APPENDIX A

EBA ENGINEERING CONSULTANTS LTD.

PROPOSED LONG TERM REMEDIAL STRATEGY – FUEL SPILL, WINDY LAKE CAMP, NUNAVUT, SPILL NUMBER 04-388

June 23, 2004

EBA File No: 1740065-003

Kitikmeot Inuit Association
P.O. Box 360
Kugluktuk, NU
X0B 0E0

Attention: Geoffery Clark , M.Sc., M.BA
Environmental Screener, Lands Division

Dear Mr. Clark:

Re: Proposed Long Term Remedial Strategy– Fuel Spill , Windy Lake Camp, Nunavut Spill Number 04-388

Further to our meeting of yesterday June 22, 2004, held in the EBA Yellowknife office, and attended by yourself and Mr. Hugh R. Wilson of Miramar Mining Corporation, the following letter provides preliminary details on the proposed long term strategy to mitigate the effects of the recent hydrocarbon release at the above location. Design details of a proposed land farm also have been (or "have been" or "were") provided for your review and information purposes.

On or about Wednesday, June 16, 2004 approximately 19,000 litres of diesel fuel was spilled onto the ice of Windy Lake, Nunavut, the site of Miramar Hope Bay Ltd.'s Windy Lake Camp. Mr. Brent Murphy of EBA was dispatched to the site and provided technical advice related to spill containment, cleanup and remediation activities.

Given the remote nature of the site, the limitations of the available onsite spill response equipment and the need to respond quickly and effectively, EBA recommended that *in situ* incineration be employed to eliminate the risk of fuel oil spreading into the lake water and potentially impacting the lake and its associated aquatic habitat. The incineration strategy appeared to be very effective in eliminating essentially all free product on the lake ice surface.

A combination of *ex-situ* soil bio-treatment and mechanical water treatment methods are recommended to address the residual impacts associated with the land portion of the impacted spill site. It is proposed that a land treatment area (LTA) be constructed in the area situated topographically down-gradient from the fuel storage tanks (Figure 1). This area was impacted by the hydrocarbon release and is the primary area where soil hydrocarbon impacts are observed. The LTA would be constructed using a 60 mil HDPE liner underlain by native soil consisting of clay. The liner will be of a thickness to prevent accidental damage and to prevent the ongoing migration of hydrocarbon-impacted waters to the environment. The liner will be installed on clean soil following the removal of all hydrocarbon-impacted material. A conceptual as-built diagram is provided as Figure 2. A final version will be provided upon completion of construction. The dimensions of the proposed LTA will be approximately 50 metres by 30 metres wide with a minimum dyke height of 0.75 metres. As fill material is in short supply at the site, it is proposed that the liner be propped up with wooden cribbing around the perimeter of

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the liner. A general schematic of the proposed landfarm or land treatment area is presented as Figure 2.

As the ongoing migration of hydrocarbon-impacted surface waters is a significant environmental concern, it is proposed that an interception trench be constructed on the western portion of the LTA situated between the LTA and the lakeshore. The trench will be excavated to a depth of approximately 1.0 metres below surface grade, lined on the west wall and base with hydrocarbon resistant high density polyethylene (HDPE) liner and backfilled with clean fill (obtained from the site). A catch basin will be installed at the northwest end of the trench. The basin, a 205 litre drum with holes drilled along the sides, allows for the placement of a pump to remove the captured water. A general schematic is presented as Figure 3.

To effectively address the presence of hydrocarbon-impacted waters captured within the proposed LTA and the interception trench, it is proposed that a FII Oil Absorption System provided by Terry Ruddy Sales of Edmonton, Alberta be utilized. The water would be first emptied into 1,400-litre capacity plastic basins present on site on site for de-emulsification purposes and coarse sediment removal. The free-phase product and sludge would then be skimmed from the water surface and large sediment particles will be removed from the water processing system by means of screening and filtration through a burlap net. The water would then be directed through the treatment unit. The treated water would be directed into the RBC lift station and pumped up to the existing sewage discharge location situated east of the camp. A schematic of the treatment system is provided as Figure 4.

The remedial systems which are proposed to address the hydrocarbon impacts at the Windy site were successfully implemented at the Boston camp during the summer of 2003 and this success can and will be repeated at the Windy Camp site.

We trust that the above information meets with your requirements at this time. Please contact the undersigned should there be questions regarding this proposed approach.

