Supplementary Information Requirements For Hydrocarbon-Impacted Soil Storage and Landfarm Treatment Facilities

Hydrocarbon Impacted Soil Storage and Landfarm Facility at Windy Camp

Miramar Hope Bay Ltd.

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1.0 GENERAL INFORMATION

Date of Application

March 5, 2007

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Number of Years Requested for the Water License

Miramar Hope Bay Ltd. requests a license renewal of a 5 year term from March 11, 2007 to March 10, 2012.

2.0 BACKGROUND

In the summer of 2004 Miramar Hope Bay Ltd. (MHBL) constructed a landfarm facility at the Windy Camp as part of a long-term remediation strategy to address clean up of a ~19,000 litre spill of diesel fuel onto the ice of Windy Lake (Nunavut Spill Number 04-388 – June 16, 2004). This facility was constructed on an urgent time basis to accommodate the immediate and longer term remediation of soil that was contaminated with diesel fuel by the June 2004 spill. This facility was constructed following consultation with the Kitikmeot Inuit Association (KIA) (June 23, 2004) and in accordance with a design provided by EBA Engineering Consultants Ltd (EBA) but was not licensed under the existing Windy Camp water license. This was an oversight and through this application, MHBL requests that the Nunavut Water Board incorporate the construction and operation of this facility into the requested renewal of the Windy Camp exploration water use license (subject of this application).

MHBL requests that the renewed water license:

1. Include authorization for the existing landfarm soil remediation facility at the Windy Camp;

2. Include authorization for the operation of an F1 "Flow and Plug" Oil Adsorption System (Model F11-C-180-TM-Cx2 as supplied by Terry Ruddy Sales of Edmonton Alberta) to treat all precipitation runoff collected in the landfarm treatment area and within the bermed fuel tank area at the Windy Camp site. This system consists of a self priming electric pump, a particulate filter, a drum containing TM-100 oil adsorbing media and two activated carbon media containers connected in series. The unit operates at 5 to 7 gpm and is sold with a design criteria removal of oil and grease to a level below 15 ppm as regulated by the Alberta Ministry of Environment. The unit is designed so that the TM-100 oil adsorbing media will blind off when it reaches its absorbent capacity.

3. Allow for the discharge of the treated water from the oil adsorption system via the RBC lift station (total allowable volume of (3,300 m^3 per year at a maximum rate of 1.8 m^3 per hour (7 gpm => 30 lpm rated upper capacity of oil adsorption system) to be land applied together with the treated grey water at a designated site situated east of the camp.

4. Set a discharge standard for the treated water from the oil adsorption system. MHBL suggest that this discharge standard be set as follows: Total Oil and Grease of 15 ppm, Benzene 0.37 ppm (CCME), Toluene 0.002 ppm (CCME), and Ethyl benzene 0.09 ppm (CCME)

