# Windy Lake Exploration Camp

# June 16 2004 Spill Updated Progressive Report

# Spill Number 04-388


MIRAMAR HOPE BAY LIMITED

**Revised document – February 27, 2005**

Prepared by: Matthew H Kawei
Senior Environmental Coordinator

Document # MHBLENV-04-2005
February 2005

# 1.0 EXECUTIVE SUMMARY

## 1.1 Overview

On the morning of Wednesday June 16, 2004, an employee of MHBL on his routine morning inspection noticed a strong smell of hydrocarbon in the air. Further investigation revealed that diesel fuel was siphoning out of a 50,000 litre above ground storage tank (AST) located inside a naturally made berm east of the helipad. The employee quickly notified his immediate supervisor; the site supervisor then activated the MHBL Emergency Response Plan procedures protocols.

A senior staff representative responsible for Miramar Hope Limited, using the 24-hr NWT Spill Report Line reported the spill on June 16, 2004. An incident report submitted thereafter to regulatory authorities. The reported spill registered as Spill Number 04-388.

## 1.2 Facts relating to incident (Spill Number # 04-388)

Table 1 provides summary data of the findings into the spill incident. The root causes identified were - (i) failure by operators to utilize the fuel transferring system. The new system for fuel dispensing was installed prior to the incident; and (ii) use of substandard equipment for dispensing fuel from the 50,000 L AST tank. Two pieces of general-purpose hose secured together by a "hose joiner and clamps" that was not suitable for such a task.

Table 1 A summary table giving aspects, impacts, and root cause of the incident.

| Aspect | Impact/Activity | Comments |
|---|---|---|
| Reported Fuel Siphoned (Spill Number 04-388) | 19,000 Litres | Volume derived from last dip reading (evening of June 15 2004) |
| Total Recovered Fuel | 9,062 litres | 8,250 Litres immediate and additional 810 litres from unburned absorbent pads. Process continuing. |
| Incineration (Insitu) | 2,750 to 5,500 litres | Estimated volume (range) |
| Fuel unaccounted | 4,438 to 7,185 litres | Lost to burning of absorbent pads and still trap in absorbent pads for further processing |
| Impacted total surface Area | Estimated 3,500 $m^2$ | Land and Lake surface |
| Recycle Contaminated fuel | 9,062 Litres | Estimated recovered fuel used for camp heating to date |
| Root cause of incident | (i) Failure to utilize the fuel transferring system. | A new secured system for fuel dispensing was installed prior to the incident. |
| Root cause of incident | (ii) Use of substandard equipment | (i) Wrong type of joiner and clamps were used in securing 2 fuel lines together; and (ii) 2 hoses were used rather than one. |
| Immediate Cause | Gust wind blowing that night pulled the hose apart thus letting fuel to siphon out of an AST 50,000 L tank. | Hose was not secured. Improper procedure utilized for fuel transferring. Poor house keeping. |

## 1.3 Water Quality

Two additional sets of water samples were colleted from Windy Lake after the ones collected by EBA consultants in July 2004. Sample collection, preservation and transportation followed procedure out lined by EBA Engineering consultants. Enviro-Test Laboratory based in Edmonton, supplied specially prepared sample bottles. The samples collected in August and September was from the same location as those collected by EBA in July of 2004 at Windy Lake.

A comparison of the results made with the Alberta Soil and Water quality guidelines for hydrocarbons at upstream oil and gas facilities in the absences of a Nunavut guideline. All samples analysed were - (a) below analytical detection limits; and (b) results were within the Alberta Guidelines for hydrocarbons for the protection of human consumption, wildlife consumption and use for all parameters tested. This indicates that there is no evidence of fuel seepage from the impacted area into Windy Lake at these selected sampling locations.

### 1.4 Long Term Water and Soil Monitoring

Also presented is this report is a proposed long-term water and soil quality monitoring work plan for continued impact monitoring at Windy Lake. The work plan also covers water and soil sampling at Boston Camp with the anticipated implementation starting in 2005.

### 1.5 Land Treatment Area (LTA) Management

Work will continue with the management of the LTA's at both Windy Lake and Boston Camps. For Windy Lake, this will involve continuation with spreading of the contaminated topsoil within the lined LTA. Previously contaminated topsoil currently stored in 45-gallon barrels will be emptied into the LTA. To accelerate the rate of treatment for the topsoil during aeration process, addition of peat moss and mixing with the contaminated soil is vital.

As for Boston LTA, once the contaminated soil have been tested and confirmed as safe for use, the treated soil will be removed from the bio cells and spread over identified areas that needed reclamation, such as old drill sites and specific areas along the land airstrip. Contaminated soil from other areas on the Belt currently stored in 45-gallon drums at Boston will be emptied and spread into the LTA for treatment

### 1.6 Fuel Storage Management

A secondary lined containment berm will be constructed in 2005 at Windy Lake. The facility will be big enough to contain not only a 50,000 L AST tank and a 70,000 L AST tank but also the Jet B and gas drums. The second 70,000 L AST tanks currently stationed at Windy Lake will be relocated to Patch Lake in the winter of 2005. The 50,000 L tank will be relocated to Patch Lake in the winter of 2006, as it is required at Windy Camp for constructing of the secondary containment there. Once Windy Lake camp has ceased operations, the final tank will be removed as outlined in the Windy Lake A&R Plan.