Yours truly,
EBA ENGINEERING CONSULTANTS LTD.,

R. Brent Murphy, M.Sc., P.Geol.,
Project Director, NWT/Nunavut

RBM/rah/…

Attachments

c.c. Hugh Wilson
Miramar Mining Corporation

Scott Stringer
Miramar Con Mine Ltd.,

Jack Kaniak
Lands Manager
Kitikmeot Inuit Association

Stanley Anablak
Lands Officer
Kitikmeot Inuit Association

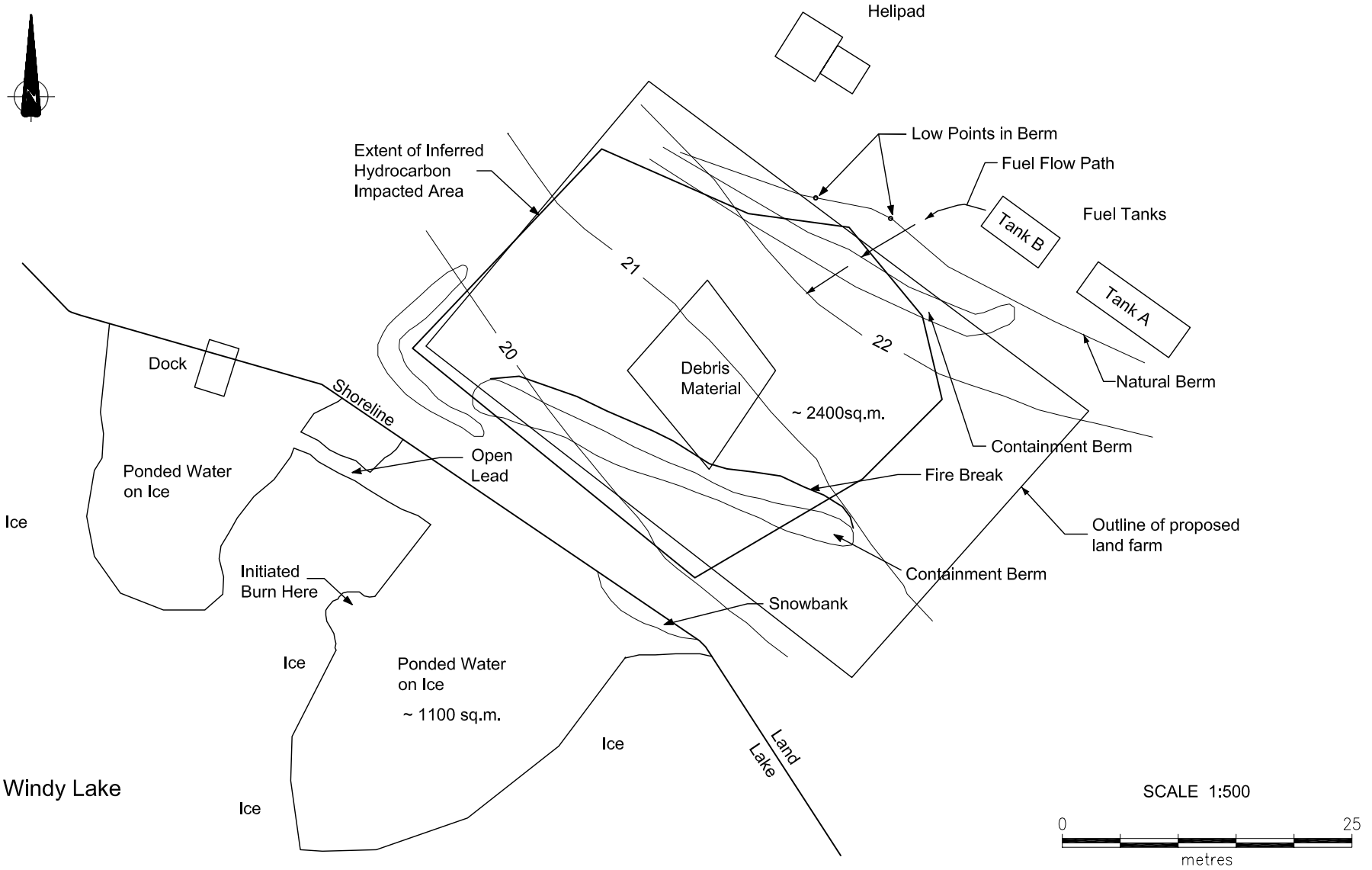
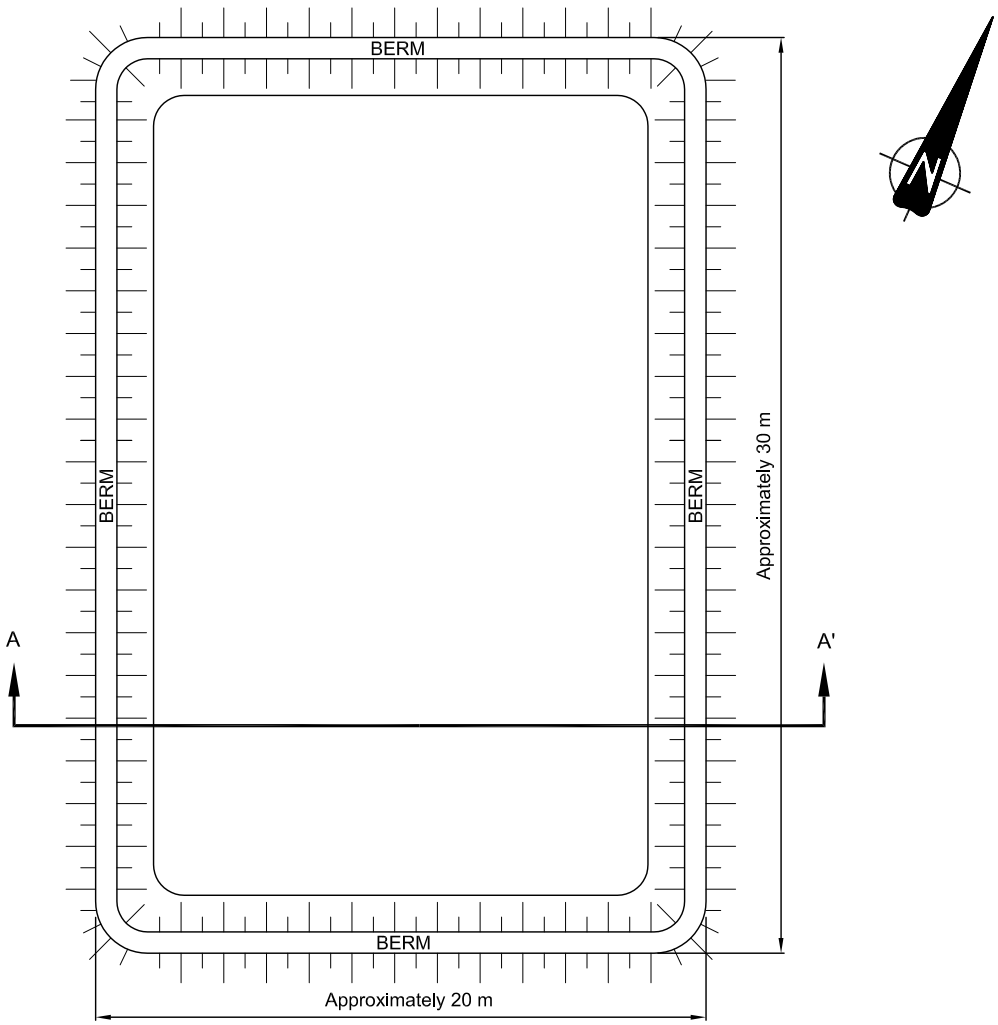
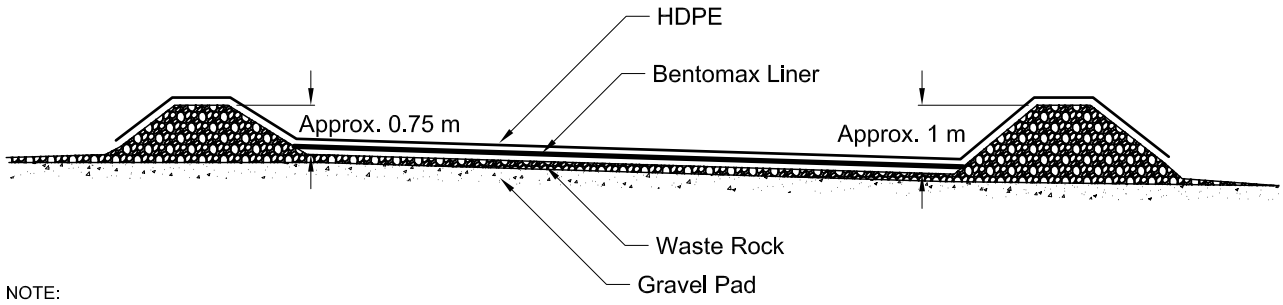


Figure 1
Site Plan

17400665.003fig01.dwg



Plan View



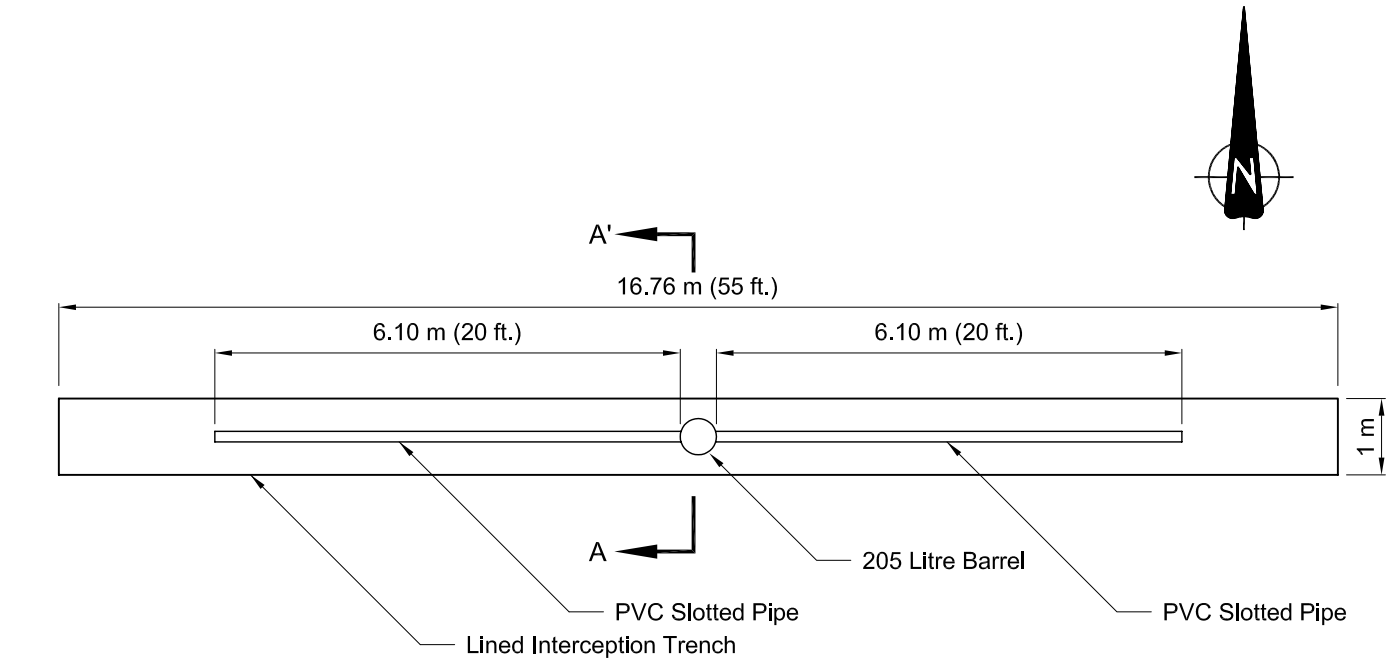
NOTE:
Bentomax Liners and HDPE Material shown separated for clarity.

Cross-Section A-A'

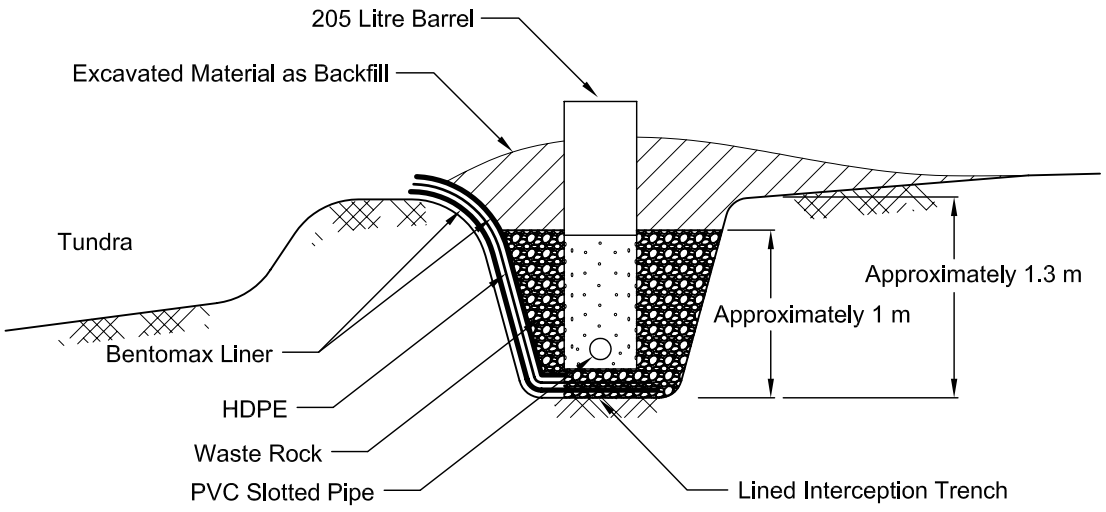
Figure 2
General Schematic
Land Treatment Area

Not To Scale

1740065.003-FIG2.dwg



Plan View



NOTE:
Bentomax Liners and HDPE Material shown separated for clarity.