3.0 SITE ASSESSMENT CONSIDERATIONS

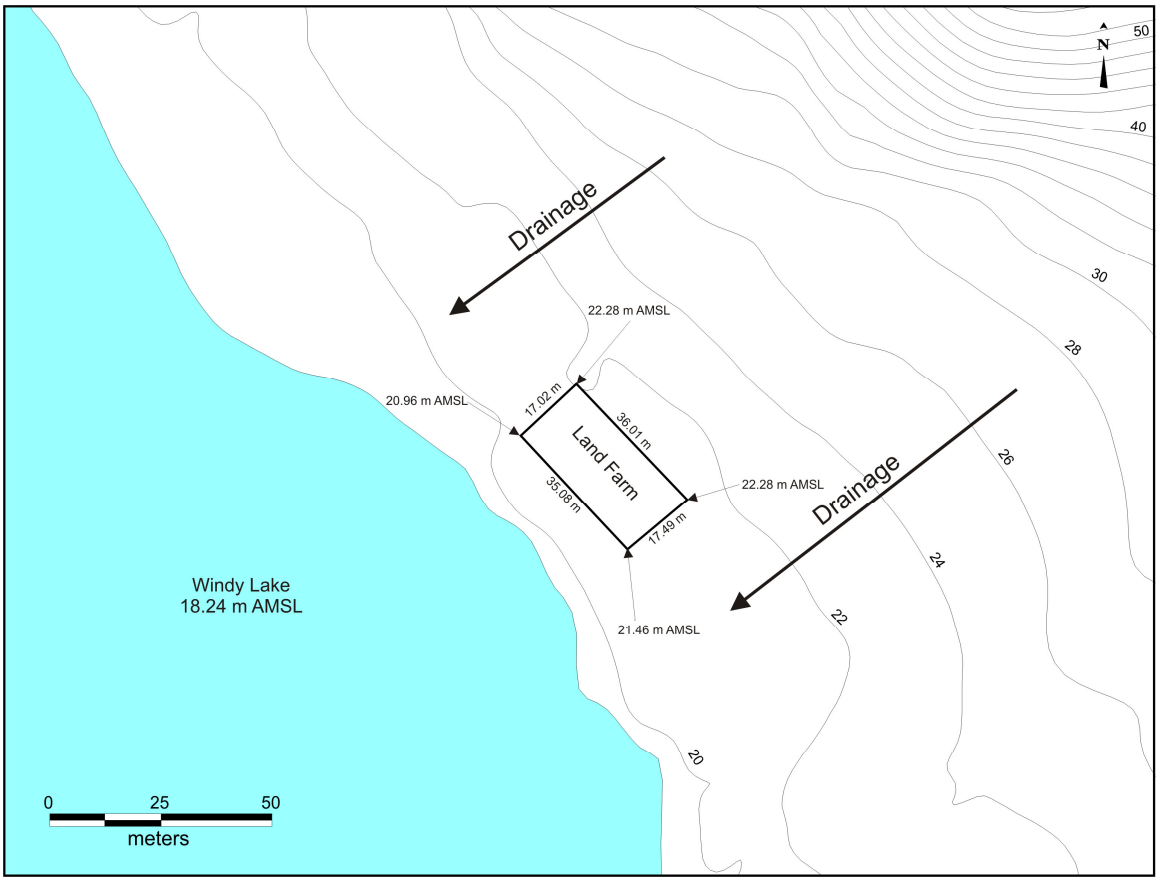
Site selection for the land treatment facility was primarily determined by the location of the June 2004 fuel spill. The facility was sited immediately down slope of the fuel tank from where the spill occurred; and on top of the area where the contaminated organic layer and topsoil were removed. This site was chosen to minimize the overall footprint of the Windy Camp and to utilize the area that had to be excavated to recover the organics and top soil that was contaminated.

Figure 1 is a photograph that shows the landfarm treatment facility (#15) in relation to the infrastructure of Windy Camp. Figure 2 is a drawing that illustrates the surveyed dimensions of the landfarm treatment facility, the local topographic contours, and the drainage patterns to Windy Lake.

Figure 1: Windy Camp Aerial View

1. Core Storage Area (x3)
2. Accommodation facilities
3. Kitchen, Recreational, Office Complex
4. Emergency Response Equipment
5. Freshwater Intake
6. Sauna
7. RBC Sewage treatment System
8. Incinerator
9. Core logging / splitting shacks
10. Erection Tent (Muster Point)
11. Generator Shed
12. Propane Storage Area
13. Jetty
14. Lined Interception Dyke
15. Land Treatment Area
16. Helipad (x2)
17. Jet B Storage Area
18. AST fuel tanks and gas drums
19. Contaminated fuel storage area
20. Gas drums (temporary storage)
21. Emergency winter tent
22. Non-combustible solid waste storage
23. Unusable timber/plywood
24. Snow machines
25. Calcium chloride (Salt)

Figure 2: Land Treatment Area Site Survey Diagram



3.1 Hydrological / Climatic Assessment

A precipitation and temperature profile for the area is taken from the baseline meteorology data compiled for the Doris North Project [(1)]. The average monthly air temperature is typically above 0° C between June and September with the peak in July, and below freezing between October and May with the coldest temperatures usually occurring in February. The mean annual precipitation adjusted for under-catch is approximately 207 mm with 41% occurring as rain between May and October and 59% as snow through the remainder of the year.

Windy Camp is located on the east shore of Windy Lake. The outflow from Windy Lake flows northwest into Glenn Lake which in turn drains into the Arctic Ocean at Roberts Bay.

The landfarm treatment facility is constructed at an elevation (top of down slope dyke) of ~21.2 metres ASL. The surface of Windy Lake is typically at maximum elevation of

[1] AMEC, 2003. Meteorology And Hydrology Baseline, Doris North Project, Nunavut, Canada, prepared for Miramar Hope Bay Ltd. November 2003, p.D-iii.

~18.2 metres ASL with an annual lake level variation of less than ~0.3 metres. Given the large surface area of Windy Lake and its natural drainage outlet it is highly unlikely that the level within Windy Lake would rise by the 3 metres that would be necessary to overtop the down slope berm of the existing landfarm treatment facility. Consequently in MHBL's judgment, it is highly improbable that a flood event could disrupt the landfarm treatment facility.