All topsoil identified as contaminated with petroleum products from these areas will be removed and treated in the lined LTA. A trench will be dug around the fuel farm to divert water runoffs into the lined trench around the LTA for treatment before being release via the sewage line onto the tundra.

All above ground storage (AST) tanks on Hope Bay Belt property will be enclosed within a lined secondary containment. This work is anticipated to start in 2005, pending approval from Kitikmeot Inuit Association (KIA).

# TABLE OF CONTENTS

**Page**

# 2.0 INTRODUCTION

## 2.1 General

This report is a brief following-up on the work done since the last reported submitted to KIA 30 days after the reported spill. It provides details on the continuing remediation work that has taken place since the last report and puts forward a long-term work plan strategy for water and contaminated soil monitoring for implementation during 2005 exploration season at both Windy Lake and Boston Camps.

## 2.2 Site Location and Description

Located in western Nunavut, east of Bathurst Inlet within the Hope Bay Greenstone Belt, Windy Lake lies within the zone of continuous permafrost at approximately 68°03'99.1"N and 106°36'55.6"E.

The site consists of an approximate 100-person camp constructed for support services directed towards exploration activities. The camp is situated on the slope of the eastern bank of Windy Lake. The lakeshore is approximately 50 m distant toward the west and the regional gradient surrounding the camp ranges from approximately 2% to 20% towards the west. The camp is approximately 400 metres (m) in length from north to south and 100 m wide from east to west, covering an area of 40,000 $m^2$. The camp facilities are located on natural tundra underlain by a 10 cm organic layer overlying silt-sand parent material. In high traffic areas, no organic material was present.

Figure 1 shows photograph of the camp with the layout show in Appendix C of this report. The northern portion of the camp consists of a series of tents and wooden structures that comprise the sleeping and eating quarters. The camp has the capacity to accommodate approximately 100 personnel. Located immediately south of the sleeping quarters are a series of tents and wooden structures used for offices and a core logging area. Three aboveground storage tanks (AST), containing diesel fuel, are located south of the offices and have a capacity of 50,000 and 70,000 litres. A barrel storage area (approximately 200 drums of Jet-B fuel) is located to the northeast (upslope) of the ASTs. A second area, southeast of the ASTs, is used for storage of 60 barrels of gasoline.

The camp uses a RBC sewage treatment facility, which is located northwest of the site. The waste water is released from this unit is directed to an upland area situated north of the camp.

Solid wastes generate from the camp are segregated with food and paper products being incinerated within the camp incinerator. Wood and metal wastes are stored in the southern-most area of the camp. The waste wood is periodically burned in specially made cut out 45 gallons half-size 45-gallon drum erected on iron stands.

Potable water is obtained from Windy Lake with the freshwater intake being located directly west of the camp buildings.

## 2.3 Description of Spill Incident

On the morning of Wednesday June 16, 2004, an employee of MHBL on his routine morning inspection noticed a strong smell of hydrocarbon in the air. Further investigation revealed that diesel fuel was siphoning out of a 50,000 litre above ground storage tank (AST) located inside a naturally made berm east of the helipad. The employee quickly notified his immediate supervisor; the site supervisor then activated the MHBL Emergency Response Plan procedures protocols.

A senior staff representative responsible for Miramar Hope Limited, using the 24-hr NWT Spill Report Line reported the spill on June 16, 2004. An incident report submitted thereafter to regulatory authorities. The reported spill registered as Spill Number 04-388.

Figure 1 Aerial photograph showing Windy Lake looking east to west.


## 2.4 Previous EBA Report Recommendations

A report by EBA submitted to KIA on behalf of Miramar Hope Bay Limited recommended the following on-going remediation and monitoring of the impacted area: - *A remediation action Plan should be developed to address the following issues [page10].*

### 2.4.1 Mechanical Aeration of Soil within Land farm

*Soil within the LTA should cleared of all large objects, segregated based on the date the material was placed in the LTA, and periodically aerated to promote remediation [page11].*

### 2.4.2 Continued Treatment of Contained Water

*All water captured in the catch basics installed at the southeast corner of the interception trench should be removed and treated prior to discharge [page 11]*

#### 2.4.3 Containment of Remaining Impacted Soil Surrounding the AST's

*Diesel fuel impacted soil located immediately below the tank was not excavated due to the proximity of the tank and the concern that, by moving the material, the sol stability could be compromised, resulting in damage to the tank. Therefore, it recommended that this area be dewatered using a serious of diversion trenches installed upslope to control surface runoff through the area. The impacted soil in this area should also be covered with waterproof material prior to snowfall to further limit melt water migration through the soil. These methods are recommended until such time as the soil can be safely excavated and placed into the LTA for remediation [page 11].*

### 2.5 Scope of Reporting

This report provides a summary of the work completed at the site; ongoing work and long-term management strategy on prevent such unforeseen incidences and management of the LTA at Windy Lake and Boston Camp.