Cross-Section A-A'

Figure 3
General Schematic
Containment Trench

Not To Scale

1740065.003–FIG3.dwg

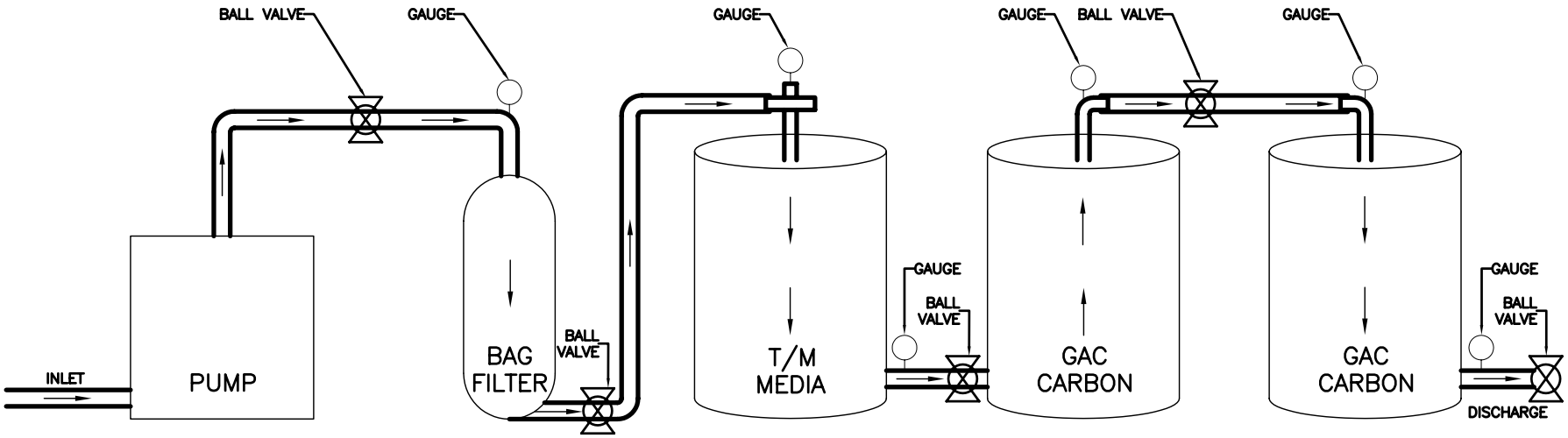


Figure 4
General Schematic
Granular Activated Carbon (GAC) Unit

FSC ENGINEERING AND ARCHITECTS

REVIEW OF THE RESPONSE BY MIRAMAR HOPE BAY LIMITED TO THE JUNE 16, 2004 OIL SPILL AT WINDY LAKE CAMP

Review of the Response by Miramar Hope Bay Limited to the June 16, 2004 Oil Spill at Windy Lake Camp

Prepared for:

Kitikmeot Inuit Association (KIA)
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Prepared by:

FSC Architects & Engineers
4910 53rd Street, Yellowknife,
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FSC Project Number: 2005-0820
Date: October 25, 2005

Review of the Response by Miramar Hope Bay Limited (MHBL) to the June 16, 2004 Oil Spill at Windy Lake Camp

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APPENDIX C – Laboratory Results
APPENDIX D – Site Map of Windy Lake Camp
APPENDIX E – Bioremediation of Land Adjacent to Lake by Application of Peat Moss

1. EXECUTIVE SUMMARY

The Kitikmeot Inuit Association (KIA) contracted FSC Architects & Engineers to review the response by Miramar Hope Bay Limited (MHBL) to the June 16, 2004 Oil Spill at Windy Lake Camp from a spill of 19,000 litres (L) of P-40 diesel fuel.

FSC reviewed the available consultant's documents and reports, MHBL's Standard Operating Procedure - Spill Contingency Plan and its review comments from other organizations such as DIAND, Nunavut Department of Environment and Environment Canada; NWT Spill Report and Hazardous Materials Spill Database; and the report of the Nunavut Environmental Health Officer.

We submitted a draft report of our literature review with an agenda for a site visit.

During our site visit on August 27, 2005, we walked the site and took soil samples from the spill and land treatment area (LTA), and we took water samples from the diversion ditches/LTA, the treated water and the discharge point at the Lake.

The soil excavated from beneath the spill site and now located in the land treatment area (LTA) contains hydrocarbons that do not meet Nunavut and CCME requirements for residential and parkland uses. Aeration of the LTA should continue. Other soils in the LTA do meet these requirements and could be removed for use in other activities.

All soils impacted by hydrocarbons that can be, should be excavated and treated in the LTA. Contaminated soils determined by qualified engineer to be inappropriate to excavate should be treated in-situ.

Drainage throughout the site should be reviewed by a qualified engineer and controls implemented appropriately. Continue to monitor the water being discharged into the lake to ensure that it is kept within licensed requirements. Non-conformities should be addressed immediately.

Fuel drums should be stored within containment barriers. Barrels containing liquids should be labelled and properly covered. All empty barrels should be labelled, properly covered and stored appropriately.

Operational practices at the site could be strengthened in the area of fuel management. Staff training and spill emergency exercises should be conducted regularly.

Miramar's abandonment and reclamation (A&R) plans should be revised to address the spill reclamation and any other activities that have changed since the plan's original submission. Further, any future activity or event the fundamentally affects the site should be addressed in an immediate revision of the A&R plan.

2. INTRODUCTION

2.1 BACKGROUND

KIA contracted FSC Architects & Engineers to review the response by MHBL to the June 16, 2004 Oil Spill at Windy Lake Camp, as detailed in the spill response reports and to recommend future actions to assure that the spill is cleaned up and risk to the environment is minimized and the site is returned to as close to the previous condition as possible.

Approximately 19,000 L of diesel fuel was reported to have spilled from a 50,000 L Above-ground Storage Tank (AST) located on MHBL advanced exploration mining camp at Windy Lake, Nunavut on or about June 16, 2004. A MHBL staff reported the spill to NWT Spill Report Line on June 16, 2004 and the incident was assigned Spill Number 04-388.

MHBL and EBA Consulting Engineers personnel, made some initial and secondary responses to assess and implement remedial measures concerning hydrocarbon impacted soil and groundwater on the site. Reports and report updates of these efforts were prepared.

FSC's mandate for this project includes:

- Review the spill response report, recent updates to the report and other available information (spill-related) on the site.
- Conduct a site visit during the snow-free season to confirm reported accounts and obtain additional details on the site and the spill.
- Recommend future actions to assure that the spill is cleaned up and risk to the environment is minimized and the site is returned to as close to the previous condition as possible.

3. REVIEW OF AVAILABLE INFORMATION

3.1 GENERAL

FSC carried out the review of the following information:

- Historical information on the site;
- Spill records as recorded in the GNWT Hazardous Waste Database
- Spill Assessment and Remediation Report by EBA Consultants.
- 2004 MHBL Annual Report to the NWB
- Windy Lake Exploration Camp June 16 2004 Spill - Updated Progressive Report, February 2005
- Nunavut Environmental Health Office Records
- MHBL Standard Operating Procedure, Spill Contingency Plan

3.2 OWNERSHIP HISTORY

Jack Kaniak, KIA's Lands Manager, provided FSC with the ownership history of the site through e-mail as follows:

The development of the land in the Hope Bay belt area has not had a long history. A couple of mining/exploration companies set-up camps in the area, or directly on site, over the past 50 years.

In the mid-1960's the Roberts Bay Mining Co. did some silver exploration and mining on the north side of the Roberts Lake. During the late1970's to early 1980's a company named Noranda did some exploration for gold. Their camp was set up on Windy Lake as well but the exact location of the camp is not known.

BHP Billiton had an exploration camp situated where the present MHBL Camp is now situated. The camp was built by BHP as they were doing gold exploration throughout the whole belt area during the early to mid 1990's.

Cambior Inc. then took over these BHP Billiton properties during the mid 1990's. Shortly after this transaction Cambior formed a joint venture with Miramar Mining to explore the area for gold. Miramar would take over the operations of the property.

In the early 2000's Miramar Mining took over the whole Hope Bay belt properties and now have plans to open a gold mine at Doris Lake.

3.3 SPILL HISTORY

According to the GNWT Hazardous Spills Materials Database, for the period of 1971-2005, there have been four (4) recorded spills at Windy Lake Camp, one of which is the spill 2004-338. The other spills were 1998-088 Diesel fuel spill (20 L), 2000-093 Heating Fuel – P50 (2 L) and 2002-451 Diesel P-50 (7200 L). A copy of the spill summaries can be viewed under Appendix B.