3.2 Soil Description

Since the land treatment area was constructed as an emergency response measure, a site investigation was not conducted prior to construction. In a report reviewing the site and spill remediation, FSC Architects and Engineers reported that the native soil underlying the HDPE liner in the land treatment area is silty sand. Data collected across the Hope Bay Belt suggests that the area is underlain by continuous permafrost estimated to extend to depths of approximately 550 m [(2)]. Temperature data collected around Tail Lake indicates that the active layer in the marine clay/silt soils appears to be about 0.5 m, while the sand deposit has an active zone no greater than 2 m. The depth of zero annual amplitude varies between 11 and 17 m. The ground temperatures at the depth of zero annual amplitude are generally in the range of -9 to -7^{o} C [(3)]. Observation during construction affirms that the landfarm treatment facility is constructed on permafrost and is outside any talik zone created by Windy Lake.

3.3 Conformity With Land Use Planning

There are no municipal zoning or land use planning regulations applicable to this facility. The Windy Camp (including the landfarm treatment facility) is fully located on Inuit Owned Land managed by the Kitikmeot Inuit Association (KIA). MHBL did consult with the KIA prior to construction of the landfarm treatment facility and obtained their consent to the long term remedial strategy proposed by EBA Engineering on behalf of Miramar Hope Bay Ltd. in June 2004. In August 2005, the KIA contracted FSC Architects and Engineers to review and report on the status of these remediation measures. Both documents are available in Appendix A.

4.0 SOIL STORAGE AND LANDFARM TREATMENT DESIGN CONSIDERATIONS

The Windy Camp landfarm facility as constructed has a footprint inside the berm of 36 m in length by 17 m in width with a minimum berm height of 0.75 m on the up slope side and 1.0 m on the down slope side, providing an area within the landfarm facility of 612 square metres. The facility was constructed in an area topographically down-gradient of

[2] SRK, 2005. Preliminary Tailings Dam Design, Doris North Project, Hope Bay, Nunavut, Canada, prepared for Miramar Hope Bay Ltd., p. 13

[3] Design of the Surface Infrastructure Components Doris North Project, Hope Bay, Nunavut, Canada, prepared for Miramar Hope Bay Ltd. by SRK Consulting Engineers and Scientists, dated October 2006, Section 2.5

the fuel storage tanks at the Windy exploration camp as shown in the attached Figure # 2. Site selection for the land treatment facility was primarily determined by the location of the June 2004 fuel spill. The facility was sited immediately down slope of the fuel tank from where the spill occurred; and on top of the area where the contaminated organic layer and topsoil were removed. This site was chosen to minimize the overall footprint of the Windy Camp and to utilize the area that had to be excavated to recover the organics and top soil that was contaminated. Since the land treatment area was constructed as an emergency response measure, a site investigation was not conducted prior to construction

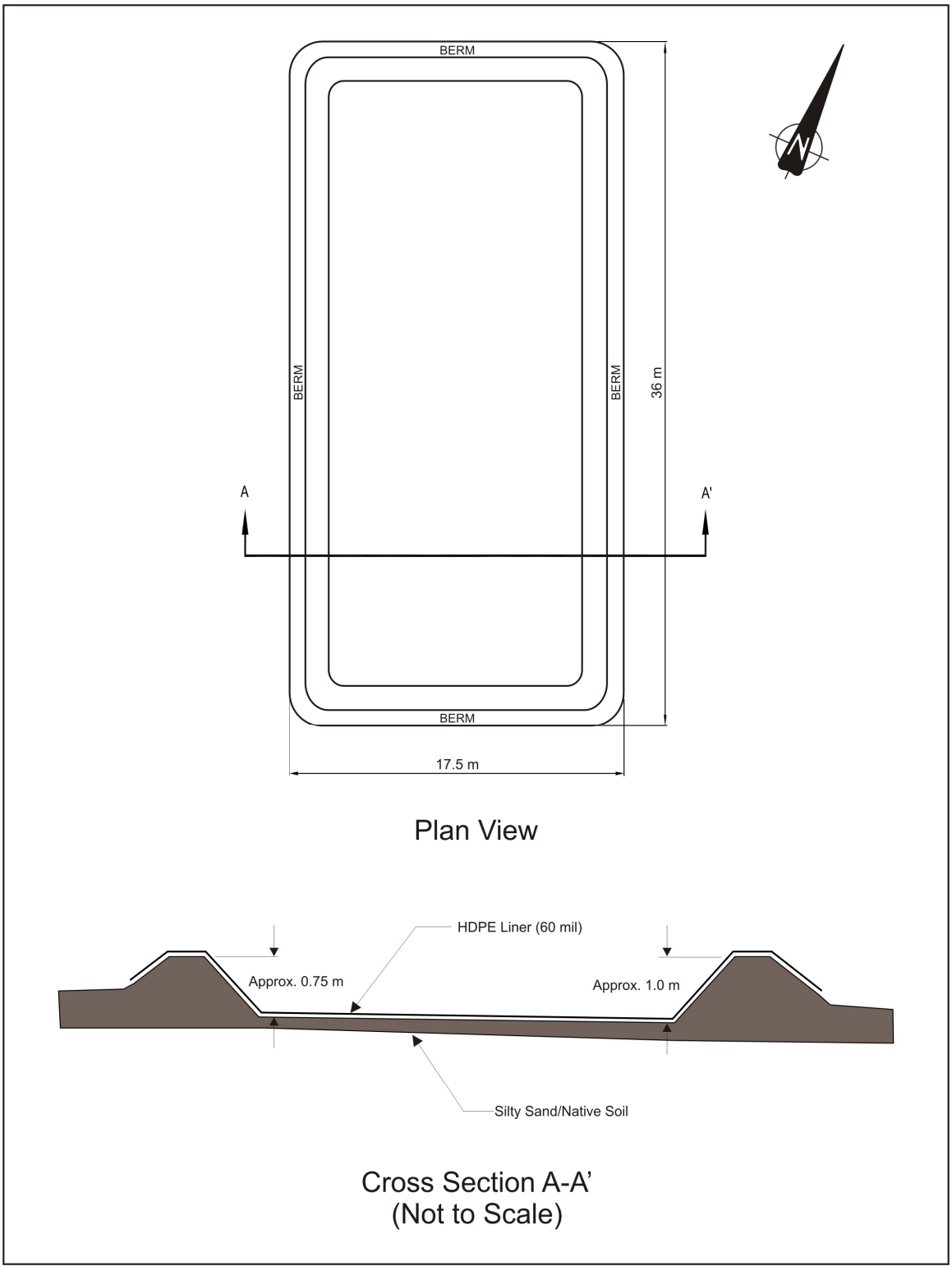
This area was impacted by the June 16, 2004 hydrocarbon spill and is the primary area where soil hydrocarbon impacts were identified. The facility was constructed as follows:

