | | | |
| **00-7015** | | | | 5 | 34 | 33.0 | 14 | <1.0 | <10 | 64 | 89 | 21.0 | | | | | | |
| **00-7016** | 00-7015 | | | 40 | 37 | 37.0 | 15 | <1.0 | <10 | 73 | 91 | 23.0 | | | | | | |
| **00-7017** | | | | 5 | 37 | 28.0 | 12 | <1.0 | <10 | 63 | 70 | 14.0 | | | | | | |
| **00-7018** | | | | 5 | 31 | 26.0 | 11 | <1.0 | <10 | 59 | 64 | 9.5 | | | | | | |
| **00-7019** | 00-7018 | | | 30 | 46 | 31.0 | 12 | <1.0 | <10 | 67 | 65 | 19.0 | | | | | | |
| **06-7020/21** | | | | 5 | 35 | 26.0 | 12 | <1.0 | <10 | 60 | 72 | 14.0 | | | | | | |
| **00-7022** | | | | 5 | 24 | 24.0 | 11 | <1.0 | <10 | 55 | 68 | 9.4 | | | | | | |
| **00-7023** | 00-7022 | | | 30 | 36 | 36.0 | 15 | <1.0 | <10 | 82 | 98 | 19.0 | | | | | | |
| **00-7024** | | | | 5 | 43 | 36.0 | 15 | <1.0 | <10 | 83 | 84 | 15.0 | | | | | | |
| **00-7025** | | | | 0 | 20 | 21.0 | 10 | <1.0 | <10 | 48 | 50 | 9.3 | | | | | | |
| **00-7026** | | | | 5 | 15 | 22.0 | 9.5 | <1.0 | <10 | 50 | 57 | 8.6 | | | | | | |
| **00-7027** | 00-7026 | | | 55 | 27 | 28.0 | 12 | <1.0 | <10 | 62 | 70 | 15.0 | | | | | | |
| **00-7028** | | | | 0 | 22 | 27.0 | 12 | <1.0 | <10 | 59 | 63 | 8.1 | | | | | | |
| **00-7029** | 00-7028 | | | 50 | 24 | 27.0 | 12 | <1.0 | <10 | 56 | 58 | 8.1 | | | | | | |
| **06-7030/31** | | | | 0 | 20 | 31.0 | 10 | <1.0 | <10 | 54 | 52 | 10.0 | | | | | | |
| **00-7032** | 00-7030 | | | 30 | 26 | 30.0 | 11 | <1.0 | <10 | 58 | 56 | 8.9 | | | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **00-7033** | 00-7030 | | | 60 | 47 | 37.0 | 12 | <1.0 | <10 | 70 | 64 | 14.0 | | | | | | |
| **00-7034** | | | | 0 | 28 | 29.0 | 13 | <1.0 | <10 | 68 | 69 | 9.2 | | | | | | |
| **00-7035** | 00-7034 | | | 50 | 35 | 36.0 | 16 | <1.0 | <10 | 75 | 78 | 10.0 | | | | | | |
| **00-7036** | | | | 10 | 16 | 20.0 | 8.8 | <1.0 | <10 | 54 | 50 | 9.0 | | | | | | |
| **00-7037** | 00-7036 | | | 40 | 19 | 19.0 | 8.7 | <1.0 | <10 | 98 | 52 | 11.0 | | | | | | |
| **00-7038** | | | | 5 | 43 | 22.0 | 9.9 | <1.0 | <10 | 60 | 66 | 22.0 | | | | | | |
| **00-7039** | | | | 10 | 25 | 17.0 | 7.7 | <1.0 | <10 | 43 | 49 | 58.0 | | | | | | |
| **06-7040/41** | | | | 10 | 99 | 49.0 | 12 | <1.0 | 16 | 81 | 77 | 10.0 | | | | | | |
| **00-7042** | | | | 0 | 34 | 33.0 | 15 | <1.0 | <10 | 83 | 83 | 12.0 | | | | | | |
| **00-7043** | 00-7042 | | | 40 | 39 | 35.0 | 14 | <1.0 | 11 | 83 | 94 | 8.8 | | | | | | |
| **00-7044** | | | | 5 | 40 | 28.0 | 12 | <1.0 | <10 | 64 | 73 | 9.6 | | | | | | |
| **00-7045** | | | | 10 | 42 | 31.0 | 13 | <1.0 | <10 | 66 | 76 | 13.0 | | | | | | |
| **00-7046** | | | | 0 | 31 | 21.0 | 7.8 | <1.0 | <10 | 51 | 42 | 11.0 | | | | | | |
| **00-7047** | 00-7046 | | | 40 | 30 | 22.0 | 8.1 | <1.0 | <10 | 40 | 48 | 12.0 | | | | | | |
| **00-7048** | | | | 10 | 29 | 21.0 | 8.8 | <1.0 | <10 | 43 | 53 | 13.0 | | | | | | |
| **00-7049** | 00-7048 | | | 35 | 36 | 36.0 | 15 | <1.0 | <10 | 63 | 78 | 11.0 | | | | | | |
| **06-7050/51** | | | | 10 | 28 | 33.0 | 12 | <1.0 | <10 | 58 | 82 | 12.0 | | | | | | |
| **00-7052** | | | | 10 | 39 | 26.0 | 13 | <1.0 | <10 | 64 | 68 | 9.9 | | | | | | |
| **00-7053** | | | | 10 | 29 | 30.0 | 13 | <1.0 | <10 | 64 | 68 | 8.2 | | | | | | |
| **00-7054** | 00-7053 | | | 40 | 38 | 34.0 | 15 | <1.0 | <10 | 71 | 76 | 12.0 | | | | | | |
| **00-7055** | | | | 5 | 9.7 | 14.0 | 6.5 | <1.0 | <10 | 38 | 35 | 5.3 | | | | | | |
| **00-7056** | 00-7055 | | | 50 | 16 | 14.0 | 6 | <1.0 | <10 | 37 | 35 | 4.0 | | | | | | |
| **00-7057** | | | | 5 | 31 | 18.0 | 8.2 | <1.0 | <10 | 43 | 45 | 11.0 | | | | | | |
| **00-7058** | 00-7057 | | | 40 | 28 | 24.0 | 10 | <1.0 | <10 | 54 | 65 | 8.8 | | | | | | |
| **00-7059** | | | | 0 | 29 | 25.0 | 10 | <1.0 | <10 | 53 | 65 | 10.0 | | | | | | |
| **06-7060/61** | | | | 0 | 32 | 28.0 | 12 | <1.0 | <10 | 59 | 73 | 11.0 | | | | | | |
| **00-7062** | 00-7060 | | | 45 | 28 | 23.0 | 10 | <1.0 | <10 | 54 | 62 | 9.7 | | | | | | |
| **00-7063** | | | | 10 | 26 | 28.0 | 11 | <1.0 | <10 | 58 | 76 | 11.0 | | | | | | |
| **00-7064** | | | | 0 | 35 | 29.0 | 12 | <1.0 | <10 | 61 | 76 | 8.2 | | | | | | |
| **00-7065** | 00-7064 | | | 50 | 27 | 29.0 | 10 | <1.0 | <10 | 55 | 70 | 7.6 | | | | | | |
| **00-7066** | | | | 0 | 29 | 30.0 | 12 | <1.0 | <10 | 59 | 75 | 11.0 | | | | | | |
| **00-7067** | | | | 0 | 26 | 30.0 | 13 | <1.0 | <10 | 53 | 71 | 11.0 | | | | | | |
| **00-7068** | | | | 0 | 35 | 32.0 | 12 | <1.0 | <10 | 50 | 70 | 34.0 | | | | | | |
| **00-7069** | 00-7068 | | | 30 | 42 | 37.0 | 13 | <1.0 | 13 | 50 | 60 | 14.0 | | | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **06-7070/71** | | | | 0 | 13 | 20.0 | 8.2 | <1.0 | <10 | 40 | 44 | 5.8 | | | | | | |
| **00-7072** | 00-7070 | | | 30 | 18 | 20.0 | 8.6 | <1.0 | <10 | 41 | 42 | 8.8 | | | | | | |
| **00-7073** | | | | 5 | 21 | 25.0 | 10 | <1.0 | 11 | 52 | 50 | 7.2 | | | | | | |
| **00-7074** | 00-7073 | | | 40 | 21 | 22.0 | 8 | <1.0 | <10 | 46 | 47 | 6.0 | | | | | | |
| **00-7075** | 00-7073 | | | 70 | 15 | 23.0 | 9.7 | <1.0 | <10 | 44 | 51 | 6.2 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | N Value | | | 104 | 106 | 104 | 106 | 106 | 104 | 106 | 106 | 2 | 2 | 2 | | | |
| | | Average | | | 32.2 | 27.4 | 11.4 | <1.0 | <10 | 59 | 67 | 10.9 | <0.05 | <0.01 | <5 | | | |
| | | Standard Deviation | | | 12.1 | 6.9 | 2.7 | | | 11 | 17 | 6.9 | | | | | | |
| | | Minimum | | | 9.7 | 14.0 | 6.0 | | <10 | 37 | 35 | 2.7 | | | | | | |
| | | Maximum | | | 99.0 | 57.0 | 23.0 | <1.0 | 16 | 98 | 160 | 58.0 | <0.05 | <0.01 | <5 | | | |
| | | 95% Confidence Limit | | | 2.3 | 1.3 | 0.5 | | | 2 | 3 | 1.3 | | | | | | |

**Table 1.3: Climate Normals for Dewar Lakes**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precipitation | | | | | | | | | | | | | |
| Mean Rainfall | 0 | 0 | 0 | 0.2 | 0.5 | 7.8 | 40.9 | 54.7 | 10.5 | 0 | 0 | 0 | 114.4 |
| Mean Snowfall | 4.9 | 3.5 | 5.5 | 11.4 | 22.8 | 12.2 | 4.2 | 7.8 | 24.1 | 30.7 | 13.9 | 7.0 | 148.0 |
| Precipitation (mm) | 4.9 | 3.5 | 5.5 | 11.4 | 23.2 | 20.0 | 45.1 | 62.5 | 34.5 | 30.8 | 14.0 | 7.0 | 262.5 |
| No. days w/ meas. rain | 0 | 0 | 0 | 0 | * | 2 | 8 | 10 | 2 | * | 0 | 0 | 23 |
| No. days w/ meas. snow | 3 | 2 | 3 | 5 | 9 | 6 | 2 | 3 | 9 | 10 | 6 | 4 | 61 |
| Temperature | | | | | | | | | | | | | |
| Mean Daily Max. | -23.6 | -24.4 | -23.7 | -16.0 | -6.6 | 2.1 | 8.7 | 6.5 | -0.9 | -8.2 | -15.3 | -21.0 | -10.2 |
| Mean Daily Min. | -30.6 | -31.5 | -30.6 | -22.5 | -12.4 | -3.1 | 2.4 | 0.9 | -5.1 | -13.6 | -21.7 | -27.7 | -16.3 |
| Daily Mean | -26.8 | -27.6 | -26.9 | -19.2 | -9.4 | -0.5 | 5.5 | 3.7 | -3.0 | -10.8 | -18.5 | -24.1 | -13.1 |
| Extreme Max. | 22.2 | 0.0 | -2.3 | -1.1 | 9.5 | 17.2 | 23.2 | 20.6 | 11.1 | 3.3 | -0.6 | 0.0 | |
| Extreme Min. | -49.4 | -50.7 | -48.3 | -39.8 | -29.4 | -17.2 | -6.3 | -7.5 | -17.2 | -33.0 | -40.6 | -45.0 | |
| Degree Days | | | | | | | | | | | | | |
| Above 18°C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Below 18°C | 1390.8 | 1294.3 | 1388.6 | 1123.6 | 851.8 | 556.1 | 388.6 | 440.9 | 634.1 | 894.6 | 1097.0 | 1304.2 | 11365 |
| Above 5°C | 0 | 0 | 0 | 0 | 0 | 7.1 | 52.4 | 23.9 | 0.4 | 0 | 0 | 0 | 84 |
| Below 0°C | 832.8 | 786.6 | 830.6 | 583.6 | 295.0 | 57.4 | 1.0 | 3.9 | 106.7 | 336.6 | 557.0 | 746.2 | 5137 |
| Month-end Snow Cover (cm) | 48 | 49 | 52 | 54 | 43 | 7 | 0 | 2 | 14 | 36 | 43 | 46 | |

*X – data exists, but not enough to derive a value.*
** -- quantity is less than 1.*
*Information as provided by Environment Canada – Climate Normals 1961-1990 for Dewar Lakes, Nunavut.*

## 1.3 Landfill Monitoring Program

The general components of the landfill monitoring program at FOX-3 include:

- Visual inspection
- Surface and shallow depth soil sampling and analyses
- Groundwater sampling and analyses
- Ground temperature monitoring

The requirements for landfill monitoring, as laid out in Environmental Provisions of the NTI-DND Agreement, are summarized in Table 1.4. Detailed landfill monitoring requirements are described in the Landfill Monitoring Plan - Part B - Nunavut Settlement Region.

**Table 1.4: General Landfill Monitoring Requirements**

| Landfill Classification | Visual Inspection | Groundwater Sampling | Soil Sampling | Thermal Monitoring |
|---|---|---|---|---|
| Existing Landfill, High Potential Environmental Risk (Class A) | Not required, as landfill to be excavated. | | | |
| Existing Landfills, Moderate Potential Environmental Risk (Class B) | √ | √ | √ | √ |
| Existing Landfills, Low Potential Environmental Risk (Class C) | √ | | √ | |
| New Landfill, Non-Hazardous Waste Landfill | √ | √ | √ | |
| New Landfill, Tier II Disposal Facility | √ | √ | √ | √ |

A summary of these requirements, as related to the specific landfills at FOX-3, is provided in Table 1.5. The rationale for the monitoring requirement is provided in the landfill-specific sections.

**Table 1.5: FOX-3 Dewar Lakes Landfill Monitoring Requirements**

| Landfill Designation | Visual Inspection | Groundwater Sampling | Soil Sampling | Thermal Monitoring |
|---|---|---|---|---|
| West Landfill | √ | | √ | |
| Station West Landfill | √ | | √ | |
| Non-Hazardous Waste Landfill | √ | √ | √ | |
| Tier II Disposal Facility | √ | √ | √ | √ |

### 1.3.1 Visual Inspection

The physical condition of each landfill is inspected in accordance with the Visual Inspection Checklist provided in the Environmental Provisions of the NTI-DND Agreement. Documented observations include evidence of settlement, ponding, frost action, erosion, and lateral movement, as well as sloughing of berms, and thermal contraction cracks. Documentation of observations is supported using hand drawn sketches, as applicable. Photographic records are provided to document the general condition of the landfill and to substantiate all recorded observations.

### 1.3.2 Soil Sampling

Background (naturally occurring) conditions refer to native soil geochemistry and represent soil quality from an area not impacted by site activities. Soil sampling to establish general site background conditions was conducted in 2006. Results are reported in Table 1.2 above.

Baseline conditions refer to existing soil chemistry at the landfill area prior to and during remediation. The baseline landfill monitoring program consists of two phases: samples collected as part of the landfill assessment program which determined whether the landfill posed a potential environmental risk, and samples collected during the construction/closure of the landfill. The results of subsequent landfill monitoring events are compared to baseline and background values to evaluate any potential changes in environmental conditions.

As part of the baseline sampling program, soil samples are collected in areas up-gradient and down-gradient of each landfill. Up-gradient samples are targeted to areas near the landfill, but not influenced by migration of contaminants through the landfill. Up-gradient samples are meant to be representative of contaminant input conditions to the landfill and serve as the primary basis upon which to compare the down-gradient contaminant concentrations.

Down-gradient soil samples are collected at surface/shallow depths from designated areas at the toe of each landfill and from areas of preferential drainage. These soil samples are collected and analyzed to document whether there has been migration of contaminants, either historically or recently, from the landfill area. Although contaminants are primarily transported in water (surface and groundwater), they have a tendency to adsorb to soil particles the water is migrating through. The soil, thus, retains information regarding the historical input of contaminants.

Analytical results of soil samples collected down-gradient of a landfill are compared to contaminant concentrations of samples collected up-gradient. Down-gradient samples are also compared to overall site background contaminant levels because they help in establishing a more broad level of naturally occurring contaminant concentrations that can be found at the site, particularly where different soil or rock types are present. Contaminant concentrations in down-gradient samples that are significantly higher than background or up-gradient concentrations, particularly where there have been changes over time; provide evidence of contaminants having migrated to, and possibly beyond, the soil sampling location. These data, in conjunction with other site-specific information, were used in the assessment of the environmental status of the landfill and the determination of an appropriate remediation solution.

Soil sampling locations are indicated on the site-specific landfill drawings included in the Annexes to this report included in Appendix A.

Samples collected during baseline and subsequent landfill monitoring are analyzed for the following parameters:

- Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc, and mercury
- PCBs (polychlorinated biphenyls – total Aroclor)
- TPH (Total Petroleum Hydrocarbons) – as represented by the sum of F1 ($nC_6$ to $nC_{10}$), F2 ($nC_{10}$ to $nC_{16}$), and F3 ($nC_{16}$ to $nC_{34}$), as defined by the CCME Tier I Method – Rev 5, Analyses of Total Petroleum Hydrocarbons in soil

The Method Detection Limit (MDL) for each parameter is specified in Table 1.8.

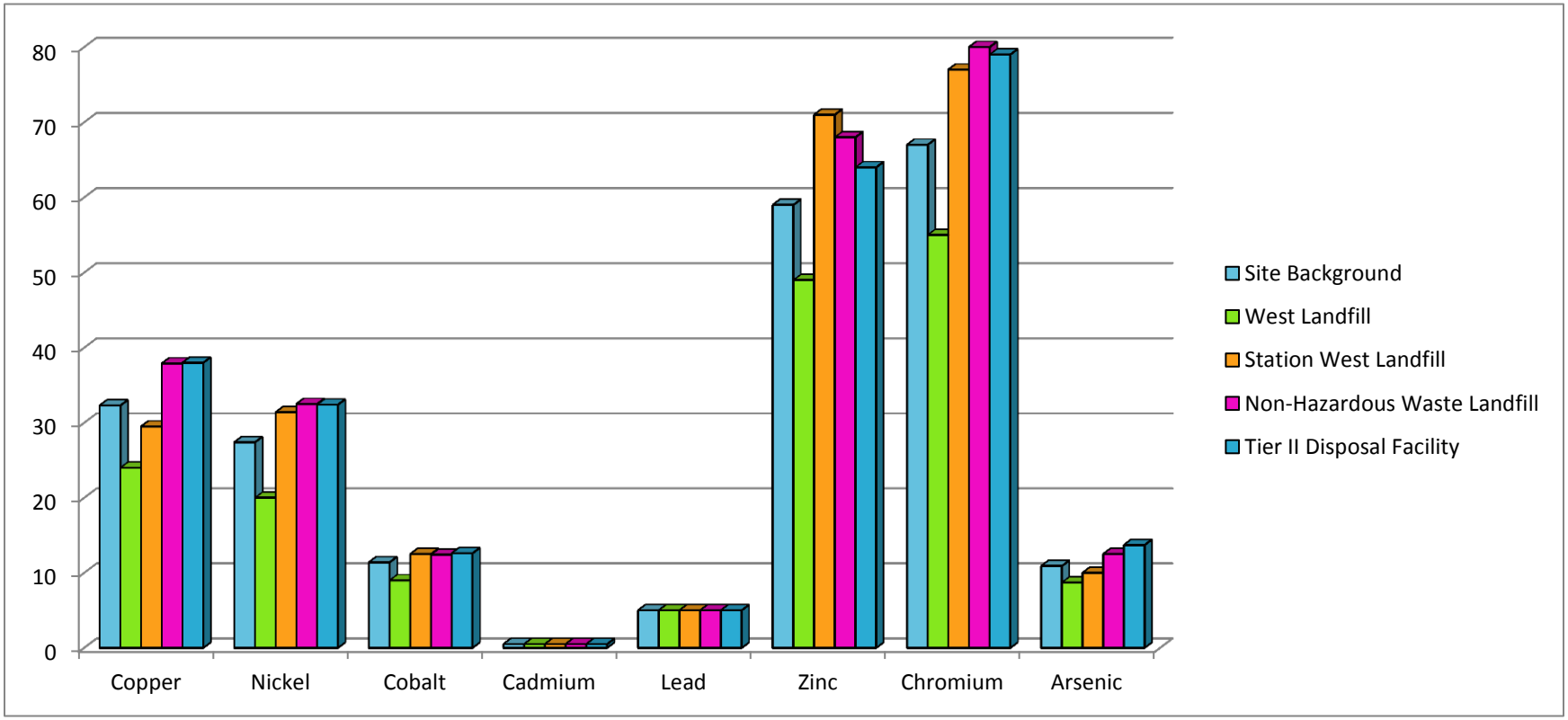
The requirement for the analyses of baseline samples is to provide record information on the environmental status of the landfill should potential problems be identified during the monitoring program. Analytical results are presented under the discussion for each landfill.

To provide a basis for evaluation with subsequent monitoring analytical results, simple statistical analyses were carried out to determine the arithmetic mean, standard deviation, and 95% confidence interval for each inorganic parameter analyzed. In general, for samples in which the concentration was less than the Method Detection Limit (MDL), one-half of the MDL was used in the statistical analyses. However, in cases where the majority of the analytical results fell below the MDL, the arithmetic mean is represented as less than the MDL. It should be noted that MDLs for analyses completed under previous years' landfill assessment programs may not be the same as those specified in Table 1.8, particularly for PCBs. In cases where the contaminant was not detected, the chemical baseline is typically represented as a range over the different MDLs. Summaries of the arithmetic mean of the concentration of inorganic elements in soil are presented in Table 1.6. Additional statistical data is presented under the discussion for each landfill.

**Table 1.6: FOX-3 Dewar Lakes – Summary of Arithmetic Mean – Soil Baseline Data**

| Area | Arithmetic Mean (in mg/kg) | | | | | | | | Range |
|---|---|---|---|---|---|---|---|---|---|
| | Copper | Nickel | Cobalt | Cadmium | Lead | Zinc | Chromium | Arsenic | PCBs |
| **Site Background** | 32.3 | 27.4 | 11.4 | <1.0 | <10 | 59 | 67 | 10.9 | <0.01 |
| **West Landfill** | 24.0 | 20.0 | 9.0 | <1.0 | <10 | 49 | 55 | 8.7 | <0.050 to <0.1 |
| **Station West Landfill** | 29.5 | 31.4 | 12.5 | <1.0 | <10 | 71 | 77 | 10 | <0.050 to 0.300 |
| **Non-Hazardous Waste Landfill** | 37.9 | 32.5 | 12.4 | <1.0 | <10 | 68 | 80 | 12.5 | <0.0030 to <0.050 |
| **Tier II Disposal Facility** | 38.0 | 32.4 | 12.6 | <1.0 | <10 | 64 | 79 | 13.7 | <0.050 to <0.1 |

**Figure 1.1: FOX-3 Dewar Lakes – Summary of Arithmetic Mean – Soil Baseline Data**



### 1.3.3 Groundwater Sampling

During the construction phase, groundwater monitoring wells are installed at all existing landfills classified as moderate environmental risk (Class B landfills) and new landfills. No existing landfills at FOX-3 had monitoring wells installed, but wells were installed at the two new landfills constructed; the Non-Hazardous Waste Landfill, and the Tier II Disposal Facility. Groundwater monitoring wells were installed hydraulically up-gradient and down-gradient of the landfills as indicated in Table 1.9. Surface and shallow depth soil samples are also collected adjacent to monitoring well locations. Analytical data from water samples collected from wells up and down-gradient are reviewed in conjunction with soil analytical data to evaluate potential impacts associated with the landfill. Baseline groundwater data exists from the site investigation at temporary wells, as well as the site clean-up period. A summary of arithmetic mean baseline data concentrations of contaminants in groundwater is provided in Table 1.7.

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

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

Prior to sampling, monitoring wells are purged until groundwater parameters such as pH, temperature and conductivity stabilize. In the event of low recharge volumes, standing water may be sampled and specifically documented. Water samples are not filtered.

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

- Colour and odour
- pH, conductivity and temperature

Groundwater samples are analyzed for the following parameters:

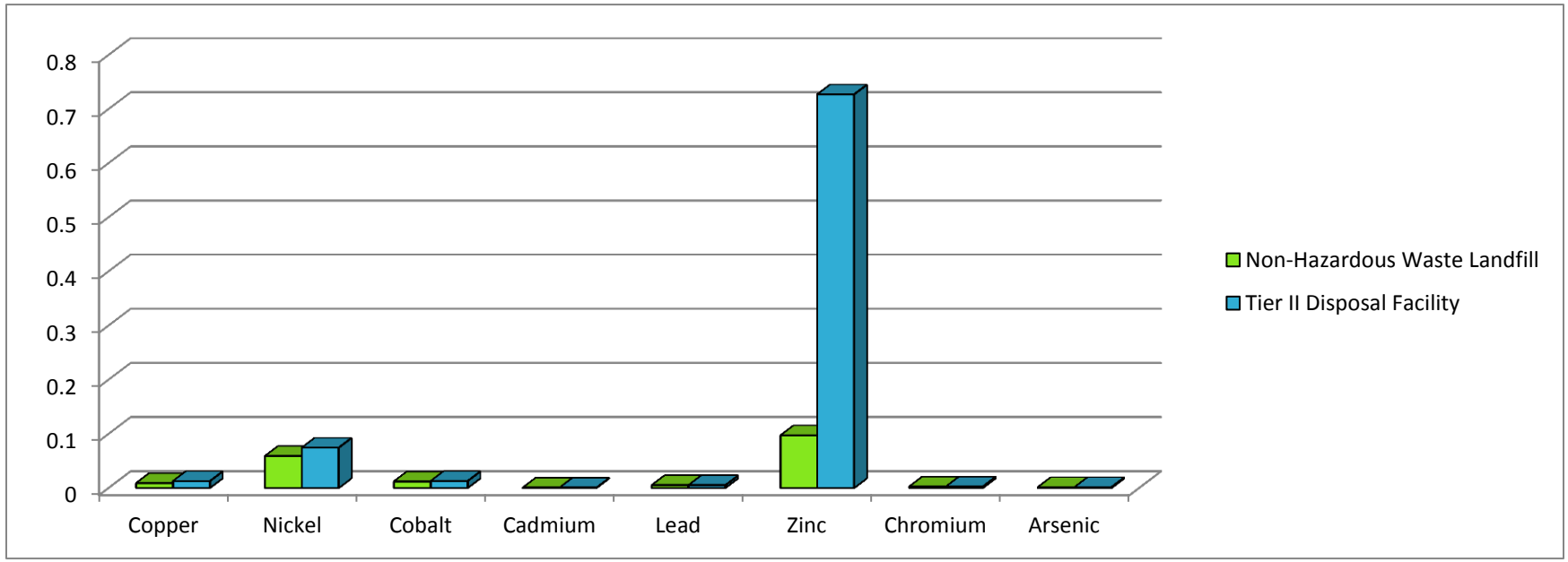
- Inorganic elements (total concentrations): arsenic, cadmium, chromium, cobalt, copper, lead, nickel, zinc and mercury
- PCBs (polychlorinated biphenyls – total Aroclor)
- TPH (Total Petroleum Hydrocarbons) – $C_6$ to $C_{32}$

Minimum MDLs are specified in Table 1.8. A summary of the FOX-3 landfill monitoring installations / sampling locations is provided in Table 1.9.

**Table 1.7: FOX-3 Dewar Lakes – Summary of Arithmetic – Groundwater Baseline Data**

| Area | Arithmetic Mean (in mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Copper | Nickel | Cobalt | Cadmium | Lead | Zinc | Chromium | Arsenic |
| Non-Hazardous Waste Landfill | 0.009 | 0.059 | 0.012 | 0.0005 | 0.005 | 0.097 | 0.0025 | 0.0015 |
| Tier II Disposal Facility | 0.0126 | 0.0744 | 0.0127 | 0.0005 | 0.005 | 0.727 | 0.0025 | 0.0015 |

**Figure 1.2: FOX-3 Dewar Lakes – Summary of Arithmetic Mean – Groundwater Baseline Data**



## Table 1.8: Detection Limits for Analytical Requirements

| Parameter | Soil Samples Minimum Analytical Detection Limit (mg/kg = ppm) | Water Samples Minimum Analytical Detection Limit (mg/L = ppm) |
|---|---|---|
| **Copper** | <3.0 | <0.005 |
| **Nickel** | <5.0 | <0.010 |
| **Cobalt** | <5.0 | <0.005 |
| **Cadmium** | <1.0 | <0.001 |
| **Lead** | <10 | <0.01 |
| **Zinc** | <15 | <0.005 |
| **Chromium (total)** | <20 | <0.005 |
| **Arsenic** | <0.2 | <0.05 |
| **Mercury** | <0.1 | <0.001 |
| **PCBs** | <0.05 | <0.003 |
| **TPH** | <40 | <1 |

### 1.3.4 Thermal Monitoring

For Class B landfills and Tier II Disposal Facilities where a component of the design includes the placement of sufficient fill to promote aggradation of permafrost through the landfill contents, geothermal modeling is conducted to determine the maximum depth of active layer at the landfill, and the amount of fill required on the landfill surface to avoid active layer penetration into the landfill contents following remediation. Geothermal modelling considers soil type, soil thermal properties, presence or absence of insulating cover (vegetation or snow drift), measured ground temperatures at the site or at nearby sites, measured air temperature and climatic data (1956 to 1990 climate normals data from Environment Canada for Dewar Lakes, Nunavut), an estimated 1 in 100 warm year air temperature, an estimated ten consecutive 1 in 100 warm years, and an estimate of the effect of global warming (based on estimates of temperature change reported by Canadian Climate Impact Scenario project). At FOX-3, a typical active layer depth based on ten consecutive mean years of climatic data is 1.6 metres (m) for the Tier II Soil Disposal Facility. The predicted active layer depth for a 1 in 100 warm year is 2.1 m and for ten consecutive 1 in 100 warm years is 2.2 m. The predictive active layer depth for the landfill after 100 years of global warming (using the average of the four Global Circulation Models) is 2.6 m. The active layer depth used for the Tier II Disposal Facility at FOX-3 is the resultant active layer depth from modeling 100 years of global warming plus one 1:100 warm year – a depth of 3.1 m. It is expected to take one year for the landfill contents to freeze back with this depth of cover fill.

During landfill construction, vertical thermistors were installed within the landfill to record ground temperatures. Measured ground temperatures will be compared to the active layer depth and freeze back time modeled during design. It is anticipated that all landfills where freeze back is an integral part of the design will reach thermal equilibrium within approximately five years following closure. If thermal equilibrium is not achieved within five years, it may be necessary to increase the term of the thermal monitoring.