Section 2 of the report gives a brief account of the general description of the Windy Lake and the unforeseen incident. Recommendation of the previous report by EBA is spelt out in this section.

Section 3 provides analytical results of two additional sets of water samples collected in August and September at Windy Lake. Comparisons of these datasets were made with the Alberta Water Quality guidelines for hydrocarbon.

Sections 4, 5 and 6 of the report provide a brief on current ongoing clean up process and recommends long-term management strategies, while Section 7 lists in bullet form, concluding items that MHBL would like to achieve in 2005 and beyond. References and Appendices are provided in Sections 8 and 9 respectively.

## 3.0 WINDY LAKE WATER SAMPLING

Two additional sets of water samples were colleted from Windy Lake after the ones collected by EBA consultants in July 2004. Sample collection, preservation and transportation followed procedure out lined by EBA Engineering Consultants. Enviro-Test Laboratory based in Edmonton, supplied specially prepared sample bottles. The samples collected in August and September were from the same location as those collected by EBA Engineering Consultants in July of 2004 at Windy Lake.

The sites are shown in Appendix C, however brief descriptions of the sites are as follows:-

- Lake North: - Water sampling station east side of the jetty;
- Lake Spill: - Water sampling stations directly below the land treatment area (LTA);
- Lake South: - Water sampling station about 50 meters east of Lake Spill station directly below the core empty core boxes yard;
- Tap Kitchen: - Water sample taken from the kitchen.

### 3.1 Surface Water Samples - August 17 2004

#### 3.1.1 August 17 2004 Water Sample Results

Table 2 show analytical results received from Enviro-Test Laboratory. A comparison of the results made with the Alberta Soil and Water quality guidelines for hydrocarbons at upstream oil and gas

facilities in the absences of a Nunavut guideline show all samples analysed were below analytical detection limits for all parameters tested. A further comparison with the Alberta guidelines indicate that all parameter tested were within published guidelines except for F2 (0.00016 mg/L) for freshwater aquatic use. It was not possible to determine the actual number as the laboratory analytical detection limits for F2 was set at 0.05 mg/L. Appendix A provides the analytical results for water samples collected in August 2004.

Table 2. Analytical results for water quality samples collected at Windy Lake, August 17 2004. All units are in mg/L.

| **Matrix – Water** | **Benzene** | **Toluene** | **Ethyl benzene** | **Xylenes** | **F1** | **F2** |
|---|---|---|---|---|---|---|
| Lake North | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Spill Area | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Lake South | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Tap Kitchen | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| **(Lab detection Limit (mg/L)** | **0.0005** | **0.0005** | **0.0005** | **0.0005** | **0.1** | **0.05** |
| ***Criteria – Alberta Soil & Water Quality Guidelines for Hydrocarbons at Upstream Oil & Gas Facilities*** | | | | | | |
| Human Drinking Water | 0.005 | 0.024 | 0.0024 | 0.3 | 4.6 | 2.1 |
| Freshwater Aquatic Use | 0.370 | 0.002 | 0.090 | 0.180 | 0.017 | 0.00016 |
| Livestock Watering (cattle) | 0.51 | 29 | 19 | 76 | 62 | 57 |
| Wildlife Watering | 1.2 | 69 | 45 | 180 | 150 | 140 |

## 3.2 Surface Water Samples - September 28 2004

### 3.2.1 September 2004 Water Sample Results

Table 3 show analytical results received from Enviro-Test Laboratory. A comparison of the results made with the Alberta Soil and Water quality guidelines for hydrocarbons at upstream oil and gas facilities in the absences of a Nunavut guideline show all samples analysed were below analytical detection limits for all parameters tested. A further comparison with the Alberta guidelines indicate that all parameter tested were within published guidelines except for F2 (0.00016 mg/L) for freshwater aquatic use. It was not possible to determine the actual number as the laboratory analytical detection limits for F2 was set at 0.05 mg/L. Appendix B provides the analytical results for water samples collected in September 2004.