- The hydrocarbon impacted soils were excavated from the area of the landfarm facility and put aside for relocation into the facility once construction was complete;

- A 60 mil HDPE liner was then placed on top of the underlying clean soil. The underlying native soil consists of silty sand. Clean silty sand taken from the bottom of the excavation was used around the perimeter of the facility to form the containment berm. The berm is partially formed by the excavation and partially by silty sand pushed up from the bottom of the excavation. This was necessary as fill material is in short supply at this site and could not be obtained without opening up a new borrow source.

A general schematic of the landfarm facility as constructed is provided in Figure 3. This is similar in design to the EBA conceptual design as shown in the June 23, 2004 memo from EBA to the KIA. Engineering Consultants Ltd, entitled “Proposed Long Term Remedial Strategy – Fuel Spill, Windy Lake Camp, Nunavut Spill Number 04-338” (attached as Appendix A).

Figure 3: Schematic of Landfarm Facility As Constructed



An interception trench was excavated on the western portion of the Land Treatment Area (LTA) situated between the LTA and the lakeshore. The trench was excavated to a depth of 1 metre below surface grade and was lined on the west wall and base with a hydrocarbon resistant high density polyethylene (HDPE) liner and backfilled with clean fill (obtained from the site). A catch basin, consisting of a 205 litre drum with holes drilled along the sides, was installed at the northwest end of the trench to allow water draining from the active soil layer beneath the diesel fuel tank farm and the LTA to be collected and pumped back to the landfarm facility for treatment. This trench and the interception sump were removed in 2005 following confirmation sampling that indicated that water draining from upstream met *CCME Guidelines for the Protection of Freshwater Aquatic Life, 2001* for Benzene, Toluene, Ethyl benzene and Xylenes (BTEX). The trench and sump were being expelled by frost heave from the underlying permafrost.

The hydrocarbon contaminated soils that were excavated for construction of the landfarm facility were relocated into the lined landfarm facility. These soils have been aerated through spreading and turning at regular intervals during warm weather. In 2005 additional hydrocarbon impacted soil from beneath the tank from where the 2004 fuel spill occurred was excavated and placed within the landfarm facility for bio-remediation. There is currently approximately 100 m^3 of contaminated soil within this facility.

The land treatment facility has a footprint of approximately 612 square metres. The tank farm has a footprint of approximately 1,200 square meters providing a total precipitation collection area of 1,812 square metres from which water must be collected and treated. Mean precipitation ranges from 94 mm to 207 mm, with only about 40% falling as rain. Annual lake evaporation (typically occurring between June and September) is about 220 mm. Consequently the mean annual volume of precipitation runoff expected to be collected within the landfarm and fuel tank farm is as follows:

Landfarm (612 m^2)	575 m^3 to 1,267 m^3 (612 m^2 x mean precipitation)
Tank farm (1,200 m^2)	1,128 m^3 to 2,484 m^3 (1,200 m^2 x mean precipitation

While it is understood that a lot of this runoff will be lost through wind movement of snow, sublimation and evaporation for the purposes of estimating the maximum potential volume of water to be treated through the oil adsorption system these losses have not been considered. Offsetting sublimation and evaporation losses from within the liner of the tank farm and landfarm treatment facilities will be contaminated snow brought to the landfarm treatment facility for remediation.