## 1.4 Scope of Report

The following sections of the report are organized according to landfill designation. For each landfill included in the monitoring program, the following information is provided:

- A brief description of the landfill
- Qualitative assessment of the potential environmental risk associated with the specific landfill
- Summary of the remediation design
- Baseline conditions (as applicable)

**Table 1.9: Summary of Landfill Monitoring Installations/Sampling Locations FOX-3 Dewar Lakes**

| | UTM Coordinates | | Elevation |
|---|---|---|---|
| **Landfill Designation/Monitoring Locations** | **North (m)** | **East (m)** | **(m.a.s.l.)** |
| **West Landfill** | | | |
| F3-1 (soil) | 7617347.0 | 407898.2 | - |
| F3-2 (soil) | 7617406.7 | 407935.2 | - |
| F3-3 (soil) | 7617416.8 | 407894.6 | - |
| **Station West Landfill** | | | |
| F3-4 (soil) | 7617124.1 | 409026.0 | - |
| F3-5 (soil) | 7617106.2 | 408974.8 | - |
| F3-6 (soil) | 7617067.7 | 408940.2 | - |
| F3-7 (soil) | 7617015.4 | 408933.8 | - |
| F3-8 (soil) | 7617057.0 | 409077.0 | - |
| F3-9 (soil) | 7616933.0 | 408791.4 | - |
| F3-10(soil) | 7616897.7 | 408950.4 | - |
| F3-11(soil) | 7616783.6 | 408916.6 | - |
| F3-12(soil) | 7616811.3 | 408870.2 | - |
| **Non-Hazardous Waste Landfill** | | | |
| MW-05 (soil and groundwater) | 7616753.5 | 409590.8 | 510.0 |
| MW-06 (soil and groundwater) | 7616690.3 | 409524.3 | 506.7 |
| MW-07 (soil and groundwater) | 7616677.7 | 409667.2 | 506.4 |
| MW-08 (soil and groundwater) | 7616607.1 | 409594.3 | 502.5 |
| **Tier II Disposal Facility** | | | |
| MW-01 (soil and groundwater) | 7615624.0 | 409425.0 | 417.7 |
| MW-02 (soil and groundwater) | 7615610.5 | 409290.4 | 417.5 |
| MW-03 (soil and groundwater) | 7615540.1 | 409428.5 | 416.8 |
| MW-04 (soil and groundwater) | 7615513.3 | 409428.3 | 416.3 |
| VT-1 (temperature) | 7615563.3 | 409319.5 | 422.0 |
| VT-2 (temperature) | 7615561.6 | 409336.4 | 422.4 |
| VT-3 (temperature) | 7615523.7 | 409368.6 | 422.3 |
| VT-4 (temperature) | 7615522.4 | 409385.0 | 422.0 |

# 2. West Landfill

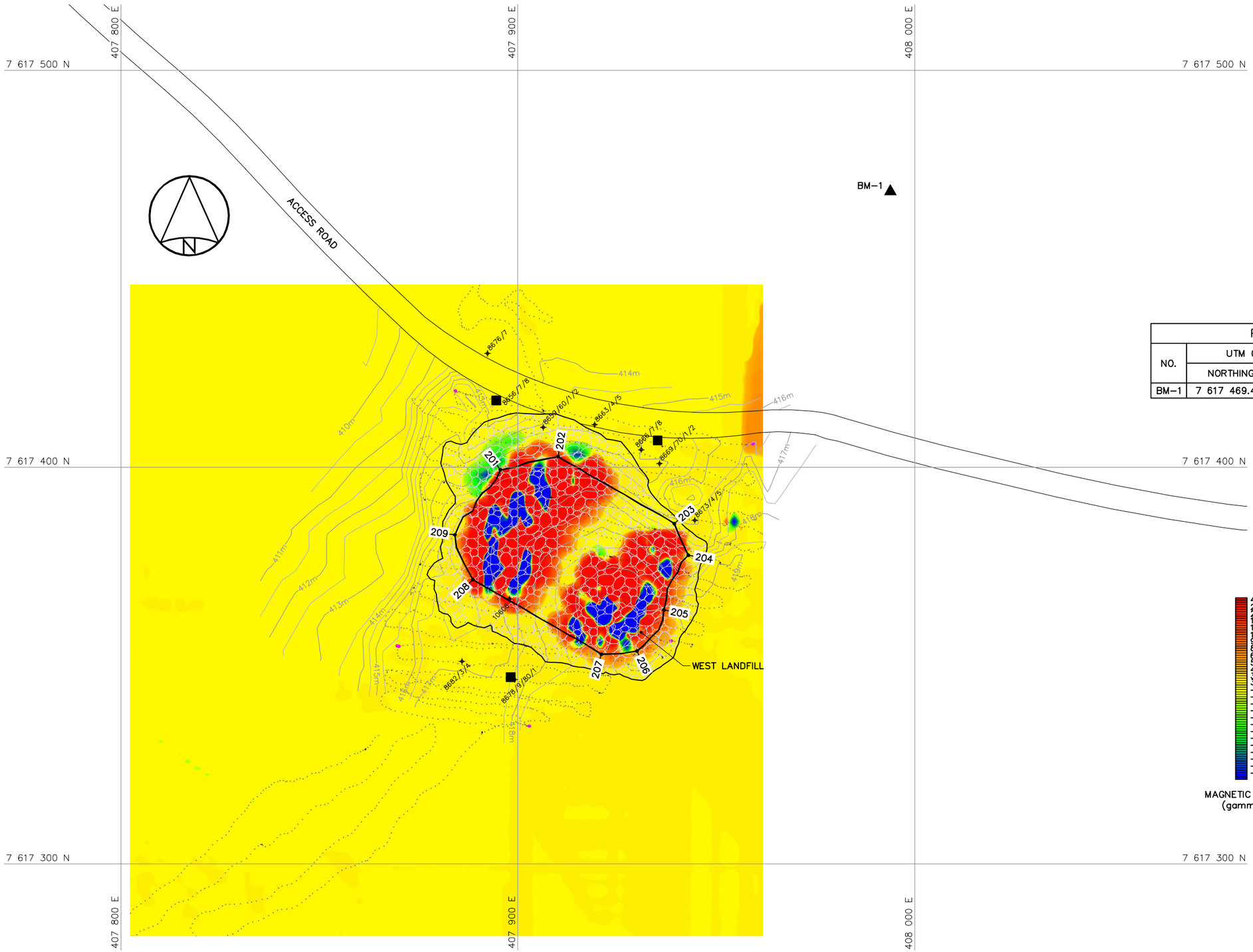
The West Landfill is located 1.3 km west of station and 0.5 km beyond the Reserve boundary. It consists of one lobe covering an area of approximately 1,900 square metres ($m^2$). The landfill soil is composed of sand with some gravel and occasional cobbles and boulders. During the assessment, no existing erosion was noted at the landfill.

Scattered surface debris consisted of structural steel. The assessment did not identify any evidence of surface contamination or contaminant migration. Based on the above, and the lack of nearby aquatic receptors, the West Landfill was classified as a low potential environmental risk. The landfill was covered with 0.4 m of Type 1 granular fill over 0.4 m of Type 2 granular fill.

**The long term monitoring plan consists of visual monitoring and collection of soil samples.** Approximate locations for the collection of soil samples are identified on Figure FOX-3.2

## 2.1 Baseline Data

Sample locations for soil baseline data are shown in Figure FOX-3.2. A summary of the baseline soil analytical data is provided in Table 2.1. Baseline data is comprised of site investigation information collected up and down-gradient of the landfill in 2006 and samples collected at permanent monitoring locations up and down-gradient of the landfill in 2009, 2010 and 2011. Mean soil baseline concentrations of inorganic elements are consistent with or lower than site background levels, with the exception of copper, nickel and zinc concentrations which are slightly higher than background levels. All PCB results were not detectable. Low levels of TPH were detected at the down-gradient sample locations. Concentrations of TPH ranged between <10 milligrams per kilogram (mg/kg) and 22 mg/kg.




GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- ▲BM-1 — PERMANENT BENCHMARK LOCATION (1)
- •201 — COORDINATE POINT
- ■ — MONITORING SOIL SAMPLE LOCATION (3)
- ✶8666 — SOIL SAMPLE TAG LOCATION

PERMANENT BENCHMARK (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| BM-1 | 7 617 469.460 | 407 993.870 | 415.600 | 25mm DIA. STEEL PIPE |

WEST LANDFILL REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 201 | 7 617 399.3 | 407 895.6 | 415.6 |
| 202 | 7 617 402.7 | 407 910.1 | 415.5 |
| 203 | 7 617 385.8 | 407 939.4 | 416.1 |
| 204 | 7 617 377.8 | 407 943.0 | 417.0 |
| 205 | 7 617 364.0 | 407 936.8 | 419.6 |
| 206 | 7 617 353.7 | 407 930.0 | 420.5 |
| 207 | 7 617 352.9 | 407 921.0 | 419.4 |
| 208 | 7 617 371.7 | 407 888.7 | 416.7 |
| 209 | 7 617 382.9 | 407 884.2 | 416.7 |

400 280 220 180 150 120 95 80 65 50 41 38 35 −36 −39 −42 −55 −70 −85 −100 −130 −160 −190 −240 −300 −360

MAGNETIC GRADIENT (gammas/m)

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

**WEST LANDFILL**

FIGURE FOX-3.2

AECOM

## Table 2.1: West Landfill – Baseline Soil Data

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **8678** | 8678 | | 2006 | 0 | 33 | 26.0 | 11.0 | <1.0 | <10 | 58 | 73 | 10 | | <0.1 | | | | |
| **8679** | 8678 | | 2006 | 55 | 32 | 25.0 | 11.0 | <1.0 | <10 | 61 | 70 | 9.8 | | <0.1 | | | | |
| **06-8680/81** | 8678 | | 2006 | 120 | 27 | 19.0 | 8.7 | <1.0 | <10 | 44 | 56 | 16 | | <0.1 | | | | |
| **8682** | 8682 | | 2006 | 0 | 30 | 25.0 | 11.0 | <1.0 | <10 | 54 | 68 | 9.7 | | <0.1 | | | | |
| **8683** | 8682 | | 2006 | 70 | 14 | 8.7 | <5.0 | <1.0 | <10 | 22 | 22 | 4.4 | | <0.1 | | | | |
| **8684** | 8682 | | 2006 | 140 | 18 | 11 | 5.1 | <1.0 | <10 | 28 | 31 | 6.7 | | <0.1 | | | | |
| **11-28523/24*** | 28523 | F3-01 | 2011 | 0-10 | 28 | 25.05 | 11.6 | <1.0 | <10 | 56.06 | 61.27 | 9.485 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28525/26*** | 28523 | F3-01 | 2011 | 30-40 | 29 | 25.3 | 11.7 | <1.0 | <10 | 56.73 | 61.78 | 8.215 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **Down gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **8656** | 8656 | | 2006 | 0 | 23 | 17.0 | 8.2 | <1.0 | <10 | 47 | 48 | 8.4 | | | | | | |
| **8657** | 8656 | | 2006 | 30 | 25 | 18.0 | 8.1 | <1.0 | <10 | 47 | 49 | 6.9 | | | | | | |
| **8658** | 8656 | | 2006 | 60 | 29 | 21.0 | 9.4 | <1.0 | <10 | 51 | 55 | 8.9 | | <0.1 | | | | |
| **8659** | 8659 | | 2006 | 5 | 27 | 21.0 | 8.9 | <1.0 | <10 | 53 | 57 | 7.1 | | <0.1 | | | | |
| **06-8660/61** | 8659 | | 2006 | 50 | 33 | 18.0 | 8.2 | <1.0 | <10 | 45 | 54 | 13.0 | | <0.1 | | | | |
| **8662** | 8659 | | 2006 | 110 | 20 | 25.0 | 11 | <1.0 | <10 | 58 | 69 | 7.8 | | <0.1 | | | | |
| **8663** | 8663 | | 2006 | 0 | 20 | 19.0 | 8.2 | <1.0 | 14 | 63 | 53 | 7.1 | | | | | | |
| **8664** | 8663 | | 2006 | 40 | 26 | 24.0 | 11 | <1.0 | <10 | 57 | 66 | 9.2 | | | | | | |
| **8665** | 8663 | | 2006 | 70 | 25 | 21.0 | 9.8 | <1.0 | <10 | 52 | 62 | 7.8 | | <0.1 | | | | |
| **8666** | 8666 | | 2006 | 0 | 22 | 20.0 | 8.5 | <1.0 | <10 | 54 | 54 | 7.8 | | | | | | |
| **8667** | 8666 | | 2006 | 40 | 20 | 16.0 | 7.4 | <1.0 | <10 | 41 | 47 | 7.2 | | | | | | |
| **8668** | 8666 | | 2006 | 70 | 19 | 17.0 | 7.7 | <1.0 | <10 | 40 | 47 | 7.6 | | <0.1 | | | | |
| **8669** | 8669 | | 2006 | 0 | 20 | 17.0 | 7.6 | <1.0 | <10 | 38 | 44 | 5.3 | | | | | | |
| **06-8670/71** | 8669 | | 2006 | 45 | 25 | 22.0 | 9.7 | <1.0 | <10 | 50 | 58 | 10.0 | | | | | | |
| **8672** | 8669 | | 2006 | 90 | 24 | 19.0 | 8.8 | <1.0 | <10 | 45 | 52 | 12.0 | | <0.1 | | | | |
| **8673** | 8673 | | 2006 | 0 | 26 | 22.0 | 9.7 | <1.0 | <10 | 52 | 61 | 10.0 | | <0.1 | | | | |
| **8674** | 8673 | | 2006 | 50 | 25 | 23.0 | 10 | <1.0 | <10 | 55 | 67 | 9.3 | | | | | | |
| **8675** | 8673 | | 2006 | 90 | 25 | 16.0 | 7.4 | <1.0 | <10 | 40 | 49 | 12.0 | | <0.1 | | | | |
| **8676** | 8676 | | 2006 | 0 | 16 | 13.0 | 6.2 | <1.0 | <10 | 35 | 39 | 5.1 | | | | | | |
| **8677** | 8676 | | 2006 | 50 | 25 | 19.0 | 8.8 | <1.0 | <10 | 48 | 56 | 8.4 | | <0.1 | | | | |
| **11-28527/28*** | 28527 | F3-02 | 2011 | 0-10 | 18 | 20.7 | 9.36 | <1.0 | <10 | 50 | 51 | 6.3 | <0.10 | <0.050 | 22 | <10 | <4.0 | 22 |
| **11-28529/30*** | 28527 | F3-02 | 2011 | 30-40 | 27 | 25.7 | 11.7 | <1.0 | <10 | 60 | 64 | 10.8 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28531/32*** | 28531 | F3-03 | 2011 | 0-10 | 23 | 21.6 | 9.66 | <1.0 | <10 | 48 | 52 | 8.2 | <0.10 | <0.050 | 18 | <10 | 18 | <9.0 |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **11-28533/34*** | 28531 | F3-03 | 2011 | 30-40 | 23 | 20.4 | 9.61 | <1.0 | <10 | 50 | 51 | 8.7 | <0.10 | <0.050 | 16 | <10 | 4.3 | 12 |
| | | | | | | | | | | | | | | | | | | |
| | | N Value | | | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 6 | 32 | 6 | | | |
| | | Average | | | 24 | 20.0 | 9.0 | <1.0 | <10 | 49 | 55 | 8.7 | <0.10 | <0.1 | 12 | | | |
| | | Standard Deviation | | | 5 | 4.3 | 2.0 | | | 9 | 11 | 2.4 | | | 8 | | | |
| | | Minimum | | | 14 | 8.7 | <5.0 | | <10 | 22 | 22 | 4.4 | | <0.050 | <10 | | | |
| | | Maximum | | | 33 | 26.0 | 11.7 | <1.0 | 14 | 63 | 73 | 16.0 | <0.10 | <0.1 | 22 | | | |
| | | 95% Confidence Limit | | | 2 | 1.5 | 0.7 | | | 3.2 | 4 | 0.8 | | | 6 | | | |

# 3. Station West Landfill

The Station West Landfill is located 150 m west of the main station area and west of the old station access road. The landfill consists of 3 lobes covering approximately 7,500 $m^2$. The entire landfill area is gently sloping radially away from the landfill lobes to the west. Terrain in the area is largely boulder, with partially developed frost circles comprised of boulder perimeters with finer grained interiors. Early in the season (mid-July), the entire upper site is quite wet and soft; however, conditions are typically drier later in the season.

Five areas of Tier II soil contamination, one area of hazardous soil contamination, and one Tier I area of soil contamination were identified during the assessment. Remediation activities involved the excavation of the Tier II and hazardous soils and covering the Tier I soils with a minimum of 30 centimetres (cm) Type 2 soil. Evidence of contaminant migration was not present at any of the lobes.

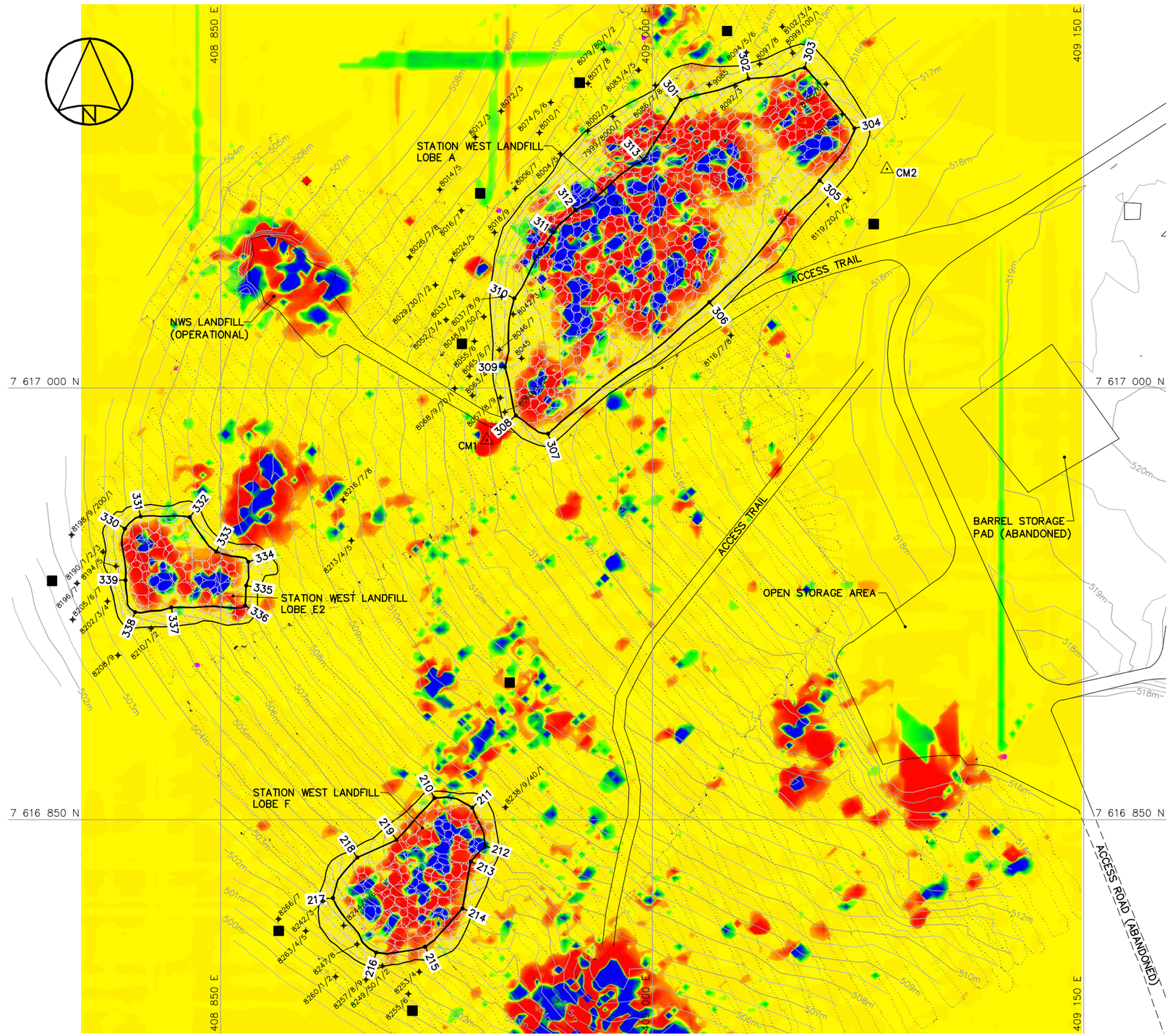
Based on an assessment of the Station West Landfill as a contaminant source, the potential for migration, and down gradient receptors, the landfill was classified as a low potential environmental risk. Accordingly, surface and partially exposed debris was removed, and the landfill was regraded with 0.4 m of Type 1 granular fill over 0.4 m of Type 2 granular fill.

**The long term monitoring plan consists of visual monitoring and collection of soil samples.** Approximate locations for the collection of soil samples are identified on Figure FOX-3.3

## 3.1 Baseline Data

Sample locations for soil baseline data are shown in Figure FOX-3.3. A summary of the baseline soil analytical data is provided in Table 3.1. Baseline data is comprised of site investigation information collected up and down-gradient of the landfill in 2006 and samples collected at permanent monitoring locations up and down-gradient of the landfill in 2011. Mean soil baseline concentrations of inorganic elements are consistent with or lower than site background levels, with the exception of copper, nickel, cobalt, zinc, and chromium concentrations which are slightly higher than background levels. All PCB results were not detectable, with the exception of one up gradient and two down gradient samples. The results ranged from <0.050 to 0.300 mg/kg. TPH was detected at both up gradient and down gradient sample locations. Concentrations of TPH ranged between <10 mg/kg and 2100 mg/kg.

Sheet Size: 11 x 17 (432mm x 279mm)
PLOT: January 24, 2013 1:25:34 PM
Saved by: Cechi
AECOM FILE NO.: FOX-3.3 Baseline LF MON.dwg




MAGNETIC GRADIENT (gammas/m)

400 280 220 180 150 120 95 80 65 50 41 38 35 −36 −39 −42 −55 −70 −85 −100 −130 −160 −190 −240 −300 −360

## GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

## LEGEND:

- CM1 — SURVEY CONTROL MONUMENT (2)
- 301 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION (9)
- 8116 — SOIL SAMPLE TAG LOCATION

### SURVEY CONTROL MONUMENTS

| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| CM1 | 7 616 981.903 | 408 942.460 | 513.650 | FOX-3 BASELINE STA. 0+00 |
| CM2 | 7 617 076.152 | 409 081.577 | 517.980 | FOX-3 BASELINE STA. 5+51.73 |

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

### STATION WEST LANDFILL (LOBE E2) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 330 | 7 616 951.1 | 408 816.7 | 505.7 |
| 331 | 7 616 955.4 | 408 822.1 | 506.1 |
| 332 | 7 616 955.1 | 408 839.2 | 507.1 |
| 333 | 7 616 943.1 | 408 848.4 | 507.6 |
| 334 | 7 616 939.6 | 408 859.6 | 508.0 |
| 335 | 7 616 931.3 | 408 858.8 | 508.0 |
| 336 | 7 616 924.4 | 408 858.4 | 507.7 |
| 337 | 7 616 923.8 | 408 832.8 | 506.1 |
| 338 | 7 616 922.1 | 408 820.2 | 505.2 |
| 339 | 7 616 933.2 | 408 816.9 | 505.3 |

### STATION WEST LANDFILL (LOBE F) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 210 | 7 616 857.5 | 408 924.3 | 507.8 |
| 211 | 7 616 854.2 | 408 937.5 | 508.3 |
| 212 | 7 616 840.9 | 408 941.8 | 507.6 |
| 213 | 7 616 835.4 | 408 936.9 | 507.1 |
| 214 | 7 616 819.1 | 408 934.0 | 505.6 |
| 215 | 7 616 805.8 | 408 921.0 | 503.9 |
| 216 | 7 616 803.8 | 408 904.1 | 502.8 |
| 217 | 7 616 822.7 | 408 888.9 | 503.3 |
| 218 | 7 616 836.8 | 408 897.5 | 505.1 |
| 219 | 7 616 842.9 | 408 911.1 | 506.5 |

### STATION WEST LANDFILL (LOBE A) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 301 | 7 617 100.2 | 409 009.9 | 513.9 |
| 302 | 7 617 107.5 | 409 033.5 | 514.7 |
| 303 | 7 617 111.3 | 409 053.0 | 515.6 |
| 304 | 7 617 090.3 | 409 070.3 | 517.2 |
| 305 | 7 617 072.2 | 409 058.2 | 517.7 |
| 306 | 7 617 029.8 | 409 019.9 | 516.8 |
| 307 | 7 616 984.1 | 408 963.8 | 514.5 |
| 308 | 7 616 990.4 | 408 952.6 | 514.0 |
| 309 | 7 617 007.3 | 408 948.8 | 513.5 |
| 310 | 7 617 031.2 | 408 952.0 | 513.6 |
| 311 | 7 617 054.1 | 408 965.7 | 515.1 |
| 312 | 7 617 061.9 | 408 973.3 | 515.0 |
| 313 | 7 617 079.3 | 408 997.0 | 515.5 |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 15 30 m SCALE 1:1500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