The 2004 MHBL annual report to the Nunavut Water Board showed that besides the spill reported on June 16th 2004, there was three (3) other spills during 2004 exploration season, at the Windy Lake Camp. These other spills include: a 1 L spill from broken chain case on snowmobile, a 5 to 10 L spill that occurred while fueling a heater in the shop and about 1.5 L spill that occurred while fueling on of the air planes.

3.4 SPILL ASSESSMENT AND REMEDIATION, WINDY CAMP, NUNAVUT

EBA Engineering Consultants Ltd. prepared an interim spill report on the assessment and remediation of spill 04-338 after being called to the site on 16th June 2004; a day after the spill was reported. Their report consists of the description of the spill, causes of the spill, description of site conditions and immediate response procedures taken before the arrival of EBA staff and remediation procedures implemented while EBA was on site.

3.4.1 SITUATION AND CAUSE OF SPILL

The spill, believed to have occurred on or about June 16th, 2004, was reported to the 24-hour NWT spill report line on June 16th, 2004. The leak of 19, 000 L came from a 50, 000 litre AST. The spill number is 2004-0388. The fuel type was P-40 diesel. The spill occurred over an estimated surface area (land and water) of 3,500m^2: 2,400m² land and 1, 100m² water

The spill was caused as a result of the fuel line separating from the tank at a connection in the line due to high wind speeds that night. The root causes identified were:

- Failure by operators to use the fuel transferring system. The new system for fuel dispensing was installed prior to the incident; and
- The use of substandard equipment for dispensing fuel from the 50,000 litre AST. Two pieces of general-purpose hose secured together by a "hose joiner and clamps" that was not suitable for such a task.

3.4.2 SITE CONDITIONS AND REMEDIAL RESPONSES

From the review of EBA interim report, we understand the following about the site conditions after the spill:

Approximately 0.25 to 6cm of free diesel was present near shore ice surface and melt water pools. Soil with diesel fuel odours were found to be present, extending from the 50,000 litre AST to the shoreline area located down-gradient. The spill pathway appeared to pass directly below a collection of stored debris and drums located on-site. Water with noticeable hydrocarbon sheen was observed draining (at a rate of less that one litre per minute) into the lake outside of the containment area. Surface runoff up-gradient of the spill was migrating though the spill area.

Prior to EBA's arrival, MHBL personnel installed containment booms and barriers at the edge of the ice surrounding the diesel fuel and absorbent pads on the frozen lake surface around melt-water pools. Several drainage interception trenches, approximately 10 cm deep, were excavated on the bank with absorbent booms installed in them.

We also understand that EBA staff directed the following remedial measures:

- Excavation of run-off containment trenches to redirect natural surface runoff away from the impacted area, or in the case of impacted runoff, into the containment area on the frozen lake surface.
- Watershed diversion trenches installed up-gradient of the spill location to re-direct surface runoff away from the diesel-impacted area therefore preventing further transport of diesel fuel onto the still frozen lake ice.
- Installation of Hydrocarbon-absorbent booms on the surface of the lake ice and around melt-water pools containing diesel at locations where possible containment breaches could occur.
- Use of absorbent pads placed on the surface of the melt-water pools to manually recover free diesel fuel.
- Use of Coffee cans to skim the diesel fuel from the surface of the melt-water pools
- Incineration of used Hydrocarbon-Absorbent Material
- In situ incineration of diesel fuel, which had moved down-gradient onto the surface of the melting lake ice, to eliminate the risk of fuel oil spreading further into the lake water and potentially impacting Windy Lake and its associated aquatic habitats.

The EBA report indicated that a total of approximately 8,250 L of free diesel fuel were recovered by the above remedial measures (besides the on-site incineration). The on-site incineration was estimated to have removed additional diesel fuel of between 2,750 to 5,500 L.

3.4.3 SECONDARY REMEDIAL MEASURES

Land Treatment Area (LTA)

A LTA was constructed to hold 100m³ of contaminated soil excavated from area down-gradient of the AST where staining/odour was evident. Though soils with noticeable contaminantion are present in and around the AST location, no excavation was made at the vicinity of the AST for fear of damaging the AST. Soil samples taken from the AST location recorded hydrocarbon concentrations significantly higher than applicable guidelines. Samples from locations where impacted soils had been stripped recorded concentrations lower than applicable guidelines.

The LTA was constructed using a 60 mil high density polyethylene (HDPE) liner underlain by native soil consisting of silty sand. The area of the LTA is 600 m².

Runoff interception trench

A surface runoff interception trench was constructed to reduce the risk of hydrocarbon migration from any residual source areas into Windy Lake.

Water Testing and Discharge

Intercepted runoffs from the site were pumped to the camp's RBC sewage treatment facility located to the northwest of the impacted site. Samples of treated runoffs, water from camp taps, lake inlet and lake outlet were collected and analysed. All samples recorded concentrations of BTEX and PHC fractions below analytical detection limits and Nunavut and CCME guidelines.

3.4.4 RECOMMENDATIONS FOR ON-GOING REMEDIATION AND MONITORING

EBA's interim spill report provided the following recommendations for on-going remedial attention on the site:

- Mechanical Aeration (periodically) of Soil within the LTA.
- Continued Treatment of Contained Water
- Containment of Remaining Impacted Soil Surrounding the AST. Adoption of temporary remedial measures (e.g. covering with waterproof material prior to snowfall to limit melt water migration through the soil) until the impacted soil can be removed and treated in the LTA.

3.5 2004 MHBL ANNUAL REPORT TO THE NWB

FSC reviewed the 2004 Annual Report prepared by MHBL for NWB to fulfil the reporting requirements of Water Licence NWB2HOP0207 for the Windy Lake Camp. This report gave the account of spill 04-388, the cause of the spill, immediate remedial actions as well as the on-going

remediation procedures for soil contamination. It also gave an account of other non-reportable spills on the site during the 2004 exploration period. These spills are a 1 L spill from broken chain case on snowmobile, a 5 to 10 L spill that occurred while fueling a heater in the shop and about 1.5 L spill that occurred while fueling on of the air planes.

3.6 WINDY LAKE - JUNE 16 2004 SPILL - UPDATED PROGRESSIVE REPORT

This report, dated February 2005, put together by MHBL is a follow-up report to the one completed by EBA Engineering Consultants Ltd. In this report MHBL identifies all issues needing to be addressed with regards to continuing of a soil/water remediation and monitoring programs, a briefing on the current ongoing cleanup processes and long-term management strategies for Windy Lake, along with other camps currently run in that area by MHBL.

3.7 NUNAVUT ENVIRONMENTAL HEALTH OFFICE RECORDS

The Nunavut Environmental Health Office was contacted with regards to any information they have about the Windy Lake Camp site. Jeremy Roberts, Environmental Health Officer for the Kitikmeot Region stationed out of Kugluktuk, provided the following information:

The Department of Health and Social Services (DHSS) has a file on Windy Lake Camp. The information within went back to 1998. In 1998, BHP Diamonds Inc. received an inspection from the Department of Indian and Northern Affairs Canada regarding camp set-up. DHSS (then with the NWT) sent a letter to BHP stating that the sewage and water would have to meet the standards set out in the Public Health Act.

On February 23, 2000, 30 L of grade A motor oil were spilled on the lake. The lake was frozen at the time. An area perpendicular to the shore was being used as an ice airstrip. The oil was recovered with absorbent pads. Contaminated snow was thrown in the incinerator. The remainder was burned with a Tiger Torch. Spill #: 00-094.

On July 27, 2000, Health and Social Services sent a letter regarding setback distances for the camp's proposed sewage system. This letter was addressed to Cambiex Exploration. There is no indication of when Cambiex took over the site from BHP. Cambiex was drilling for diamonds.

On August 01, 2002, 7,200 L of diesel fuel P-50 was spilled at the site. 3,280 L were collected from the surface. By August 20, 2002, most of the contaminated soil had been dug up and put into 45 gallon drums. Absorbent materials used. As a result of this spill a Water Resources Officer required that the fuel storage area be equipped with a berm complete with an impermeable liner. Spill #: 02-451.

The Department of Health and Social Services corresponded with the operator of Windy Lake Camp throughout the summer of 2004. This was a standard public health inspection. The biggest

item of concern was that the camp ensure the water treatment system be well maintained since lake water often turns up bad bacterial results.

3.8 MHBL STANDARD OPERATING PROCEDURE, SPILL CONTINGENCY PLAN

The MHBL Spill Contingency Plan, updated in July 2004, shows staff training and exercises, and action and notification procedures in case of a fuel spill. FSC also reviewed the review comments of MHBL Spill Contingency Plan made by DIAND, Nunavut DOE and EC.

The Spill Contingency Plan is adequate particularly if the comments by previous reviewers are affected. What may require improvement is the execution of the Plan as evident from the cause of the June 2004 Spill.

