

**Transport Canada  
Cambridge Bay, Nunavut Airport Apron / Fire Training Area  
Landfarm Operation and Maintenance Plan**

**May 29, 2014**

**Water License No.:1BR-FTA1217**

**Nunavut Water Board  
P.O. Box 119  
Gjoa Haven, Nunavut  
X0B 0P6**



## **Table of Contents**

	Page
i Introduction	3
ii History	3
1.0 Operation and Maintenance Program	4
1.1 Sampling Program	4
1.2 Nutrient Amendments and Tilling	5
1.3 Leachate Management	6
1.4 Monitoring Well Sampling	7
2.0 Remediation Targets and Landfarm Closure	7
Attachments	9
- Google Earth photo of Site	
- Engineered Drawing of Landfarm	
- Site Photos	

## **i Introduction**

Transport Canada (TC) received a water license from the Nunavut Water Board (July 26, 2012) to operate a landfarm in order to treat petroleum hydrocarbon (PHC) contaminated soil at the Cambridge Bay airport. The water license (1BR-FTA1217) outlines the terms and conditions for the operations and maintenance of the facility. The following operation and maintenance (O&M) plan is required under the terms and conditions of the agreement Part E, Item #2. The plan will outline the types of material accepted at the facility, the procedures to be utilized in the treatment and storage of the PHC impacted soil, the remediated soil criteria used prior to soil being deemed remediated, and the ultimate deposition of any treated soil.

## **ii History**

Prior to July 1, 1995 Iqaluit Airport was owned by the Government of Canada and operated by the Quebec Region of the Department of Transport. From July 1, 1995 until April 1, 1999 the airport was owned by the Government of Northwest Territories and operated by the Arctic Airports Division of the Department of Transportation. Since April 1, 1999 the airport has been owned by the Government of Nunavut (GN) and operated by the Nunavut Airports Division of the Nunavut Department of Community Government, Housing and Transportation.

As a condition of the Arctic A Airport transfer agreement (July 1995) between GNWT and Transport Canada, the environmental issues, which existed prior to the airport transfer, are to be remediated as well as any items identified by the GN within six years of the transfer date. Works identified under this document address some of the issues identified in the transfer agreement as well as post transfer issues. For the purposes of this O&M Plan only, PHC contaminated soil will be considered from this document and the placement of this material in the landfarm. Types of PHC contaminated soils encountered for disposal in the landfarm are gasoline, diesel, and jet fuel (A, B) which are the main sources of fuel spills and leaks over the past 60 years at this location. The depth of contaminated soil in the landfarm will not be greater than 1m. The landfarms will be constructed based on the parameters outlined in the water licence application (also see the attached engineered drawing).

Transport Canada is obligated to remediate all hazardous substances that are the department's responsibility that do not comply with the applicable environmental laws.

The license application was completed to include the remediation of the Apron and Fire Training Area (FTA) with the construction of two (2) landfarms to receive the soil during the 2013 field season. The Apron remediation and associated landfarm was completed in 2013; however, due to contracting issues the remediation of the FTA was cancelled and will be retendered for completion in the 2014 field season.

## 1.0 Operation and Maintenance Program

### 1.1 Sampling Program

The first objective is to conduct a comprehensive soil sampling program at the beginning of each field season to identify the levels of PHC contamination in the soil. Due to the long winter season at this location, TC anticipates initially sampling the landfarm in the beginning of June depending on weather conditions. The soil criteria used for this site will be the CCME Canada Wide Standards for Petroleum Hydrocarbon Contaminated Soils Tier 1, coarse grain soil, industrial site. This industrial criteria is used due to the location of the facility between the runway and Apron I. Access to the site requires airport security. The location will not be used for commercial development due to the location adjacent to the runway and Apron.

i) The sampling program will require eight (8) composite soil samples for each cell and a sample from each monitoring well from the landfarm for submission to a laboratory for analysis. The sampling protocol for the landfarm will require a random grid pattern covering the entire area. All sampling procedures will be in accordance with the standards contained in the CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites Volume I & II. Quality assurance/quality control will be observed while conducting the sampling program and include at a minimum the following:

- Use of trip, field and equipment blanks;
- Use of duplicate and spiked samples;
- Proper sample containment, preservation, chain of custody; and
- Due regard for necessary health and safety precautions.

ii) All samples should be analyzed for the following parameters:

- BTEX;
- Total Extractable Hydrocarbons (TEH);
- CCME Canada Wide Standards for Petroleum Hydrocarbons in Soil for Fractions #1 to #4 for the Tier 1 criteria, coarse grain soil for Industrial Sites.
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Heavy Metals (Al, As, Cd, Co, Cu, Fe, Pb, Mo, Ni, Se, Ag, Tl, Zn).