**STATION WEST LANDFILL**

FIGURE FOX-3.3

AECOM

## Table 3.1: Station West Landfill – Baseline Soil Data

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **8113** | 8113 | | 2006 | 10 | 46.0 | 32.0 | 12 | <1.0 | <10 | 71 | 76 | 6.7 | | <0.1 | | | | |
| **8114** | 8113 | | 2006 | 50 | 28.0 | 26.0 | 9.2 | <1.0 | <10 | 57 | 70 | 6.3 | | <0.1 | | | | |
| **8115** | 8113 | | 2006 | 80 | 35.0 | 25.0 | 9.6 | <1.0 | <10 | 56 | 67 | 17.0 | | <0.1 | | | | |
| **8116** | 8116 | | 2006 | 10 | 34.0 | 27.0 | 11 | <1.0 | <10 | 63 | 73 | 7.8 | | <0.1 | | | | |
| **8117** | 8116 | | 2006 | 50 | 49.0 | 34.0 | 12 | <1.0 | <10 | 70 | 84 | 13.0 | | <0.1 | | | | |
| **8118** | 8116 | | 2006 | 85 | 46.0 | 34.0 | 13 | <1.0 | <10 | 75 | 84 | 5.6 | | <0.1 | | | | |
| **8119** | 8119 | | 2006 | 10 | 34.0 | 23.0 | 9.2 | <1.0 | <10 | 52 | 83 | 5.5 | | <0.1 | | | | |
| **06-8120/21** | 8119 | | 2006 | 50 | 54.0 | 36.0 | 12 | <1.0 | <10 | 75 | 92 | 8.4 | | <0.1 | | | | |
| **8122** | 8119 | | 2006 | 75 | 44.0 | 31.0 | 13 | <1.0 | <10 | 68 | 83 | 13.0 | | <0.1 | | | | |
| **8213** | 8213 | | 2006 | 10 | 34.0 | 32.0 | 13 | <1.0 | <10 | 72 | 72 | 7.4 | | <0.1 | | | | |
| **8214** | 8213 | | 2006 | 40 | 35.0 | 31.0 | 13 | <1.0 | <10 | 65 | 72 | 5.6 | | <0.1 | | | | |
| **8215** | 8213 | | 2006 | 70 | 40.0 | 38.0 | 13 | <1.0 | <10 | 76 | 79 | 6.2 | | <0.1 | | | | |
| **8216** | 8216 | | 2006 | 10 | 40.0 | 32.0 | 13 | <1.0 | <10 | 71 | 77 | 9.8 | | 0.3 | 2100 | | | |
| **8217** | 8216 | | 2006 | 45 | 48.0 | 37.0 | 14 | <1.0 | <10 | 77 | 94 | 11.0 | | <0.1 | | | | |
| **8218** | 8216 | | 2006 | 80 | 55.0 | 37.0 | 14 | <1.0 | <10 | 82 | 84 | 11.0 | | <0.1 | | | | |
| **8238** | 8238 | | 2006 | 10 | 33.0 | 30.0 | 12 | <1.0 | <10 | 62 | 73 | 8.9 | | <0.1 | | | | |
| **8239** | 8238 | | 2006 | 40 | 39.0 | 34.0 | 13 | <1.0 | <10 | 69 | 82 | 10.0 | | <0.1 | | | | |
| **06-8240/41** | 8238 | | 2006 | 70 | 36.0 | 33.0 | 12 | <1.0 | <10 | 66 | 78 | 9.0 | | <0.1 | | | | |
| **11-28567/68*** | 28567 | F3-08 | 2011 | 0-10 | 57.2 | 27.3 | 12.12 | <1.0 | 16.29 | 63.65 | 58 | 10.1 | <0.10 | <0.050 | 119 | <10 | 8.8 | 110 |
| **11-28569/70*** | 28567 | F3-08 | 2011 | 30-40 | 36.9 | 33.2 | 14.68 | <1.0 | <10 | 70.99 | 77.37 | 11.7 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28535/36*** | 28535 | F3-10 | 2011 | 0-10 | 41.5 | 33.4 | 14.3 | <1.0 | 33.7 | 190 | 78.03 | 11.5 | <0.10 | <0.050 | 28 | <10 | 5.2 | 23 |
| **11-28537/38*** | 28535 | F3-10 | 2011 | 30-40 | 37.7 | 32.4 | 15.04 | <1.0 | <10 | 74.5 | 77.47 | 12.9 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **Down gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **7999** | 7999 | | 2006 | 10 | 39.0 | 31.0 | 13 | <1.0 | <10 | 67 | 84 | 9.8 | | <0.1 | | | | |
| **06-8000/01** | 7999 | | 2006 | 45 | 36.0 | 33.0 | 14 | <1.0 | <10 | 70 | 82 | 10.0 | | <0.1 | | | | |
| **8002** | 8002 | | 2006 | 10 | 43.0 | 31.0 | 14 | <1.0 | <10 | 82 | 74 | 12.0 | | <0.1 | | | | |
| **8003** | 8002 | | 2006 | 50 | 40.0 | 28.0 | 13 | <1.0 | <10 | 64 | 64 | 8.6 | | <0.1 | | | | |
| **8004** | 8004 | | 2006 | 10 | 45.0 | 32.0 | 13 | <1.0 | <10 | 71 | 76 | 18.0 | | <0.1 | | | | |
| **8005** | 8004 | | 2006 | 40 | 33.0 | 28.0 | 12 | <1.0 | <10 | 64 | 73 | 13.0 | | <0.1 | | | | |
| **8006** | 8006 | | 2006 | 10 | 30.0 | 26.0 | 11 | <1.0 | <10 | 62 | 66 | 9.2 | | <0.1 | | | | |
| **8007** | 8006 | | 2006 | 60 | 34.0 | 28.0 | 12 | <1.0 | <10 | 64 | 69 | 11.0 | | <0.1 | | | | |
| **06-8010/11** | 8010 | | 2006 | 30 | 43.0 | 32.0 | 14 | <1.0 | <10 | 74 | 74 | 12.0 | | <0.1 | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **8012** | 8012 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8013** | 8012 | | 2006 | 65 | | | | | | | | | | | | | | |
| **8014** | 8014 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8015** | 8014 | | 2006 | 60 | | | | | | | | | | | | | | |
| **8016** | 8016 | | 2006 | 10 | 46.0 | 29.0 | 11 | <1.0 | <10 | 76 | 74 | 10.0 | | <0.1 | | | | |
| **8017** | 8016 | | 2006 | 50 | 45.0 | 31.0 | 14 | <1.0 | <10 | 77 | 76 | 14.0 | | <0.1 | | | | |
| **8018** | 8018 | | 2006 | 10 | 42.0 | 31.0 | 13 | <1.0 | <10 | 75 | 77 | 12.0 | | <0.1 | | | | |
| **8019** | 8018 | | 2006 | 60 | 50.0 | 34.0 | 13 | <1.0 | <10 | 83 | 80 | 11.0 | | <0.1 | | | | |
| **8024** | 8024 | | 2006 | 10 | 41.0 | 29.0 | 13 | <1.0 | <10 | 65 | 74 | 13.0 | | <0.1 | | | | |
| **8025** | 8024 | | 2006 | 65 | 28.0 | 26.0 | 11 | <1.0 | <10 | 59 | 63 | 4.6 | | <0.1 | | | | |
| **8026** | 8026 | | 2006 | 10 | 37.0 | 29.0 | 12 | <1.0 | <10 | 67 | 74 | 7.3 | | <0.1 | | | | |
| **8027** | 8026 | | 2006 | 40 | 44.0 | 32.0 | 14 | <1.0 | <10 | 73 | 81 | 12.0 | | <0.1 | | | | |
| **8028** | 8026 | | 2006 | 75 | 67.0 | 47.0 | 19 | <1.0 | <10 | 100 | 120 | 19.0 | | <0.1 | | | | |
| **8029** | 8029 | | 2006 | 10 | | | | | | | | | | | | | | |
| **06-8030/31** | 8029 | | 2006 | 40 | | | | | | | | | | | | | | |
| **8032** | 8029 | | 2006 | 70 | | | | | | | | | | | | | | |
| **8033** | 8033 | | 2006 | 8 | 43.0 | 34.0 | 14 | <1.0 | <10 | 76 | 87 | 9.7 | | <0.1 | | | | |
| **8034** | 8033 | | 2006 | 35 | 39.0 | 34.0 | 13 | <1.0 | <10 | 74 | 83 | 8.8 | | <0.1 | | | | |
| **8035** | 8033 | | 2006 | 60 | 49.0 | 35.0 | 16 | <1.0 | <10 | 85 | 87 | 14.0 | | <0.1 | | | | |
| **8037** | 8037 | | 2006 | 8 | 46.0 | 36.0 | 15 | <1.0 | <10 | 81 | 100 | 12.0 | | <0.1 | | | | |
| **8038** | 8037 | | 2006 | 40 | 39.0 | 29.0 | 13 | <1.0 | <10 | 68 | 78 | 12.0 | | <0.1 | | | | |
| **8039** | 8037 | | 2006 | 65 | 41.0 | 29.0 | 13 | <1.0 | <10 | 68 | 82 | 14.0 | | <0.1 | | | | |
| **06-8040/41** | 8040 | | 2006 | 40 | 50.0 | 34.0 | 13 | <1.0 | 18 | 98 | 84 | 18.0 | | 0.15 | | | | |
| **8042** | 8042 | | 2006 | 10 | 39.0 | 31.0 | 12 | <1.0 | <10 | 68 | 73 | 6.8 | | <0.1 | | | | |
| **8043** | 8042 | | 2006 | 40 | 34.0 | 27.0 | 10 | <1.0 | <10 | 140 | 69 | 5.7 | | <0.1 | | | | |
| **8044** | 8042 | | 2006 | 70 | 44.0 | 30.0 | 11 | <1.0 | <10 | 81 | 73 | 6.6 | | <0.1 | | | | |
| **8045** | 8045 | | 2006 | 15 | 41.0 | 31.0 | 12 | <1.0 | <10 | 84 | 74 | 4.8 | | <0.1 | | | | |
| **8046** | 8046 | | 2006 | 10 | 43.0 | 34.0 | 13 | <1.0 | <10 | 71 | 80 | 6.9 | | <0.1 | | | | |
| **8047** | 8046 | | 2006 | 65 | 41.0 | 30.0 | 12 | <1.0 | <10 | 65 | 77 | 6.9 | | <0.1 | | | | |
| **8048** | 8048 | | 2006 | 10 | 34.0 | 30.0 | 11 | <1.0 | <10 | 66 | 76 | 5.5 | | <0.1 | | | | |
| **8049** | 8048 | | 2006 | 40 | 47.0 | 33.0 | 11 | <1.0 | <10 | 63 | 82 | 11.0 | | <0.1 | | | | |
| **06-8050/51** | 8048 | | 2006 | 75 | 40.0 | 33.0 | 12 | <1.0 | <10 | 67 | 75 | 4.7 | | <0.1 | | | | |
| **8051** | 8048 | | 2006 | 75 | 36.0 | 31.0 | 11 | <1.0 | <10 | 65 | 73 | 4.5 | | <0.1 | | | | |
| **8052** | 8052 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8053** | 8052 | | 2006 | 40 | | | | | | | | | | | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **8054** | 8052 | | 2006 | 60 | | | | | | | | | | | | | | |
| **8055** | 8055 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8056** | 8055 | | 2006 | 50 | | | | | | | | | | | | | | |
| **8057** | 8057 | | 2006 | 10 | 35.0 | 29.0 | 11 | <1.0 | <10 | 62 | 73 | 5.9 | | <0.1 | | | | |
| **8058** | 8057 | | 2006 | 40 | 35.0 | 31.0 | 11 | <1.0 | <10 | 61 | 75 | 7.7 | | <0.1 | | | | |
| **8059** | 8057 | | 2006 | 70 | 32.0 | 28.0 | 11 | <1.0 | <10 | 63 | 69 | 3.7 | | <0.1 | | | | |
| **06-8060/61** | 8060 | | 2006 | 10 | 40.0 | 31.0 | 12 | <1.0 | <10 | 70 | 80 | 13.0 | | <0.1 | | | | |
| **8062** | 8060 | | 2006 | 60 | 45.0 | 32.0 | 13 | <1.0 | <10 | 68 | 77 | 10.0 | | <0.1 | | | | |
| **8063** | 8063 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8064** | 8063 | | 2006 | 60 | | | | | | | | | | | | | | |
| **8065** | 8065 | | 2006 | 10 | 46.0 | 41.0 | 17 | <1.0 | <10 | 82 | 94 | 21.0 | | <0.1 | | | | |
| **8066** | 8065 | | 2006 | 40 | | | | | | | | | | | | | | |
| **8067** | 8065 | | 2006 | 80 | 29.0 | 31.0 | 13 | <1.0 | <10 | 67 | 80 | 11.0 | | <0.1 | | | | |
| **8068** | 8068 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8069** | 8068 | | 2006 | 40 | | | | | | | | | | | | | | |
| **06-8070/71** | 8068 | | 2006 | 75 | | | | | | | | | | | | | | |
| **8072** | 8072 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8073** | 8072 | | 2006 | 70 | | | | | | | | | | | | | | |
| **8074** | 8074 | | 2006 | 10 | 43.0 | 31.0 | 11 | <1.0 | <10 | 95 | 81 | 9.0 | | <0.1 | | | | |
| **8075** | 8074 | | 2006 | 35 | 38.0 | 29.0 | 11 | <1.0 | <10 | 62 | 81 | 6.8 | | <0.1 | | | | |
| **8076** | 8074 | | 2006 | 55 | 35.0 | 26.0 | 10 | <1.0 | <10 | 56 | 73 | 7.8 | | <0.1 | | | | |
| **8077** | 8077 | | 2006 | 5 | 37.0 | 28.0 | 11 | <1.0 | <10 | 67 | 74 | 6.8 | | <0.1 | | | | |
| **8078** | 8077 | | 2006 | 50 | 38.0 | 29.0 | 11 | <1.0 | <10 | 68 | 74 | 8.4 | | <0.1 | | | | |
| **8079** | 8079 | | 2006 | 10 | | | | | | | | | | | | | | |
| **06-8080/81** | 8079 | | 2006 | 60 | | | | | | | | | | | | | | |
| **8082** | 8079 | | 2006 | 85 | | | | | | | | | | | | | | |
| **8083** | 8083 | | 2006 | 10 | 36.0 | 27.0 | 11 | <1.0 | <10 | 63 | 71 | 13.0 | | <0.1 | | | | |
| **8084** | 8083 | | 2006 | 40 | 46.0 | 31.0 | 12 | <1.0 | <10 | 72 | 85 | 7.7 | | <0.1 | | | | |
| **8085** | 8083 | | 2006 | 75 | 39.0 | 30.0 | 12 | <1.0 | <10 | 78 | 80 | 7.8 | | <0.1 | | | | |
| **8086** | 8086 | | 2006 | 10 | 34.0 | 26.0 | 10 | <1.0 | <10 | 63 | 67 | 6.4 | | <0.1 | | | | |
| **8087** | 8086 | | 2006 | 35 | 45.0 | 30.0 | 13 | <1.0 | <10 | 69 | 80 | 7.6 | | <0.1 | | | | |
| **8088** | 8086 | | 2006 | 50 | 40.0 | 32.0 | 13 | <1.0 | <10 | 70 | 79 | 7.9 | | <0.1 | | | | |
| **8092** | 8092 | | 2006 | 5 | 46.0 | 32.0 | 12 | <1.0 | 29 | 87 | 76 | 7.0 | | <0.1 | | | | |
| **8093** | 8092 | | 2006 | 40 | 41.0 | 32.0 | 12 | <1.0 | <10 | 69 | 75 | 5.9 | | <0.1 | 320 | | | |
| **8094** | 8094 | | 2006 | 10 | 36.0 | 32.0 | 12 | <1.0 | <10 | 99 | 82 | 8.9 | | <0.1 | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **8095** | 8094 | | 2006 | 35 | 29.0 | 23.0 | 8.9 | <1.0 | <10 | 51 | 62 | 5.8 | | <0.1 | | | | |
| **8096** | 8094 | | 2006 | 75 | 45.0 | 35.0 | 14 | <1.0 | <10 | 71 | 73 | 7.7 | | <0.1 | | | | |
| **8097** | 8097 | | 2006 | 10 | 40.0 | 29.0 | 11 | <1.0 | <10 | 66 | 75 | 6.7 | | <0.1 | | | | |
| **8098** | 8097 | | 2006 | 30 | 42.0 | 31.0 | 12 | <1.0 | <10 | 65 | 77 | 6.6 | | <0.1 | | | | |
| **8099** | 8099 | | 2006 | 10 | 28.0 | 27.0 | 10 | <1.0 | <10 | 56 | 66 | 5.0 | | <0.1 | | | | |
| **06-8100/01** | 8099 | | 2006 | 40 | 36.0 | 30.0 | 12 | <1.0 | <10 | 68 | 70 | 5.5 | | <0.1 | | | | |
| **8102** | 8102 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8103** | 8102 | | 2006 | 40 | | | | | | | | | | | | | | |
| **8105** | 8105 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8106** | 8105 | | 2006 | 30 | | | | | | | | | | | | | | |
| **8107** | 8107 | | 2006 | 10 | 40.0 | 32.0 | 12 | <1.0 | <10 | 65 | 70 | 4.4 | | <0.1 | | | | |
| **8108** | 8107 | | 2006 | 30 | 38.0 | 29.0 | 11 | <1.0 | <10 | 62 | 70 | 5.0 | | <0.1 | | | | |
| **06-8190/91** | 8190 | | 2006 | 10 | 34.0 | 30.0 | 12 | <1.0 | <10 | 70 | 74 | 6.5 | | <0.1 | | | | |
| **8192** | 8190 | | 2006 | 40 | 47.0 | 36.0 | 14 | <1.0 | <10 | 80 | 89 | 13.0 | | <0.1 | <40 | | | |
| **8193** | 8190 | | 2006 | 70 | 50.0 | 37.0 | 14 | <1.0 | <10 | 78 | 83 | 8.4 | | <0.1 | | | | |
| **8194** | 8194 | | 2006 | 10 | 27.0 | 24.0 | 9.6 | <1.0 | <10 | 74 | 61 | 11.0 | | <0.1 | | | | |
| **8195** | 8194 | | 2006 | 55 | 49.0 | 42.0 | 14 | <1.0 | <10 | 73 | 97 | 7.2 | | <0.1 | <40 | | | |
| **8196** | 8196 | | 2006 | 10 | 40.0 | 33.0 | 15 | <1.0 | <10 | 74 | 84 | 11.0 | | <0.1 | | | | |
| **8197** | 8196 | | 2006 | 60 | | | | | | | | | | | | | | |
| **8198** | 8198 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8199** | 8198 | | 2006 | 40 | | | | | | | | | | | | | | |
| **06-8200/01** | 8198 | | 2006 | 70 | | | | | | | | | | | | | | |
| **8202** | 8202 | | 2006 | 10 | 42.0 | 34.0 | 15 | <1.0 | <10 | 71 | 75 | 6.6 | | 0.2 | | | | |
| **8203** | 8202 | | 2006 | 40 | 65.0 | 43.0 | 15 | <1.0 | <10 | 82 | 92 | 13.0 | | <0.1 | <40 | | | |
| **8204** | 8202 | | 2006 | 70 | 52.0 | 41.0 | 16 | <1.0 | <10 | 82 | 80 | 16.0 | | <0.1 | | | | |
| **8205** | 8205 | | 2006 | 5 | 28.0 | 28.0 | 11 | <1.0 | <10 | 61 | 76 | 5.7 | | <0.1 | | | | |
| **8206** | 8205 | | 2006 | 40 | 54.0 | 39.0 | 17 | <1.0 | <10 | 85 | 92 | 12.0 | | <0.1 | | | | |
| **8207** | 8205 | | 2006 | 80 | | | | | | | | | | | | | | |
| **8208** | 8208 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8209** | 8208 | | 2006 | 40 | | | | | | | | | | | | | | |
| **06-8210/11** | 8210 | | 2006 | 5 | 40.0 | 31.0 | 13 | <1.0 | <10 | 68 | 74 | 10.0 | | <0.1 | | | | |
| **8212** | 8210 | | 2006 | 30 | 36.0 | 30.0 | 13 | <1.0 | <10 | 64 | 77 | 10.0 | | | | | | |
| **8242** | 8242 | | 2006 | 10 | 38.0 | 33.0 | 13 | <1.0 | <10 | 67 | 76 | 12.0 | | <0.1 | | | | |
| **8243** | 8242 | | 2006 | 40 | 33.0 | 30.0 | 11 | <1.0 | <10 | 56 | 77 | 10.0 | | <0.1 | | | | |
| **8244** | 8244 | | 2006 | 10 | 41.0 | 35.0 | 12 | <1.0 | <10 | 66 | 82 | 7.5 | | <0.1 | | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **8245** | 8244 | | 2006 | 40 | 40.0 | 33.0 | 12 | <1.0 | <10 | 67 | 85 | 9.4 | | <0.1 | | | | |
| **8246** | 8244 | | 2006 | 70 | 40.0 | 36.0 | 13 | <1.0 | <10 | 66 | 78 | 11.0 | | <0.1 | | | | |
| **8247** | 8247 | | 2006 | 10 | 30.0 | 31.0 | 11 | <1.0 | <10 | 66 | 77 | 6.1 | | <0.1 | | | | |
| **8248** | 8247 | | 2006 | 45 | 40.0 | 32.0 | 12 | <1.0 | <10 | 64 | 78 | 9.1 | | <0.1 | | | | |
| **8249** | 8249 | | 2006 | 10 | 26.0 | 27.0 | 10 | <1.0 | <10 | 59 | 70 | 6.7 | | <0.1 | | | | |
| **06-8250/51** | 8249 | | 2006 | 45 | 29.0 | 30.0 | 12 | <1.0 | <10 | 61 | 120 | 8.0 | | <0.1 | | | | |
| **8252** | 8249 | | 2006 | 85 | 36.0 | 33.0 | 13 | <1.0 | <10 | 65 | 74 | 6.4 | | <0.1 | | | | |
| **8253** | 8253 | | 2006 | 10 | 26.0 | 30.0 | 11 | <1.0 | <10 | 59 | 75 | 9.5 | | <0.1 | | | | |
| **8254** | 8253 | | 2006 | 50 | 27.0 | 29.0 | 12 | <1.0 | <10 | 56 | 66 | 8.7 | | <0.1 | | | | |
| **8255** | 8255 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8256** | 8255 | | 2006 | 40 | | | | | | | | | | | | | | |
| **8257** | 8257 | | 2006 | 10 | 35.0 | 29.0 | 11 | <1.0 | <10 | 64 | 74 | 20.0 | | <0.1 | | | | |
| **8258** | 8257 | | 2006 | 45 | 37.0 | 31.0 | 13 | <1.0 | <10 | 66 | 69 | 9.6 | | <0.1 | | | | |
| **8259** | 8257 | | 2006 | 80 | 32.0 | 29.0 | 11 | <1.0 | <10 | 60 | 68 | 11.0 | | <0.1 | | | | |
| **06-8260/61** | 8260 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8262** | 8260 | | 2006 | 40 | | | | | | | | | | | | | | |
| **8263** | 8263 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8264** | 8263 | | 2006 | 50 | | | | | | | | | | | | | | |
| **8265** | 8263 | | 2006 | 90 | | | | | | | | | | | | | | |
| **8266** | 8266 | | 2006 | 10 | | | | | | | | | | | | | | |
| **8267** | 8266 | | 2006 | 55 | | | | | | | | | | | | | | |
| **11-28551/52*** | 28551 | F3-04 | 2011 | 0-10 | 34.7 | 32.2 | 12.92 | <1.0 | 11.47 | 71.88 | 84.35 | 13.9 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28553/54*** | 28551 | F3-04 | 2011 | 30-40 | 26.0 | 25.4 | 11.37 | <1.0 | <10 | 59.64 | 67.09 | 11.9 | <0.10 | <0.050 | <10 | <10 | 4.9 | <9.0 |
| **11-28555/56*** | 28555 | F3-05 | 2011 | 0-10 | 39.8 | 31.4 | 14.23 | <1.0 | <10 | 70.6 | 79.23 | 16.3 | <0.10 | <0.050 | 21 | <10 | 5.4 | 16 |
| **11-28557/58*** | 28555 | F3-05 | 2011 | 30-40 | 39.7 | 30.0 | 13.66 | <1.0 | <10 | 67.06 | 75.61 | 17.8 | <0.10 | <0.050 | <10 | <10 | 6.1 | <9.0 |
| **11-28559/60*** | 28559 | F3-06 | 2011 | 0-10 | 50.2 | 33.1 | 14.29 | <1.0 | <10 | 76 | 72.975 | 17.7 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28561*/62*** | 28559 | F3-06 | 2011 | 30-40 | 43.7 | 30.9 | 13.39 | <1.0 | <10 | 67.48 | 72.06 | 21.7 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28563/64*** | 28563 | F3-07 | 2011 | 0-10 | 45.1 | 29.3 | 13.58 | <1.0 | <10 | 66.6 | 69.59 | 14.6 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28565/66*** | 28563 | F3-07 | 2011 | 30-40 | 37.1 | 27.5 | 12.42 | <1.0 | <10 | 62.04 | 70.35 | 14.9 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28547/48*** | 28547 | F3-09 | 2011 | 0-10 | 25.0 | 25.2 | 10.98 | <1.0 | <10 | 55.96 | 62.76 | 10.7 | <0.10 | <0.050 | <10 | <10 | 4.2 | <9.0 |
| **11-28549/50*** | 28547 | F3-09 | 2011 | 30-40 | 29.4 | 27.7 | 12.03 | <1.0 | <10 | 60.32 | 68.68 | 12.6 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28539/40*** | 28539 | F3-11 | 2011 | 0-10 | 45.0 | 36.5 | 15.32 | <1.0 | <10 | 74.69 | 78.52 | 18.7 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28541/42*** | 28539 | F3-11 | 2011 | 30-40 | 46.0 | 35.8 | 15.03 | <1.0 | <10 | 68.31 | 76.4 | 20.0 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28543/44*** | 28543 | F3-12 | 2011 | 0-10 | 29.6 | 31.5 | 12.35 | <1.0 | <10 | 60.14 | 74.26 | 9.9 | <0.10 | <0.050 | 16 | <10 | 5 | 11 |
| **11-28545*/46*** | 28543 | F3-12 | 2011 | 30-40 | 28.5 | 32.8 | 11.97 | <1.0 | <10 | 55.85 | 76.05 | 11.1 | <0.10 | <0.050 | <10 | <10 | 6.75 | <9.0 |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| | | N Value | | | 128 | 128 | 128 | 128 | 128 | 128 | 128 | 128 | 19 | 128 | 31 | | | |
| | | Average | | | 39.5 | 31.4 | 12.5 | <1.0 | <10 | 71 | 77 | 10.0 | <0.10 | <0.050 | <10 | | | |
| | | Standard Deviation | | | 7.6 | 3.9 | 1.7 | | | 15 | 9 | 3.9 | | | | | | |
| | | Minimum | | | 25.0 | 23.0 | 8.9 | | <10 | 51 | 58 | 3.7 | | <0.050 | <10 | | | |
| | | Maximum | | | 67.0 | 47.0 | 19.0 | <1.0 | 34 | 190 | 120 | 21.7 | <0.10 | 0.300 | 2100 | | | |
| | | 95% Confidence Limit | | | 1.3 | 0.7 | 0.3 | | | 3 | 2 | 0.7 | | | | | | |

# 4. Non-Hazardous Waste Landfill

The Non-Hazardous Waste Landfill is a new landfill constructed for the disposal of non-hazardous wastes and debris generated and collected during clean-up activities. The landfill is located at the station area, approximately 300 m southeast of the module train, on the east side of the main access road.

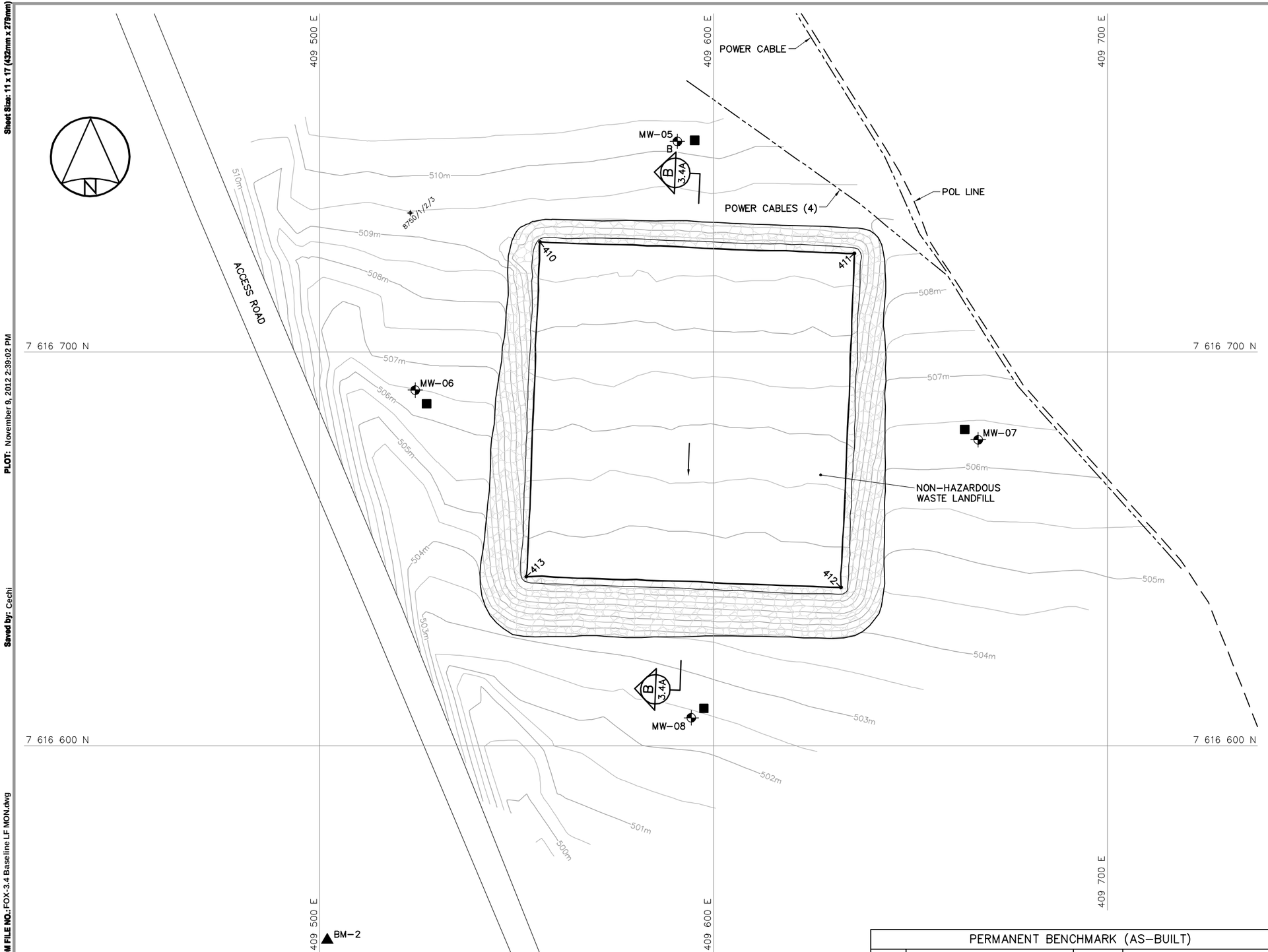
The design of this landfill includes perimeter berms and placement of a cover of compacted granular fill over the landfilled material. Four groundwater monitoring wells were installed around the perimeter of the landfill.

**The long term monitoring plan will consist of visual monitoring and periodic collection of soil and groundwater samples.** Approximate locations for the collection of soil and groundwater samples are identified on Figure FOX-3.4.

## 4.1 Baseline Data

Sample locations for soil baseline data are shown in Figure FOX-3.4. A summary of the baseline soil analytical data is provided in Table 4.1. Baseline data is comprised of site investigation information collected up and down-gradient of the landfill in 2006 and samples collected at permanent monitoring locations up and down-gradient of the landfill in 2009, 2010, and 2011. Mean soil baseline concentrations of inorganic elements were slightly higher than site background levels, with the exception of cadmium, lead, mercury, and PCB concentrations which were consistent with background levels. All PCB results were not detectable. Low levels of TPH were detected at both the up-gradient and down-gradient sample locations. Concentrations of TPH ranged between <10 mg/kg and 56 mg/kg.

A summary of baseline groundwater data is provided in Table 4.2. Baseline data was collected from permanent monitoring locations in 2009, 2010 and 2011. Low level copper, nickel, cobalt, chromium, and zinc were detected in all wells. Cadmium and TPH (F1, F2, and F3 fractions) were detected in MW-05. Chromium was detected in MW-06 and MW-08. Arsenic was detected in MW-07 and MW-08. Lead, mercury and PCB concentrations were below detection limits.




GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- BM-2 — PERMANENT BENCHMARK LOCATION (1)
- 410 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- MONITORING SOIL SAMPLE LOCATION (4)
- 8750 — SOIL SAMPLE TAG LOCATION

NON-HAZARDOUS WASTE LANDFILL MONITORING WELLS (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| MW-05 | 7 616 753.5 | 409 590.8 | 510.0 |
| MW-06 | 7 616 690.3 | 409 524.3 | 506.7 |
| MW-07 | 7 616 677.7 | 409 667.2 | 506.4 |
| MW-08 | 7 616 607.1 | 409 594.3 | 502.5 |

NON-HAZARDOUS WASTE LANDFILL FINAL GRADING (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 410 | 7 616 728.0 | 409 555.9 | 510.7 |
| 411 | 7 616 725.0 | 409 635.7 | 510.9 |
| 412 | 7 616 640.2 | 409 632.4 | 507.6 |
| 413 | 7 616 643.0 | 409 552.5 | 507.5 |

NOTE:
COORDINATE POINTS AND ELEVATIONS PROVIDED ARE TO THE FINAL GRADE OF THE TYPE 2 GRANULAR FILL CAP PRIOR TO THE PLACEMENT OF THE TYPE 1 GRANULAR FILL ON THE SIDE SLOPES.

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

PERMANENT BENCHMARK (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| BM-2 | 7 616 550.650 | 409 501.940 | 498.460 | 25mm DIA. STEEL PIPE |

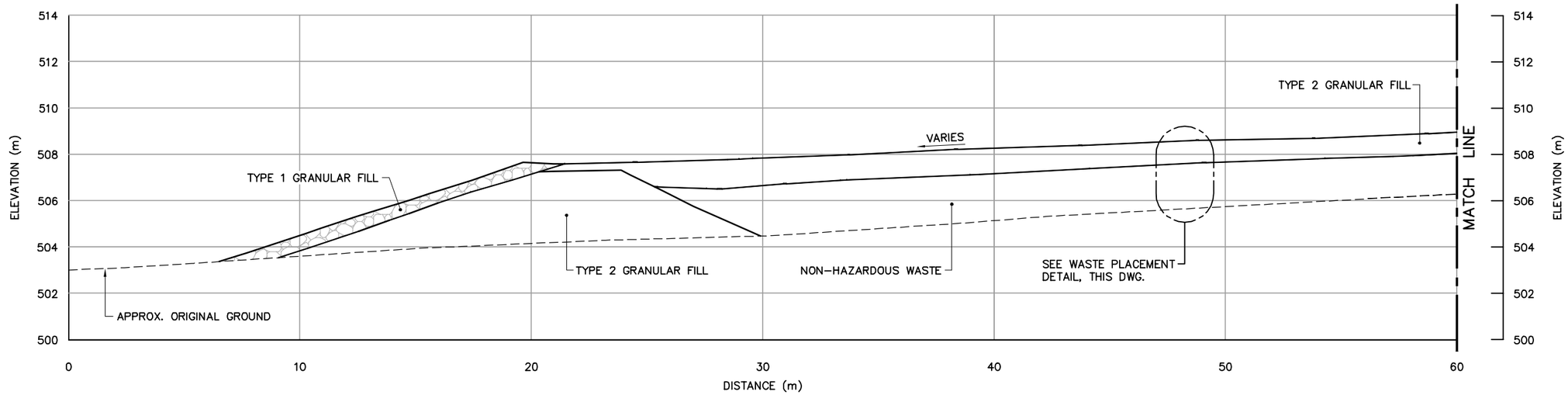
AECOM

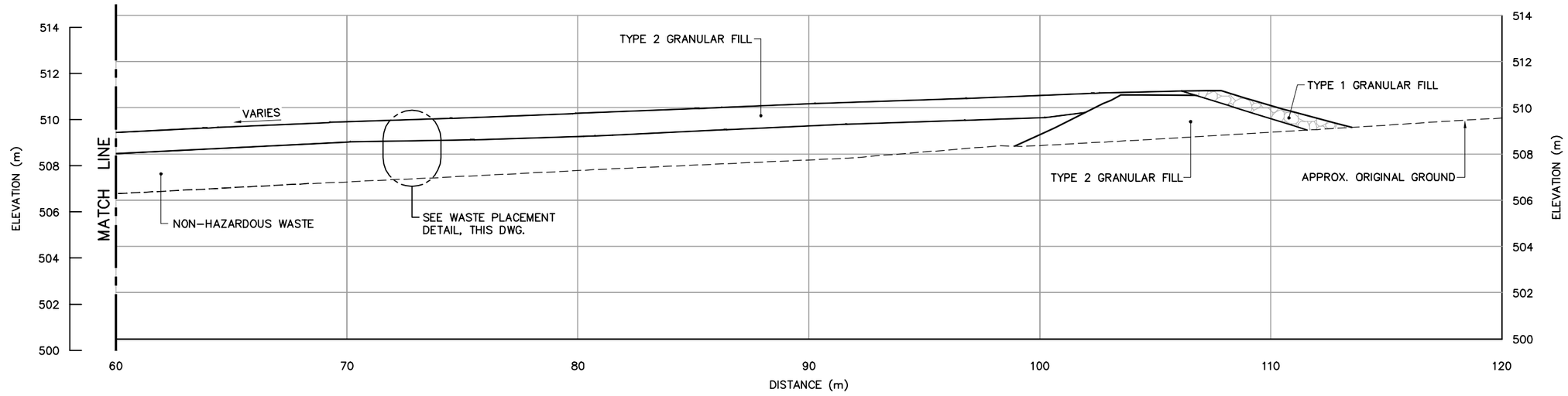
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

# NON-HAZARDOUS WASTE LANDFILL

FIGURE FOX-3.4



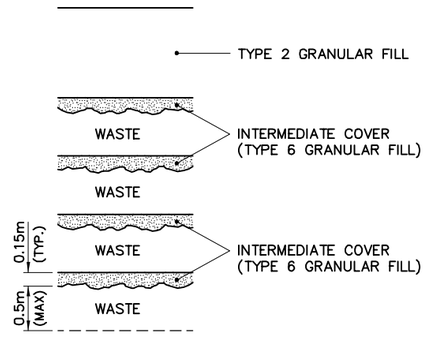

SECTION B 3.4

GENERAL NOTES:

1. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

GENERATED BASED ON AS-BUILT SURVEY INFORMATION




WASTE PLACEMENT DETAIL
SCALE: NTS

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

# NON-HAZARDOUS WASTE LANDFILL CROSS SECTION AND DETAIL

FIGURE FOX-3.4A

AECOM

## Table 4.1: Non-Hazardous Waste Landfill – Baseline Soil Data

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **06-8750/51** | 8750 | | 2006 | 0 | 48.0 | 36.0 | 14 | <1.0 | 13 | 72 | 90 | 12.0 | | <0.1 | | | | |
| **8752** | 8750 | | 2006 | 50 | 58.0 | 42 | 14 | <1.0 | <10 | 80 | 100.0 | 8 | | <0.1 | | | | |
| **8753** | 8750 | | 2006 | 95 | 48.0 | 36 | 13 | <1.0 | <10 | 72 | 90.0 | 8.5 | | <0.1 | | | | |
| **09-27688*/89*** | 27688 | MW-05 | 2009 | 0-10 | 28.0 | 29 | 11 | <1.0 | <10 | 58 | 72.0 | 11 | <0.10 | <0.0030 | 23 | <10 | 6 | 17 |
| **09-27690*/91*/92*** | 27688 | MW-05 | 2009 | 30-40 | 41.0 | 32 | 12 | <1.0 | <10 | 66 | 82.0 | 15 | <0.10 | <0.0030 | 26 | <10 | 6 | 20 |
| **10-36015*/16*** | 36015 | MW-05 | 2010 | 0-10 | 39.0 | 35 | 12 | <1.0 | <10 | 77 | 90.0 | 10 | <0.10 | <0.0030 | <10 | <10 | <4.0 | < 9.0 |
| **10-36017*/18** | 36015 | MW-05 | 2010 | 30-40 | 46.0 | 35.0 | 12 | <1.0 | <10 | 82 | 89 | 12.0 | <0.10 | <0.0030 | 12 | <10 | <4.0 | 12 |
| **11-28440/41*** | 28440 | MW-05 | 2011 | 0-10 | 45.3 | 35.3 | 14.5 | <1.0 | <10 | 74.14 | 86.66 | 13.705 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28442/43*** | 28440 | MW-05 | 2011 | 30-40 | 38.23 | 29.6 | 12.4 | <1.0 | <10 | 64.34 | 73.81 | 12.09 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **Down gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **09-27696*/97*** | 27696 | MW-06 | 2009 | 0-10 | 32.0 | 29 | 13 | <1.0 | <10 | 61 | 73.0 | 13 | <0.10 | <0.0030 | 56 | <10 | 8.1 | 48 |
| **09-27698*/99*** | 27696 | MW-06 | 2009 | 30-40 | 46.0 | 35 | 14 | <1.0 | <10 | 75 | 92.0 | 17 | <0.10 | <0.0030 | 25 | <10 | <4.0 | 25 |
| **09-27679*/80*/81*** | 27679 | MW-07 | 2009 | 0-10 | 37.0 | 34 | 14 | <1.0 | <10 | 72 | 81.0 | 14 | <0.10 | <0.0030 | 30 | <10 | 7.1 | 23 |
| **09-27682*/83*** | 27679 | MW-07 | 2009 | 30-40 | 34.0 | 35 | 13 | <1.0 | <10 | 69 | 83.0 | 15 | <0.10 | <0.0030 | <10 | <10 | 4.4 | <9.0 |
| **09-27672*/73*** | 27672 | MW-08 | 2009 | 0-10 | 31.0 | 28 | 9.8 | <1.0 | <10 | 53 | 71.0 | 16 | <0.10 | <0.0030 | 46 | <10 | 8.5 | 37 |
| **09-27674*/75*** | 27672 | MW-08 | 2009 | 30-40 | 31.0 | 24 | 9.2 | <1.0 | <10 | 50 | 59.0 | 13 | <0.10 | <0.0030 | 19 | <10 | 5.4 | 14 |
| **10-36010*/11** | 36010 | MW-06 | 2010 | 0-10 | 36.0 | 32 | 10 | <1.0 | <10 | 69 | 87.0 | 8.6 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **10-36012*/13** | 36010 | MW-06 | 2010 | 30-40 | 25.0 | 31 | 11 | <1.0 | <10 | 70 | 85.0 | 8.5 | <0.10 | <0.0030 | 14 | <10 | <4.0 | 14 |
| **10-36025*/26*** | 36025 | MW-07 | 2010 | 0-10 | 43.0 | 36 | 13 | <1.0 | <10 | 70 | 84.0 | 6.5 | <0.10 | | | - | - | - |
| **10-36027*/28** | 36025 | MW-07 | 2010 | 30-40 | 35.0 | 34 | 11 | <1.0 | <10 | 67 | 84.0 | 5.3 | <0.10 | | | - | - | - |
| **10-36020*/21** | 36020 | MW-08 | 2010 | 0-10 | 31.0 | 31 | 10 | <1.0 | <10 | 52 | 71.0 | 13 | <0.10 | <0.0030 | 12 | <10 | <4.0 | 12 |
| **10-36022*/23** | 36020 | MW-08 | 2010 | 30-40 | 56.0 | 27 | 10 | <1.0 | <10 | 61 | 65.0 | 9.8 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **11-28444/45*** | 28444 | MW-06 | 2011 | 0-10 | 24.0 | 30.85 | 13.91 | <1.0 | <10 | 65.86 | 72.5 | 30.385 | <0.10 | <0.050 | 54 | <10 | 5.7 | 48 |
| **11-28446/47*** | 28444 | MW-06 | 2011 | 30-40 | 27.0 | 27.5 | 12.21 | <1.0 | <10 | 64.52 | 73.2 | 11.255 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28448/49*** | 28448 | MW-07 | 2011 | 0-10 | 39.0 | 34.48 | 14.34 | <1.0 | <10 | 72.55 | 83.7 | 13.365 | <0.10 | <0.050 | 37 | <10 | 5.1 | 32 |
| **11-28450*/51*** | 28448 | MW-07 | 2011 | 30-40 | 40.1 | 36.93 | 14.83 | <1.0 | <10 | 75.7 | 89.1 | 16.65 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28452/53*** | 28452 | MW-08 | 2011 | 0-10 | 29.7 | 30.31 | 12.6 | <1.0 | <10 | 66.94 | 64.8 | 10.99 | <0.10 | <0.050 | 27 | <10 | 4.3 | 23 |
| **11-28454/55*** | 28452 | MW-08 | 2011 | 30-40 | 34.2 | 32.15 | 12.92 | <1.0 | <10 | 65.09 | 67.5 | 12.895 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| | | | | | | | | | | | | | | | | | | |
| | | N Value | | | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 24 | 25 | 22 | | | |
| | | Average | | | 37.9 | 32.5 | 12.4 | <1.0 | <10 | 68 | 80.0 | 12.5 | <0.10 | <0.050 | 19 | | | |
| | | Standard Deviation | | | 8.8 | 3.8 | 1.6 | | | 8 | 10.1 | 4.7 | | | 17 | | | |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| | | Minimum | | | 24.0 | 24.0 | 9.2 | | <10 | 50 | 59.0 | 5.3 | | <0.0030 | <10 | | | |
| | | Maximum | | | 58.0 | 42.0 | 14.8 | <1.0 | 13 | 82 | 100.0 | 30.4 | <0.10 | <0.050 | 56 | | | |
| | | 95% Confidence Limit | | | 3.3 | 1.4 | 0.6 | | | 3 | 3.8 | 1.8 | | | 7 | | | |

## Table 4.2: Non-Hazardous Waste Landfill – Baseline Groundwater Data

| Sample # | Location | Date | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [mg/L] | TPH [mg/L] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Groundwater Samples** | | | | | | | | | | | | | | | | |
| **09-27693** | MW-05 | 2009 | 0.013 | 0.018 | <0.0030 | <0.0010 | <0.010 | <0.010 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | 11.3 | 0.26 | 8.7 | 2.3 |
| **10-36019** | MW-05 | 2010 | 0.010 | 0.044 | 0.004 | <0.0010 | <0.010 | <0.010 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28769** | MW-05 | 2011 | 0.009 | 0.226 | 0.062 | 0.001 | <0.010 | 0.3660 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | < 0.50 | <1.0 |
| **Down gradient Groundwater Samples** | | | | | | | | | | | | | | | | |
| **09-27700/01*** | MW-06 | 2009 | <0.0050 | 0.033 | <0.0030 | <0.0010 | <0.010 | 0.0180 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **09-27684** | MW-07 | 2009 | 0.014 | 0.061 | 0.008 | <0.0010 | <0.010 | 0.0180 | <0.0050 | 0.0040 | <0.00040 | <0.000020 | <1.0 | <0.050 | 0.5 | <1.0 |
| **09-27676** | MW-08 | 2009 | 0.009 | 0.007 | <0.0030 | <0.0010 | <0.010 | 0.0170 | <0.0050 | 0.0260 | <0.00040 | <0.000020 | <1.0 | <0.050 | 0.7 | <1.0 |
| **10-36014** | MW-06 | 2010 | <0.0050 | <0.0050 | <0.0030 | <0.0010 | <0.010 | 0.0191 | 0.0061 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **10-36029** | MW-07 | 2010 | 0.008 | 0.054 | 0.013 | <0.0010 | <0.010 | 0.0396 | <0.0050 | 0.0061 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **10-36024** | MW-08 | 2010 | 0.006 | 0.007 | <0.0030 | <0.0010 | <0.010 | <0.010 | 0.0067 | 0.0060 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28770** | MW-06 | 2011 | 0.014 | 0.102 | 0.028 | <0.0010 | <0.010 | 0.0612 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | < 0.50 | <1.0 |
| **11-28771** | MW-07 | 2011 | 0.016 | 0.150 | 0.017 | <0.0010 | <0.010 | 0.6000 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | < 0.50 | <1.0 |
| **11-28772** | MW-08 | 2011 | 0.009 | 0.007 | <0.0030 | <0.0010 | <0.010 | 0.0118 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | < 0.50 | <1.0 |
| | | | | | | | | | | | | | | | | |
| **N Value** | | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | | | |
| **Average** | | | 0.009 | 0.059 | 0.012 | <0.0010 | <0.010 | 0.097 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | | | |
| **Standard Deviation** | | | 0.004 | 0.069 | 0.018 | | | 0.188 | | | | | | | | |
| **Minimum** | | | 0.006 | 0.007 | 0.004 | <0.0010 | | 0.012 | <0.0050 | <0.0030 | | <0.000020 | <1.0 | | | |
| **Maximum** | | | 0.016 | 0.226 | 0.062 | 0.001 | <0.010 | 0.600 | 0.007 | 0.026 | <0.00040 | <0.0030 | 11.3 | | | |
| **95% Confidence Limit** | | | 0.002 | 0.039 | 0.010 | | | 0.106 | | | | | | | | |

# 5. Tier II Disposal Facility

A Tier II Disposal Facility has been constructed at the FOX-3 site for the disposal of Tier II soil excavated during the clean-up. The facility is 1.3 km from the Station Area, 300 m west of the access road.

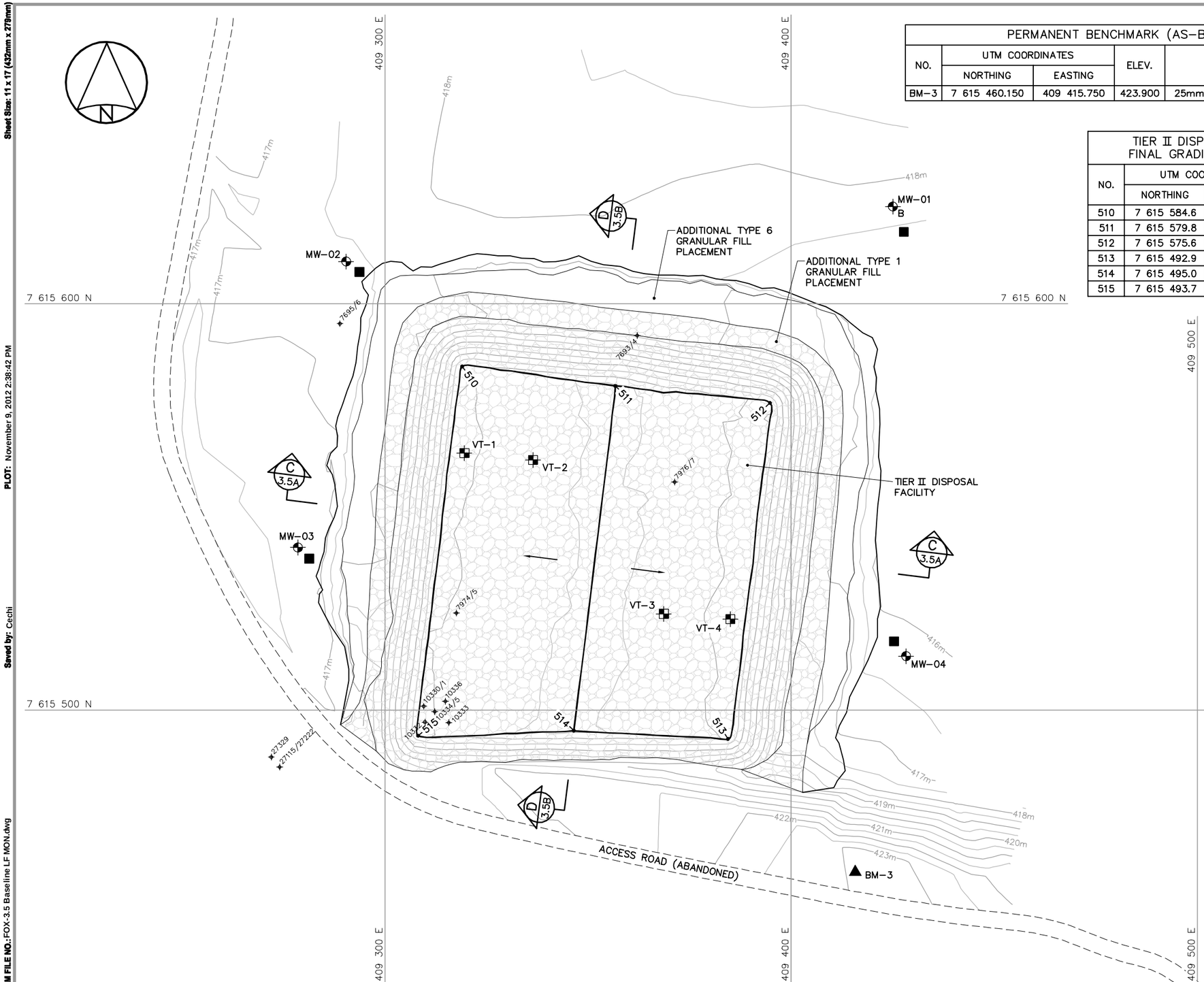
The Tier II Disposal Facility design is a double containment system. The landfill was constructed with the placement of low-permeability, saturated, compacted berms keyed into frozen/saturated ground below existing ground, the installation of a liner system over the berms and along the landfill base, and the placement of a surface liner system over the landfill contents with the placement of sufficient overlying granular fill to promote freeze back of landfill contents. Four groundwater monitoring wells were installed at the landfill perimeter, and four thermistors were installed within the landfill to monitor ground temperatures.

**The long term monitoring plan consists of visual monitoring, periodic collection of soil and groundwater samples, and monitoring of subsurface ground temperatures in the berms and in the main body of the disposal facility.** Locations for the collection of soil and groundwater samples and thermistor installations are identified on Figure FOX-3.5.

## 5.1 Baseline Data

Sample locations for the baseline soil samples are shown on Figure FOX-3.5. A summary of the baseline soil analytical data is provided in Table 5.1. Baseline soil data is comprised of samples collected in the vicinity of the Tier II Disposal Facility during the site investigation in 2006, and samples collected at permanent monitoring locations during 2009, 2010, and 2011. Copper, nickel, cobalt, zinc, chromium, and arsenic soil baseline concentrations were slightly elevated above the background levels. The remaining inorganic elements were consistent, or below, the background levels. PCBs were below detection limits which ranged from <0.050 to <0.1. Low level TPH concentrations were detected at several of the sample locations. Hydrocarbon concentrations ranged between <10 mg/kg to 117 mg/kg.

A summary of baseline groundwater data is provided in Table 5.2. Baseline data was collected from permanent monitoring locations in 2010 and 2011. Up gradient well MW-01 was installed and sampled in 2009. Low level copper, nickel, cobalt, zinc, and arsenic were detected in all monitoring wells. Mercury was detected in low levels in MW-01. Lead, PCBs, and TPH were below detection limits.




| PERMANENT BENCHMARK (AS-BUILT) | | | | |
|---|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
| | NORTHING | EASTING | | |
| BM-3 | 7 615 460.150 | 409 415.750 | 423.900 | 25mm DIA. STEEL PIPE |

| TIER II DISPOSAL FACILITY FINAL GRADING (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| 510 | 7 615 584.6 | 409 318.9 | 422.0 |
| 511 | 7 615 579.8 | 409 356.7 | 422.6 |
| 512 | 7 615 575.6 | 409 394.8 | 422.0 |
| 513 | 7 615 492.9 | 409 384.4 | 422.0 |
| 514 | 7 615 495.0 | 409 346.4 | 422.6 |
| 515 | 7 615 493.7 | 409 308.1 | 421.8 |

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- BM-3 — PERMANENT BENCHMARK LOCATION (1)
- 510 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- 7695 — SOIL SAMPLE TAG LOCATION

| TIER II DISPOSAL FACILITY MONITORING WELLS (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| MW-01 | 7 615 624.0 | 409 425.0 | 417.7 |
| MW-02 | 7 615 610.5 | 409 290.4 | 417.5 |
| MW-03 | 7 615 540.1 | 409 278.5 | 416.8 |
| MW-04 | 7 615 513.3 | 409 428.3 | 416.3 |

| TIER II DISPOSAL FACILITY GROUND TEMPERATURE CABLES (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| VT-1 | 7 615 563.3 | 409 319.5 | 422.0 |
| VT-2 | 7 615 561.6 | 409 336.4 | 422.4 |
| VT-3 | 7 615 523.7 | 409 368.6 | 422.3 |
| VT-4 | 7 615 522.4 | 409 385.0 | 422.0 |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

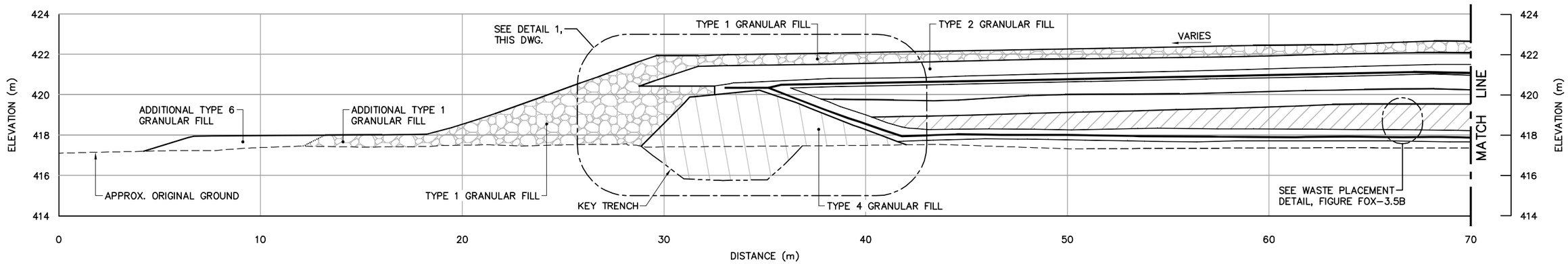
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

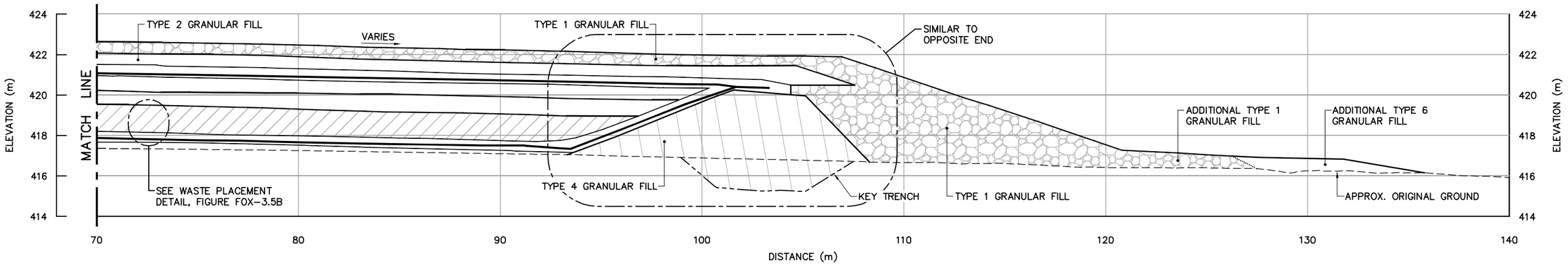
FOX-3 DEWAR LAKES

**TIER II DISPOSAL FACILITY**

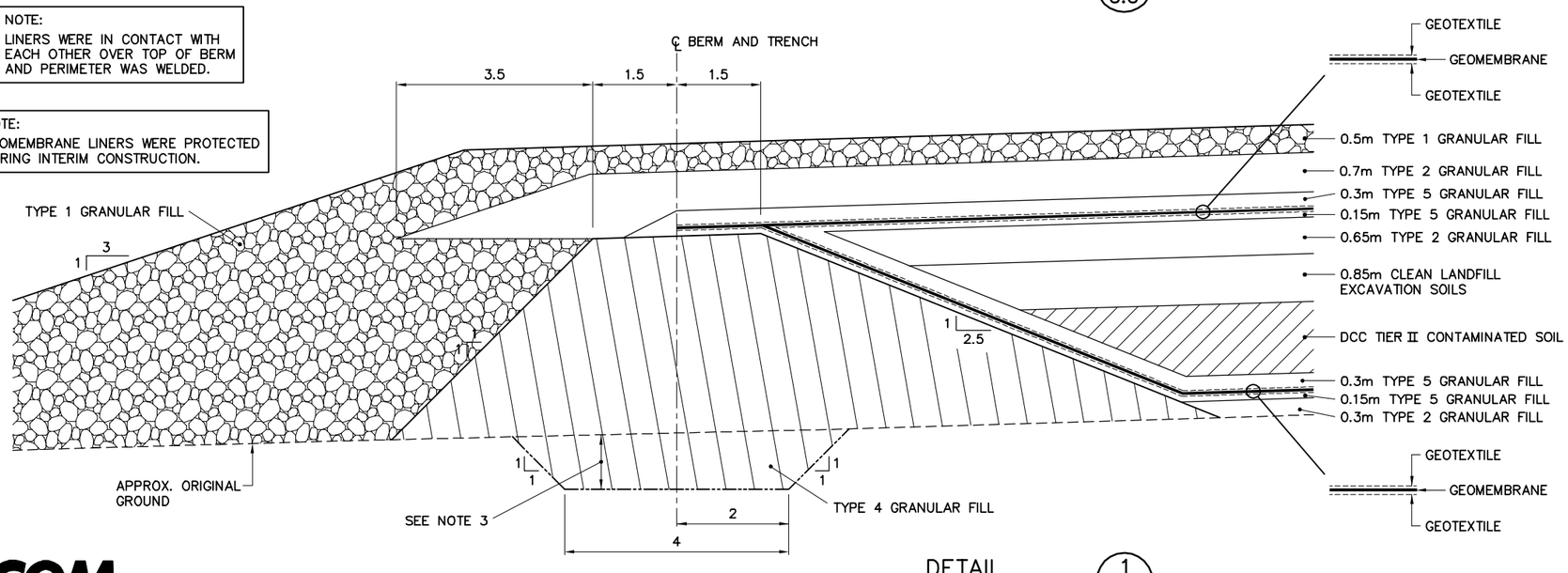
FIGURE FOX-3.5

AECOM




SECTION C 3.5




DETAIL 1 3.5A

GENERAL NOTES:

1. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. KEY TRENCH WAS EXCAVATED TO SATURATED GROUND, ICE SATURATED PERMAFROST OR SOUND BEDROCK. EXCAVATION DEPTH WAS FIELD CONFIRMED BY THE SITE ENGINEER.

LEGEND:

GENERATED BASED ON AS–BUILT SURVEY INFORMATION

CONSTRUCTED AS PER DESIGN, NO AS–BUILT SURVEY INFORMATION

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

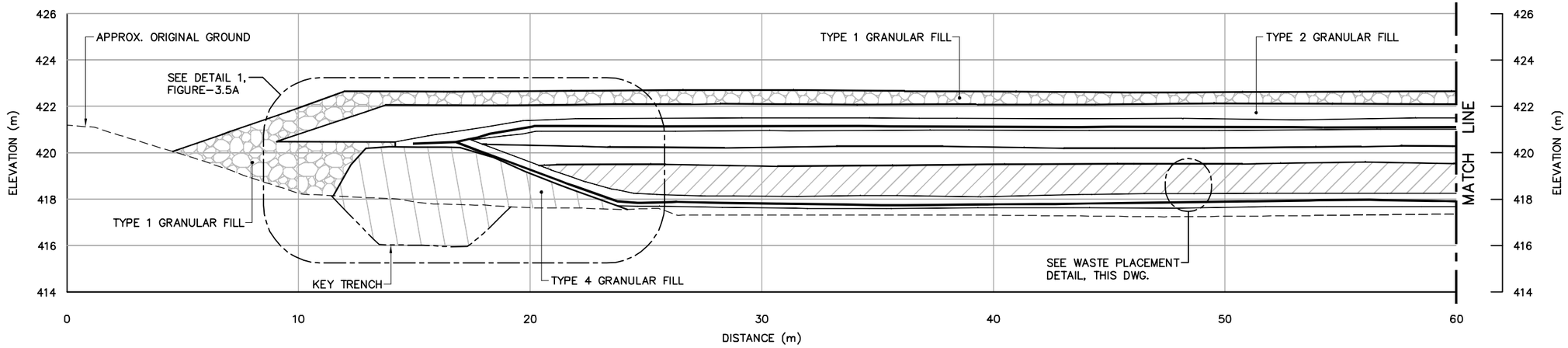
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

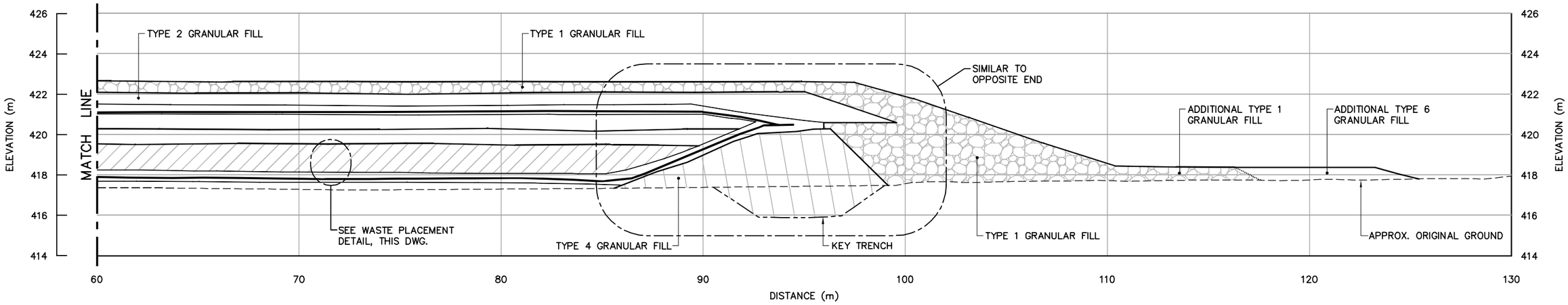
FOX-3 DEWAR LAKES

# TIER II DISPOSAL FACILITY CROSS SECTION AND DETAIL

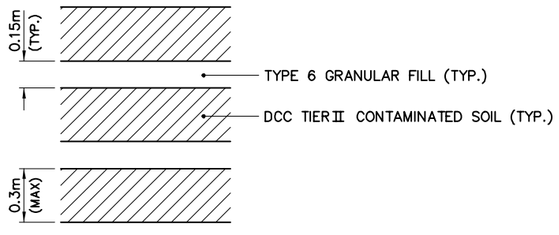
FIGURE FOX-3.5A

AECOM




SECTION D 3.5




WASTE PLACEMENT DETAIL
SCALE: NTS

GENERAL NOTES:

1. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. KEY TRENCH WAS EXCAVATED TO SATURATED GROUND, ICE SATURATED PERMAFROST OR SOUND BEDROCK. EXCAVATION DEPTH WAS FIELD CONFIRMED BY THE SITE ENGINEER.