4. SITE VISIT

4.1 GENERAL

KIA asked FSC to compliment the review of information with a site visit during the snow free season. FSC set up a site visit agenda as follows:

- Find answers to questions raised from the review of available information.
- Consult with the MHBL personnel that have been working on the long-term remediation plans on the site for updates on the site monitoring.
- Take soil and water samples where there are evidences of contamination and at locations that monitoring sampling are being taken by the MHBL staff.
- Take samples from the soil underneath the AST. From our review, we believe this soil is heavily contaminated and contain much of the P-40 diesel that was not accounted for in the remediation process. We hope to be able to come up with a permanent remediation plan for the soil in the area.

Dele Morakinyo, PhD, P. Eng. visited MHBL site on Saturday August 27, 2005. He conducted a walk around the site in the company of Matthew Kawei, MHBL Senior Environmental Coordinator, Scott Stringer, Human Resource Superintendent, Miramar Con Mine and Lynn Carter of KIA. Dele also took soil and water samples from different locations on the site.

4.2 SITE OBSERVATIONS AND OTHER COMMENTS

4.2.1 MAIN FUEL STORAGE AREA

During the site visit, we observed that the 50,000 L tank from which the spill occurred ("spill tank") has been abandoned. There is a 70,000 L, double wall, AST standing close to the previous location of the 50,000 L AST. A secondary containment barrier has been built around the fuel storage area enclosing the 70,000 L and the previous location of the spill tank.

Some drums were observed within the containment area (Photo 1). These drums were empty. We understand that they used to contain Jet A and B fuels and were previously stored just on the bank of the berm of the main storage area adjacent to the road. The section of the road between the main storage area and the LTA contained some stains suggesting contamination.

FSC was informed by the MHBL staff that the stains resulted partly from leaks from the jet A/B drums before they were moved to the lined area, and from leaks from equipment (e.g. front loader) used at this location. We were told that at one time, the soil in this location was excavated and moved to the LTA. However, at the time of the visit there were still stains (Photo 2).

The spill tank was removed and contaminated soil beneath the tank was removed and placed in the LTA about June/July 2005. The previous location of the spill tank is shown in Photo 3. The soil is currently stockpiled in the LTA, separate from the stockpile of soil removed from the contamination areas immediately after the spill of June 2004.

During the initial spill response in 2004, the soil beneath the tank could not be remediated for lack of access.

4.2.2 THE PIPE CONNECTION SYSTEM ON THE TANKS

As reported under section 3.4.1 above, the spill of June 2004 was believed to have been caused as a result of the fuel line separating from the tank at a connection in the line due to high wind speeds on the night of the incidence. We understand that the operators failed to use the fuel transferring system on the tank. Rather, they used two pieces of general-purpose hose secured together by a "hose joiner and clamps" to drain fuel from the top of the 50,000 L tank. The new system for fuel dispensing was installed prior to the incident.

MHBL informed our staff that the new system consists of a hard pipe with three anti-siphon valves installed (Photo 4). The anti-siphon valves are located at different points in the pipe, which regulates fuel flow through the pipe.

4.2.3 LAND TREATMENT AREA

There exists two soil stockpiles in the LTA: the pile from contaminated areas around the spill tank, collected and hauled to the LTA in 2004 as part of the spill initial response actions and the pile from underneath the spill tank, collected (after tank removal) and hauled to the LTA in July 2005 (Photo 5). MHBL personnel informed us that the piles were spread and turned at intervals to allow aeration of the materials. MHBL plans to eventually barge the soil (after satisfactory treatment – i.e. treatment that meets applicable guidelines) to another nearby MHBL Camp Site for re-use.

A depressed location on the LTA currently has a pool of hydrocarbon-contaminated water as a result of leaching from the soil and the melted ice. This water is being treated, using the treatment unit shown in Photo 6, and discharged to the Windy Lake.

4.2.4 BARREL STORAGE AREAS

At two locations on the site (one to the southeast and the other to the northeast of the main fuel storage area) were several drums. Our site contact, MHBL's Environmental Coordinator informed us that some of the drums contain Jet-B fuel, while others are empty. The empty drums were uncovered. We also learnt that overflows from the uncovered empty drums have caused the distribution of remnant fuel in the tank to the surroundings of the drums. This is evident from the stains in and around the locations of the drums (Photo 7). There are no containment barriers around these drums.

With the drums located upstream of the Windy Lake, there is the potential of contamination of the Lake from the barrel storage areas.

4.2.5 STRIP OF LAND ADJACENT TO THE LAKE

Our attention has been drawn to a strip of land (about 3-5 m wide) along the lake (Photo 8). This strip was not mentioned in any of the reports that we reviewed and therefore there was no record of any prior treatment carried out on the strip.

Since this piece of land is close to the lake, excavating and transporting the material from the strip to the LTA will not be a proper remediation option as this will disturb the land at the location and push contaminated soil into the lake. Rather an on-site remediation option will be preferable whereby the hydrocarbon are absorbed with the soil in place.

MBHL informed us that prior to our coming to the site they scraped the topsoil on this strip of land and placed it in the LTA. They also applied peat moss and planted grass to absorb the hydrocarbon and clean up the strip. A summary of the remediation works they carried out is attached as Appendix E in this report.

Peat moss application is a bioremediation approach that inhibits soil compaction thereby allowing the hydrocarbon in the soil to break down naturally. Peat moss treatment also prevents the spreading of the hydrocarbon plume in soil through absroption. Remediation with Peat moss takes three (3) to six (6) months under warm weather conditions to produce the required results.

Besides bioremediation, two other on-site remediation techniques include air sparging and soil vapour extraction (SVE). Air sparging involves drilling boreholes on the strip of land and injecting air or oxygen into the ground to aid in the removal of hydrocarbons, particularly the volatile components. SVE involves injecting, into the boreholes, a gaseous hydrocarbon solvent which dissolves the hydrocarbons, become a sludge-like fluid which is then drained into a lower horizontal well and is extracted. Both approaches involve a lot more money than the bioremediation approach and are generally in appropriate in permafrost.

Confirmation samples should be taken from the strip of land to determine the level of remediation achieved so far by the planting of grass and the application of peat moss material carried out by MBHL. The samples should be sent to an accredited laboratory for analysis and the results compared with established guidelines.

4.2.6 PREVENTION OF EROSION

Where activities have the potential to cause erosion, following are treatments that could be considered site specifically by a qualified engineer including:

- Diversion of water;

- Grading to slopes of less than 4:1;
- Silt curtains;
- Natural treatments such as vegetation;
- Armour treatments such as rip-rap or other clean, large granular material; and
- Selection of another location for the intended activities.

4.3 SOIL AND WATER SAMPLING

4.3.1 SOIL SAMPLES

Two (2) soil samples were collected from the soil pile deposited to the LTA since 2004 to determine the degree of treatment so far received by the pile. The Spill Tank has been removed. The contaminated soil trapped under the tank have also been removed and transported to the LTA for treatment. The last two operations were completed in July 2005. FSC collected two (2) soil samples from this new pile to determine the contamination level of soil from beneath the tank. To ascertain the level of remediation achieved at the previous location of the spill tank, we took two soil samples from that location.

The soil samples were stored in laboratory- provided jars, placed in coolers to maintain the temperature at 4^{o}C prior to shipment to the laboratory for analysis. Shipment was done via Canadian North using accepted Chain of Custody protocols.

4.3.2 WATER SAMPLES

We also took three (3) water samples as follows:

- Runoff water to ditch and LTA area (to determine the amount of contamination in the runoff water
- Treated runoff water (to determine the efficiency of the treatment system)
- At point of discharge to Windy Lake (to determine the effluent concentration at discharge to the Lake).

The water samples were collected and stored in laboratory-provided bottles. The bottles were placed in coolers, maintained at 4^{o}C and shipped to the Laboratory for analysis. Shipment was done via Canadian North using acceptable Chain of Custody protocols.

4.4 SOIL AND WATER QUALITY ANALYSIS

4.4.1 LABORATORY AND PARAMETERS TESTED

We performed Laboratory analysis on the soil and water samples from the site. FSC uses Enviro-Test Laboratories (ETL), Edmonton, Alberta for all its laboratory tests, ETL is accredited by the Standard Council of Canada / Canadian Association for Environmental Analytical Laboratories (SCC/CAEAL), American Industrial Hygiene Association (AIHA), and Health Canada. ETL is also certified by the National Environmental Laboratory Accreditation Program (NELAP).

The soil samples were tested for the following parameters: Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) and Petroleum Hydrocarbon (PHC) fractions, F1 – F4. We tested the water samples for BTEX; F1 and F2.

4.4.2 LABORATORY RESULTS AND APPLICABLE GUIDELINES

Soil Analytical Results

The soil analytical results for BTEX were compared to the Nunavut Environmental Guideline for Site Remediation, 2002. There are no current guidelines for PHC fractions F1 to F4 in soil in Nunavut. The PHC results were compared to Canadian Council of Ministers of Environment (CCME) Canada Wide Standards (CWS) for Petroleum Hydrocarbons in Soil for coarse-grained soil. Since the site has camp residences built around it, Residential/Parkland criteria were applied for both BTEX and PHC.