5.0 ACCEPTANCE OF MATERIAL AT THE FACILITY

The Windy Camp landfarm facility will only receive hydrocarbon contaminated soil generated through MHBL's ongoing regional exploration activities on the Hope Bay Belt. In its exploration activity on the Hope Bay Belt, MHBL's use of hydrocarbons is limited by need to the following products:

- Diesel fuel for generators and diesel fueled equipment;
- Aviation fuel for helicopters and small aircraft (Jet B)
- Hydraulic fluid
- Gasoline

In the event of all spills, MHBL's on-site Environmental Coordinator will be contacted and consulted by the exploration personnel and their contractors on clean up and remediation protocols. The Environmental Coordinator will, based on his investigation and understanding of the spill, make a decision on how each spill is to be cleaned up and the affected area remediated. In the event where soil or snow is contaminated by spilled hydrocarbons the Environmental Coordinator will give direction to the clean up personnel on whether this contaminated soil and/or snow is to be taken to the Windy Camp landfarm facility and where within the facility it is to be placed.

The Environmental Coordinator will ensure that only hydrocarbon contaminated soil and/or snow is taken to the landfarm and that other contaminants such as heavy metals, glycol or heavy oils that are not bio-remedial using the landfarm procedures are not mixed with soils/snow taken to the landfarm. This action is to preserve the remedial performance of the landfarm and prevent generation of large volumes of contaminated soil that cannot be successfully bio-remediated. Alternative methods will be used to address these types of contaminants, up to and including off-site disposal through appropriate remediation/disposal facilities.

Early in each summer the soils placed within the landfarm facility will be sampled and analyzed for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB), and an ICP-MS 30 element trace metal scan to determine the nature and amount of contamination to be addressed.

Soils with light hydrocarbon fraction products (diesel fuel and Jet B) are expected to be most easily landfarmed and will thus be kept in a separate pile within the landfarm for remediation. Soils contaminated with heavy fraction hydrocarbons, such as motor or hydraulic oils, will be more difficult to remediate and thus these materials will be segregated and treated within a separate pile within the same landfarm facility. Hydrocarbon contaminated snow will be placed within one designated area of the landfarm facility in a location where the snowmelt can be collected in the early summer at the low point within the berm and the resultant contaminated water pumped to an oil water treatment system (an F1 "Flow and Plug" Oil Adsorption System (Model F11-C-180-TM-Cx2 as supplied by Terry Ruddy Sales of Edmonton Alberta).

6.0 LANDFARM MANAGEMENT

The focus of management of the landfarm will be safety and environmental responsibility. Employees working in the landfarm will be trained prior to commencement of work so that they are aware of the health and safety risks associated with the landfarm.

6.1 Health and Safety

There are four primary exposure pathways to chemicals within the landfarm:

1. inhalation;
2. ingestion;
3. skin contact; and
4. eye contact.

Since the facility is outside and concentrations of contaminants will be generally relatively low, inhalation exposure is not likely to be problematic. In special circumstances where contamination is heavy, respirators shall be worn to scrub the air of volatile organics. Ingestion, under normal circumstances is very unlikely.

Skin contact will be prevented by the use of suitable personal protective equipment provided by MHBL to employees working in the landfarm (see Table 6.1 for appropriate personal protective equipment).

Eye contact is unlikely under normal circumstances. Where hand work is to be carried out in the landfarm with the risk of eye contact, protective goggles will be required.

Table 6.1 Guidelines for Safe Handling Of Contaminated Soil and Snow

Personal Protection	
Ventilation	Use adequate ventilation (normally assured at the landfarm due to being outdoors).
Respiratory protection	Not generally required unless needed to prevent respiratory irritation. Use organic cartridge respirator per MSDS recommendations.
Eye protection	For splash protection, use chemical goggles and face shield
Skin protection	Use gloves resistant to the material being used, i.e., neoprene or nitrile rubber. Use protective garments to prevent excessive skin contact.
Health Hazard Data	
Acute effects of overexposure	Eye: May cause mild irritation, with stinging and redness of eyes.
	Skin: May cause severe irritation. Repeated or prolonged contact may cause defatting of the skin, resulting in dermatitis. Dermal LD50 for diesel fuel is >5 mg/kg (rabbit).
	Inhalation: May cause irritation to nose, throat or lungs. Headache, nausea, dizziness, unconsciousness may occur.
	Ingestion: Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pail, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency.
First Aid and Emergency Procedures	
Eye	Flush eyes with running water for at least 15 minutes. If irritation or adverse symptoms develop, seek medical attention.
Skin	Immediately wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.
Inhalation	Remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.
Ingestion	Do not induce vomiting. Seek immediate medical attention.
Fire	
Fire extinguishing media	Dry chemical, foam, or carbon dioxide.