LEGEND:

GENERATED BASED ON AS–BUILT SURVEY INFORMATION

CONSTRUCTED AS PER DESIGN, NO AS–BUILT SURVEY INFORMATION

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 2 4 m SCALE 1:200

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

# TIER II DISPOSAL FACILITY CROSS SECTION AND DETAIL

FIGURE FOX-3.5B

AECOM

## Table 5.1: Tier II Disposal Facility – Baseline Soil Data

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **09-27663*/64*** | 27663 | MW-01 | 2009 | 0-10 | 44.0 | 37.0 | 12 | <1.0 | <10 | 64 | 79 | 15.0 | <0.10 | <0.0030 | 117 | <10 | 17.0 | 100 |
| **09-27666*/67*** | 27633 | MW-01 | 2009 | 30-40 | 31.0 | 36.0 | 12 | <1.0 | <10 | 63 | 87 | 23.0 | <0.10 | <0.0030 | 38 | <10 | 9.2 | 29 |
| **10-35990*/91** | 35990 | MW-01 | 2010 | 0-10 | 40.0 | 36.0 | 13 | <1.0 | <10 | 71 | 92 | 21.0 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **10-35992*/93** | 35990 | MW-01 | 2010 | 30-40 | 35.0 | 33.0 | 11 | <1.0 | <10 | 65 | 89 | 13.0 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **11-28424*/25*** | 28424 | MW-01 | 2011 | 0-10 | 24.7 | 32.4 | 11.935 | <1.0 | <10 | 59 | 79 | 23.3 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28426/27*** | 28424 | MW-01 | 2011 | 30-40 | 40.1 | 35.4 | 12.94 | <1.0 | <10 | 64 | 90 | 26.8 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **Down gradient Soil Samples** | | | | | | | | | | | | | | | | | | |
| **7693** | 7693 | | 2006 | 0 | 46.0 | 39.0 | 13 | <1.0 | <10 | 65 | 82 | 7.0 | | <0.1 | | | | |
| **7694** | 7693 | | 2006 | 30 | 62.0 | 46.0 | 16 | <1.0 | <10 | 73 | 87 | 19.0 | | <0.1 | | | | |
| **7695** | 7695 | | 2006 | 0 | 43.0 | 36 | 13 | <1.0 | <10 | 70 | 88.0 | 7.5 | | <0.1 | | | | |
| **7696** | 7695 | | 2006 | 30 | 44.0 | 35 | 13 | <1.0 | <10 | 66 | 95.0 | 11 | | <0.1 | | | | |
| **7974** | 7974 | | 2006 | 10 | 52.0 | 28 | 13 | <1.0 | <10 | 62 | 71.0 | 16 | | <0.1 | | | | |
| **7975** | 7974 | | 2006 | 70 | 36.0 | 33 | 14 | <1.0 | <10 | 68 | 82.0 | 13 | | <0.1 | | | | |
| **7976** | 7976 | | 2006 | 10 | 50.0 | 29 | 13 | <1.0 | <10 | 65 | 74.0 | 15 | | <0.1 | | | | |
| **7977** | 7976 | | 2006 | 40 | 50.0 | 31 | 13 | <1.0 | <10 | 74 | 82.0 | 8.1 | | <0.1 | | | | |
| **06-10330/31** | | | 2006 | 0 | 5.9 | 12 | 8.9 | <1.0 | <10 | 74 | 87.0 | <2.0 | | <0.1 | | | | |
| **10332** | | | 2006 | 0 | 22.0 | 27 | 11 | <1.0 | <10 | 51 | 66.0 | 8.5 | | <0.1 | | | | |
| **10333** | | | 2006 | 0 | 43.0 | 41 | 15 | <1.0 | <10 | 69 | 92.0 | 17 | | <0.1 | | | | |
| **10334** | | | 2006 | 0 | 36.0 | 31 | 12 | <1.0 | 23 | 63 | 77.0 | 11 | | <0.1 | | | | |
| **10335** | 10334 | | 2006 | 30 | 38.0 | 40 | 15 | <1.0 | <10 | 66 | 95.0 | 16 | | <0.1 | | | | |
| **10336** | | | 2006 | 0 | 33.0 | 34 | 13 | <1.0 | <10 | 62 | 85.0 | 15 | | <0.1 | | | | |
| **10337** | | | 2006 | 0 | 12.0 | 12 | <5.0 | <1.0 | <10 | 28 | 28.0 | 5.3 | | | | | | |
| **10-36005*/06** | | MW-02 | 2010 | 0-10 | 29.0 | 28.0 | 10 | <1.0 | <10 | 61 | 70 | 9.7 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **10-36007*/08** | | MW-02 | 2010 | 30-40 | 31.0 | 29.0 | 11 | <1.0 | <10 | 64 | 72 | 12.0 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **10-36000*/01** | | MW-03 | 2010 | 0-10 | 32.0 | 34.0 | 11.0 | <1.0 | <10 | 71 | 84 | 6.1 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **10-36002*/03** | | MW-03 | 2010 | 30-40 | 40.0 | 39.0 | 13.0 | <1.0 | <10 | 72 | 91 | 6.6 | <0.10 | <0.0030 | 10 | 10 | <4.0 | <9.0 |
| **10-35995*/96*** | | MW-04 | 2010 | 0-10 | 44.0 | 37.0 | 24.0 | <1.0 | 13 | 75 | 82 | 27.0 | <0.10 | <0.0030 | 12 | 12 | <4.0 | <9.0 |
| **10-35997*/98** | | MW-04 | 2010 | 30-40 | 42.0 | 32.0 | 12.0 | <1.0 | 11 | 71 | 79 | 16.0 | <0.10 | <0.0030 | <10 | <10 | <4.0 | <9.0 |
| **11-28428/29*** | | MW-02 | 2011 | 0-10 | 29.2 | 24.8 | 10.9 | <1.0 | <10 | 52 | 64 | 12.6 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28430/31*** | | MW-02 | 2011 | 30-40 | 32.1 | 26.8 | 11.0 | <1.0 | <10 | 54 | 68 | 14.4 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28432/33*** | | MW-03 | 2011 | 0-10 | 34.6 | 32.9 | 13.5 | <1.0 | <10 | 68 | 71 | 12.6 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28434/35*** | | MW-03 | 2011 | 30-40 | 43.1 | 39.4 | 16.5 | <1.0 | 10 | 72 | 86 | 16.1 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **11-28436/37*** | | MW-04 | 2011 | 0-10 | 60.5 | 33.6 | 12.1 | <1.0 | <10 | 62 | 72 | 16.8 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| **11-28438/39*** | | MW-04 | 2011 | 30-40 | 50.2 | 29.3 | 11.3 | <1.0 | <10 | 60 | 66 | 10.8 | <0.10 | <0.050 | <10 | <10 | <4.0 | <9.0 |
| | | | | | | | | | | | | | | | | | | |
| | | N Value | | | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 18 | | | |
| | | Average | | | 38.0 | 32.4 | 12.6 | <1.0 | <10 | 64 | 79 | 13.7 | <0.10 | <0.1 | <10 | | | |
| | | Standard Deviation | | | 11.9 | 7.0 | 3.1 | | | 9 | 13 | 6.1 | | | | | | |
| | | Minimum | | | 5.9 | 12.0 | 8.9 | | <10 | 28 | 28 | 5.3 | | <0.050 | <10 | | | |
| | | Maximum | | | 62.0 | 46.0 | 24.0 | <1.0 | 23 | 75 | 95 | 27.0 | <0.10 | <0.1 | 117 | | | |
| | | 95% Confidence Limit | | | 4.1 | 2.4 | 1.1 | | | 3 | 4 | 2.1 | | | | | | |

## Table 5.2: Tier II Disposal Facility – Baseline Groundwater Data

| Sample # | Location | Date | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [mg/L] | TPH [mg/L] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Up gradient Groundwater Samples** | | | | | | | | | | | | | | | | |
| **09-27668** | MW-01 | 2009 | 0.014 | 0.034 | 0.0090 | <0.0010 | <0.010 | 0.2 | <0.0050 | 0.0050 | 0.0005 | <0.000020 | <1.0 | 0.05 | <0.50 | <1.0 |
| **10-35994** | MW-01 | 2010 | 0.008 | 0.055 | 0.0113 | <0.0010 | <0.010 | 0.1400 | 0.0190 | 0.0110 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28765** | MW-01 | 2011 | 0.006 | 0.140 | 0.0097 | <0.0010 | <0.010 | 0.0937 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | <0.50 | <1.0 |
| **Down gradient Groundwater Samples** | | | | | | | | | | | | | | | | |
| **10-36009** | MW-02 | 2010 | 0.0135 | 0.03 | 0.0062 | <0.0010 | <0.010 | 0.0576 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **10-36004** | MW-03 | 2010 | 0.006 | 0.0817 | 0.0169 | <0.0010 | <0.010 | 3.5 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **10-35999** | MW-04 | 2010 | <0.0050 | 0.0071 | <0.0030 | <0.0010 | <0.010 | <0.010 | 0.0072 | <0.0030 | <0.00040 | <0.000020 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28766** | MW-02 | 2011 | 0.0266 | 0.0222 | <0.0030 | <0.0010 | <0.010 | <0.010 | 0.0070 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28767** | MW-03 | 2011 | 0.030 | 0.180 | 0.018 | 0.0012 | <0.010 | 2.5000 | 0.0164 | 0.0034 | <0.00040 | <0.0030 | <1.0 | <0.050 | <0.50 | <1.0 |
| **11-28768** | MW-04 | 2011 | 0.007 | 0.120 | 0.040 | 0.0015 | <0.010 | 0.0418 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | <0.050 | <0.50 | <1.0 |
| | | | | | | | | | | | | | | | | |
| **N Value** | | | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | | | |
| **Average** | | | 0.0126 | 0.0744 | 0.0127 | <0.0010 | <0.010 | 0.7270 | <0.0050 | <0.0030 | <0.00040 | <0.0030 | <1.0 | | | |
| **Standard Deviation** | | | 0.0096 | 0.0600 | 0.0119 | | | 1.3142 | | | | | | | | |
| **Minimum** | | | 0.0060 | 0.0071 | 0.0062 | <0.0010 | | 0.0418 | <0.0050 | <0.0030 | <0.00040 | <0.000020 | | | | |
| **Maximum** | | | 0.0297 | 0.1800 | 0.0403 | 0.0015 | <0.010 | 3.5000 | 0.0190 | 0.0110 | 0.0005 | <0.0030 | <1.0 | | | |
| **95% Confidence Limit** | | | 0.0063 | 0.0392 | 0.0078 | | | 0.8586 | | | | | | | | |

# Appendix A

## FOX-3 Dewar Lakes Year 1 Monitoring Data

## FOX-3 Dewar Lakes – 2012 Landfill Monitoring

In August 2012, a visual inspection of each landfill and downloading of ground temperature data, where required, was carried out by EBA. Soil and groundwater samples were collected where applicable by the Environmental Sciences Group (ESG). Samples were analyzed at Queen's University and Royal Military College laboratories, in Kingston, Ontario.

The following table documents the specific monitoring requirements for 2012 (year 1 of monitoring) at each landfill.

| Landfill Designation | Visual Inspection | Groundwater Sampling | Soil Sampling | Thermal Monitoring |
|---|---|---|---|---|
| West Landfill | √ | | √ | |
| Station West Landfill | √ | | √ | |
| Non-Hazardous Waste Landfill | √ | √ | √ | |
| Tier II Disposal Facility | √ | √ | √ | √ |

This appendix serves as a compilation of the EBA geotechnical report (EBA 2012) and the ESG environmental report (ESG 2012) to document the results of landfill monitoring from year 1. The data is organized by landfill in separate annexes. The following information is provided in each Annex:

- Visual inspection checklist
- Visual inspection drawing mark-up
- A selection of visual inspection photos (all photos will be provided electronically)
- Thermal monitoring summary (where applicable)
- Plots of ground temperatures with depth at each thermistors installation (where applicable)
- Evaluation of 2012 soil analytical data, as compared to baseline conditions
- Summary of 2012 soil analytical data
- Summary of 2012 groundwater analytical data
- Monitoring well development/sampling reports (where applicable)

### Summary of Significant Observations

With the exception of thermal data, no interpretation or recommendations have been provided in this appendix; these shall be provided by the Environmental Working group – Nunavut Tunngavik Incorporated (EWG-NTI). Meeting minutes from the review shall be appended to this report.

## Annex 1 West Landfill – Year 1 Data

### Figures:

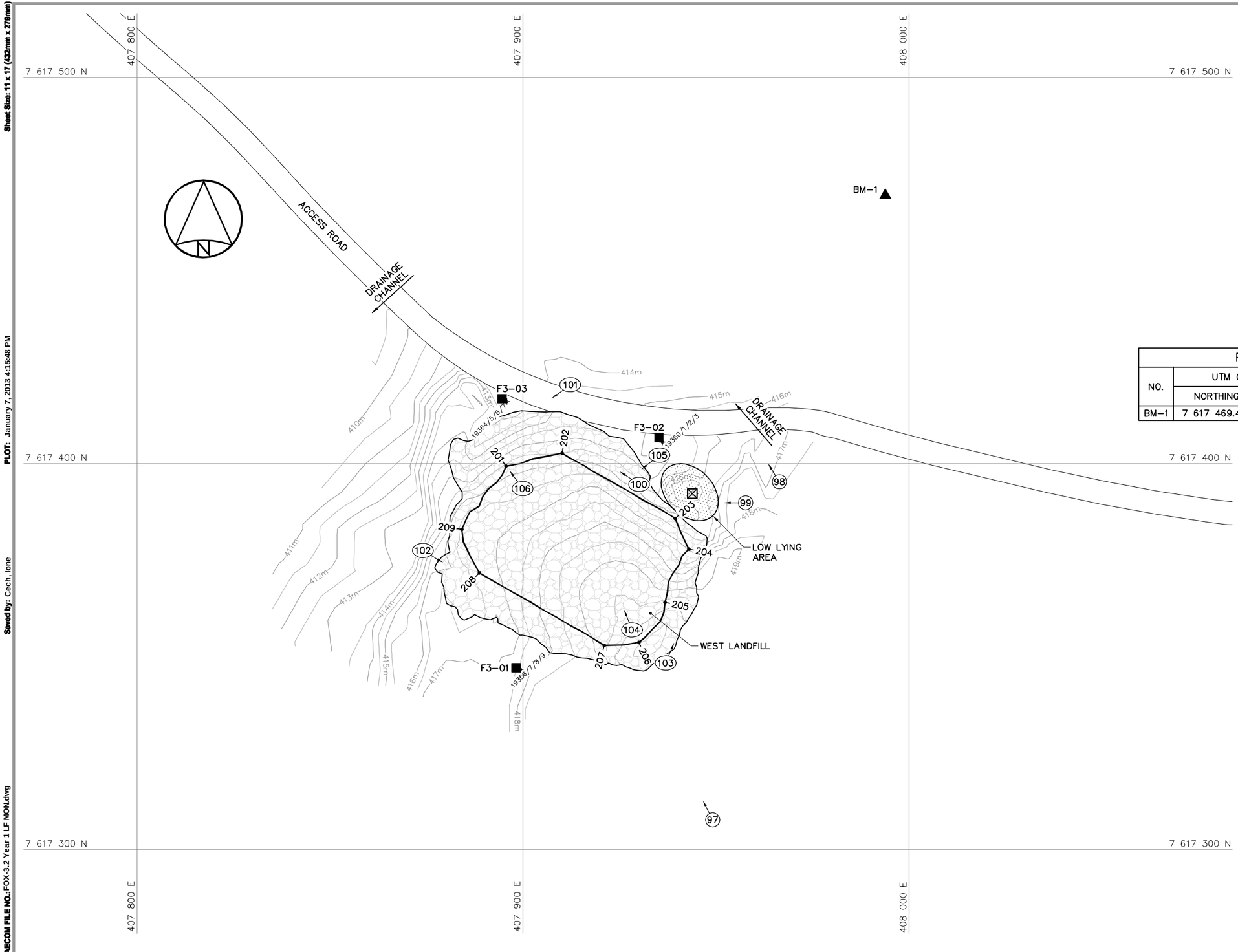
- FOX-3.2: Site Plan – West Landfill

### Tables:

- Landfill Visual Inspection – West Landfill
- West Landfill – Evaluation of Year 1 Soil Data
- West Landfill – Year 1 (2012) Soil Data

### Photographic Records:

- Photos 1 and 2
- Photos 3 and 4




GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- BM-1 — PERMANENT BENCHMARK LOCATION (1)
- 201 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION (3)
- MONITORING SITE FEATURE
- PONDED WATER
- 100 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19356 — 2012 SOIL SAMPLE TAG LOCATION

| PERMANENT BENCHMARK (AS-BUILT) | | | | |
|---|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
| | NORTHING | EASTING | | |
| BM-1 | 7 617 469.460 | 407 993.870 | 415.600 | 25mm DIA. STEEL PIPE |

| WEST LANDFILL REGRADED (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| 201 | 7 617 399.3 | 407 895.6 | 415.6 |
| 202 | 7 617 402.7 | 407 910.1 | 415.5 |
| 203 | 7 617 385.8 | 407 939.4 | 416.1 |
| 204 | 7 617 377.8 | 407 943.0 | 417.0 |
| 205 | 7 617 364.0 | 407 936.8 | 419.6 |
| 206 | 7 617 353.7 | 407 930.0 | 420.5 |
| 207 | 7 617 352.9 | 407 921.0 | 419.4 |
| 208 | 7 617 371.7 | 407 888.7 | 416.7 |
| 209 | 7 617 382.9 | 407 884.2 | 416.7 |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

**WEST LANDFILL**
FIGURE FOX-3.2

AECOM

## Landfill Visual Inspection

**Site Name:** FOX-3 (Dewar Lakes) DEW Line Site
**Landfill:** **West Landfill**
**Designation:** **Regrade Landfill**
**Date Inspected:** August 25, 2012
**Inspected by:** Ed Grozic, P.Eng.
EBA –Tt

**Signature:** 

**Table A1: West Landfill**

| Checklist Item | Present (Yes/No) | Location | Length | Width | Depth | Extent | Description | Photographic Records | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Erosion | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Frost Action | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Staining | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Debris Exposed | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Other Features of Note – Wet ground between landfill and access road | Yes | As shown on Figure FOX-3.2 | N/A | N/A | N/A | Isolated – | Poorly drained wet area between West Landfill and Access Road | Photo 2 IMG_0099 | Acceptable | The poorly drained wet area does not appear to be impacting the landfill, but has been identified as an adjacent feature of note. |
| Other Features of Note – Two nearby drainage channels survey located and presented on drawing | Yes | As shown on Figure FOX-3.2 | N/A | N/A | N/A | N/A | Two drainage channels crossing access road | Photo 3 IMG_0098 Photo 4 IMG_0106 | Acceptable | The drainage channels are not impacting the landfill, but have been identified as adjacent features of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

**West Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA**

| Parameter | N value Baseline | Arithmetic Mean +/- 95% Confidence Limit Baseline | Maximum Baseline [mg/kg] | 2012 | Comments |
|---|---|---|---|---|---|
| Copper | 32 | 24 +/- 2 | 33 | All concentrations within 95% confidence limit, with three exceptions. | The surface and depth samples at F3-01 had concentrations of 27.7 and 37.0 mg/kg, respectively. The depth sample at F3-02 had a concentration of 38.7 mg/kg. The depth sample at F3-02 was abvoe the baseline maximum. |
| Nickel | 32 | 20.0 +/- 1.5 | 26 | All concentrations within 95% confidence limit, with four exceptions. | The surface and depth samples and F3-01 and F3-02 had concentrations of 24.9, 30.5, 24.3, and 25.4 mg/kg, respectively. The depth sample at F3-01 was above the baseline maximum. |
| Cobalt | 32 | 9.0 +/- 0.7 | 11.7 | All concentrations within 95% confidence limit. | |
| Cadmium | 32 | <1.0 | <1.0 | Concentrations consistent with baseline mean (non-detect). | |
| Lead | 32 | <10 | 14 | Concentrations consistent with baseline mean (non-detect). | |
| Zinc | 32 | 49 +/- 32 | 63 | All concentrations within 95% confidence limit. | |
| Chromium | 32 | 55 +/- 4 | 73 | All concentrations within 95% confidence limit, with four exceptions. | The surface and depth samples at F3-01 and F3-02 had concentrations of 61.5, 72, 60, and 66 mg/kg, respectively. All results are below the baseline maximum. |
| Arsenic | 32 | 8.7 +/- 0.8 | 16 | All concentrations within 95% confidence limit, with four exceptions. | The surface and depth samples at F3-01 and F3-02 had concentrations of 10.7, 13.5, 10.0, and 14.2 mg/kg, respectively. All results are below the baseline maximum. |
| Mercury | 6 | <0.10 | <0.10 | Concentrations consistent with baseline mean (non-detect). | |
| PCBs | 32 | <0.1 | <0.1 | Concentrations consistent with baseline mean (non-detect). | |
| TPH | 6 | 12 +/- 6 | 22 | All concentrations within 95% confidence limit. | |

**West Landfill - Year 1 (2012) Soil Data**

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **West Landfill- Baseline Concentrations** | | | | | **24 +/- 2** | **20.0 +/- 1.5** | **9.0 +/- 0.7** | **<1.0** | **<10** | **49 +/- 32** | **55 +/- 4** | **8.7 +/- 0.8** | **<0.10** | **<0.1** | **12 +/- 6** | | | |
| **West Landfill - Maximum Concentrations** | | | | | **33** | **26** | **11.7** | **<1.0** | **14** | **63** | **73** | **16.0** | **<0.10** | **<0.1** | **22** | | | |
| Upgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19356*/57 | 19356 | F3-01 | 2012 | 0-10 | 27.7 | 24.9 | 7.9 | <0.50 | 6.8 | 63 | 61.5 | 10.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19358*/59 | 19356 | F3-01 | 2012 | 30-40 | 37.0 | 30.5 | 9.2 | <0.50 | 9.6 | 70 | 72 | 13.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| Downgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19360*/61 | 19360 | F3-02 | 2012 | 0-10 | 23.0 | 24.3 | 7.5 | <0.50 | 7.1 | 61 | 60 | 10.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19362*/63 | 19360 | F3-02 | 2012 | 30-40 | 38.7 | 25.4 | 7.7 | <0.50 | 7.2 | 65 | 66 | 14.2 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19364*/65 | 19364 | F3-03 | 2012 | 0-10 | 14.8 | 16.0 | 5.0 | <0.50 | 4.1 | 51 | 41 | 5.1 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19366*/67 | 19364 | F3-03 | 2012 | 30-40 | 20.7 | 21.3 | 6.6 | <0.50 | 5.2 | 63 | 56 | 8.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |

**PHOTO 1 IMG 0104:** West landfill - Surface of the landfill looking Northwest.

**PHOTO 2 IMG 0099:** West landfill - Low-lying, wet area along northeast side of landfill looking west.

**PHOTO 3 IMG 0098:** West landfill - Drainage channel northeast of landfill looking northerly.

**PHOTO 4 IMG 0106:** West landfill - Drainage channel across access road to the west of the landfill.

## Annex 2 Station West Landfill – Year 1 Data

### Figures:

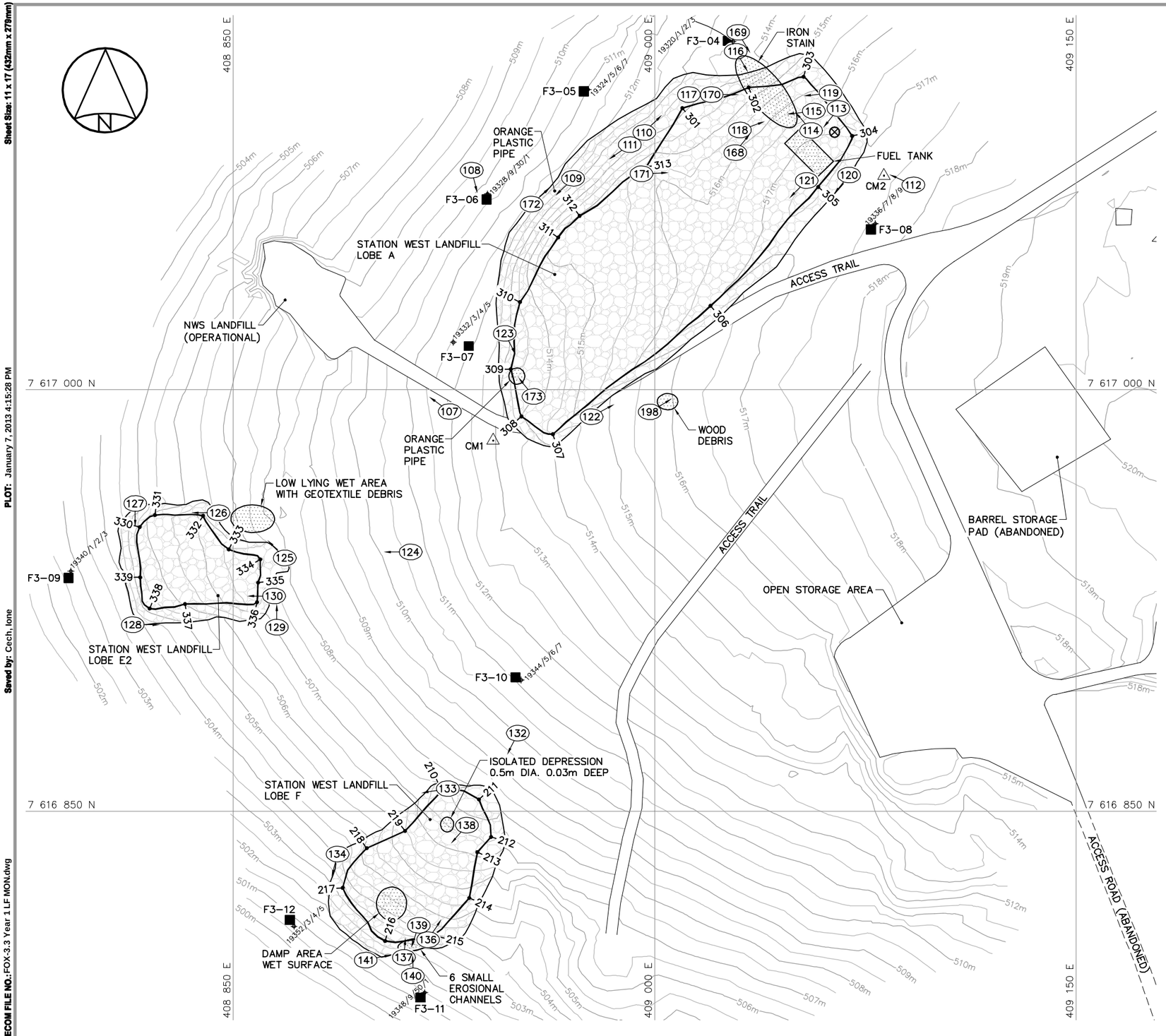
- FOX-3.3: Site Plan – Station West Landfill

### Tables:

- Landfill Visual Inspection – Station West Landfill
- Station West Landfill – Evaluation of Year 1 Soil Data
- Station West Landfill – Year 1 (2012) Soil Data

### Photographic Records:

- Photos 5 and 6
- Photos 7 and 8
- Photos 9 and 10
- Photos 11 and 12




GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- CM1 — SURVEY CONTROL MONUMENT (2)
- 301 — COORDINATE POINT
- ■ — MONITORING SOIL SAMPLE LOCATION (9)
- MONITORING SITE FEATURE
- ⊗ — STAIN (HYDROCARBON)
- 112 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19320 — 2012 SOIL SAMPLE TAG LOCATION

SURVEY CONTROL MONUMENTS

| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| CM1 | 7 616 981.903 | 408 942.460 | 513.650 | FOX-3 BASELINE STA. 0+00 |
| CM2 | 7 617 076.152 | 409 081.577 | 517.980 | FOX-3 BASELINE STA. 5+51.73 |

NOTE: BASELINE STATIONS SHOWN ARE IN IMPERIAL UNITS.

STATION WEST LANDFILL (LOBE E2) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 330 | 7 616 951.1 | 408 816.7 | 505.7 |
| 331 | 7 616 955.4 | 408 822.1 | 506.1 |
| 332 | 7 616 955.1 | 408 839.2 | 507.1 |
| 333 | 7 616 943.1 | 408 848.4 | 507.6 |
| 334 | 7 616 939.6 | 408 859.6 | 508.0 |
| 335 | 7 616 931.3 | 408 858.8 | 508.0 |
| 336 | 7 616 924.4 | 408 858.4 | 507.7 |
| 337 | 7 616 923.8 | 408 832.8 | 506.1 |
| 338 | 7 616 922.1 | 408 820.2 | 505.2 |
| 339 | 7 616 933.2 | 408 816.9 | 505.3 |

STATION WEST LANDFILL (LOBE A) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 301 | 7 617 100.2 | 409 009.9 | 513.9 |
| 302 | 7 617 107.5 | 409 033.5 | 514.7 |
| 303 | 7 617 111.3 | 409 053.0 | 515.6 |
| 304 | 7 617 090.3 | 409 070.3 | 517.2 |
| 305 | 7 617 072.2 | 409 058.2 | 517.7 |
| 306 | 7 617 029.8 | 409 019.9 | 516.8 |
| 307 | 7 616 984.1 | 408 963.8 | 514.5 |
| 308 | 7 616 990.4 | 408 952.6 | 514.0 |
| 309 | 7 617 007.3 | 408 948.8 | 513.5 |
| 310 | 7 617 031.2 | 408 952.0 | 513.6 |
| 311 | 7 617 054.1 | 408 965.7 | 515.1 |
| 312 | 7 617 061.9 | 408 973.3 | 515.0 |
| 313 | 7 617 079.3 | 408 997.0 | 515.5 |

STATION WEST LANDFILL (LOBE F) REGRADED (AS-BUILT)

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 210 | 7 616 857.5 | 408 924.3 | 507.8 |
| 211 | 7 616 854.2 | 408 937.5 | 508.3 |
| 212 | 7 616 840.9 | 408 941.8 | 507.6 |
| 213 | 7 616 835.4 | 408 936.9 | 507.1 |
| 214 | 7 616 819.1 | 408 934.0 | 505.6 |
| 215 | 7 616 805.8 | 408 921.0 | 503.9 |
| 216 | 7 616 803.8 | 408 904.1 | 502.8 |
| 217 | 7 616 822.7 | 408 888.9 | 503.3 |
| 218 | 7 616 836.8 | 408 897.5 | 505.1 |
| 219 | 7 616 842.9 | 408 911.1 | 506.5 |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 15 30 m SCALE 1:1500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

FOX-3 DEWAR LAKES

**STATION WEST LANDFILL**

FIGURE FOX-3.3

AECOM

## Landfill Visual Inspection

**Site Name:** FOX-3 (Dewar Lakes) DEW Line Site
**Landfill:** **Station West Landfill (Lobes A, E2 and F)**
**Designation:** **Regrade Landfill**
**Date Inspected:** August 25, 2012
**Inspected by:** Ed Grozic, P.Eng.
EBA-Tt

**Signature:**

**Table B1: Station West Landfill**

| Checklist Item | Present (Yes/No) | Location | Length | Width | Depth | Extent | Description | Photographic Records | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | Yes<br>Lobe F | Refer to Figure FOX-3.3, Lobe F | 0.5 m diameter | N/A | ~4 cm | isolated | N/A | **Photo 11**<br>**IMG_0132** | N/A | Fine grained sand with some silt and trace clay. |
| Erosion | Yes<br>Lobe F | Refer to Figure FOX-3.3, Lobe F | ~5 m long | < 10cm | < 3cm | isolated | Minor isolated erosion along south facing slope | IMG_0137<br>IMG_0139<br>IMG_0140<br>**Photo 12**<br>**IMG_0141** | Acceptable | Finer grained soils have eroded as the regrade area naturally stabilizes. Erosion occurred along 15-20% slope. |
| Frost Action | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Staining - Hydrocarbon | Yes<br>Lobe A | Refer to Figure FOX-3.3, Lobe A | N/A | N/A | N/A | None | Two hydrocarbon stains (<0.6 m diameter) | **Photo 7**<br>**IMG_0113**<br>IMG_0114<br>**Photo 8**<br>**IMG_0115**<br>IMG_0116 | Acceptable | Isolated hydrocarbon stains on surface of landfill. |
| Staining - Iron | Yes<br>Lobe A | Refer to Figure FOX-3.3, Lobe A | -25 m | -10 m | N/A | Isolated | Iron staining, Irregular shape and isolated. | IMG_0168 | Acceptable | Reddish brown iron staining on surface of landfill, which extends off of Lobe A to the West. Adjacent vegetation does not appear distressed. |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Debris Exposed | Yes<br>Lobe A | 2 locations - Refer to Figure FOX-3.3, Lobe A | Protruding from surface 10 cm | 1½ “diameter | unknown | None | Plastic pipe protruding from the surface of the | IMG_0109<br>IMG_0123<br>IMG_0172<br>IMG_0173 | Marginal to Acceptable | Orange coloured plastic pipe (tubing) protruding from the landfill. |

**Table B1: Station West Landfill**

| Checklist Item | Present (Yes/No) | Location | Length | Width | Depth | Extent | Description | Photographic Records | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | landfill at two isolated locations | | | |
| | Yes<br>Lobe E2 | Refer to Figure FOX-3.3, Lobe E2 | N/A | N/A | N/A | isolated | Non-Woven geotextile, windblown scrap/waste | IMG_ 0125 | Acceptable | Windblown scrap construction material alongside the landfill lobe. Debris should be picked up. |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Other Features of Note – Fuel tank on Lobe A | Yes | Refer to Figure FOX-3.3, Lobe A | N/A | N/A | N/A | Single location (isolated) | Fuel tank stored on Lobe A, Northeast corner | IMG_0112 | Acceptable | A fuel tank is presently being stored on the landfill. It is understood the fuel tank was used by the General Contractor during site clean-up. It is not known whether the fuel tank contains any residual fuel. |
| Other Features of Note – Wood debris along southeast side of Lobe A | Yes<br>Lobe A | Refer to Figure FOX-3.3, Lobe A | N/A | N/A | N/A | Isolated | Wood surface debris | **Photo 9 IMG_0122** | Acceptable | Occasional wood surface debris is present along the east side of the landfill, specifically along the southeast area of Lobe A. Remaining timber includes 30 – 6”x6”x 10’ long, 1-8”x12”x8’ long. |
| Other Features of Note – Small localized area of ponded water adjacent to Lobe E2 | Yes<br>Lobe E2 | Refer to Figure FOX-3.3, Lobe E2 | N/A | N/A | N/A | Single location (Isolated) | Water ponding along northeast side of Lobe E2 | **Photo 10 IMG_0125** | Acceptable | Does not appear to be impacting the regrade area, but is an adjacent feature of note. |
| Other Features of Note – Damp/Wet ground in southwest part of Lobe F | Yes<br>Lobe F | Refer to Figure FOX-3.3, Lobe F | 10 m | 10 m | N/A | Single location (Isolated) | | IMG_0138 | Acceptable | Damp, wet ground on surface of Lobe F post rainfall. Does not appear to be impacting the landfill lobe, but is identified as a feature of note. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