The results from the laboratory analysis returned BTEX and PHC concentrations below the limits specified by the above-referred guidelines for the samples taken from the 2004 pile in the LTA and those taken from the old location of the spill tank

The soil samples collected from the new (July 2005) soil pile in the LTA (hauled from old location of spill tank) show high concentrations of BTEX and PHC concentrations.

The detailed results of the Laboratory Analysis for the soil samples are included in this report as Appendix C.

Water Analytical Results

Water quality analytical results for BTEX were compared to CCME Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, 2001. All the water samples (S01, S02 and S03) contain BTEX at concentrations below the CCME limits.

There are currently no guidelines in Nunavut for PHC concentrations in water. However, we analysed the water samples for PHC F1 and F2 to confirm hydrocarbon removal during water

treatment. The concentrations of F1 and F2 in the treated water (S02) are lower than the concentrations in the untreated water (S01).

Generally the treatment somewhat improves the quality of the water being discharged into the Lake. Both the BTEX and the fractions are lower in the treated water (S02) than the untreated water. At the discharge point to the Lake (S03), the water sample analysis shows lowest concentrations of BTEX and Fractions.

The detailed results of the Laboratory analysis for the water samples are included in this report as Appendix C.

5. CONCLUSIONS

From our review of available information prior to March 2005, we learned that:

- Of the 19,000 L P-40 diesel fuel discharged into the Windy Lake Camp Site on June 16th, 2004, an estimated 11,000 to 13,800 L were recovered through series of initial spill response interventions while between 5,200 and 8,000 L remain unaccounted.
- Following the initial spill response of 2004, a Land Treatment Area (LTA) was constructed for additional fuel removal over a long time period. The LTA was to be aerated through spreading and turning at regular intervals during the warm weather.
- Following recommendations by EBA, it was planned that runoff will be collected in the interception ditches, and there will be the monitoring of the soil and water quality in and around the site.
- The accounts obtained from the previous records suggested that the soil directly beneath and closely surrounding the spill tank could not be accessed for treatment.
- The existing MBHL spill contingency plan meet current industry standards.

1. Our visit to the site on August 27, 2005 confirmed that additional works had been undertaken between March and August 2005 to further remediate the soil impacted by the diesel fuel spill of June 16, 2004, including:
   - The removal of the spill tank and discontinuation of its use;
   - Soil was removed from beneath the spill tank to the LTA;
   - Our laboratory results showed that the previous location of the spill tank now contains petroleum hydrocarbon concentrations below the specified residential/parkland limits;
   - Secondary containment has been built around the former location of the spill tank. Inside the containment barrier was a 70, 000 L double wall fuel tank and some drums containing fuel; and
   - There was continuing treatment of runoff water from the drainage channels and the LTA.
2. Sampling and laboratory analysis showed that the soil samples taken from the 2004 pile in the LTA and those taken from the old location of the spill tank meet Nunavut and CCME guidelines for BTEX and PHC for residential and parkland uses.

3. However, the BTEX and PHC concentrations exceed the guidelines in the soil hauled from old location of spill tank and now located in the new (July 2005) soil pile in the LTA.

4. All the water samples tested contain BTEX at concentrations below the CCME limits.

5. The concentrations of PHC fractions (F1 and F2) in the treated water are lower than the concentrations in the untreated water. Concentrations of BTEX and PHC fractions are lowest at the discharge point to the Lake.

6. Operational practices could be strengthened in fuel management. The initial leak was a result of improper equipment used for siphoning fuels. Also, there are reported leaks from the operation of equipment (e.g. front loader), and barrels are inappropriately stored.

7. Now that the LTA exists, it should probably remain available throughout the operation and well into the A&R program.

6. DISCUSSION

The best operations come from a dedicated and proactive workforce that works safely, and strives to prevent mishaps and acts quickly if they occur. Such a condition is a refection of management's commitment to excellence. FSC visited Windy Lake several years ago as part of a MHBL due diligence effort to address a perceived problem. At that time, FSC was met with a strong sense of such a commitment and such staff at this site.

Often, a company's commitment to the environment is demonstrated through an environmental management plan such as may be developed using ISO 14001. While it may not be necessary to be ISO registered, one can certainly apply the principals.

With the exception of the individual(s) that caused the spill, and given the immediate response and on-going actions toward the spill, there's no reason to believe that MHBL has changed their corporate approach. However, in the light of the spill it would not be unreasonable to request that MHBL reaffirm their commitment to Windy Lake Camp. In doing so they may perhaps either provide, or make available, regular reporting of their environmental activities beyond those currently specified.

Also, the site has now fundamentally changed as a result of the clean-up efforts, and the construction of the LTA. MHBL's abandonment and reclamation (A&R) plans should be revised to address this spill reclamation and any other activities that have changed since the plan's original submission. Further, any future activity or event the fundamentally affects the site should be addressed in an immediate revision of the A&R plan.

That all said, it is inappropriate for the landlord or regulatory agency to micromanage a company, even one with a history of poor operations and lease/licence infractions. To do so puts the landlord or agency in an unwanted situation of assuming some liability for the failings of the operation.

There are punitive alternatives available under various acts that regulate land use and water use activities for those companies that do not live up to their legal and moral commitments. In addition, a significant deterrent from poor operations is the knowledge that a lease or licence may not be renewed, or granted for new operations. It is in these two areas where an advocacy organization may have a great influence.

7. RECOMMENDATIONS

The following are our recommendations for future actions to assure that the spill is cleaned up, risk to the environment is minimized and the site is returned to as close to the previous condition as possible.

1. Continue aeration and testing of the soil in the LTA until the soil parameters meet the specified Nunavut and CCME requirements.

2. All soils impacted by hydrocarbons that can be, should be excavated and treated in the LTA. This includes soils associated with this spill, plus any future soils contaminated by other activities or events.

3. Contaminated soils determined by qualified engineer to be inappropriate to excavate should be treated in-situ.

4. The efficiency of the peat moss treatment on the strip of land adjacent to lake should be confirmed by sampling.

5. Drainage should be reviewed by a qualified engineer and controls implemented appropriately.

6. Continue to monitor the water being discharged into the lake to ensure that it is kept within the licensed requirements. Non-conformities should be addressed immediately.

7. Fuel drums should be stored within containment barriers.

8. Barrels containing liquids should be labelled and properly covered.

9. All empty barrels should be labelled, properly covered and stored appropriately.

10. Operational practices for fuel management at the site should be addressed.

11. Staff training and spill emergency exercises should be conducted regularly.

12. MHBL's abandonment and reclamation (A&R) plans should be revised to address this spill reclamation and any other activities that have changed since the plan's original submission. Further, any future activity or event the fundamentally affects the site should be addressed in an immediate revision of the A&R plan.

Literature Reviewed

2004 Annual Report to the Nunavut Water Board, Miramar Hope Bay Limited, March 31, 2005

Department of Environment, Government of Nunavut comments to updated spill plan, August 18, 2004.

Environment Canada comments to updated spill plan, August 25, 2004.

Indian and Northern Affairs Canada comments to updated spill plan, August 18, 2004.

Miramar Hope Bay Limited, Standard Operating Procedure, Spill Contingency Plan, Update – July 2004

The GNWT Spill Report and Hazardous Materials Spill Summary.

Windy Camp, Nunavut: Diesel Fuel Spill Assessment and Remediation. Completed by EBA Engineering Consultants Ltd. July, 2004

Windy Lake Exploration Camp June 16 2004 Spill Updated Progressive Report, Miramar Hope Bay Limited, February 2005.