Table 3. Analytical results for water quality samples collected at Windy Lake, September 28 2004. All units are in mg/L.

| **Matrix – Water** | **Benzene** | **Toluene** | **Ethyl benzene** | **Xylenes** | **F1** | **F2** |
|---|---|---|---|---|---|---|
| Lake North | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Spill Area | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Lake South | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| Tap Kitchen | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.1 | <0.05 |
| **(Lab detection Limit (mg/L)** | **0.0005** | **0.0005** | **0.0005** | **0.0005** | **0.1** | **0.05** |
| ***Criteria – Alberta Soil & Water Quality Guidelines for Hydrocarbons at Upstream Oil & Gas Facilities*** | | | | | | |
| Human Drinking Water | 0.005 | 0.024 | 0.0024 | 0.3 | 4.6 | 2.1 |
| Freshwater Aquatic Use | 0.370 | 0.002 | 0.090 | 0.180 | 0.017 | 0.00016 |
| Livestock Watering (cattle) | 0.51 | 29 | 19 | 76 | 62 | 57 |
| Wildlife Watering | 1.2 | 69 | 45 | 180 | 150 | 140 |

# 4.0 SOLID WASTE MANAGEMENT

## 4.1 Spill Area

The site was surveyed on June 17, 2004 by EBA and Miramar to determine the surficial area of diesel fuel impacts on both land and water.

### 4.1.1 Land

The surveyed boundary for the impacted area on the land was based upon EBA's visual identification of diesel fuel within the soil or surface drainage network. The estimated surficial area of hydrocarbon impacts on land was 2,400 $m^2$.

### 4.1.2 Water

The surficial area of melt-water on the ice surface was estimated at 1,100 $m^2$. The total area, both on land and water affected by the spill was estimated to be 3,500 $m^2$.

The insitu incineration site was cleaned by safely walking over the area and removing debris while the ice was considered safe. During the summer months, further cleaning was done using a boat to collect floating debris along the lake shorelines. Absorbent booms that were visibly saturated and partially sinking were replaced immediately. Saturated booms were disposed of in cutout half 45-gallon drums wielded on a stand. This was used in preference to 45 gallons drums standing on the ground.

### 4.1.3 Trench Clean-up

A runoff containment trench was excavated using a Kubota 320 to redirect surface runoff to further reduce the risk of hydrocarbon migration from any residual source areas into Windy Lake. The trench was excavated to a depth of approximately 1 m, lined on the down-gradient wall and base with hydrocarbon resistant high-density polyethylene (HDPE) liner. A catch basin was installed at the southeast corner. The basin, consisting of a 205-litre drum with holes drilled along the sides, will allow water to be pumped out, deterring further migration of hydrocarbons by creating a flow gradient towards the basin and the removal of potentially impacted water. The excavated trench was later backfilled with uncontaminated excavated material.

### 4.1.4 Solid Waste placement

Solid wastes; from batteries, metal scraps, iron rods to house hold items were relocated from the previously lay down area (current LTA location) to a new location east of the fuel storage area.
These items are arranged in such a way that it can be easily removed of the property during winter months to a designated landfill area either on the Belt or in Yellowknife. Other materials near the spill area were relocated to new areas.

## 4.2 Contaminated Fuel Reclamation

### 4.2.1 Recycle of contaminated fuel

A total volume of 9,062 litres has been recovered from contaminated fuel stored in 45-gallon drums and from absorbents pads stored in drums. All recovered contaminated fuels were used for camp heating, power generation or in the garbage incinerator.

### 4.3 Contaminated Area Reclamation

#### 4.3.1 Biodegradable peat moss

Biodegradable peat moss grains were spread over areas that were contaminated either directly or indirectly by spillage. The objective was to utilize other products that have been environmentally proven in such clean up and absorb the petroleum products in the soil where absorbent pads were no longer effective. Once individual grain was saturated, new peat moss grains were added until the peat moss grains were visibly not saturated anymore (see photos below). Peat moss was effective in removing petroleum products.



## 5.0 ON-GOING REMEDIATION AND LONG TERM MANAGEMENT STRATEGY

### 5.1 Land Treatment Area Management

The LTA was constructed using a 60-mil high-density polyethylene (HDPE) liner underlain by native soil consisting of silt sand. The liner was put into placed on June 29, 2004 and the contaminated soil spread over on June 30 as shown in the photographs below. The surficial area of the land treatment area (inside corners used for measurement) is 600 $m^2$.



The area topographically down gradient of the storage tanks was the primary location of hydrocarbon impacts to the soil. The impacted soil was stripped from the areas where hydrocarbon odours and staining were detected. The soil was stripped using a D5 CAT Dozer to an approximate depth of 10 cm below surface grade where frozen ground was encountered.

The whole area surrounding the lined LTA is designated as a contaminated site until such time that MHBL is satisfied with the on-going remediation. The area is cleared of any debris or any other solid wastes. The estimated volume of contaminated soil currently placed into the lined LTA is approximately 100 $m^3$.

## 5.2 Water Treatment and Discharge

Water abstracted during spring runoffs from the interception trench will be treated using the FII Oil Absorption System supplied by Terry Ruddy Sales of Edmonton, Alberta. The water was first pumped into 1,400 litre capacity basins for coarse sediment removal then processed though the system. Following treatment, the water was pumped to the discharged of the camp's RBC sewage treatment facility located to the northwest of the site and released into the tundra situated north of the camp. All spent media from the water treatment unit will be placed within the LTA as recommended by the supplier. Water samples will continue to be collected at the time of each processing.