6.2 Landfarm Operational Procedures

A mixture of ammonium nitrate and corn cobs is used as a bacterial medium and mixed with the contaminated soil in the first warm weather summer months after the contaminated soil is placed within the landfarm. The bioremediation medium will be added as needed during the biodegradation process. Soil containing petroleum products will be spread uniformly over the surface of the prepared area. The contaminated soil will be incorporated into the top 15 to 20 cm of the soil, either manually or with a tiller or disc harrow if large quantities of contaminated soil must be treated. Soils will be tilled monthly when dry enough over the summer period (June to September) to ensure adequate aeration.

The average hydrocarbon fuel content in the soil will be kept below 5% by mixing clean and contaminated soil if necessary. Soils contaminated with hydrocarbons heavier than diesel will be segregated and treated in a separate pile within the facility. Soils will be kept moist with a target soil moisture content of 15 to 30%; water will be applied where necessary and soil moisture content monitored to help ensure it stays within the acceptable range. Soil will be also be watered as required to prevent dust generation; saturation will be avoided.

Any standing water in the landfarm is collected and pumped to a head tank sited within the landfarm and then treated through an F1 “Flow and Plug” Oil Adsorption System (Model F11-C-180-TM-Cx2 as supplied by Terry Ruddy Sales of Edmonton Alberta). This system consists of a self priming electric pump, a particulate filter, a drum containing TM-100 oil adsorbing media and two activated carbon media containers connected in series. The unit operates at 5 to 7 gpm and is sold with a design criteria removal of oil and grease to a level below 15 ppm as regulated by the Alberta Ministry of Environment. The unit is designed so that the TM-100 oil adsorbing media will blind off when it reaches its absorbent capacity.

All precipitation runoff collected within the landfarm facility is pumped to a plastic head (feed) tank and then pumped through the Oil Adsorption System with the treated water then directed into the existing lift station located at the discharge of the Rotary Biological Contactor (RBC) sewage treatment plant and pumped up the hill to be land applied together with the treated grey water at a designated site situated east of the camp. The discharge from the Oil Adsorption System is sampled and analyzed on a once per day basis whenever the system is in operation.

Precipitation runoff and snowmelt collected within the lined tank farm facility is pumped into the landfarm treatment facility and then treated through the oil adsorption system as described above.

Equipment used in the landfarming operation for aeration, etc. will be cleaned off within the landfarm area prior to exiting to ensure that contaminated soil is not transferred away from the landfarm on the wheels and other parts of this equipment.

7.0 SOIL SAMPLING, APPLICABLE REMEDIATION GUIDELINES, INSPECTIONS AND REPAIRS

The Environmental Protection Service of the Nunavut Department of Sustainable Development has a published an "Environmental Guideline for Soil Remediation" that provides guidance as to acceptable levels for the remediation of hydrocarbon contaminated soils in Nunavut. These guidelines are derived from the CCME 1991 Interim Criteria, and the CCME 1997 Recommended Canadian Soil Quality Guidelines.

MHBL will use the industrial remediation guideline as set out in Table 7.1 to determine when soil has been remediated to a level acceptable for removal from the landfarm facility for use in site remediation.

Table 7.1 Nunavut Environmental Guidelines for Soil Remediation

Remediation Guidelines for Soil				
	Agricultural	Residential/ Parkland	Commercial	Industrial
Benzene	0.05	0.5	5	5
Toluene	0.1	0.8	0.8	0.8
Ethylbenzene	0.1	1.2	20	20
Xylene	0.1	1	17	20
Total Petroleum Hydrocarbons (TPH)*	-	500**	2500**	2500**
Lead	70	140	260	400
Polychlorinated biphenyl	0.5***	5***	50***	50***

Note: All values are in µg/g or parts per million (ppm). These are the more commonly required parameters. The type of contamination at the site may require analysis for additional CCME parameters.

* Total petroleum hydrocarbons (includes total purgeable and total extractable hydrocarbons).
** The TPH guidelines were developed by the Government of the Northwest Territories (GNWT)
*** CCME 1991 Interim Criteria (note: 1998 PCB Soil Quality Guidelines are currently under development).