**Station West Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA**

| Parameter | N value Baseline | Arithmetic Mean +/- 95% Confidence Limit Baseline | Maximum Baseline [mg/kg] | 2012 | Comments |
|---|---|---|---|---|---|
| Copper | 128 | 39.5 +/- 1.3 | 67 | All concentrations within the 95% confidence limit, with five exceptions. | The surface and depth samples at F3-04 had concentrations of 59.4 and 46.6 mg/kg, respectively. The depth samples at F2-09 and F3-11 had concentrations of 46.9 and 46.6 mg/kg. The surface sample at F3-12 had a concentration of 43.2 mg/kg. None of the results exceeded the baseline maximum. |
| Nickel | 128 | 31.4 +/- 0.7 | 47 | All concentrations within the 95% confidence limit, with six exceptions. | The surface samples at F3-11 and F3-12 had concentrations of 33.3 and 36.8 mg/kg, respectively. The depth samples at F3-04, F3-08, F3-09, and F3-11 had concentrations of 32.2, 32.3, 35.2, and 35.6 mg/kg, respectively. The results were all below the baseline maximum. |
| Cobalt | 128 | 12.5 +/- 0.3 | 19 | All concentrations within the 95% confidence limit. | |
| Cadmium | 128 | <1.0 | <1.0 | Concentrations consistent with baseline mean (non-detect). | |
| Lead | 128 | <10 | 34 | Concentrations consistent with baseline mean (non-detect), with three exceptions. | The surface and depth samples at F3-04 had concentrations of 50.8 and 33.5 mg/kg, respectively. The surface sample at F3-08 had a concentration of 16.0 mg/kg. The surface sample collected from F3-04 exceeded the baseline maximum. |
| Zinc | 128 | 71 +/- 3 | 190 | All concentrations within 95% confidence limit, with eight exceptions. | The surface samples at F3-04, F3-10, and F3-12 had concentrations of 130, 75 and 75 mg/kg, respectively. The depth samples at F3-04, F3-07, F3-08, F3-09, and F3-11 had concentrations of 110, 78, 79, 80, and 76 mg/kg, respectively. The results were below the baseline maximum. |
| Chromium | 128 | 77 +/- 2 | 120 | All concentrations within 95% confidence limit, with two exceptions. | The depth samples at F3-04 and F3-11 had concentrations of 84 and 81 mg/kg, respectively. Both results were below the baseline maximum. |
| Arsenic | 128 | 10.0 +/- 0.7 | 21.7 | Three of eigtheen results were within the 95% confidence limit. | The surface samples at F3-01, F3-07, and F3-08 were within the 95% confidence limit. All other results were above. None exceeded the baseline maximum. |
| Mercury | 19 | <0.10 | <0.10 | Concentrations consistent with baseline mean (non-detect). | |
| PCBs | 128 | <0.050 | 0.3 | Concentrations consistent with baseline mean (non-detect), with one exception. | The surface sample at F3-04 had a concentration of 0.073 mg/kg. The result is below the baseline maximum. |
| TPH | 31 | <10 | 2100 | Concentrations consistent with baseline mean (non-detect), with one exception. | The surface sample at F3-04 had a concentration of 76 mg/kg. The results is below the basline maximum. |

**Station West Landfill - Year 1 (2012) Soil Data**

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Station West Landfill- Baseline Concentrations** | | | | | **39.5 +/- 1.3** | **31.4 +/- 0.7** | **12.5 +/- 0.3** | **<1.0** | **<10** | **71 +/- 3** | **77 +/- 2** | **10.0 +/- 0.7** | **<0.10** | **<0.050** | **<10** | | | |
| **Station West Landfill - Maximum Concentrations** | | | | | **67.0** | **47.0** | **19.0** | **<1.0** | **34** | **190** | **120** | **21.7** | **<0.10** | **0.300** | **2100** | | | |
| Upgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19336/37 | 19336 | F3-08 | 2012 | 0-10 | 29.2 | 29.8 | 8.7 | <0.50 | 16 | 72 | 68.9 | 10.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19338/39 | 19336 | F3-08 | 2012 | 30-40 | 34.6 | 32.3 | 9.5 | <0.50 | 6.8 | 79 | 75.8 | 13.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19344/45 | 19344 | F3-10 | 2012 | 0-10 | 31.9 | 30.7 | 9.2 | <0.50 | 5.8 | 75 | 72 | 11.2 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19346/47 | 19344 | F3-10 | 2012 | 30-40 | 34.0 | 32.0 | 9.5 | <0.50 | 5.6 | 70 | 74 | 11.3 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| Downgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19320/21 | 19320 | F3-04 | 2012 | 0-10 | 59.4 | 28.0 | 8.5 | <0.50 | 50.8 | 130 | 69 | 10.7 | 0.012 | 0.073 | 76 | <5.0 | <10 | 76 |
| 12-19322/23 | 19320 | F3-04 | 2012 | 30-40 | 46.6 | 32.2 | 8.6 | <0.50 | 33.5 | 110 | 84 | 14.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19324/25 | 19324 | F3-05 | 2012 | 0-10 | 32.3 | 30.2 | 8.9 | <0.50 | 5.6 | 74 | 75 | 12.6 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19326/27 | 19324 | F3-05 | 2012 | 30-40 | 31.6 | 25.8 | 7.9 | <0.50 | 5.3 | 73 | 66 | 13.2 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19328/29 | 19328 | F3-06 | 2012 | 0-10 | 34.4 | 28.1 | 8.7 | <0.50 | 6.3 | 73 | 69 | 15.9 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19330/31 | 19328 | F3-06 | 2012 | 30-40 | 30.9 | 26.6 | 8 | <0.50 | 6.8 | 70 | 65 | 14.4 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19332/33 | 19332 | F3-07 | 2012 | 0-10 | 28.0 | 25.6 | 7.6 | <0.50 | 5.1 | 62 | 68 | 10.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19334/35 | 19332 | F3-07 | 2012 | 30-40 | 31.4 | 27.0 | 8 | <0.50 | 6.3 | 78 | 73 | 13.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19340/41 | 19340 | F3-09 | 2012 | 0-10 | 33.7 | 29.6 | 8.8 | <0.50 | 6.3 | 71 | 70 | 12.3 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19342/43 | 19340 | F3-09 | 2012 | 30-40 | 46.9 | 35.2 | 10.2 | <0.50 | 7.4 | 80 | 78 | 17.4 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19348/49 | 19348 | F3-11 | 2012 | 0-10 | 36.5 | 33.3 | 10.0 | <0.50 | 6.5 | 73 | 73 | 16.3 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19350/51 | 19348 | F3-11 | 2012 | 30-40 | 46.6 | 35.6 | 10.9 | <0.50 | 7.1 | 76 | 81 | 21.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19352/53 | 19352 | F3-12 | 2012 | 0-10 | 43.2 | 36.8 | 9.7 | <0.50 | 7.4 | 75 | 79 | 18.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19354/55 | 19352 | F3-12 | 2012 | 30-40 | 30.5 | 26.9 | 7.7 | <0.50 | 5.6 | 72 | 66 | 11.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |

**PHOTO 5 IMG 0109:** Station West Landfill - Plastic Pipe protruding from the landfill along west side of Lobe A.

**PHOTO 6 IMG 0123:** Station West Landfill - Plastic Pipe protruding from the landfill at south end of Lobe A.

**PHOTO 7 IMG 0113:** Station West Landfill - Hydrocarbon stains at north end of Lobe A end of landfill.

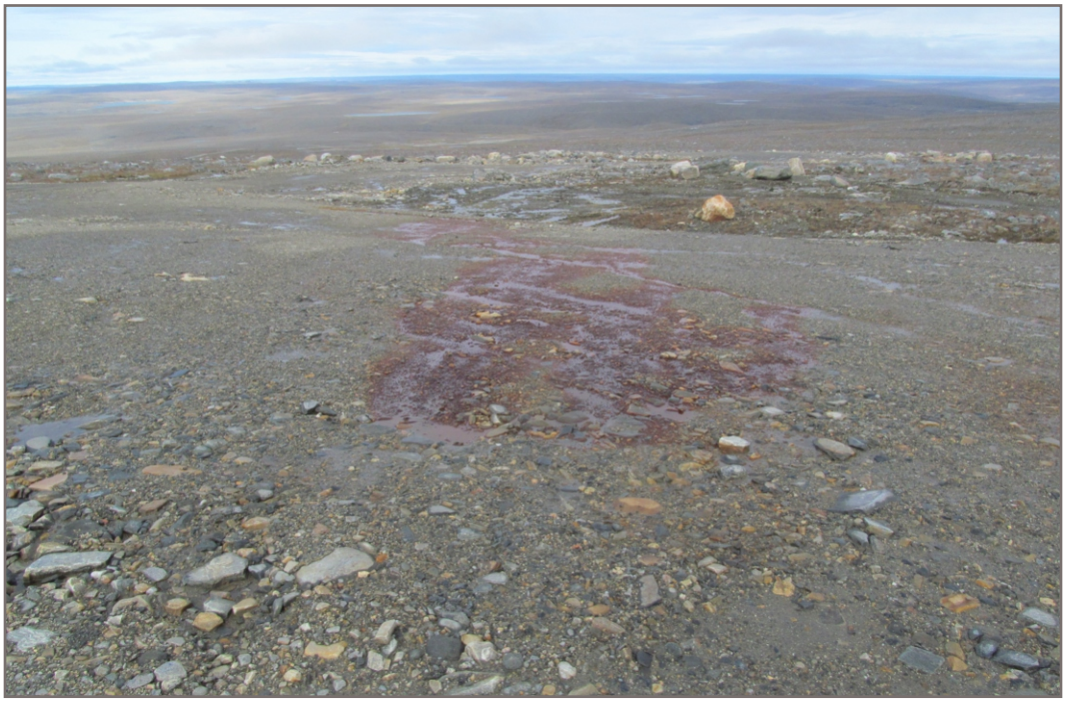


**PHOTO 8 IMG 0115:** Station West Landfill - Iron staining along northwest portion of Lobe A.

**PHOTO 9 IMG 0122:** Station West Landfill - Wood construction debris along southeast side of Lobe A.

**PHOTO 10 IMG 0125:** Station West Landfill - Area of ponded water noted along north side of Lobe E2.

**PHOTO 11 IMG 0132:** Station West Landfill - Small isolated depression of ponded water noted at north end of Lobe F.

**PHOTO 12 IMG 0141:** Station West Landfill - Minor erosion noted along south sideslope of Lobe F.

## Annex 3 Non-Hazardous Waste Landfill – Year 1 Data

### Figures:

- FOX-3.4: Site Plan – Non-Hazardous Waste Landfill

### Tables:

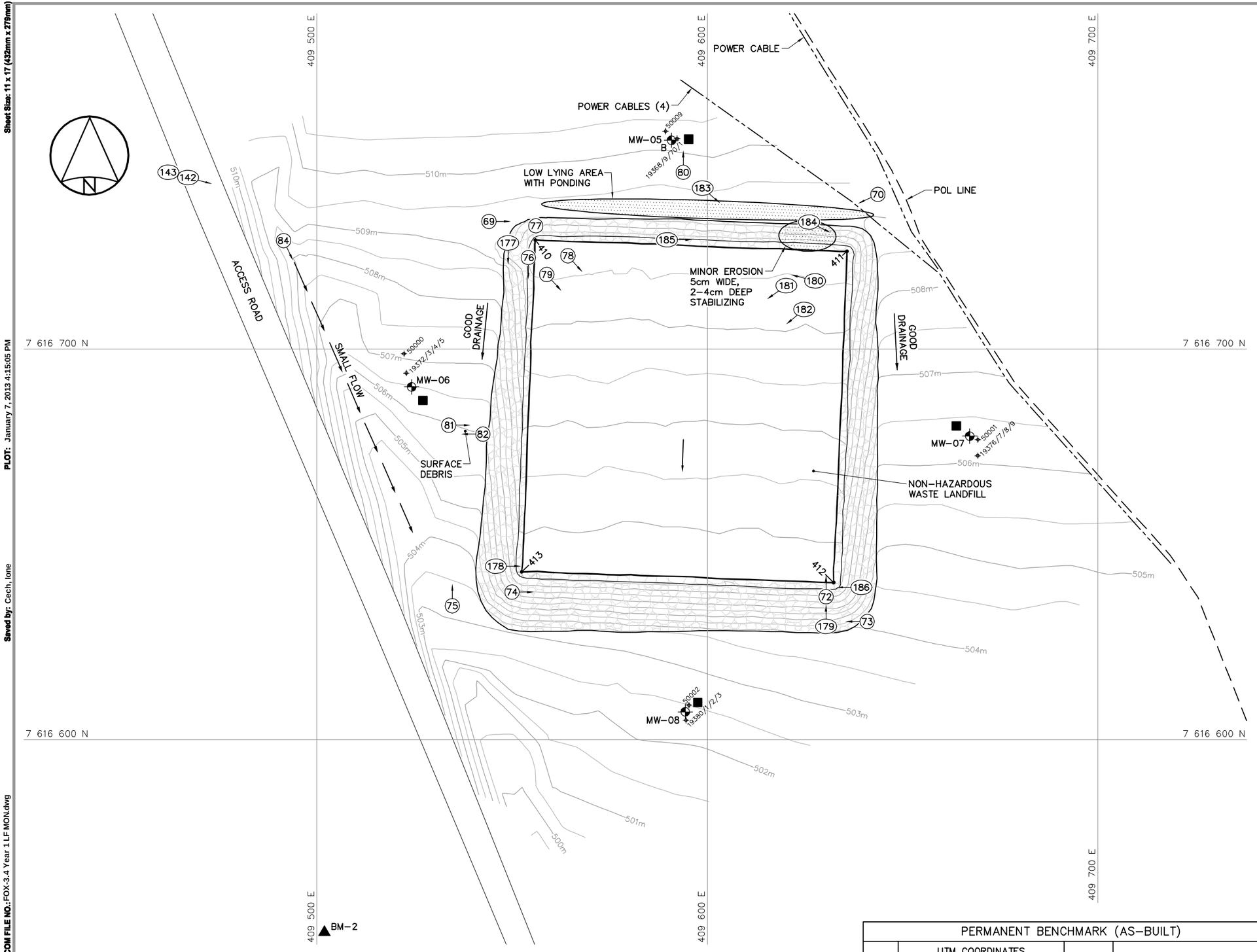
- Landfill Visual Inspection – Non-Hazardous Waste Landfill
- Non-Hazardous Waste Landfill – Evaluation of Year 1 Soil Analytical Data
- Non-Hazardous Waste Landfill – Year 1 (2012) Soil Data
- Non-Hazardous Waste Landfill – Year 1 (2012) Groundwater Data

### Photographic Records:

- Photos 13 and 14

### Well Sampling Records:

- Well MW-05
- Well MW-06
- Well MW-07
- Well MW-08




## GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

## LEGEND:

| | |
|---|---|
| ▲BM-2 | PERMANENT BENCHMARK LOCATION (1) |
| 410 | COORDINATE POINT |
| | MONITORING WELL LOCATION (3) |
| B | BACKGROUND MONITORING WELL LOCATION (1) |
| ■ | MONITORING SOIL SAMPLE LOCATION (4) |
| | MONITORING SITE FEATURE |
| 142 | APPROX. PHOTOGRAPHIC VIEWPOINT |
| 19368 | 2012 SOIL SAMPLE TAG LOCATION |

**NON-HAZARDOUS WASTE LANDFILL MONITORING WELLS (AS-BUILT)**

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| MW-05 | 7 616 753.5 | 409 590.8 | 510.0 |
| MW-06 | 7 616 690.3 | 409 524.3 | 506.7 |
| MW-07 | 7 616 677.7 | 409 667.2 | 506.4 |
| MW-08 | 7 616 607.1 | 409 594.3 | 502.5 |

**NON-HAZARDOUS WASTE LANDFILL FINAL GRADING (AS-BUILT)**

| NO. | UTM COORDINATES | | ELEV. |
|---|---|---|---|
| | NORTHING | EASTING | |
| 410 | 7 616 728.0 | 409 555.9 | 510.7 |
| 411 | 7 616 725.0 | 409 635.7 | 510.9 |
| 412 | 7 616 640.2 | 409 632.4 | 507.6 |
| 413 | 7 616 643.0 | 409 552.5 | 507.5 |

NOTE:
COORDINATE POINTS AND ELEVATIONS PROVIDED ARE TO THE FINAL GRADE OF THE TYPE 2 GRANULAR FILL CAP PRIOR TO THE PLACEMENT OF THE TYPE 1 GRANULAR FILL ON THE SIDE SLOPES.

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

**PERMANENT BENCHMARK (AS-BUILT)**

| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| BM-2 | 7 616 550.650 | 409 501.940 | 498.460 | 25mm DIA. STEEL PIPE |

# DEW LINE CLEAN UP
# LANDFILL MONITORING PLAN

## FOX-3 DEWAR LAKES

## NON-HAZARDOUS WASTE LANDFILL

FIGURE FOX-3.4

AECOM

## Landfill Visual Inspection

**Site Name:** FOX-3 (Dewar Lakes) DEW Line Site
**Landfill:** **Non-Hazardous Waste Landfill**
**Designation:** **New Landfill**
**Date Inspected:** August 24, 2012
**Inspected by:** Ed Grozic, P.Eng.
EBA-Tt

**Signature:**

**Table C1: Non-Hazardous Waste Landfill**

| Checklist Item | Present Yes/No | Location | Length | Width | Depth | Extent | Description | Photographic Records | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Erosion | Yes | Refer to Figure FOX-3.4 | Along the side slope of landfill | 5-8 cm | 2-3 cm | isolated | Minor erosion along northeast sideslope of landfill | **Photo 13 IMG_0183** IMG_0184 IMG_0185 | Acceptable | Erosion occurred on 35 % slope, but appears to have stabilized. The erosion may have originated along dozer tracks and the soils are finer grained than elsewhere on the landfill. The erosion is judged to be minor. |
| Frost Action | Yes | MW-5 and MW-6 | N/A | N/A | N/A | isolated | The protective surface casing as MW-5 and MW-6 appear to have frost heaved last winter | IMG_0080 | N/A | The protective casings have heaved about 0.3 m. The monitoring wells appeared in good condition. ESG sampled from both wells, although indicated that MW-5 appeared to be contaminated with bentonite. |
| Animal Burrows | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Staining | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Debris Exposed - Surface Debris | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Presence/Condition of Monitoring Instruments | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Other Features of Note – Water ponding | Yes | Refer to Figure FOX-3.4 | N/A | N/A | N/A | None | Minor ponded water along north side of landfill | IMG_0180 **Photo 14 IMG_0070** | Acceptable | Ponded water along the north side of the landfill due to flat/no grade. The minor ponding does not appear to be impacting the landfill, but is adjacent to the landfill and has been identified as a feature of note. Good grade and water flow along the east and west side of the landfill. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

**Non-Hazardous Waste Landfill - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA**

| Parameter | N value Baseline | Arithmetic Mean +/- 95% Confidence Limit Baseline | Maximum Baseline [mg/kg] | 2012 | Comments |
|---|---|---|---|---|---|
| Copper | 27 | 37.9 +/- 3.3 | 58 | Seven of the eight results exceed the 95% confidence limit. | The surface samples at MW-05, MW-06, MW-07, and MW-08, and the depth samples at MW-06 and MW-07 were above the 95% confidence limit. None were above the maximum baseline concentration. |
| Nickel | 27 | 32.5 +/- 1.4 | 42 | Six of the eight results exceed the 95% confidence limit. | The surface samples at MW-05, MW-06, MW-07, and MW-08, and the depth samples at MW-06 and MW-07 were above the 95% confidence limit. The depth samples at MW-06 and MW-07 were above the baseline maximum. |
| Cobalt | 27 | 12.4 +/- 0.6 | 14.8 | All concentrations were within the 95% confidence limit. | |
| Cadmium | 27 | <1.0 | <1.0 | Concentrations consistent with baseline mean (non-detect). | |
| Lead | 27 | <10 | 13 | All concentrations were within the 95% confidence limit, with two exceptions. | The surface and depth samples at MW-06 had concentrations of 10.8 and 22.4 mg/kg. The depth sample concentration was above the baseline maximum. |
| Zinc | 27 | 68 +/- 3 | 82 | Six of the eight results exceed the 95% confidence limit. | The surface and depth samples at MW-05, MW-06, and MW-07 exceeded the 95% confidence limit of 71 mg/kg. The surface sample at MW-05, the surface and depth samples at MW-06, and the surface and depth samples at MW-07 exceeded the maximum baseline concentration. |
| Chromium | 27 | 80.0 +/- 3.8 | 100 | Five of the eight results were abvoe the 95% confidence limit. | The surface and depth samples at MW-06 and MW-07, and the surface sample at MW-08 exceeded the 95% confidence limit of 83.3 mg/kg. The surface sample at MW06 and the depth sample at MW-07 exceeded the baseline maximum. |
| Arsenic | 27 | 12.5 +/- 1.8 | 30.4 | Seven of the eight results exceed the 95% confidence limit. | The surface and depth samples at MW-05, MW-06, and MW-07 exceeded the 95% confidence limit of 14.3 mg/kg. The surface sample at MW-08 also exceeded this limit. None of the results were above the baseline maximum. |
| Mercury | 24 | <0.10 | <0.10 | Concentrations consistent with baseline mean (non-detect). | |
| PCBs | 25 | <0.050 | <0.050 | Concentrations consistent with baseline mean (non-detect). | |
| TPH | 22 | 19 +/- 7 | 56 | All concentrations were within the 95% confidence limit. | |

**Non-Hazardous Waste Landfill - Year 1 (2012) Soil Data**

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Non-Hazardous Waste Landfill - Baseline Concentrations** | | | | | **37.9 +/- 3.3** | **32.5 +/- 1.4** | **12.4 +/- 0.6** | **<1.0** | **<10** | **68 +/- 3** | **80.0 +/- 3.8** | **12.5 +/- 1.8** | **<0.10** | **<0.050** | **19 +/- 7** | | | |
| **Non-Hazardous Waste Landfill - Maximum Concentrations** | | | | | **58.0** | **42.0** | **14.8** | **<1.0** | **13** | **82** | **100.0** | ***30.4*** | **<0.10** | **<0.050** | **56** | | | |
| Upgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19368/69 | 19368 | MW-05 | 2012 | 0-10 | 55.2 | 38.3 | 9.8 | <0.50 | 7.2 | 97 | 83.7 | 16.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19370/71 | 19368 | MW-05 | 2012 | 30-40 | 40.6 | 31.3 | 8.7 | <0.50 | 7.7 | 75 | 78 | 20.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| Downgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19372/73 | 19372 | MW-06 | 2012 | 0-10 | 55.0 | 40.0 | 11.5 | <0.50 | 10.8 | 88 | 94 | 19.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19374/75 | 19372 | MW-06 | 2012 | 30-40 | 50.4 | 42.2 | 11.5 | <0.50 | 22.4 | 91 | 110 | 23.9 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19376/77 | 19376 | MW-07 | 2012 | 0-10 | 42.0 | 38.6 | 10.8 | <0.50 | 8.1 | 87 | 91 | 17.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19378/79 | 19376 | MW-07 | 2012 | 30-40 | 51.5 | 43.4 | 11.7 | <0.50 | 8.5 | 95 | 110 | 18.9 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19380/81 | 19380 | MW-08 | 2012 | 0-10 | 42.0 | 36.0 | 10.0 | <0.50 | 10 | 67 | 84 | 17.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19382/83 | 19380 | MW-08 | 2012 | 30-40 | 30.9 | 24.8 | 7.4 | <0.50 | 7.4 | 61 | 63 | 10.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |

**Non-Hazardous Waste Landfill - Year 1 (2012) Groundwater Data**

| Sample # | Location | Date | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [mg/L] | TPH [mg/L] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | F1 | F2 | F3 |
| Upgradient Groundwater Samples | | | | | | | | | | | | | | | | |
| 12-50009 | MW09-05 | 2012 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | <0.00080 | <0.80 | 1.05 | <0.025 | 0.3 | 0.65 |
| Downgradient Groundwater Samples | | | | | | | | | | | | | | | | |
| 12-50000 | MW09-06 | 2012 | 0.043 | 0.021 | 0.0033 | 0.000 | 0.01 | 0.172 | 0.013 | 0.006 | <0.00010 | <0.040 | <0.25 | <0.025 | <0.10 | <0.25 |
| 12-50001 | MW09-07 | 2012 | 0.093 | 0.854 | 0.0337 | 0.001 | 0.03 | 0.947 | 0.146 | 0.017 | <0.00010 | <0.040 | <0.25 | <0.025 | <0.10 | <0.25 |
| 12-50002 | MW09-08 | 2012 | 0.026 | 0.012 | 0.001 | 0.000 | 0.01 | 0.27 | 0.008 | 0.010 | <0.00010 | <0.040 | <0.25 | <0.025 | <0.10 | <0.25 |

**PHOTO 14 IMG 0183:** Non-Hazardous Waste Landfill - Minor erosion along northeast sideslope of landfill.

**PHOTO 13 IMG 0070:** Non-Hazardous Waste Landfill - Minor water ponding along north side of landfill.

**Table B-30: Monitoring Well Sampling Log- MW09-05, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 26-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-05 | | | | | |
| Facility: | Non-hazardous Waste Landfill | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good | | | | | |
| Procedure/Equipment: | Measuring tape | | | Procedure/Equipment: | Water level interface Meter | |
| Well height above ground (m)= | 0.67 | | | Depth to water surface (m)= | 0.91 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.24 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.0 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.31 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.1 | | | Evidence of sludge etc: | yes, white/grey | |
| Well volume of water (L)= | 1.3 | | | Evidence of freezing/siltation: (compare to installation record) | n/a | |
| Length screen collecting water (m)= | 1.7 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | Bailer, interface meter, Deionized water, methanol | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 26-Aug-12 | 0.75 | 3.4 | 7.01 | 887 | 78.0 | cloudy, grey/brown |
| 26-Aug-12 | 0.75 | 5.3 | 7.86 | 794 | 257 | cloudy, grey/brown |
| 26-Aug-12 | 0.50 | 6.0 | 7.85 | 795 | 227 | cloudy, grey/brown |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/26/2012 | | | Date and time collected: | 8/26/2012 | |
| Sample Number - Water: | 12-50009 | | | Sample Number - Soil: | 12-19368, 12-19369 | |
| | | | | | 12-19370, 12-19371 (depth) | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing. pH/Temp/Cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | cloudy, grey/brown | | | Soil description: | muddy, sandy, medium brown with 20% gravel, 50% vegetative cover at surface. 50% boulder and cobble cover. | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment Decontamination: | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-31: Monitoring Well Sampling Log- MW09-06, 2012**

| | |
|---|---|
| Site Name: | FOX-3 |
| Date of Sampling Event: | 26-Aug-12 |
| Names of Samplers: | Kathryn Eagles, Tom Partridge |
| Monitoring Well ID: | 09-06 |
| Facility: | Non-hazardous Waste Landfill |

**Water Sample Measured Data**

| | | | |
|---|---|---|---|
| Condition of Well: | Good | | |
| Procedure/Equipment: | Measuring tape | Procedure/Equipment: | Water level interface Meter |
| Well height above ground (m)= | 0.78 | Depth to water surface (m)= | 0.98 |
| Diameter of well (m)= | 0.040 | Static water level* (m)= | 0.20 |
| Depth of installation* (m)= | 3.6 | Depth to bottom (m)= | 2.3 |
| Length screened section (m)= | 3.0 | Free product thickness (mm)= | n/a |
| Depth to top of screen* (m)= | 0.019 | | |

| Calculations | | Notes | |
|---|---|---|---|
| Depth of water (m)= | 1.3 | Evidence of sludge etc: | n/a |
| Well volume of water (L)= | 1.6 | Evidence of freezing/siltation: (compare to installation record) | n/a |
| Length screen collecting water (m)= | 1.3 | | |

**Development/Purging Information**

Equipment: Bailer, interface meter, Deionized water, methanol

| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
|---|---|---|---|---|---|---|
| 26-Aug-12 | 1.0 | 4.0 | 7.25 | 373 | 975 | translucent |
| 26-Aug-12 | 1.0 | 3.5 | 7.01 | 269 | 674 | translucent |
| 26-Aug-12 | 1.0 | 4.0 | 7.47 | 222 | 646 | translucent |

| Water Sampling | | Soil Sampling | |
|---|---|---|---|
| Date and time collected: | 8/26/2012 | Date and time collected: | 8/26/2012 |
| Sample Number - Water: | 12-50000 | Sample Number - Soil: | 12-19372, 12-19373 |
| | | | 12-19374, 12-19375 (depth) |
| Sample containers: | 1L HDPE | Sample containers: | Whirlpaks |
| | 1L Amber Glass Bottle | | Amber Jars |
| | 1L Teflon | | |
| Procedure/Equipment: | Watera tubing. pH/Temp/Cond meter | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel |
| Water description: | translucent | Soil description: | muddy, sandy, medium brown with 60% gravel, 40% vegetative cover at surface. 20% boulder and cobble cover. |
| Filtration: (Y/N) | n | | |
| Acidification: (Y/N) | n | | |
| Sampling Equipment Decontamination: | y | Sampling Equipment Decontamination: | disposable scoops |
| Number washes: | 1 | Number washes: | 0 |
| Number rinses: | 1 | Number rinses: | 0 |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-32: Monitoring Well Sampling Log- MW09-07, 2012**

| | |
|---|---|
| Site Name: | FOX-3 |
| Date of Sampling Event: | 26-Aug-12 |
| Names of Samplers: | Kathryn Eagles, Tom Partridge |
| Monitoring Well ID: | 09-07 |
| Facility: | Non-hazardous Waste Landfill |

**Water Sample Measured Data**

| | | | |
|---|---|---|---|
| Condition of Well: | Good | | |
| Procedure/Equipment: | Measuring tape | Procedure/Equipment: | Water level interface Meter |
| Well height above ground (m)= | 0.69 | Depth to water surface (m)= | 0.75 |
| Diameter of well (m)= | 0.040 | Static water level* (m)= | 0.060 |
| Depth of installation* (m)= | 4.4 | Depth to bottom (m)= | 1.9 |
| Length screened section (m)= | 3.0 | Free product thickness (mm)= | n/a |
| Depth to top of screen* (m)= | 0.37 | | |
| | | | |
| **Calculations** | | **Notes** | |
| Depth of water (m)= | 1.2 | Evidence of sludge etc: | n/a |
| Well volume of water (L)= | 1.5 | Evidence of freezing/siltation: (compare to installation record) | n/a |
| Length screen collecting water (m)= | 1.6 | | |