## 5.3 2005 Lake Water and LTA Contaminated Soil Quality Sampling Work Plan

Work plan outlined below is for monitoring of water and soil quality at specific locations at Windy Lake in later part of spring, summer and early part of fall of 2005. A similar strategy will be implemented in 2005 for Spyder Lake, Boston Camp.

- Water sampling in Windy Lake watershed, including the inlet and outlet of the same lake (5 samples per sampling trip);
- Water sampling in Spyder Lake watershed, including the inlet and out of the same lake (5 samples per sampling trip); and
- One set of water sample from a kitchen tap at Windy Lake and Boston Camps respectively.

The work plan is based on the following stated assumptions regarding: -

- Timing of the opening of the camp at each respective site;
- The time of ice break-up in each lake; and
- Availability of air transportation on-site during early spring for sampling.

### 5.3.1 Task 1 – Windy Lake Water Sampling

The critical period for water sampling is being identified as early spring snow/ice melts both on land and in the lake. This is the period by which, if any fuel that is still trap in the top soil or any fuel spillage during the winter fuel transfer will likely be leached into the lake.

Table 4 shows the frequency of water samples to be collected in each month during the exploration season. The water samples will only be collected when Windy Lake Camp is open for the 2005 exploration program. Note that two (2) sets of water samples will be collected in June and July in 2005, while only one sample will be collected in August and September. The months of June and July are identified as the most critical months for water sampling due to the spring snow/ice melts. It is anticipated that this task will require a minimum of one day of field work and 40 water samples collected over the period.

This task would be undertaken in conjunction with Task 2 and would require the presence of an external consultant who would be on-site to undertake water quality measurements and sampling during the projected sampling schedule. In subsequent sampling, one onsite MHBL staff member will conduct the water quality sampling.

The water samples will be collected using the approved sampling protocols previously used by MHBL personnel. The following Windy Lake locations will be sampled in 2005, depending on the availability of a helicopter during the early part of the program.

- North Lake
- Spill Lake
- South Lake
- Windy Lake Inlet – Open water
- Windy Lake Outlet – Open water
- Tap - Kitchen
- Reference (Control) Site

At four locations North Lake, Spill Lake, South Lake and Tap Kitchen will be sampled regularly as these sampling sites are within walking distance. For each sample collection, a standard water sampling method will be used. Physical water quality parameters will be measured at the time of sampling for each site. The water sampling locations are shown in Appendix C.

Table 4. Frequency of water samples to be collected at Windy Lake in 2005

| Period | Inlet Windy | South Lake | Spill Lake | North Lake | Outlet Windy | Tap Kitchen | Reference Site |
|---|---|---|---|---|---|---|---|
| June[b] | X[a] | X | X | X | X[a] | X | X |
| June[b] | X[a] | X | X | X | X[a] | X | |
| July[b] | X | X | X | X | X | X | X |
| July[b] | X | X | X | X | X | X | |
| August | X | X | X | X | X | X | X |
| September | X | X | X | X | X | X | X |

(a) If weather conditions permits samples will be taken. However, ice conditions in the inlet and outlet channels will likely preclude water sampling until mid to late June.

(b) Twice a month sampling. This period is being identified as the most crucial time of sampling due to the thawing of the snow /ice thus subsequent runoffs into the aquatic environment.

### 5.3.2 Task 2 - Windy Lake LTA Contaminated Top Soil Sampling

This task would be undertaken in conjunction with Task 1 and would require the presence of an external consultant who would be on-site to undertake soil sampling during the projected sampling schedule. In subsequent sampling, one onsite MHBL staff member will conduct the soil sampling.

Soil samples will be collected from each quadrant as a discrete sample and as a composite sample for each quadrant as shown in Appendix D. All samples will be field screened for volatile organic compounds (VOC) level. Soil samples that show the highest headspace vapours from each bio cell will be sent to an external laboratory for analytical analyses of BTEX concentrations. A composite sample from each bio cell will also be submitted to an external laboratory for analytical analyses of PHCs (F1-F4) concentrations. All sampling sites will be surveyed.

Table 5 shows the frequency and the number of soil samples to be collected during the duration of the 2005 exploration program at Windy Lake. A total of 36 composite samples will be collected and analysed in 2005. This number might increase if individual sample returns with a high headspace vapours within each quadrant.

The soil samples will be collected using the approved sampling protocols previously used by MHBL personnel.

Table 5. Frequency of soil samples to be sampled from Windy Lake Land Treatment Area (LTA) in 2005

| Period | LTA (A) | LTA (B) | LTA (C) | LTA (D) | LTA (E) | LTA (F) | LTA (G) | LTA (H) | Reference Site |
|---|---|---|---|---|---|---|---|---|---|
| June | X[c] | X[c] | X[c] | X[c] | X[c] | X | X | X | X |
| July | X[c] | X[c] | X[c] | X[c] | X[c] | X | X | X | X |
| Aug | X[c] | X[c] | X[c] | X[c] | X[c] | X | X | X | X |
| Sep | X[c] | X[c] | X[c] | X[c] | X[c] | X | X | X | X |

(c) Soil samples will be collected at these sites only if contaminated soils are placed in these bio cells (quadrants).