**Summary of Tier 1 Levels (mg/kg) for surface soil CCME.\***

Land Use	Soil Texture	F 1	F 2	F 3	F 4
Agriculture/farm	Coarse grain soil	30b	150	300	2800
	Fine grain soil	210 (170a)	150	1300	5600
Residential/Parkland	Coarse grain soil	30b	150	300	2800
	Fine grain soil	210(170a)	150	1300	5600

Commercial	Coarse grain soil	320(240a)	260	1700	3300
	Fine grain soil	320(170a)	260(230a)	2500	6600
Industrial	Coarse grain soil	320 (240a)	260	1700	3300
	Fine grain soil	320 (170a)	260 (230a)	2500	6600

\* Additional Tier 1 levels are presented in Technical Supplement.

a= Where applicable, for protection of potable groundwater.

b= assumes contamination near residence

iii) The use of a gas Photo Ionization Detector (PID) or similar equipment to monitor hydrocarbon vapors will be required to field screen the soil sample taken. The use of field screening the soil will provide an immediate representation of the conditions and levels of the PHC in the soil. This process does not replace laboratory results; however, it does give a good sense of the conditions.

The results of the laboratory analysis are to be compared to the Nunavut Environmental Guidelines for Site Remediation (most current edition), CCME Canada Wide Standards Petroleum Hydrocarbon Guidelines (most current edition) and the CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (most current edition) remediation criteria for industrial zoned sites. The selected laboratory must provide quality assurance (QA) and quality control (QC) procedures. All samples are to be procured through approved methods and procedures and are to be submitted to a Certified Laboratory (CAEAL/ Standards Council of Canada) for formal analysis. The contractor that is hired to complete the work will also be required to have the certified lab approve the sampling methodology and plan.

Once the laboratory and field screening results are obtained, TC can proceed with several options. The landfarm will require nutrient amendments and tilling if it does not meet the previous mentioned criteria. This process will immediately proceed the sampling program each June when the soil is able to be worked. The following procedures will be followed:

## 1.2 Nutrient Amendments and Tilling

Biodegradation requires micro-organisms are meeting nutritional requirements. The optimal range of carbon:nitrogen:phosphorus (C:N:P) is 100:10:1 to 100:1:0.5. Soil amendments in the form of commercially used solid fertilizers will be applied in sufficient amounts as recommended by the manufacturer to achieve this target ratio for the specified volume of soil in the landfarm (and parameters such as soil moisture, density, pH, soil type and others).

Once the nutrients have been added to the landfarm, the soil will be turned over with the use of a backhoe. This will break up and expose the soil below allowing for better aeration and proper distribution of the nutrients and moisture in the soil, thereby aiding in biodegradation. Care must be taken by the backhoe operator not to tear the liner and

report any cracks, blisters or punctures to the liner. The contractor will be required to re-till the soil two (2) weeks after the first event to increase the exposure of the contaminated soil.

### 1.3 Leachate Management

The landfarm is constructed with a 1% slope which allows any leachate to collect in the sump area. Visual monitoring of the sump ensures that water is collecting in the sump area indicates the liner is not damaged. Leachate may be recirculated over the landfarm soil surface as a means of irrigation to maintain optimal biodegradation rates. Discharge of the leachate may be required if the sump collection area rises to within 1 foot of the top of the berm. This is not likely to happen due to the height of the engineered berms taking into consideration the amount of precipitation and evaporation rates at this location. If the leachate is required to be discharged it must first meet the discharge levels within CCME EQGs and the Water License 1BR-FTA1217 agreement for landfarm wastewater discharge criteria:

Parameter	Maximum Allowable Concentration (ug/l)
Oil & Grease	5000
Lead	1
Benzyene	370
Toluene	2
Ethylbenzene	90

The area designated for leachate disposal is located adjacent to the landfarm in the open field between Apron I and the runway. This area is located greater than 500 m away from any water body and potable water source.