A record will be kept by MHBL's on-site Environmental Coordinator of the amount of contaminated soil and snow placed in the landfarm and the location of each batch of contaminated soil within the landfarm by contaminant type and length of remediation. The landfarm will be monitored weekly during summer months by the Environmental Coordinator to ensure proper operating conditions of soil moisture and aeration, i.e., moisture content between 15 and 30%, uncompacted soil.

Soil samples will be collected at least once per year by MHBL and tested for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB) and total metals using a 36 element ICP-MS scan. Soil

hydrocarbon concentrations will be monitored to ascertain the point where soils are no longer considered contaminated. There are no CCME guidelines for density of soil sampling in landfarms, consequently MHBL proposes that each separate pile within the landfarm be divided into quadrants, and sampled with a target density of one composite of ten samples per 25 m^3 to adequately characterize the soil's hydrocarbon levels. The soil sampling records will be kept by the Environmental Coordinator and reported to the Kitikmeot Inuit Association and Nunavut Water Board as required (at a minimum as part of the annual reporting). More frequent sampling may be conducted by the Environmental Coordinator especially when soil is nearing the successful remediation levels to verify when soil can be moved out of the landfarm and used in site reclamation.

Remediated soils will be used for reclamation purposes specifically on areas where the existing vegetative cover has been disturbed. Ultimate degradation rates are site-specific and cannot be predicted.

Any required repairs to the landfarm facility will be noted during the weekly inspections conducted by the Environmental Coordinator and arrangements made to have the repairs effected promptly. The nature of the repairs required and when repairs were completed will be recorded in the landfarm log.

Any unauthorized use of the facility noted on inspections will be reported to the Site Manager for corrective action and discussed at Health and Safety Committee meetings.

8.0 LANDFARM CLOSURE

The landfarm will be permanently decommissioned once the Windy Lake regional exploration camp is taken out of service. Remediated soils that test clean (based on the Nunavut Environmental Guideline for Site Remediation - Industrial guideline as described in Section 7) will be used for reclamation. Soils that remain contaminated will be relocated to the landfarm facility at the Doris North Mine site for further remediation. The HDPE geomembrane will be hand cleaned (using brooms and shovels), cut up into manageable pieces and disposed of in the non-hazardous landfill at the Doris North mine site. Bedding soil (below the geomembrane) will be tested for presence of petroleum hydrocarbons. If contaminated (based on the GN Soil Remediation Guidelines – Industrial Standard as set in Table 7.1) these soils will be excavated and moved to the landfarm facility at the Doris North Mine. The site will then be levelled consistent with the drainage plan for the site. The excavation will be backfilled using remediated soil or clean waste rock taken from the Doris North Mine Quarry #2. Detailed layout and design documentation for the Doris North Mine landfill, landfarm and quarries can be found in Supporting Documents S2, S3 and S4 of the Doris North Water License Application Support Document, submitted to the Nunavut Water Board in November 2006.

9.0 SURFACE AND GROUNDWATER MONITORING PROGRAMS

MHBL will implement a monitoring program around the landfarm facility. The objective is to measure both soil and water to verify that remediated soil removed from the landfarm and treated water from the landfarm meets the appropriate remediation criteria. The monitoring program proposed by MHBL is broken down as follows:

1. Contaminated soil within the landfarm will be sampled at the beginning of each summer treatment season to verify the nature and extent of contamination within the soils to be remediated. The soil samples will be collected by MHBL and tested for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB) and total metals using a 36 element ICP-MS scan. MHBL proposes that each separate pile within the landfarm be divided into quadrants, and sampled with a target density of one composite of ten samples per 25 m^3 to adequately characterize the soil's hydrocarbon levels. The soil sampling records will be kept by the Environmental Coordinator and reported to the Kitikmeot Inuit Association and Nunavut Water Board as required (at a minimum as part of the annual reporting).

2. A similar sampling program will be conducted by MHBL prior to any soil being removed from the landfarm for use in reclamation to demonstrate that the soil has been remediated to the GN remediation standards (Industrial) as set out in Table 7.1 above. The soil samples will be collected by MHBL and tested for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB) and total metals using a 36 element ICP-MS scan. MHBL proposes that each pile of remediated soil be divided into quadrants, and sampled with a target density of one composite of ten samples per 25 m^3 to adequately characterize the soil's hydrocarbon levels. The soil sampling records will be kept by the Environmental Coordinator and reported to the Kitikmeot Inuit Association and Nunavut Water Board as required (at a minimum as part of the annual reporting). Similarly records will be kept and reported as above as to each location where remediated soil is placed along with an estimate of the volume placed in each location.