### 5.3.3 Task 3 – Boston Camp Spyder Lake Water Sampling

The critical period for water sampling is being identified as early spring snow/ice melts both on land and in the lake. This is the period by which, if any fuel that is still trap in the top soil or any fuel spillage during the winter fuel transfer will likely to be leached into the lake.

Table 6 shows the frequency of water samples to be collected in each month during the exploration season. The water samples will only be collected when Boston Camp is open for the 2005 exploration program. Note that two (2) sets of water samples will be collected in June and July in 2005, while only one sample will be collected in August and September. The months of June and July are identified as the most critical months for water sampling due to the spring snow/ice melts. It is anticipated that this task will require a minimum of one day of field work and 40 water samples collected over the period.

This task would be undertaken in conjunction with Task 4 and would require the presence of an external consultant who would be on-site to undertake water quality measurements and sampling during the projected sampling schedule. In subsequent sampling, one onsite MHBL staff member will conduct the water quality sampling.

The water samples will be collected using the approved sampling protocols previously used by MHBL personnel. The following Spyder Lake locations will be sampled in 2005, depending on the availability of a helicopter during the early part of the program.

- North Lake
- Camp Water Intake
- South Lake
- Spyder Lake Inlet – Open water
- Spyder Lake Outlet – Open water
- Tap - Kitchen
- Reference (Control) Site

At four locations North Lake, Camp Water Intake, South Lake and Tap Kitchen will be sampled regularly as these sampling sites are within walking distance. For each sample collection, a standard water sampling method will be used. Physical water quality parameters will be measured at the time of sampling for each site. The water sampling locations are shown in Appendix E.

Table 6. Frequency of water samples to be collected at Spyder Lake, Boston Camp in 2005

| Period | Inlet Spyder | South Lake | Camp Water Intake | North Lake | Outlet Spyder | Tap Kitchen | Reference Site |
|---|---|---|---|---|---|---|---|
| June[e] | X[d] | X | X | X | X[d] | X | X |
| June[e] | X[d] | X | X | X | X[d] | X | |
| July[e] | X | X | X | X | X | X | X |
| July[e] | X | X | X | X | X | X | |
| August | X | X | X | X | X | X | X |
| September | X | X | X | X | X | X | X |

(d) If weather conditions permits samples will be taken. However, ice conditions in the inlet and outlet channels will likely preclude water sampling until mid to late June.

(e) Twice a month sampling. This period is being identified as the most crucial time of sampling due to the thawing of the snow /ice thus subsequent runoffs into the aquatic environment.

### 5.3.4 Task 4 – Boston Camp Soil Sampling

This task would be undertaken in conjunction with Task 3 and would require the presence of an external consultant who would be on-site to undertake soil sampling during the projected sampling schedule. In subsequent sampling, one onsite MHBL staff member will conduct the soil sampling.

Soil samples will be collected from each quadrant as a discrete sample and as a composite sample for each quadrant as shown in Appendix F. All samples will be field screened for volatile organic compounds (VOC) level. Soil samples that show the highest headspace vapours from each bio cell will be sent to an external laboratory for analytical analyses of BTEX concentrations. A composite sample from each bio cell will also be submitted to an external laboratory for analytical analyses of PHCs (F1-F4) concentrations. All sampling sites will be surveyed.

Table 7 shows the frequency and the number of soil samples to be collected during the duration of the 2005 exploration program at Boston Camp. A total of 36 composite samples will be collected and analysed in 2005. This number might increase if individual sample returns with a high headspace vapours within each quadrant.

The soil samples will be collected using the approved sampling protocols previously used by MHBL personnel.

Table 7. Frequency of soil samples to be sampled from Boston Camp Land Treatment Area (LTA) in 2005

| Period | LTA (A) | LTA (B) | LTA (C) | LTA (D) | LTA (E) | LTA (F) | LTA (G) | LTA (H) | Reference Site |
|---|---|---|---|---|---|---|---|---|---|
| June | X | X | X | X | X | X | X | X | X |
| July | X | X | X | X | X | X | X | X | X |
| August | X | X | X | X | X | X | X | X | X |
| September | X | X | X | X | X | X | X | X | X |

#### 5.3.5 Land Treatment Area (LTA) Management

Work will continue with the management of the LTA's at both Windy Lake and Boston Camps. For Windy Lake, this will involve continuation with spreading of the contaminated topsoil within the lined LTA. Previously contaminated topsoil currently stored in 45-gallon barrels will be emptied into the LTA. To accelerate the rate of treatment for the topsoil during aeration process, addition of peat moss and mixing with the contaminated soil is vital.

As for Boston LTA, once the contaminated soil has been tested and confirmed as safe for use, the treated soil will be removed from the bio cells and spread over identified areas that needed reclamation, such as old drill sites and specific areas along the land airstrip. Contaminated soil from other areas on the Belt currently stored in 45-gallon drums at Boston will be emptied and spread into the LTA for treatment.