The landfarm will continue to be monitored each field season to ensure the facility is operating as it has been designed. Additional soil sampling will be conducted in the fall of each year to determine the effectiveness of the previous amendments in the spring. A soil sampling program will be conducted in August or September as described earlier including monitoring wells. The following outlines when the samples and activities will be conducted:

Activity	Time of Year	Time of Year
Soil Sample	June	August - September
Monitoring Well Sample	June	August - September
Tilling/Fertilizer	June	If Required July - Sept



## 1.4 Monitoring Well Sampling

TC will undertake sampling the monitoring wells and the sump inside the landfarm as described in the Water License No. 1BR-FTA1217. The frequency and time of year are outlined in the above table. The sump will be tested prior to any required discharge and tested prior to the decommissioning of the facility. The parameters for testing the monitoring wells are as follows:

Station	Location	Parameter	Frequency
Landfarm-1	Sump	PTH, BTEX, HM,PAH	Discharge
Landfarm – MW1	Upgradient - Landfarm	PTH, BTEX, HM,PAH	Twice/year
Landfarm – MW2	Downgradient Landfarm	PTH, BTEX, HM,PAH	Twice/year
Landfarm – MW3	Downgradient Landfarm	PTH, BTEX, HM,PAH	Twice/year

## 2.0 Remediation Targets and Landfarm Closure

TC is required to meet the required PHC criteria under the Nunavut Environmental Guidelines for Site (most current edition), CCME Petroleum Hydrocarbon Guidelines (most current edition) and the CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (most current edition) remediation criteria for coarse grain soil, industrial zoned sites. Once the landfarm has been sampled and shows PHC levels are below the required criteria, the facility will be decommissioned and restored back to its original state.

The decommissioning will be done by removing the treated soil from the liner and removing the liner from the landfarm. Using a gas Photo Ionization Detector (PID) or similar equipment to monitor hydrocarbon vapours, random samples of the material below the liner will be tested to ascertain if any contamination leached beneath the liner. In addition to the portable hydrocarbon vapour testing, 10 soil samples will be taken from under the liner area and sent to a certified laboratory for analysis of the same parameters as listed earlier. The liner itself will be taken to an approved landfill site for proper disposal. If contaminated soil is found below the landfarm, this material will be removed and placed in an adjacent landfarm TC is operating on site (please see attached drawing).

The treated soil will be used to backfill the landfarm excavation and compacting, if necessary, to match the surrounding soil conditions. All monitoring wells will remain in place for future sampling until it is determined no contamination exists (approximately one year). Once this is completed the monitoring wells will be removed and sealed with bentonite using accepted standards under the Environmental Protection Agency (EPA).

Finally, once the landfarm area has been replaced with the treated soil, the soil and berms shall be leveled and compacted to match the surrounding conditions, unless the Airport Manager wishes for a different land use for the area.



## **ATTACHMENTS**

- **Google Earth photo of Site**
- **Engineered Drawing of Landfarm**
- **Site Photos**



NOTE  
PROPOSED LTU NOT TO SCALE



CLIENT		Public Works and Government Services Canada		Travaux publics et Services gouvernementaux Canada	
		 A TETRA TECH COMPANY			
PROJECT NO.		E22101988		REV	
OFFICE		EDM		DATE	
				February 22, 2012	
				FIGURE 1	

TENDER SPECIFICATIONS  
CAMBRIDGE BAY AIRPORT, NU

SITE LOCATION PLAN





04  
01

**PROPOSED LTU LOCATION**

**FTA AREA**

03

**SITE LOCATION**

1:25000

04

**SITE PLAN**

1:5000

**PROPOSED LTU LOCATION**

**FTA AREA**



PROJECT

**FIRE TRAINING AREA  
REMEDATION**

PROJECT NO.