Appendix A
SITE PHOTOGRAPHS

			
Photo 1	**Drums and water within the containment area.**	**Photo 2**	**The area between LTA and Main Storage contain some stains suggesting contamination – bank of the berm of storage area is to the left**
			
Photo 3	**Secondary Containment surrounding 70,000 L AST and the previous Location of spill tank.**	**Photo 4**	**The fuel transferring systems – with three (3) anti-siphoning valves**

			
Photo 5	**LTA with 2004 and 2005 Soil stockpiles**	**Photo 6**	**Water Treatment Unit**
			
Photo 7	**Stains around the storage barrels**	**Photo 8**	**Strip of Land adjacent to the Lake (Photo obtained from Miramar after the site visit) – More photos in Appendix E**

Appendix B

HAZARDOUS MATERIALS SPILL DATABASE – SPILL REPORTS

Hazardous Materials Spill Database

Environmental Protection Service of ENR
Scotia 7, 5102-50th Avenue; Yellowknife, NT X1A 3S8
Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: SpillNo for the year(s): 1971 - 2005

Spill No.	Date	Region	Location	Description	Commodity	Quantity	Party	Source	Agency
2000071	3/24/2000	KIT	-	Windy Lake	Diesel Fuel	20 L	Cambiex/Miramar Hope Bay Venture	DRUM	INAC
2000082	3/20/2000	KIT	-	Windy Lake (68:03:44N 106:36:50W)	Propane	4 L	Cambiex/Miramar Hope Bay Venture	ST<	INAC
2002451	8/1/2002	KIT	-	Windy Lake Camp 68:03:44N 106:36:50W	Diesel P-50	7200 L	Miramar Hope Bay Limited	ST>	INAC
2003123	3/1/2003	KIT	-	Windy Camp 68:03:44N 106:36:50W	Diesel Fuel	10 L	Miramar Hope Bay Ltd.	OTH	INAC
2003498	7/5/2003	KIT	-	Doris North 106:36:20N 68:07:55W	Diesel Fuel	0 L	Miramar Hope Bay Ltd.	ST<	INAC
2003541	8/21/2003	KIT	-	Miramar Hope Bay 67:39:41N 106:23:04W	Diesel P-50	150 L	Miramar Hope Bay	ST<	INAC
2004388	6/15/2004	KIT	-	Windy Camp	Diesel P-40	19000 L	Miramar Hope Bay	PL	INAC

Total Spills on this Report: 7

This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board

Appendix C
LABORATORY RESULTS

ETL Enviro-Test LABORATORIES

PRELIMINARY RESULTS

FSC ARCHITECTS & ENGINEERS
ATTN: DELE MORAKINYO
4910 53 ST PO BOX 1777
YELLOWKNIFE NT X1A 1V2

DATE: 06-SEP-05 02:21 PM

Lab Work Order #: L312453 **Sampled By:** DM **Date Received:** 31-AUG-05
Project P.O. #:
Project Reference: 2005-0820
Comments:

DOUG JOHNSON
Director of Operations, Edmonton

SANDRA WATSON
Account Manager

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L312453-1 SO1-TL WLC SPILL TANK LOCATION								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		06-SEP-05		
F1-BTEX	<5		5	mg/kg		06-SEP-05		
F2 (C10-C16)	<5	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	<5	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	<5	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	<5		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	YES					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	112		61-151	%	02-SEP-05	03-SEP-05	MKE	R321033
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321033
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	12		0.1	%		01-SEP-05	GRB	R320331
L312453-2 SO2-TL WLC SPILL TANK LOCATION								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		06-SEP-05		
F1-BTEX	<5		5	mg/kg		06-SEP-05		
F2 (C10-C16)	<5	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	<5	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	16	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	16		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	NO					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	86		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	7.9		0.1	%		01-SEP-05	GRB	R320331
L312453-3 SO3-TL WLC SPILL TANK LOCATION								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		06-SEP-05		
F1-BTEX	<5		5	mg/kg		06-SEP-05		
F2 (C10-C16)	34	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	19	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	8	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	61		5	mg/kg		06-SEP-05		

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L312453-3 SO3-TL WLC SPILL TANK LOCATION								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
Chromatogram to baseline at nC50	YES					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	105		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	9.3		0.1	%		01-SEP-05	GRB	R320331
L312453-4 SO1-LTA4 WLC 2004 LTA DEP.								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		06-SEP-05		
F1-BTEX	<5		5	mg/kg		06-SEP-05		
F2 (C10-C16)	59	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	170	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	38	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	270		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	NO					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	82		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	17		0.1	%		01-SEP-05	GRB	R320331
L312453-5 SO2-LTA4 WLC 2004 LTA DEP.								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	<5		5	mg/kg		06-SEP-05		
F1-BTEX	<5		5	mg/kg		06-SEP-05		
F2 (C10-C16)	13	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	82	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	27	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	120		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	NO					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	67		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L312453-5 SO2-LTA4 WLC 2004 LTA DEP.								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME BTEX								
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	19		0.1	%		01-SEP-05	GRB	R320331
L312453-6 SO1-LTA5 WLC 2005 LTA DEP.								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	34		5	mg/kg		06-SEP-05		
F1-BTEX	34		5	mg/kg		06-SEP-05		
F2 (C10-C16)	1200	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	540	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	<5	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	1800		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	YES					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	146		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	12		0.1	%		01-SEP-05	GRB	R320331
L312453-7 SO2-LTA5 WLC 2005 LTA DEP.								
Sample Date: 27-AUG-05								
Matrix: SOIL								
CCME BTEX, TVHs and TEHs								
CCME Total Hydrocarbons								
F1 (C6-C10)	35		5	mg/kg		06-SEP-05		
F1-BTEX	35		5	mg/kg		06-SEP-05		
F2 (C10-C16)	840	IPC	5	mg/kg		06-SEP-05		
F3 (C16-C34)	230	IPC	5	mg/kg		06-SEP-05		
F4 (C34-C50)	6	IPC	5	mg/kg		06-SEP-05		
Total Hydrocarbons (C6-C50)	1100		5	mg/kg		06-SEP-05		
Chromatogram to baseline at nC50	YES					06-SEP-05		
CCME Total Extractable Hydrocarbons								
Surr: Androstane	108		61-151	%	02-SEP-05	03-SEP-05	MKE	R321059
Prep/Analysis Dates					02-SEP-05	03-SEP-05	MKE	R321059
CCME BTEX								
Benzene	<0.005		0.005	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Toluene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Ethylbenzene	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
Xylenes	<0.01		0.01	mg/kg	01-SEP-05	04-SEP-05	EMP	R321137
% Moisture	18		0.1	%		01-SEP-05	GRB	R320331

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
Refer to Referenced Information for Qualifiers (if any) and Methodology.								

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
IPC	Instrument performance not showing the C50 response factor within 30% of the average of C10, C16 & C34 response factors.

Methods Listed (if applicable):

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
ETL-BTX,TVH-CCME-ED	Soil	CCME BTEX	EPA 5030	CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TEH-CCME-ED	Soil	CCME Total Extractable Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310
ETL-TVH,TEH-CCME-ED	Soil	CCME Total Hydrocarbons		CCME CWS-PHC Dec-2000 - Pub# 1310

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

PREP-MOISTURE-ED	Soil	% Moisture		Oven dry 105C-Gravimetric

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

50871

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	Enviro-Test Laboratories - Edmonton, Alberta, Canada		

Reference Information

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
< - Less than
D.L. - Detection Limit
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.

ETL Enviro-Test LABORATORIES

PRELIMINARY RESULTS

FSC ARCHITECTS & ENGINEERS
ATTN: DELE MORAKINYO
4910 53 ST PO BOX 1777
YELLOWKNIFE NT X1A 1V2

DATE: 06-SEP-05 05:20 PM

Lab Work Order #: L312455 **Sampled By:** DM **Date Received:** 31-AUG-05

Project P.O. #:

Project Reference:

Comments:

DOUG JOHNSON
Director of Operations, Edmonton

SANDRA WATSON
Account Manager

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L312455-1 S01-UT UNTREATED								
Sample Date: 27-AUG-05								
Matrix: WATER								
BTEX								
Benzene	0.0020		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Toluene	0.015		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Ethylbenzene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
m+p-Xylene	0.012		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
o-Xylene	0.015		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Xylenes	0.027		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
L312455-2 S02-UT UNTREATED								
Sample Date: 27-AUG-05								
Matrix: WATER								
F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	5.1		0.05	mg/L	01-SEP-05	02-SEP-05	MKE	R321085
CCME TVH (C6-C10)								
F1(C6-C10)	0.2		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
F1-BTEX	0.1		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
L312455-3 S03-T TREATED								
Sample Date: 27-AUG-05								
Matrix: WATER								
BTEX								
Benzene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Toluene	0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Ethylbenzene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
m+p-Xylene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
o-Xylene	0.0019		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Xylenes	0.0019		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
L312455-4 S04-T TREATED								
Sample Date: 27-AUG-05								
Matrix: WATER								
F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	0.77		0.05	mg/L	01-SEP-05	06-SEP-05	AAT	R321440
CCME TVH (C6-C10)								
F1(C6-C10)	<0.1		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
F1-BTEX	<0.1		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
L312455-5 S05-D DISCHARGE LOC.								
Sample Date: 27-AUG-05								
Matrix: WATER								
BTEX								
Benzene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Toluene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Ethylbenzene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
m+p-Xylene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
o-Xylene	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
Xylenes	<0.0005		0.0005	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
L312455-6 S06-D DISCHARGE LOC.								
Sample Date: 27-AUG-05								
Matrix: WATER								

ENVIRO-TEST ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier	D.L.	Units	Extracted	Analyzed	By	Batch
L312455-6 S06-D DISCHARGE LOC.								
Sample Date: 27-AUG-05								
Matrix: WATER								
F1 (C6-C10) and F2 (>C10-C16)								
F2 (>C10-C16)	<0.05		0.05	mg/L	01-SEP-05	02-SEP-05	MKE	R321085
CCME TVH (C6-C10)								
F1(C6-C10)	<0.1		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869
F1-BTEX	<0.1		0.1	mg/L	02-SEP-05	02-SEP-05	EJA	R320869

Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Methods Listed (if applicable):