The abandonment and reclamation of the LTAs at both camps will include removal of the liners and pushing back of the berm to cover the area. A detail plan of the closure scenario for each LTA will be outlined in the Abandonment and Reclamation Plan for respective camps.

#### 5.3.6 Task 5 – Training

The water quality and soil sampling protocol training will be given to selected MHBL personnel at Boston and Windy Lake Camps. This training will be conducted by a third party consultant during the initially sampling trip in 2005.

The objective of this training is to ensure that there is good coverage of trained and competent personnel in collecting water and soil samples thereby reducing the risks of samples not been taken in the absence a third party consultant or the onsite environmental personnel.

#### 5.3.7 Task 6 – Data Management

All data received electronically from the external laboratory will be imported into an Access database, specially designed for environmental data and stored on the MHBL server in Vancouver. Hard copies of the results will be filed at respective exploration camps.

#### 5.3.8 Task 7 – Reporting

A report will be prepared by a third party, with a brief summary of the results for both water and soil reported in the month-end report together with other routine water sampling regimes as per the operating permit requirements.

Depending on the turn around period for the analytical results to be available to MHBL, the reported data for the previous month will be reported in the following month-end report. A copy of the raw data will be attached as an appendix to the report and sent to regulatory authorities. All reports and raw data will be submitted to regulatory authorities in Acrobat PDF format.

#### 5.3.9 Analytical Analyses

An accredited external laboratory will be contracted to undertake all media samples for chemical analyses using appropriate analytical procedures. Where possible at the time of field sampling, insitu general water quality physical parameters will be measure and will include air temperature, water temperature, dissolved oxygen, conductivity, and hydrogen ions (pH). All data will be recorded into

a field notebook and later transferred in an Access database. Water and soil samples will tested for the following parameters.

***Water Samples***

- Benzene
- Toluene
- Ethylbenzene
- Xylenes (BTEX)
- PHCs (F1& F2)

***Soil Samples***

- Volatile Organic Compounds (VOC) levels – insitu measurements
- BTEX concentrations
- PHCs (F1-F4) concentrations

## 6.0 MHBL MANAGEMENT PROACTIVE APPROACH

Senior MHBL personnel, to ensure unforeseen incidents of such magnitude be eliminated, issued a series of directives to take effect immediately, which included enclosing of all AST tanks on property with a lined secondary containment. This work is anticipated to start in 2005, pending approval from KIA. Work is in progress to complete the application.

## 7.0 CONCLUSION

### 7.1 Minimization or Elimination of Negative Impacts

Miramar Hope Bay Limited will continue to look for ways to minimise or eliminate negative impacts to the receiving as a result to its activities along the Hope Bay Belt projects. This will be done by instigating:

(i) Implementing where appropriate, changes to procedures and communicating them effectively to employees.

(ii) Consider developing a Management of Change (MOC) protocol to ensure that procedures are being followed before initiating a change to the process.

(iii) The Company is looking into the feasibility of installing an alarm system that will alert person in camp, via an audible alarm, of a rate of change in the tank levels.

(iv) A lined secondary containment berm to be built at each camp to storage petroleum products.

### 7.2 Ongoing Remediation

(i) Continue with soil aeration within the LTA and solid waste management.

(ii) Use peat moss and spread around the identified impacted area around between Windy Lake front and storage tank areas. The peat moss will absorb the remaining fuel trapped in the soil and any other uncontrolled release during winter months.

(iii) Diesel fuel-impacted soil located immediately below the tank at Windy Lake was not excavated due to the proximity of the tank and the concern that, by removing the material, the soil stability could be compromised, resulting in damage to the tank. It is

our plan to remove this soil during 2005 construction of the secondary containment berm and placed the contaminated soil into the LTA.

(iv) Continue with water and soil sampling.

(v) Continue with the monthly and weekly fuel storage inspection.

### 7.3 Long-term Strategy

(i) Construct lined secondary containment berms for all fuel storage tanks greater than 4,000 L on the Hope Bay Belt property.

(ii) Conduct monthly internal audits of the fuel management at all properties on the Hope Bay Belt project.

(iii) Develop Objectives and set achievable Targets – safety and environment.

(iv) Consider developing an integrated management system for safety and environment based on the principles of ISO 9001, 14001 and 18001.

(v) Identify Aspects and Impacts of the project and develop management strategies to mitigate the impacts.

(vi) Update Spill Contingency, Abandonment, and Restoration Plans for all property to include revised A&RP costing based on current knowledge of the project direction.