**13-7423**

TITLE

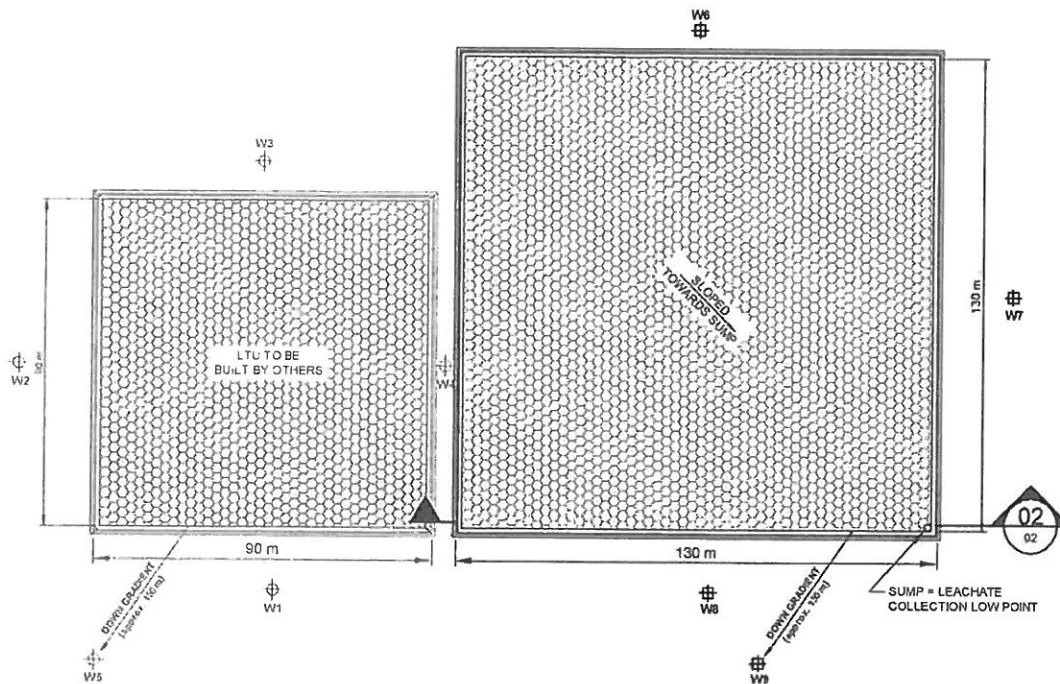
**SITE LOCATION  
AND SITE PLAN**

FIGURE NO.

**FIGURE 1**

DATE

**MAY 2013**

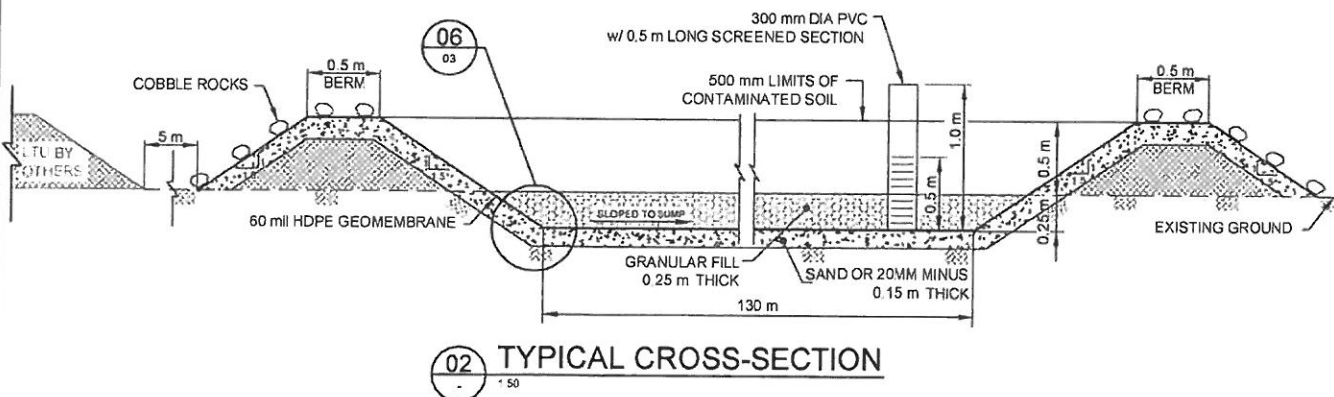


#### LEGEND

- ⊕ - GROUNDWATER MONITORING WELL
- ⊕ - GROUNDWATER MONITORING WELL BY OTHERS

#### PLAN OF FTA LTU

1:2000



#### TYPICAL CROSS-SECTION

1:50



PROJECT

**FIRE TRAINING AREA  
REMEDATION**

PROJECT NO.

**13-7423**

TITLE

**LANDFARM TREATMENT UNIT  
(LTU) DESIGN**

FIGURE NO.

**FIGURE 2**

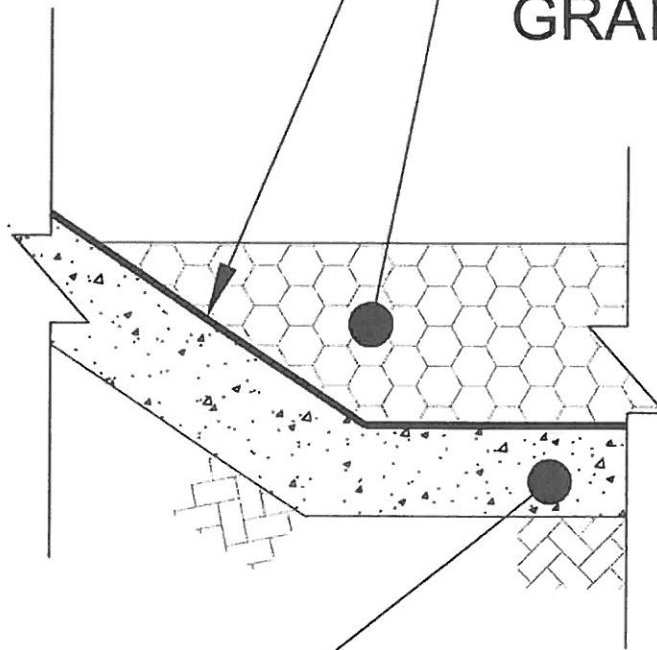
DATE

**MAY 2013**

60 mil HDPE  
GEOMEMBRANE

250 mm  
GRANULAR FILL

150mm SAND  
OR 20mm MINUS



LEGEND

GEOMEMBRANE

06 LTU DETAIL  
1:10



PROJECT

**FIRE TRAINING AREA  
REMEDATION**

PROJECT NO.