**Development/Purging Information**

Equipment: Bailer, interface meter, Deionized water, methanol

| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
|---|---|---|---|---|---|---|
| 26-Aug-12 | 1.0 | 3.6 | 7.8 | 362 | 994 | translucent |
| 26-Aug-12 | 1.0 | 4.9 | 7.5 | 375 | 861 | translucent |
| 26-Aug-12 | 1.0 | 5.1 | 7.2 | 355 | 753 | translucent |

| | | | |
|---|---|---|---|
| **Water Sampling** | | **Soil Sampling** | |
| Date and time collected: | 8/26/2012 | Date and time collected: | 8/26/2012 |
| Sample Number - Water: | 12-50001 | Sample Number - Soil: | 12-19376, 12-19377 |
| | | | 12-19378, 12-19379 (depth) |
| Sample containers: | 1L HDPE | Sample containers: | Whirlpaks |
| | 1L Amber Glass Bottle | | Amber Jars |
| | 1L Teflon | | |
| Procedure/Equipment: | Watera tubing. pH/Temp/Cond meter | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel |
| Water description: | translucent | Soil description: | muddy, sandy, medium brown with 5% gravel, 50% vegetative cover at surface. 60% boulder and cobble cover. |
| Filtration: (Y/N) | n | | |
| Acidification: (Y/N) | n | | |
| Sampling Equipment Decontamination: | y | Sampling Equipment Decontamination: | disposable scoops |
| Number washes: | 1 | Number washes: | 0 |
| Number rinses: | 1 | Number rinses: | 0 |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-33: Monitoring Well Sampling Log- MW09-08, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 26-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-08 | | | | | |
| Facility: | Non-hazardous Waste Landfill | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good | | | | | |
| Procedure/Equipment: | Measuring tape | | | Procedure/Equipment: | Water level interface Meter | |
| Well height above ground (m)= | 0.64 | | | Depth to water surface (m)= | 0.85 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.21 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.1 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.38 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.2 | | | Evidence of sludge etc: | n/a | |
| Well volume of water (L)= | 1.5 | | | Evidence of freezing/siltation: (compare to installation record) | n/a | |
| Length screen collecting water (m)= | 1.7 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | Bailer, interface meter, Deionized water, methanol | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 26-Aug-12 | 1.0 | 4.8 | 9.47 | 355 | 498 | translucent, brown tinge |
| 26-Aug-12 | 1.0 | 5.5 | 9.46 | 345 | 487 | translucent, brown tinge |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/26/2012 | | | Date and time collected: | 8/26/2012 | |
| Sample Number - Water: | 12-50002 | | | Sample Number - Soil: | 12-19380, 12-19381 | |
| | | | | | 12-19382, 12-19383 | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing. pH/Temp/Cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | translucent, brown tinge | | | Soil description: | muddy, clay present with some sand, medium brown with 5% gravel, 20% vegetative cover at surface. 80% boulder and cobble cover. | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment Decontamination: | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

## Annex 4 Tier II Disposal Facility – Year 1 Data

### Figures:

- FOX-3.5: Site Plan – Tier II Disposal Facility
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-1
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-2
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-3
- Ground Temperature Profile Tier II Disposal Facility Vertical Thermistor VT-4

### Tables:

- Landfill Visual Inspection – Tier II Disposal Facility
- Tier II Disposal Facility – Evaluation of Year 1 Soil Analytical Data
- Tier II Disposal Facility – Year 1 (2012) Soil Data
- Tier II Disposal Facility – Year 1 (2012) Groundwater Data

### Photographic Records:

- Photos 15 and 16
- Photos 17 and 18
- Photos 19 and 20
- Photos 21 and 22
- Photo 23

### Well Sampling Records:

- Well MW-01
- Well MW-02
- Well MW-03
- Well MW-04

### Thermistor Annual Maintenance Records:

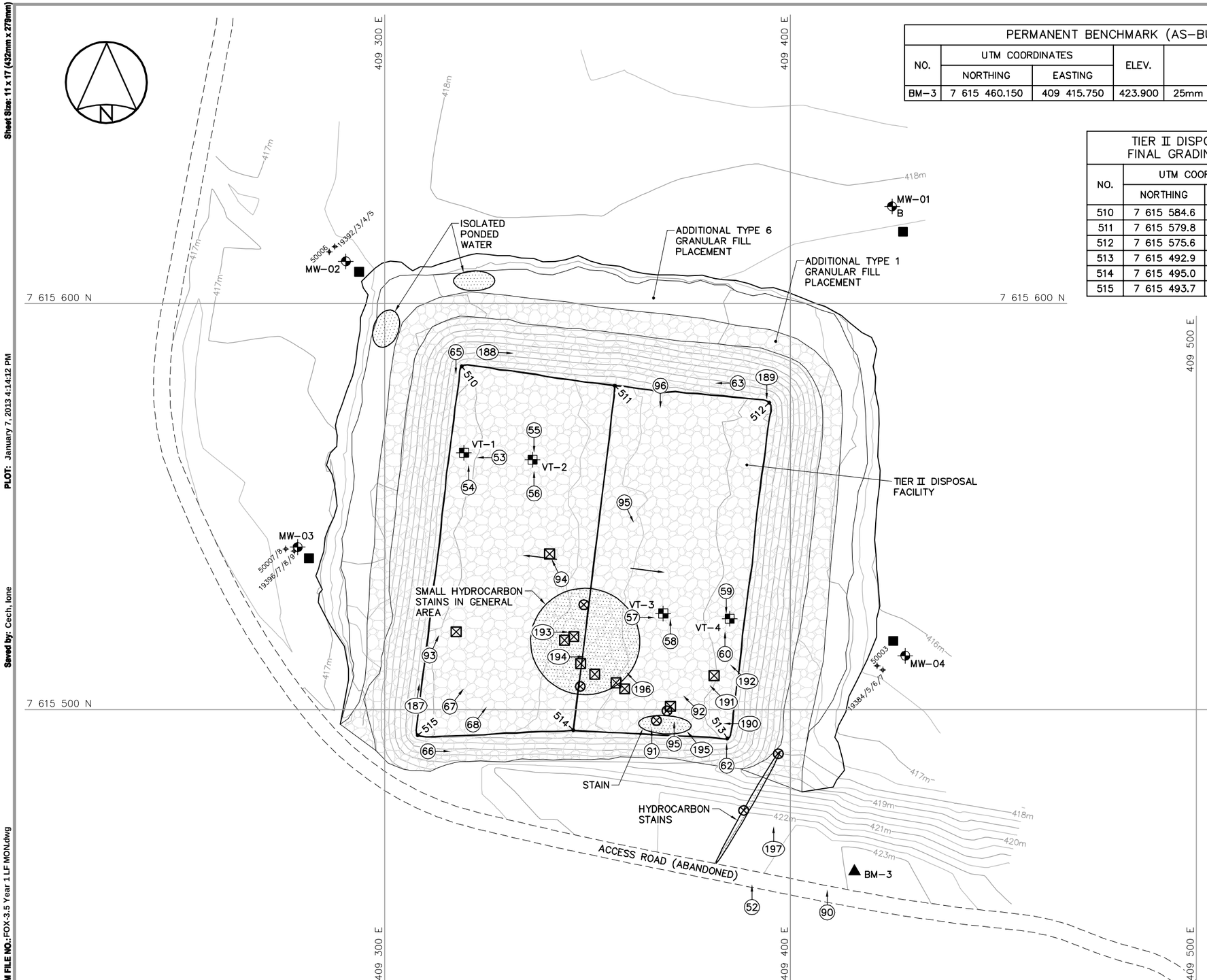
- VT-1
- VT-2
- VT-3
- VT-4

## Tier II Disposal Facility – Evaluation of Ground Temperature Data

Ground temperature profiles for the vertical thermistors are attached, showing ground temperature curves since August 2012. The table shows the depth of the active layer as defined by the 0°C isotherm for August 24, 2012.

| Summary of Tier II Disposal Facility Thermal Results | | | | |
|---|---|---|---|---|
| | **VT-1** | **VT-2** | **VT-3** | **VT-4** |
| Depth (m) of 0°C Isotherm (August 24/12) | -1.93 | -2.50 | -2.98 | -1.78 |

The inferred active layer depth noted above is less than the thickness of the 3.1 m granular cover over the Tier II soil; the landfill contents are dominantly frozen. The ground temperatures are likely warmer and active layers deeper than the long term condition and ground temperatures are expected to cool over the next several years (EBA 2012).




| PERMANENT BENCHMARK (AS-BUILT) | | | | |
|---|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. | DESCRIPTION |
| | NORTHING | EASTING | | |
| BM-3 | 7 615 460.150 | 409 415.750 | 423.900 | 25mm DIA. STEEL PIPE |

| TIER II DISPOSAL FACILITY FINAL GRADING (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| 510 | 7 615 584.6 | 409 318.9 | 422.0 |
| 511 | 7 615 579.8 | 409 356.7 | 422.6 |
| 512 | 7 615 575.6 | 409 394.8 | 422.0 |
| 513 | 7 615 492.9 | 409 384.4 | 422.0 |
| 514 | 7 615 495.0 | 409 346.4 | 422.6 |
| 515 | 7 615 493.7 | 409 308.1 | 421.8 |

GENERAL NOTES:

1. ALL COORDINATES ARE REFERENCED TO NAD83 (CSRS), UTM ZONE 19N. ALL ELEVATIONS REFER TO GEODETIC DATUM.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

LEGEND:

- BM-3 — PERMANENT BENCHMARK LOCATION (1)
- 510 — COORDINATE POINT
- MONITORING WELL LOCATION (3)
- B — BACKGROUND MONITORING WELL LOCATION (1)
- GROUND TEMPERATURE CABLE LOCATION (4)
- MONITORING SOIL SAMPLE LOCATION (4)
- MONITORING SITE FEATURE
- STAIN (HYDROCARBON)
- PONDED WATER
- 187 — APPROX. PHOTOGRAPHIC VIEWPOINT
- 19384 — 2012 SOIL SAMPLE TAG LOCATION

| TIER II DISPOSAL FACILITY MONITORING WELLS (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| MW-01 | 7 615 624.0 | 409 425.0 | 417.7 |
| MW-02 | 7 615 610.5 | 409 290.4 | 417.5 |
| MW-03 | 7 615 540.1 | 409 278.5 | 416.8 |
| MW-04 | 7 615 513.3 | 409 428.3 | 416.3 |

| TIER II DISPOSAL FACILITY GROUND TEMPERATURE CABLES (AS-BUILT) | | | |
|---|---|---|---|
| NO. | UTM COORDINATES | | ELEV. |
| | NORTHING | EASTING | |
| VT-1 | 7 615 563.3 | 409 319.5 | 422.0 |
| VT-2 | 7 615 561.6 | 409 336.4 | 422.4 |
| VT-3 | 7 615 523.7 | 409 368.6 | 422.3 |
| VT-4 | 7 615 522.4 | 409 385.0 | 422.0 |

**RECORD DRAWING**
NOT FOR CONSTRUCTION

0 10 20 m SCALE 1:1000

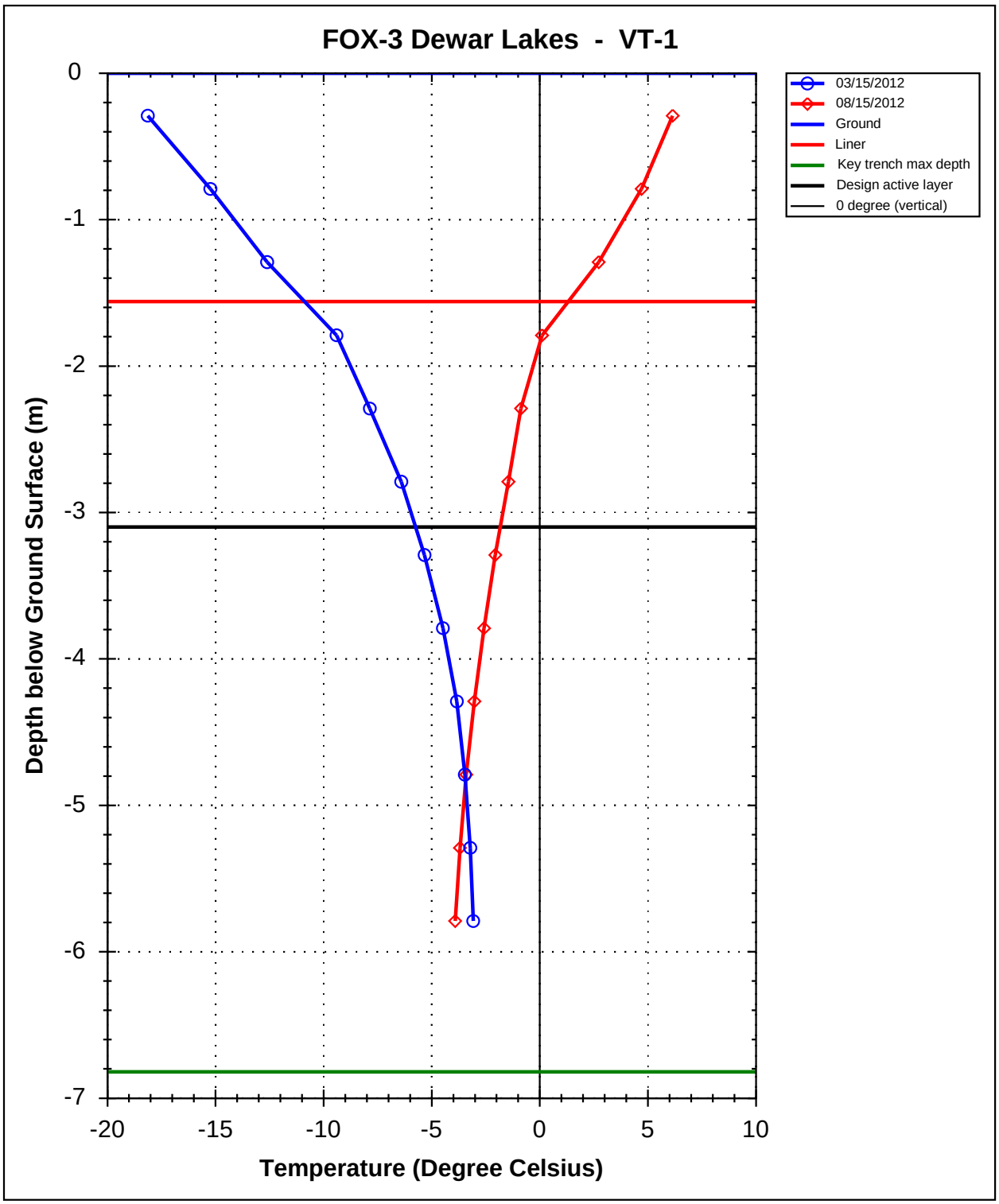
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

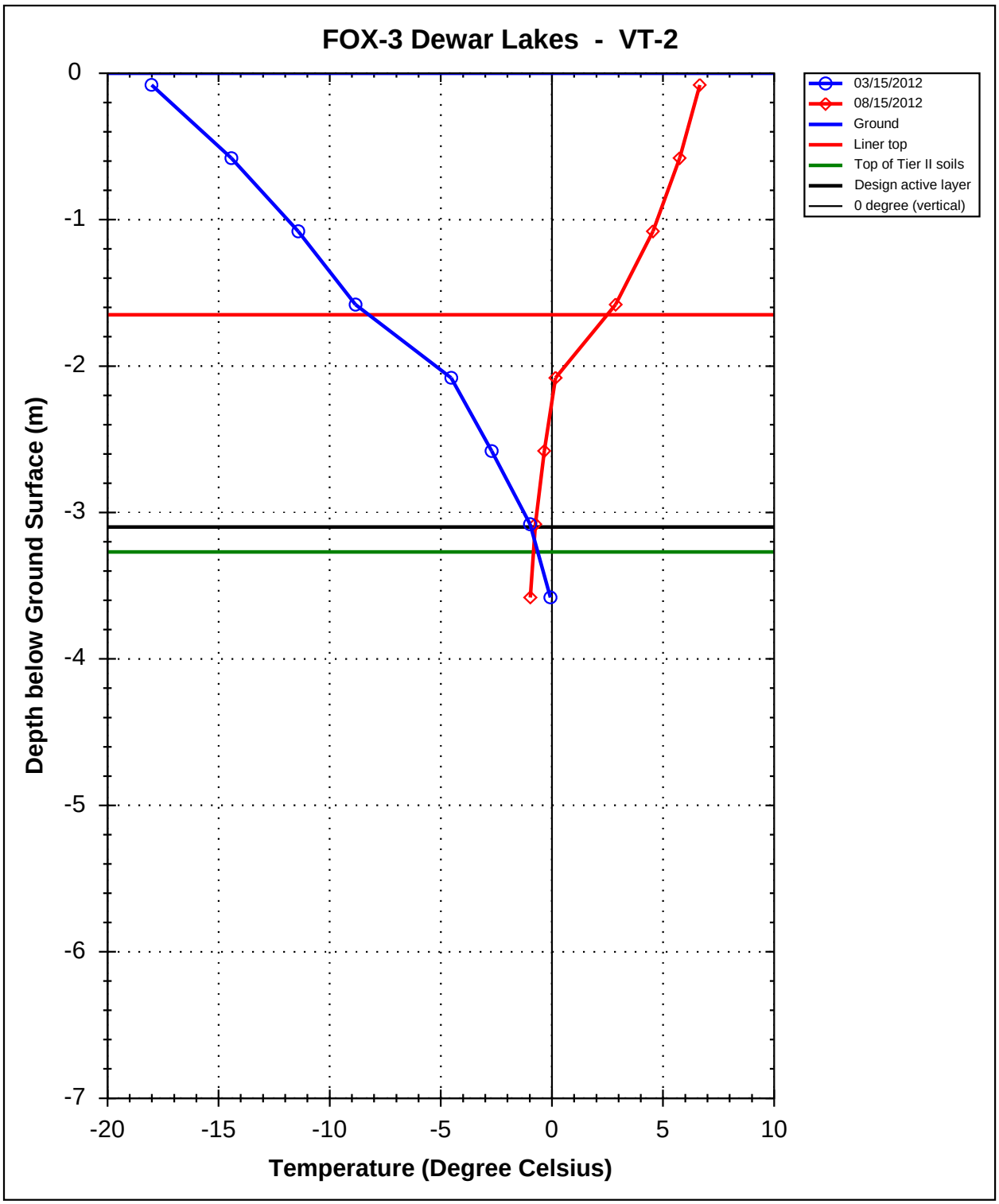
FOX-3 DEWAR LAKES

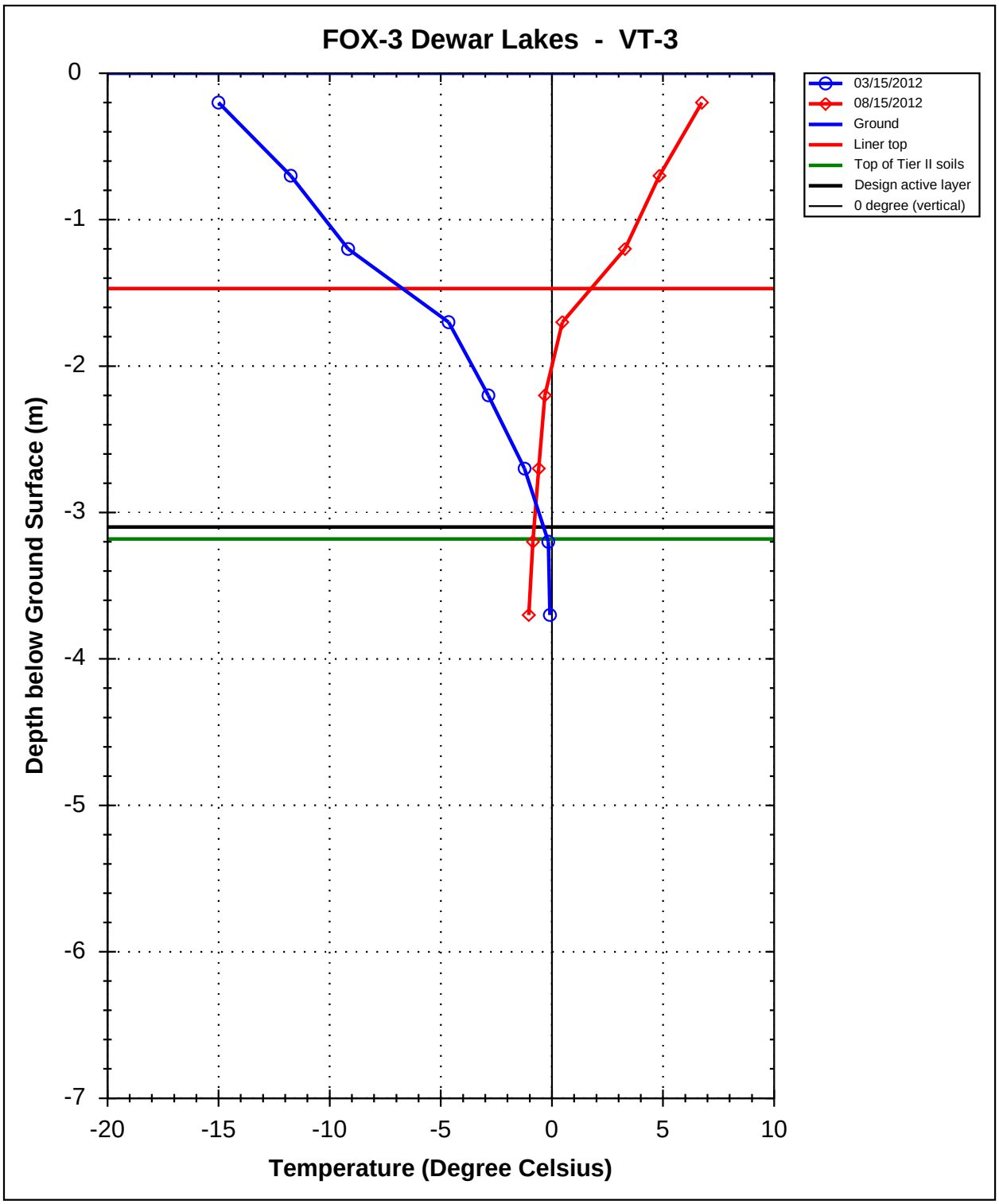
**TIER II DISPOSAL FACILITY**

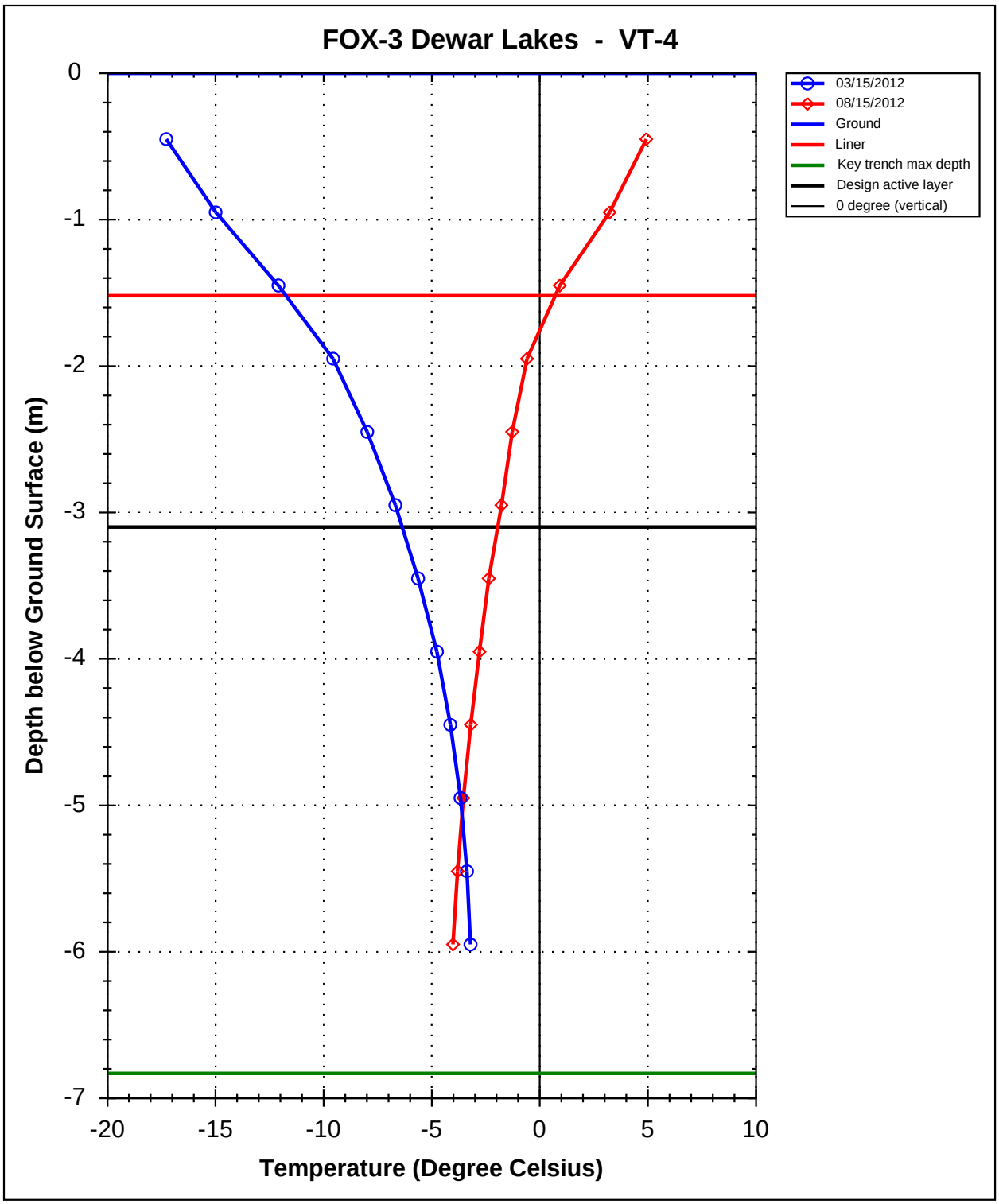
FIGURE FOX-3.5

AECOM


FOX-3 Dewar Lakes - VT-1
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-20
-15
-10
-5
0
5
10
Temperature (Degree Celsius)
03/15/2012
08/15/2012
Ground
Liner
Key trench max depth
Design active layer
0 degree (vertical)


FOX-3 Dewar Lakes - VT-2
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-20
-15
-10
-5
0
5
10
Temperature (Degree Celsius)
03/15/2012
08/15/2012
Ground
Liner top
Top of Tier II soils
Design active layer
0 degree (vertical)


FOX-3 Dewar Lakes - VT-3
Depth below Ground Surface (m)
Temperature (Degree Celsius)
0
-1
-2
-3
-4
-5
-6
-7
-20
-15
-10
-5
0
5
10
03/15/2012
08/15/2012
Ground
Liner top
Top of Tier II soils
Design active layer
0 degree (vertical)


FOX-3 Dewar Lakes - VT-4
Depth below Ground Surface (m)
0
-1
-2
-3
-4
-5
-6
-7
-20
-15
-10
-5
0
5
10
Temperature (Degree Celsius)
03/15/2012
08/15/2012
Ground
Liner
Key trench max depth
Design active layer
0 degree (vertical)

## Landfill Visual Inspection

**Site Name:** FOX-3 (Dewar Lakes) DEW Line Site
**Landfill:** **Tier II Disposal Facility**
**Designation:** **New Landfill**
**Date Inspected:** August 24, 2012
**Inspected by:** Ed Grozic, P.Eng.
EBA-Tt

**Signature:**

### Table G1: Tier II Disposal Facility

| Checklist Item | Present Yes/No | Location | Length | Width | Depth | Extent | Description | Photographic Records | Severity Rating | Additional Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Settlement | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Erosion | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Frost Action | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Animal Burrows | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Vegetation | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Staining | Yes | Refer to Figure FOX-3.5 | Irregular | Irregular | Irregular | Occasional | Hydrocarbon stains on surface of landfill | IMG_0193 to 0196<br>Photo 22 | Acceptable | One larger stain about 4 m by 1 m in size and several smaller stains and irregular shapes (less than 0.5 m diameter- see photo) located at the south and southeast portions of the landfill. The stains do not appear to be impacting the landfill |
| Vegetation Stress | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Seepage Points | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Debris Exposed | No | N/A | N/A | N/A | N/A | None | N/A | N/A | N/A | N/A |
| Presence/Condition of Monitoring Instruments | Yes | Refer to Figure FOX-3.5 | N/A | N/A | N/A | N/A | VT-01,<br>VT-02,<br>VT-03, and<br>VT-04, | IMG_0053 to 0060<br>Photos 18-21 | Acceptable | Successfully downloaded ground temperature data from Data Loggers VT-1 to VT-4. The data loggers were reset and redeployed. Collected a set of manual read readings from each thermistor cable installation. Batteries noted for replacement August 2014. |
| Other Features of Note – Isolated patches of ponded water on surface of landfill post rainfall. | Yes | Refer to Figure FOX-3.5 | Irregular | Irregular | Irregular | Occasional | Ponded water along southwest and northeast side of landfill | IMG_0091 to 0096 | Acceptable | Ponded water along southwest and northeast side of facility<br>Ponded water temporarily ponds on regraded area northeast side of facility.<br>Ponded water dominantly disappeared a day after rainfall. |
| Other Features of Note – Hydrocarbon stain beyond the landfill | Yes | Refer to Figure FOX-3.5 | Isolated | Isolated | Isolated | Isolated | hydrocarbon stain | IMG_0197 | Acceptable | Hydrocarbon stain beyond the landfill near the southeast corner of the landfill. The stain probably originated from heavy equipment as it navigated up or down the steep slope. |
| **Overall Landfill Performance:** | **Acceptable** | | | | | | | | | |

**Tier II Disposal Facility - EVALUATION OF YEAR 1 SOIL ANALYTICAL DATA**

| Parameter | N value Baseline | Arithmetic Mean +/- 95% Confidence Limit Baseline | Maximum Baseline [mg/kg] | 2012 | Comments |
|---|---|---|---|---|---|
| Copper | 33 | 38.0 +/- 4.1 | 62 | Six of the eight samples collected exceeded the 95% confidence limit. | The surface samples at MW-01, MW-02, and MW-04 were above the 95% confidence limit. The depth samples at MW-01, MW-02, and MW-03 were above the 95% confidence limit. All results were below the maximum baseline concentration. |
| Nickel | 33 | 32.2 +/- 2.4 | 46 | Seven of the eight samples collected exceeded the 95% confidence limit. | The surface and depth samples at MW-01, MW-02, and MW-03, and the surface sample at MW-04 exceeded the 95% confidence limit. The depth sample at MW-01 exceeded the baseline maximum. |
| Cobalt | 33 | 12.6 +/- 1.1 | 24 | All concentrations within the 95% confidence limit, with one exception. | The surface sample at MW-04 had a concentration of 14.4 mg/kg. The result was below the baseline maximum. |
| Cadmium | 33 | <1.0 | <1.0 | Concentrations consistent with baseline mean (non-detect). | |
| Lead | 33 | <10 | 23 | Concentrations consistent with baseline mean (non-detect), with three exceptions. | The surface and depth samples at MW-02 and the surface sample at MW-03 had concentrations of 12, 12, and 11 mg/kg, respectively. The results were below the baseline maximum. |
| Zinc | 33 | 64 +/- 3 | 75 | Seven of the eight samples collected exceeded the 95% confidence limit. | The surface and depth samples at MW-01, MW-02, and MW03, and the surface sample at MW-04 exceeded the the 95% confidence limit and the baseline maximum. |
| Chromium | 33 | 79 +/- 4 | 95 | Seven of the eight samples collected exceeded the 95% confidence limit. | The surface and depth samples at MW-02, MW-03, and MW-04, and the depth sample at MW-01 exceeded the 95% confidence limit. The sample result concentrations at MW-01 (surface), MW-02 (surface), MW-03 (depth), and MW-04 (surface) exceeded the baseline maximum. |
| Arsenic | 33 | 13.7 +/- 2.1 | 27 | Seven of the eight samples collected exceeded the 95% confidence limit. | The surface and depth samples at MW-01, MW-02, and MW03, and the surface sample at MW-04 exceeded the the 95% confidence limit. The depth sample at MW-01 and the surface sample at MW-02 exceeded the baseline maximum. |
| Mercury | 33 | <0.10 | <0.10 | Concentrations consistent with baseline mean (non-detect). | |
| PCBs | 33 | <0.1 | <0.1 | Concentrations consistent with baseline mean (non-detect). | |
| TPH | 18 | <10 | 117 | Concentrations consistent with baseline mean (non-detect). | |

**Tier II Disposal Facility - Year 1 (2012) Soil Data**

| Sample # | Surface/ Reference Tag # | Location | Date | Depth (cm) | Cu [mg/kg] | Ni [mg/kg] | Co [mg/kg] | Cd [mg/kg] | Pb [mg/kg] | Zn [mg/kg] | Cr [mg/kg] | As [mg/kg] | Hg [mg/kg] | PCBs [mg/kg] | TPH [mg/kg] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | F1 | F2 | F3 |
| **Tier II Disposal Facility- Baseline Concentrations** | | | | | **38.0 +/- 4.1** | **32.2 +/- 2.4** | **12.6 +/- 1.1** | **<1.0** | **<10** | **64 +/- 3** | **79 +/- 4** | **13.7 +/- 2.1** | **<0.10** | **<0.1** | **<10** | | | |
| **Tier II Disposal Facility - Maximum Concentrations** | | | | | **62.0** | **46.0** | **24.0** | **<1.0** | **23** | **75** | **95** | **27.0** | **<0.10** | **<0.1** | **117** | | | |
| Upgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19388/89 | 19388 | MW-01 | 2012 | 0-10 | 48.3 | 40.0 | 9.95 | <0.50 | 9 | 75 | 78 | 19.6 | 0.014 | 0.02 | <50 | <5.0 | <10 | <50 |
| 12-19390/91 | 19388 | MW-01 | 2012 | 30-40 | 51.0 | 47.8 | 12 | <0.50 | 10 | 87 | 110 | 33.0 | 0.011 | <0.020 | <50 | <5.0 | <10 | <50 |
| Downgradient Soil Samples | | | | | | | | | | | | | | | | | | |
| 12-19392/93 | 19392 | MW-02 | 2012 | 0-10 | 56.5 | 41.9 | 12.3 | <0.50 | 12 | 88 | 100 | 27.5 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19394/95 | 19392 | MW-02 | 2012 | 30-40 | 47.0 | 39.0 | 12 | <0.50 | 12 | 81 | 87 | 18.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19396/97 | 19396 | MW-03 | 2012 | 0-10 | 36.6 | 36.4 | 10.1 | <0.50 | 7 | 77 | 88 | 16.7 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19398/99 | 19396 | MW-03 | 2012 | 30-40 | 48.9 | 44.8 | 12.7 | <0.50 | 10 | 100 | 100 | 21.3 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19384/85 | 19384 | MW-04 | 2012 | 0-10 | 48.8 | 51.2 | 14.4 | <0.50 | 11 | 93 | 120 | 26.4 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |
| 12-19386/87 | 19384 | MW-04 | 2012 | 30-40 | 30.2 | 32.0 | 9.7 | <0.50 | 7 | 64 | 81 | 15.0 | <0.010 | <0.020 | <50 | <5.0 | <10 | <50 |

**Tier II Disposal Facility - Year 1 (2012) Groundwater Data**

| Sample # | Location | Date | Cu [mg/L] | Ni [mg/L] | Co [mg/L] | Cd [mg/L] | Pb [mg/L] | Zn [mg/L] | Cr [mg/L] | As [mg/L] | Hg [mg/L] | PCBs [mg/L] | TPH [mg/L] | TPH Identity | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | F1 | F2 | F3 |
| Upgradient Groundwater Samples | | | | | | | | | | | | | | | | |
| 12-50004 | MW-01 | 2012 | 0.2 | 0.528 | 0.1 | 0.0 | 0.024 | 0.522 | 0.1490 | 0.0640 | <0.00010 | <0.000040 | <0.25 | <0.025 | <0.10 | <0.25 |
| Downgradient Groundwater Samples | | | | | | | | | | | | | | | | |
| 12-50006 | MW-02 | 2012 | 0.062 | 0.032 | <0.0050 | <0.00090 | 0.01 | 0.064 | 0.010 | <0.010 | <0.00010 | <0.000040 | <0.25 | <0.025 | <0.10 | <0.25 |
| 12-50007/08 | MW-03 | 2012 | 0.032 | 0.113 | 0.0158 | 0.001 | 0.00 | 2.075 | 0.019 | 0.006 | <0.00010 | <0.000040 | <0.25 | <0.025 | <0.10 | <0.25 |
| 12-50003 | MW-04 | 2012 | 0.018 | 0.240 | 0.075 | 0.002 | 0.00 | 0.09 | 0.080 | 0.001 | <0.00010 | <0.000040 | <0.25 | <0.025 | <0.10 | <0.25 |

**PHOTO 15 IMG 0144:** Tier II Disposal Facility - View of the Facility looking southwest from the main road to the Station.