ETL Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
BTX-PT-ED	Water	BTEX	EPA 5030	EPA 5030/8260 P&T GC-MS
F2-ED	Water	F2 (>C10-C16)		EPA 3510/8000-GC-FID
TVH-CCME-F1-ED	Water	CCME TVH (C6-C10)	EPA 5030	EPA 5030/8015-P&T GC/FID

F1 does not include BTEX

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

50872

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	Enviro-Test Laboratories - Edmonton, Alberta, Canada		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency. The Laboratory warning units are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million
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< - Less than
D.L. - Detection Limit
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
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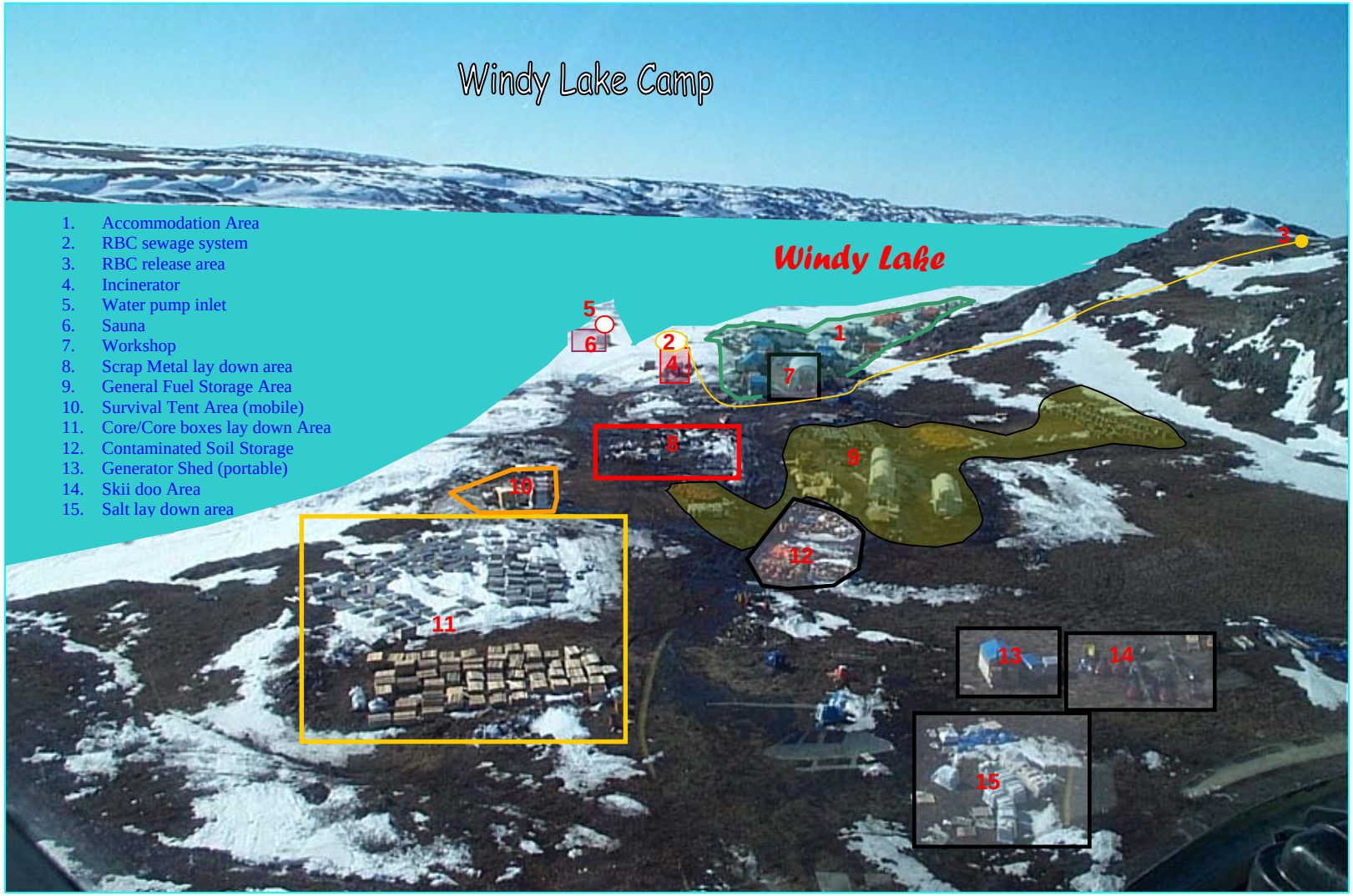
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

Enviro-Test Laboratories has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, Enviro-Test Laboratories assumes no liability for the use or interpretation of the results.

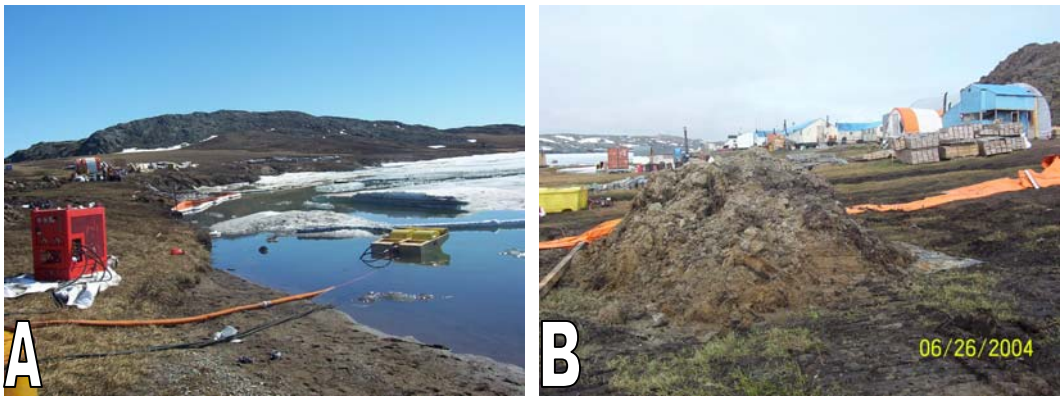
Appendix D
SITE MAP OF WINDY LAKE CAMP


Windy Lake Camp
1. Accommodation Area
2. RBC sewage system
3. RBC release area
4. Incinerator
5. Water pump inlet
6. Sauna
7. Workshop
8. Scrap Metal lay down area
9. General Fuel Storage Area
10. Survival Tent Area (mobile)
11. Core/Core boxes lay down Area
12. Contaminated Soil Storage
13. Generator Shed (portable)
14. Skii doo Area
15. Salt lay down area
Windy Lake
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

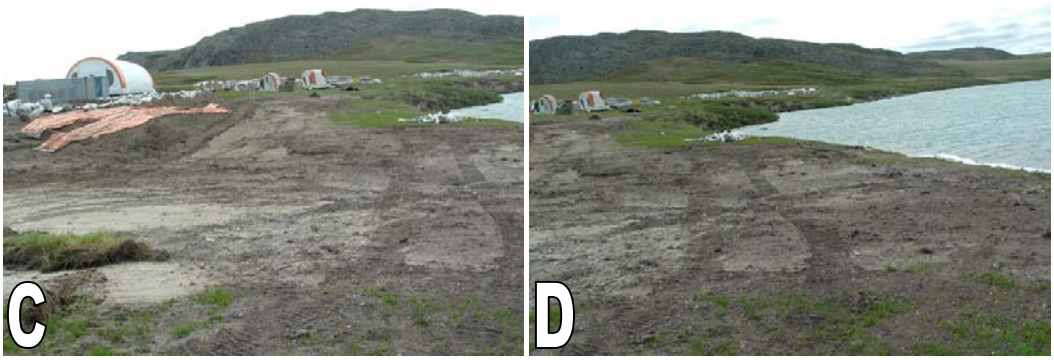
Appendix E
Bioremediation of Soil on the Strip of Land Adjacent to the Lake by Miramar

Use of peat moss in some areas at Windy Lake absorbent pad became no longer effective or cause more garbage problem due to strong wind action or lack of close supervision in monitoring and removing saturated pads.

Photos in 2004 (A & B) show land strip between LTA and Windy Lake. A: recovering oil using a skimmer. B: A portion of area excavated and placed on a liner before moving into the LTA.



Photos taken in 2005 (C & D) show land strip between LTA and Windy Lake. Portion of topsoil scraped and moved into the LTA to make way for placing of borrowed grass used in reclamation and erosion control between LTA and Windy Lake land strip.



Photos taken in 2005 (E & F) show land strip between LTA and the road leading to the jetty. Portion of topsoil scraped and moved into the LTA to make way for placing of borrowed grass used in reclamation and erosion control.

Photos taken in 2005 (G & H). Photo G shows patch areas of native grass. Some of the grasses from these areas were randomly selected and used for reclamation and erosion control between bare land strip between LTA and Windy Lake front.

Photos taken in 2005 (I & J) showing mats of borrowed natives grasses placed on bare strip between LTA and Windy Lake front. The objectives were to slow down runoffs thus allowing eroded sediments to settle and promote natural grass growth.