3. Samples of the standing water collected within the tank farm liner and the landfarm facility liner will be conducted early each summer following the spring melt to determine water quality prior to the start up of the oil adsorption treatment system. The samples will be analyzed for Total Oil and Grease, Benzene, Toluene and Ethyl benzene and Xylene.

4. The discharge from the Oil Adsorption system will be sampled and analyzed on a once per day basis whenever the system is in operation. The sample will be taken from the discharge of the oil adsorption system prior to this water being mixed with the treated grey water from the RBC sewage treatment plant at the RBC discharge lift station. The GPS coordinates of this sampling point are as follows:

- 432490 E
- 7550638 N

The samples will be analyzed for: Total Oil and Grease, Benzene, Toluene, Ethyl benzene and Xylene. MHBL recommends that the standard that must be achieved for discharge be set as follows: Total Oil and Grease of 15 ppm, Benzene 0.37 ppm (CCME), Toluene 0.002 ppm (CCME), and Ethyl benzene 0.09 ppm (CCME). There is currently no published guidance from CCME on an acceptable Xylene discharge limit. The other CCME limits are based on the CCME Guidelines for the Protection of Aquatic Life.

5. During the open water season on Windy Lake, MHBL will collect surface water samples from Windy Lake at three sites along the shoreline down slope of the landfarm treatment facility. These sites are shown on the attached Figure 4 along with their GPS coordinates. Each site will be sampled once per month during open water and analyzed for Total Oil and Grease, Benzene, Toluene, Ethyl benzene and Xylene. The purpose is to verify that no residual hydrocarbon contamination from this site and the upstream June 2004 fuel spill site is reaching Windy Lake and resulting in an environmental effect. MHBL proposes that if any of these samples exceed the following concentrations: Total Oil and Grease of 15 ppm, Benzene 0.37 ppm (CCME), Toluene 0.002 ppm (CCME), and Ethyl benzene 0.09 ppm (CCME); then the following actions by MHBL be triggered:

    - MHBL will immediately set out an oil containment berm along this shoreline and use oil adsorbent materials to recover hydrocarbons contained within the berm;
    - MHBL will initiate activities to intercept all surface drainage and shallow groundwater draining from this area. This activity will include constructing a berm and shallow lined trench along the contour line down slope of the landfarm treatment facility along with the installation of a sump and pump to be used to intercept, collect and pump back all surface and shallow groundwater to the landfarm treatment facility to be passed through the oil adsorption system. This would then continue through the rest of that open water season.

    The results and actions taken will be reported to the NWB and KIA on a timely basis.

6. MHBL will use an accredited commercial laboratory to carry out all of the analysis as laid out in this section. Consequently the lab will provide and report their QA/QC procedure as part of the analytical reporting. These will be included in the reports provided to the NWB and KIA.

    MHBL will apply the following QA/QC procedures during sampling:

    - Use of field blanks - Field blanks are samples of pure water that are subjected to exactly the same procedures as routine samples, following

which they are analyzed for the same parameters as the field samples. Any measurement of the parameter of interest, above method detection limits, will indicate any analytical error, impurities in the laboratory distilled water supply, contaminated sample preservatives, or contamination of the sample during the handling process. Combined with the results of other quality control procedures, analysis of field blanks can help identification of sources of contamination. A set of field blanks will be made up once each month and taken into the field when the active SNP stations are sampled. New sample bottles will be used and prepared using distilled water from the normal laboratory water supply. This set will represent all of the parameters routinely analyzed. They will be preserved in the field and submitted to the laboratory identified as field blanks.

- Duplicate sampling – Replicate sampling (or sometimes referred to as duplicate sampling) is the collection of more than one sample for a given analysis at a given location. The replicate samples are collected, handled, and analyzed using the standard procedures applied to routine samples. Replicate sampling, combined with the results of other quality control procedures, can help indicate sources of error and are particularly useful in identifying problems with accuracy and sampling methods. Once per operating season, for each active SNP sampling site, a set of duplicate samples will be taken, representing as many of the routine analyses as possible. Where possible, this should be carried out in conjunction with audit sampling conducted by the designated inspector. Replicate sampling should alternate between the prescribed SNP stations.

These results will be included in the reports provided to the NWB and KIA.

Samples will be delivered to the analytical laboratory as soon as possible after collection. All samples will be stored and transported at a temperature <10 degrees Celsius. Coolers and ice packs are provided for field transportation and samples will be refrigerated as soon as possible following arrival at the laboratory.

A chain of custody form will be completed for each sampling site respectively. The original will be sent to the external laboratory while a copy will be filed accordingly on-site. A follow-up call will be made to the external environmental laboratory ensuring that samples are received

Figure 4: Windy Lake Sampling Locations For Monitoring Potential Hydrocarbon Contamination from June 2004 Fuel Spill