**PHOTO 16 IMG 0091:** Tier II Disposal Facility - Panoramic view of the surface of the Facility, Photo 1 of 2.

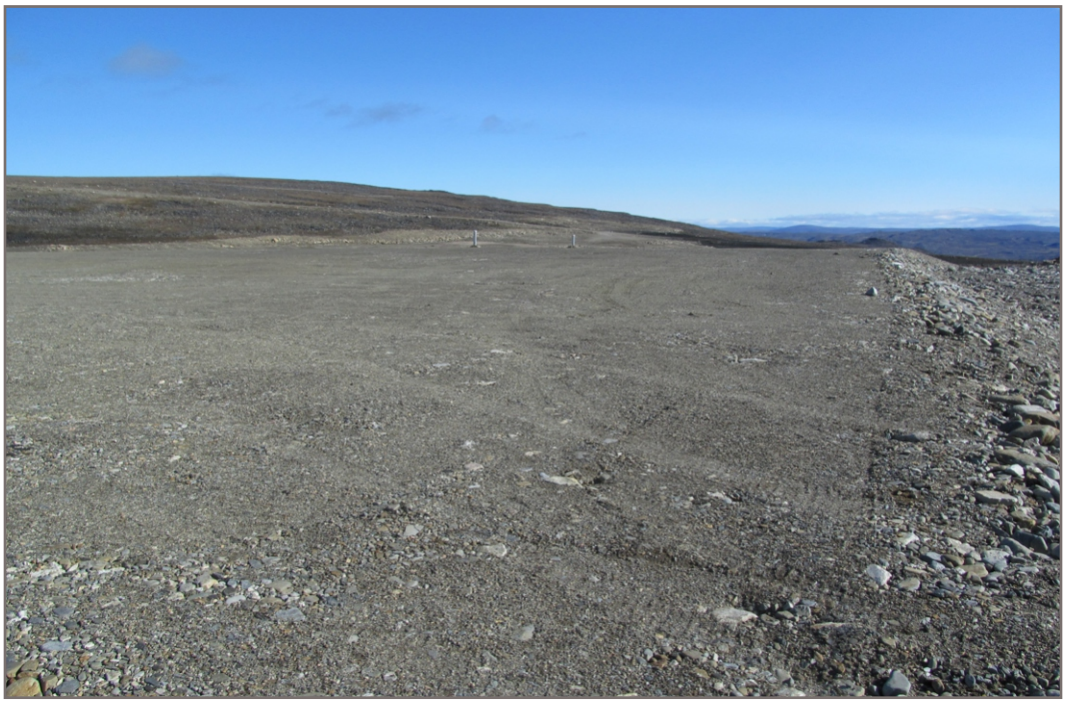


**PHOTO 17 IMG 0192:** Tier II Disposal Facility - Panoramic view of the surface of the Facility, Photo 2 of 2.

**PHOTO 18 IMG 0054:** Tier II Disposal Facility - Vertical Thermistor (VT-1), looking north.

**PHOTO 19 IMG 0056:** Tier II Disposal Facility - Vertical Thermistor (VT-2), looking north.

**PHOTO 20 IMG 0058:** Tier II Disposal Facility - Vertical Thermistor (VT-3), looking north.

**PHOTO 21 IMG 0060:** Tier II Disposal Facility - Vertical Thermistor (VT-4), looking north.

**PHOTO 22 IMG 0195:** Tier II Disposal Facility - Hydrocarbon staining on the surface of the facility at various locations as shown on Figure FOX-3.5.

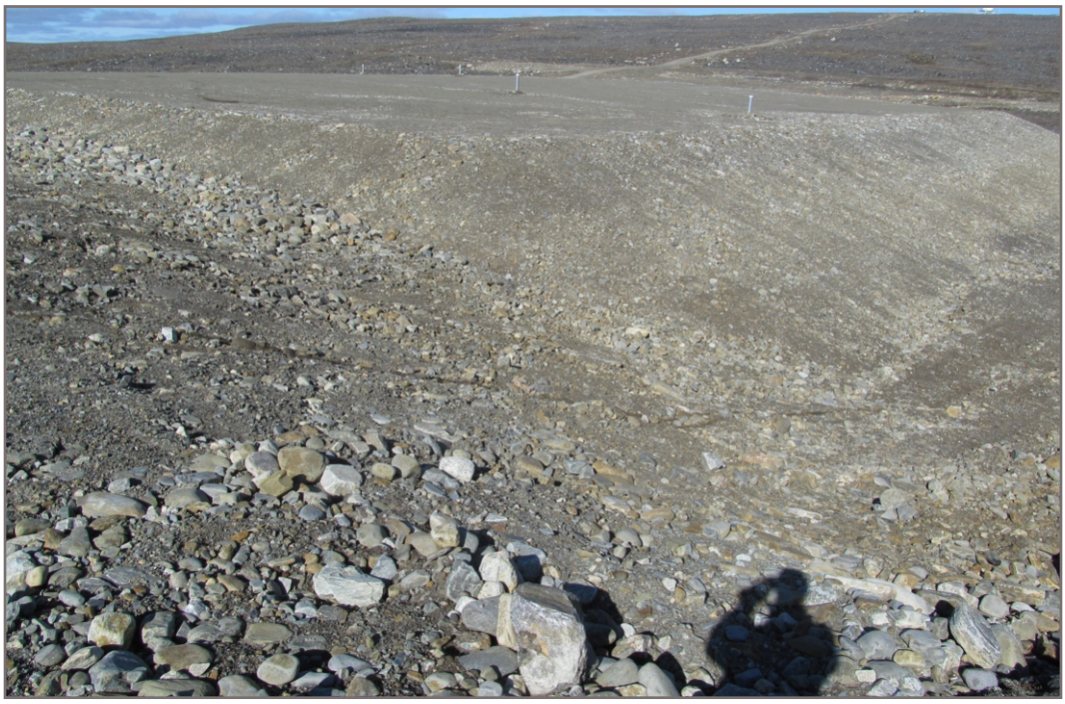


**PHOTO 23 IMG 0197:** Tier II Disposal Facility - Hydrocarbon stain beyond the landfill to the southeast as shown on Figure FOX-3.5.

**Table B-12: Monitoring Well Sampling Log- MW11-01, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 24-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-01 | | | | | |
| Facility: | Tier II Disposal Facility | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good - new well installed in 2011 | | | | | |
| Procedure/Equipment: | tape Measure | | | Procedure/Equipment: | Interface Meter | |
| Well height above ground (m)= | 0.65 | | | Depth to water surface (m)= | 0.83 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.18 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.1 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.36 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.2 | | | Evidence of sludge etc: | n/a | |
| Well volume of water (L)= | 1.5 | | | Evidence of freezing/siltation: (compare to | n/a | |
| Length screen collecting water (m)= | 1.7 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | Bailer, interface meter, Deionized water, methanol | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 8/24/2012 | 1.0 | 3.8 | 6.5 | 1499 | 278 | translucent, reddish |
| 8/24/2012 | 1.0 | 4.6 | 6.5 | 1181 | 811 | opaque, brown |
| 8/24/2012 | 1.0 | 4.9 | 6.3 | 1201 | 811 | opaque, brown |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/24/2012 | | | Date and time collected: | 8/24/2012 | |
| Sample Number - Water: | 12-50004 | | | Sample Number - Soil: | 12-19388, 12-19389 | |
| | | | | | 12-19390, 12-19391 (depth) | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing, pH/Temp/cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | Clear | | | Soil description: | soil is muddy, clay present, 50% gravel, 70% vegetation, 60% cobbles/boulders | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-13: Monitoring Well Sampling Log- MW09-02, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 24-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-02 | | | | | |
| Facility: | Tier II Disposal Facility | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good | | | | | |
| Procedure/Equipment: | tape Measure | | | Procedure/Equipment: | Interface Meter | |
| Well height above ground (m)= | 0.91 | | | Depth to water surface (m)= | 1.0 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.13 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.2 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.36 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.2 | | | Evidence of sludge etc: | n/a | |
| Well volume of water (L)= | 1.5 | | | Evidence of freezing/siltation: (compare to installation record) | n/a | |
| Length screen collecting water (m)= | 1.9 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | HDPE Watera tubing, ball valve | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 8/24/2012 | 1.0 | 3.2 | 7.58 | 470 | 307 | Clear |
| 8/24/2012 | 1.0 | 4.1 | 7.66 | 428 | 476 | Clear |
| 8/24/2012 | 1.0 | 4.4 | 7.6 | 455 | 477 | Clear |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/24/2012 | | | Date and time collected: | 8/24/2012 | |
| Sample Number - Water: | 12-50006 | | | Sample Number - Soil: | 12-19392, 12-19393 | |
| | | | | | 12-19394, 12-19395 (depth) | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing, pH/Temp/cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | Clear | | | Soil description: | soil is muddy, clay present, 15% gravel, 50% vegetation, 60% cobbles/boulders | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment Decontamination: | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-14: Monitoring Well Sampling Log- MW09-03, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 24-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-03 | | | | | |
| Facility: | Tier II Disposal Facility | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good | | | | | |
| Procedure/Equipment: | tape Measure | | | Procedure/Equipment: | Interface Meter | |
| Well height above ground (m)= | 0.90 | | | Depth to water surface (m)= | 1.1 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.20 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.2 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.36 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.1 | | | Evidence of sludge etc: | n/a | |
| Well volume of water (L)= | 1.4 | | | Evidence of freezing/siltation: (compare to installation record) | n/a | |
| Length screen collecting water (m)= | 1.8 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | Bailer, interface meter, Deionized water, methanol | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 8/24/2012 | 1.0 | 3.6 | 6.94 | 456 | 97 | Translucent (contains ice particles) |
| 8/24/2012 | 1.0 | 3.7 | 6.77 | 490 | 49 | Translucent (contains ice particles) |
| 8/24/2012 | 1.0 | 4.4 | 6.64 | 520 | 30 | Translucent (contains ice particles) |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/24/2012 | | | Date and time collected: | 8/24/2012 | |
| Sample Number - Water: | 12-50007/08 | | | Sample Number - Soil: | 12-19396, 12-19397 | |
| | | | | | 12-19398, 12-19399 (depth) | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing, pH/Temp/cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | Translucent (contains ice particles) | | | Soil description: | soil is muddy, clay present, 10% gravel, 50% vegetation, 60% cobbles/boulders | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

**Table B-15: Monitoring Well Sampling Log- MW09-04, 2012**

| | | | | | | |
|---|---|---|---|---|---|---|
| Site Name: | FOX-3 | | | | | |
| Date of Sampling Event: | 24-Aug-12 | | | | | |
| Names of Samplers: | Kathryn Eagles, Tom Partridge | | | | | |
| Monitoring Well ID: | 09-04 | | | | | |
| Facility: | Tier II Disposal Facility | | | | | |
| | | | | | | |
| **Water Sample Measured Data** | | | | | | |
| Condition of Well: | Good | | | | | |
| Procedure/Equipment: | tape Measure | | | Procedure/Equipment: | Interface meter | |
| Well height above ground (m)= | 0.83 | | | Depth to water surface (m)= | 0.86 | |
| Diameter of well (m)= | 0.040 | | | Static water level* (m)= | 0.030 | |
| Depth of installation* (m)= | 4.4 | | | Depth to bottom (m)= | 2.2 | |
| Length screened section (m)= | 3.0 | | | Free product thickness (mm)= | n/a | |
| Depth to top of screen* (m)= | 0.36 | | | | | |
| | | | | | | |
| **Calculations** | | | | **Notes** | | |
| Depth of water (m)= | 1.3 | | | Evidence of sludge etc: | n/a | |
| Well volume of water (L)= | 1.6 | | | Evidence of freezing/siltation: (compare to installation record) | n/a | |
| Length screen collecting water (m)= | 1.8 | | | | | |
| **Development/Purging Information** | | | | | | |
| Equipment: | Bailer, interface meter, Deionized water, methanol | | | | | |
| | | | | | | |
| Date & Time | Volume Removed (L) | Temperature ($^{o}$C) | pH | Conductivity (uS/cm) | Turbidity (NTU) | Description of water |
| 8/24/2012 | 1.0 | 4.3 | 7.8 | 555 | 131 | Clear |
| 8/24/2012 | 1.0 | 4.3 | 7.3 | 534 | 122 | Clear |
| 8/24/2012 | 1.0 | 4.3 | 7.2 | 540 | 126 | Clear |
| **Water Sampling** | | | | **Soil Sampling** | | |
| Date and time collected: | 8/24/2012 | | | Date and time collected: | 8/24/2012 | |
| Sample Number - Water: | 12-50003 | | | Sample Number - Soil: | 12-19384, 12-19385 | |
| | | | | | 12-19386, 12-19387 (depth) | |
| Sample containers: | 1L HDPE | | | Sample containers: | Whirlpaks | |
| | 1L Amber Glass Bottle | | | | Amber Jars | |
| | 1L Teflon | | | | | |
| Procedure/Equipment: | Watera tubing, pH/Temp/cond meter | | | Procedure/Equipment: | Disposable scoops, nitrile gloves, shovel | |
| Water description: | Clear | | | Soil description: | soil is muddy, clay present, 5% gravel, 70% vegetation, 40% cobbles/boulders | |
| Filtration: (Y/N) | n | | | | | |
| Acidification: (Y/N) | n | | | | | |
| | | | | | | |
| Sampling Equipment | y | | | Sampling Equipment Decontamination: | disposable scoops | |
| Number washes: | 1 | | | Number washes: | 0 | |
| Number rinses: | 1 | | | Number rinses: | 0 | |

n/a=not applicable

*From ground surface. Unless this is stated, all measurements are assumed to be from the top of the casing.

Battery LE8304 4UBS Retriem at 09:20
SN# 09100022 download 14:09

Fox-3 VT-1 **Thermistor Annual Maintenance Report**

| | |
|---|---|
| Contractor Name: EBA | Inspection Date: Aug 24 |
| Prepared By: EMG | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: | | Thermistor Location T2 | |
| Thermistor Number: VT1 | | Inclination V | |
| Install Date: Sept 7, 2011 | | First Date Event | Last Date Event |
| Coordinates and Elevation | N | E | Elev 422 |
| Length of Cable (m) | Cable Lead Above Ground (m) | Nodal Points | |
| Datalogger Serial # | | Cable Serial Number | |

11164 Housing

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | ☑ | ☐ | |
| Cover | ☑ | ☐ | |
| Data Logger | ☐ | ☐ | |
| Cable | ☐ | ☐ | |
| Beads | ☐ ? | ☐ | |
| Battery Installation Date | Sept 7, 2011 | | |
| Battery Levels | Main 11.34V | Aux 14.11V | |

Memory 39%

Main (9v) 11.34V

Anx (12v) 14.11V

DL date 08/24/12

DL time 13:43

+1:39 Logger to computer

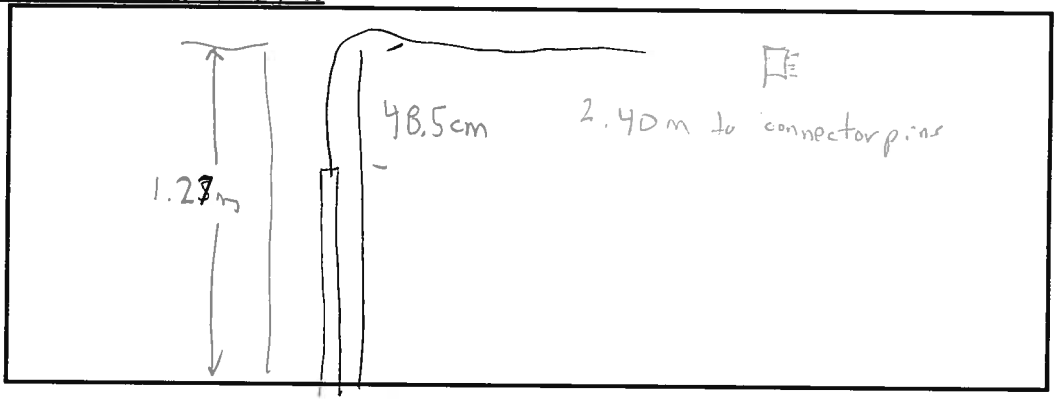
Computer MST site EST off by 19 minutes leave as is,

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C |
|---|---|---|
| 1 | 11.89 | |
| 2 | 11.70 | |
| 3 | 11.90 | |
| 4 | 13.08 | |
| 5 | 14.44 | |
| 6 | 16.08 | |
| 7 | 16.95 | |
| 8 | 17.50 | |

| Bead | ohms | Degrees C |
|---|---|---|
| 9 | 17.93 | |
| 10 | 18.40 | |
| 11 | 18.81 | |
| 12 | 19.18 | |
| 13 | 19.51 | |
| 14 | 19.78 | |
| 15 | OL | |
| 16 | OL | |

**Observations and Proposed Maintenance**



Battery LE8304 ULBS

Fox 3 VT-2

SN# 09100028

Time: 14:28

Retrieve at 09:30

# Thermistor Annual Maintenance Report

| | |
|---|---|
| Contractor Name: EBA | Inspection Date: Aug 24, 2012 |
| Prepared By: FMG | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: VT2 | | Thermistor Location T2 | |
| Thermistor Number: | VT2 | Inclination V | |
| Install Date: Sept 7, 2011 | | First Date Event | Last Date Event |
| Coordinates and Elevation | N | E | Elev 422 |
| Length of Cable (m) | Cable Lead Above Ground (m) | Nodal Points | |
| Datalogger Serial # | | Cable Serial Number | |

Housing 11165

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | ☑ | ☐ | |
| Cover | ☑ | ☐ | |
| Data Logger | ☐ | ☐ | |
| Cable | ☑ | ☐ | |
| Beads | ☐ | ☐ | |
| Battery Installation Date | Sept 7, 2011 | | |
| Battery Levels | Main 11.34V | Aux 13.99V | |

Memory 39%

Main(9v) 11.34v

Aux(12v) 13.99v

DL date 08/24/12

**Manual Ground Temperature Readings**

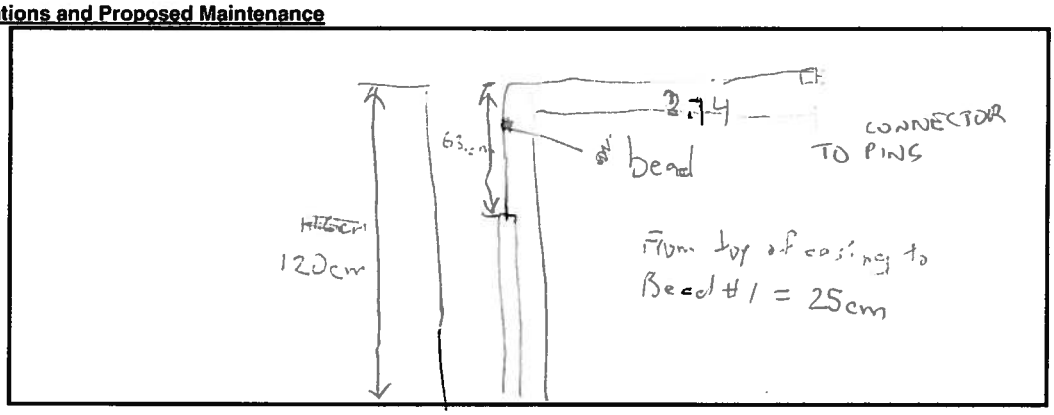
| Bead | ohms | Degrees C |
|---|---|---|
| 1 | 11.73 | |
| 2 | 11.88 | |
| 3 | 11.70 | |
| 4 | 11.94 | |
| 5 | 13.15 | |
| 6 | 14.22 | |
| 7 | 15.89 | |
| 8 | 16.58 | |

| Bead | ohms | Degrees C |
|---|---|---|
| 9 | 16.85 | |
| 10 | 17.14 | |
| 11 | OL | |
| 12 | OL | |
| 13 | OL | |
| 14 | OL | |
| 15 | OL | |
| 16 | OL | |

DL time - 14:04

+1:36:26 Logger to Computer

**Observations and Proposed Maintenance**




off by 24 minutes

leave as is.

Computer MST

Logger EST.

Battery LE8304 4435

DL SN# 09100048 Retrieved 09:45am

FOX-3 VT-3

## Thermistor Annual Maintenance Report

download 14:37

| | | | |
|---|---|---|---|
| Contractor Name: | EBA | Inspection Date: | Aug 24, 12 |
| Prepared By: | EMG | | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: VT3 | | Thermistor Location | T2 |
| Thermistor Number: | VT3 | Inclination | V |
| Install Date: Sept 7, 2011 | | First Date Event | Last Date Event |
| Coordinates and Elevation | N | E | Elev 422 |
| Length of Cable (m) | Cable Lead Above Ground (m) | Nodal Points | |
| Datalogger Serial # | | Cable Serial Number | |

Housing # 11163

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | ☑ | ☐ | |
| Cover | ☑ | ☐ | |
| Data Logger | ☐ | ☐ | |
| Cable | ☑ | ☐ | |
| Beads | ☐ | ☐ | |
| Battery Installation Date | Sept 7, 2011 | | |
| Battery Levels | Main 11.34V | Aux 13.75V | |

Memory 39%

Main (9v) 11.34V

Aux (12v) 13.75V

DL date 08/24/12

DL time 14:13:12

+1:35:40 logger to computer

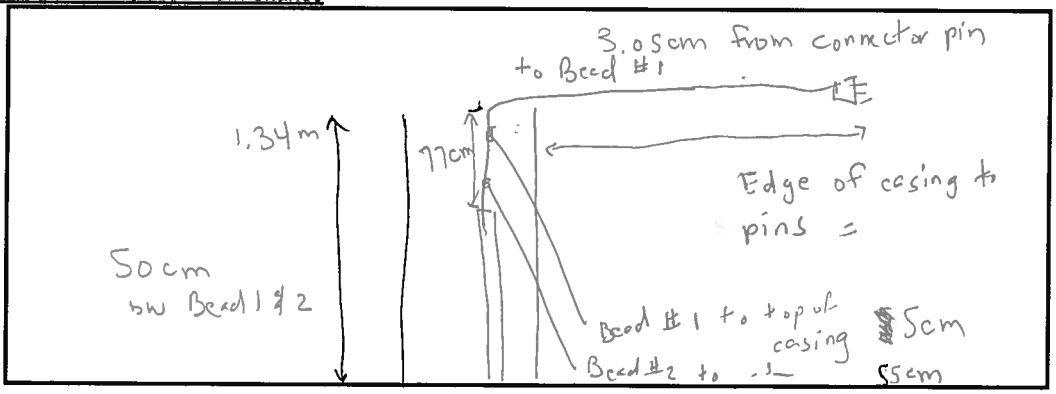
off by 25 minutes

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C |
|---|---|---|
| 1 | 11.61 | |
| 2 | 11.73 | |
| 3 | 11.69 | |
| 4 | 11.70 | |
| 5 | 12.72 | |
| 6 | 14.09 | |
| 7 | 15.79 | |
| 8 | 16.59 | |

| Bead | ohms | Degrees C |
|---|---|---|
| 9 | 16.84 | |
| 10 | 16.97 | |
| 11 | 17.24 | |
| 12 | OL | |
| 13 | OL | |
| 14 | OL | |
| 15 | OL | |
| 16 | OL | |

**Observations and Proposed Maintenance**




leave as is.

Computer at MSI

Logger at EST

Battery LE8304 NCB5 retrieve 10:00 cm

DL SN# 09100049

FOX-3 VT-4

## Thermistor Annual Maintenance Report

| | | | |
|---|---|---|---|
| Contractor Name: | EBA | Inspection Date: | Aug 24 |
| Prepared By: | EMG | | |

Thermistor Information

| | | | |
|---|---|---|---|
| Site Name: | VT4 | Thermistor Location | T2 |
| Thermistor Number: | VT4 | Inclination | V |
| Install Date: | Sept 7, 2011 | First Date Event | Last Date Event |
| Coordinates and Elevation | N | E | Elev 422 |
| Length of Cable (m) | Cable Lead Above Ground (m) | Nodal Points | |
| Datalogger Serial # | | Cable Serial Number | |

Housing # 11167

**Thermistor Inspection**

| | Good | Needs Maintenance | |
|---|---|---|---|
| Casing | ☑ | ☐ | |
| Cover | ☑ | ☐ | |
| Data Logger | ☐ | ☐ | |
| Cable | ☑ | ☐ | |
| Beads | ☐ | ☐ | |
| Battery Installation Date | Sept 2011 | | |
| Battery Levels | Main 11.34V | Aux 13.99V | |

Memory 39%

Main (9V) 11.34

Anx (12V) 13.99V

**Manual Ground Temperature Readings**

| Bead | ohms | Degrees C |
|---|---|---|
| 1 | 11.63 | |
| 2 | 11.81 | |
| 3 | 11.76 | |
| 4 | 12.47 | |
| 5 | 13.93 | |
| 6 | 15.51 | |
| 7 | 16.74 | |
| 8 | 17.29 | |

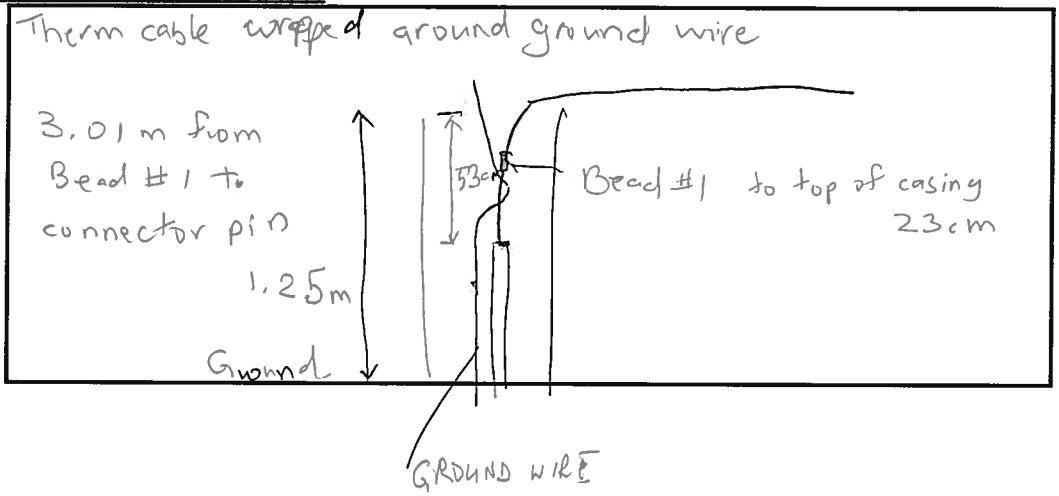
| Bead | ohms | Degrees C |
|---|---|---|
| 9 | 17.76 | |
| 10 | 18.20 | |
| 11 | 18.59 | |
| 12 | 19.09 | |
| 13 | 19.34 | |
| 14 | 19.62 | |
| 15 | 19.86 | |
| 16 | OL | |

DL date 08/24/12

DL time 14:22:11

**Observations and Proposed Maintenance**

Therm cable wrapped around ground wire




11:35:36 logger to computer

off by 25 minutes leave as is

Computer MST

Logger EST

# Appendix B

## Laboratory Analytical Results (on DVD)

# Appendix C

## Field Notes (on DVD)

# Appendix D

## Photographs (on DVD)