**13-7423**

TITLE

**DETAIL**

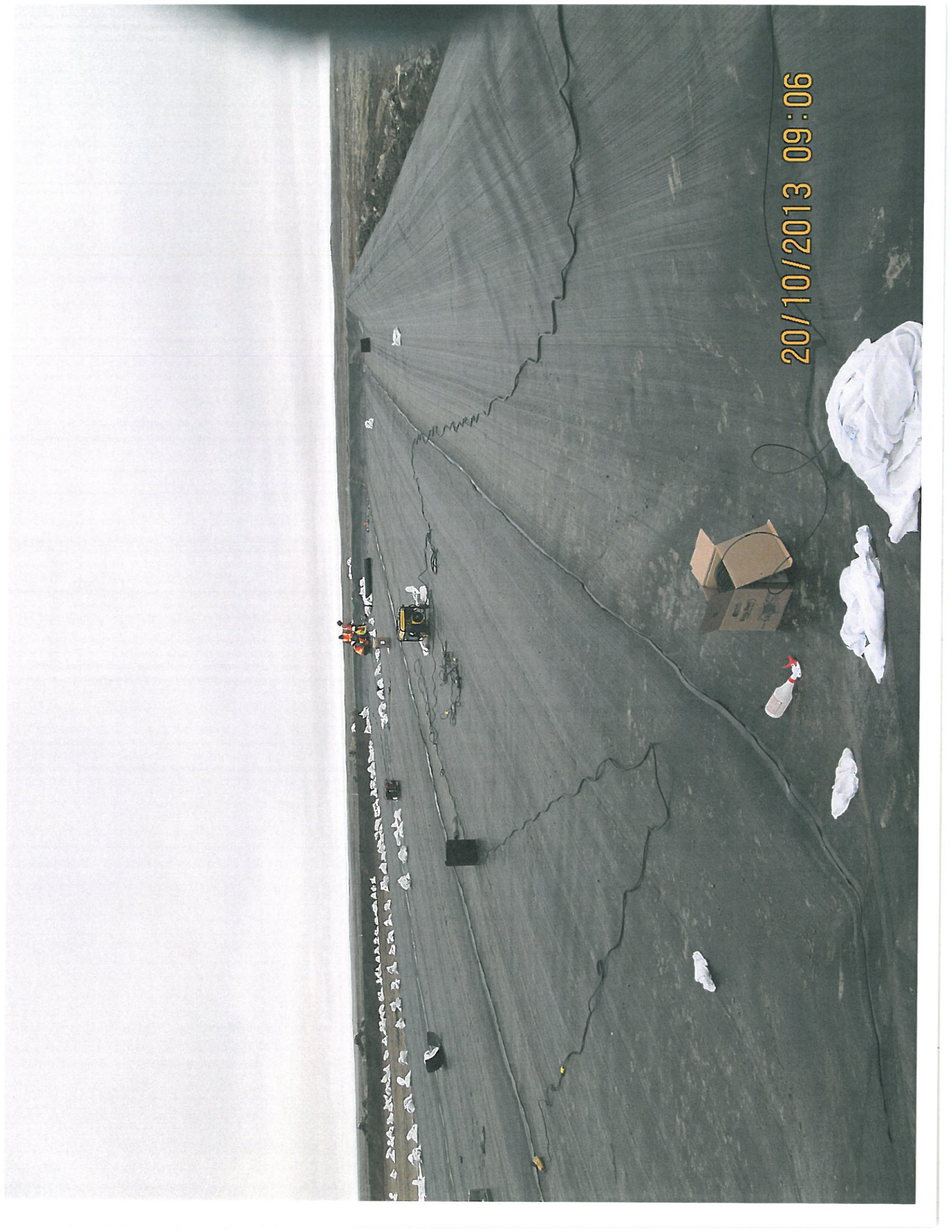
FIGURE NO.

**FIGURE 3**

DATE

**MAY 2013**





20/10/2013 09:06



20/10/2013 17:32







09/10/2013 09:31





28/09/2013 11:34