## 8.0 REFERENCES


- Alberta Environment, 2001. *Alberta Soil and Water Quality Guidelines for Hydrocarbon at Upstream Gas and Oil Facilities.*
- EBA engineering Consultants, July 2004. *Spill Assessment and Remediation, Windy Lake Nunavut.*

# 9.0 APPENDICES

## 9.1 Appendix A – Windy Lake August Water Samples Analytical Results

ETL Enviro-Test LABORATORIES

ANALYTICAL REPORT

MIRAMAR CON MINE LTD
**ATTN:** SCOTT STRINGER
PO BOX 2000
YELLOWKNIFE NT X1A 2M1

**DATE:** 24-FEB-05 09:14 AM

**Lab Work Order #:** L199389 **Sampled By:** MCRIPPS **Date Received:** 20-AUG-04
**Project P.O. #:**
**Project Reference:** HO5013 REQUISTION
**Comments:**

DOUG JOHNSON
Director of Operations, Edmonton

KAREN HUEBNER
Client Service Specialist

HO5013 REQUISTION

L199389 CONT

PAGE 2 of

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By |
|---|---|---|---|---|---|---|---|
| L199389-1 LAKE NORTH | | | | | | | |
| Sample Date: 17-AUG-04 17:00 | | | | | | | |
| Matrix: WATER | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 24-AUG-04 | 25-AUG-04 | AAT |
| **BTEX and F1 (C6-C10)** | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Toluene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| L199389-2 LAKE SPILL | | | | | | | |
| Sample Date: 17-AUG-04 17:00 | | | | | | | |
| Matrix: WATER | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 24-AUG-04 | 25-AUG-04 | AAT |
| **BTEX and F1 (C6-C10)** | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Toluene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| L199389-3 LAKE SOUTH | | | | | | | |
| Sample Date: 17-AUG-04 17:00 | | | | | | | |
| Matrix: WATER | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 24-AUG-04 | 25-AUG-04 | AAT |
| **BTEX and F1 (C6-C10)** | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Toluene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| L199389-4 TAP KITCHEN | | | | | | | |
| Sample Date: 17-AUG-04 17:00 | | | | | | | |
| Matrix: WATER | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 24-AUG-04 | 25-AUG-04 | AAT |
| **BTEX and F1 (C6-C10)** | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Toluene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 23-AUG-04 | 24-AUG-04 | WSO |

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

**HO5013 REQUISTION** **L199389 CONTD....**

**PAGE 3 of 3**

# Reference Information

**Methods Listed (if applicable):**

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

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

Chain of Custody numbers:

097967

*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*
*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.*

## 9.2 Appendix B – Windy Lake September 28 2004 Water Samples Analytical Results

ETL EnviroTest LABORATORIES

ANALYTICAL REPORT

MIRAMAR CON MINE LTD
**ATTN:** SCOTT STRINGER
PO BOX 2000
YELLOWKNIFE NT X1A 2M1

**DATE:** 22-FEB-05 10:30 AM

**Lab Work Order #:** L212092 **Sampled By:** MCRIPPS **Date Received:** 30-SEP-04
**Project P.O. #:**
**Project Reference:** H 06260 REQUISTION
**Comments:**

DOUG JOHNSON
Director of Operations, Edmonton

RICK ZOLKIEWSKI
Client Service Specialist

H 06260 REQUISTION

L212092 CONTD....
PAGE 2 of 3

# ENVIRO-TEST ANALYTICAL REPORT

| Sample Details/Parameters | Result | Qualifier | D.L. | Units | Extracted | Analyzed | By | Batch |
|---|---|---|---|---|---|---|---|---|
| L212092-1 LAKE NORTH | | | | | | | | |
| Sample Date: 28-SEP-04 10:00 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 05-OCT-04 | 05-OCT-04 | MKE | R225743 |
| **BTEX and F1 (C6-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| L212092-2 LAKE SPILL | | | | | | | | |
| Sample Date: 28-SEP-04 10:00 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 05-OCT-04 | 05-OCT-04 | MKE | R225743 |
| **BTEX and F1 (C6-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| L212092-3 LAKE SOUTH | | | | | | | | |
| Sample Date: 28-SEP-04 10:00 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 05-OCT-04 | 05-OCT-04 | MKE | R225743 |
| **BTEX and F1 (C6-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| L212092-4 TAP KITCHEN | | | | | | | | |
| Sample Date: 28-SEP-04 10:00 | | | | | | | | |
| Matrix: WATER | | | | | | | | |
| **BTEX, F1 (C6-C10) and F2 (>C10-C16)** | | | | | | | | |
| F2 (>C10-C16) | <0.05 | | 0.05 | mg/L | 05-OCT-04 | 05-OCT-04 | MKE | R225743 |
| **BTEX and F1 (C6-C10)** | | | | | | | | |
| Benzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Toluene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| EthylBenzene | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| Xylenes | <0.0005 | | 0.0005 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1(C6-C10) | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |
| F1-BTEX | <0.1 | | 0.1 | mg/L | 03-OCT-04 | 03-OCT-04 | WSO | R224714 |

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

H 06260 REQUISITION

L212082 CONTD....

PAGE 3 of 3

## Reference Information

**Methods Listed (If applicable):**

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

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

Chain of Custody numbers:

*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 environmental 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.*

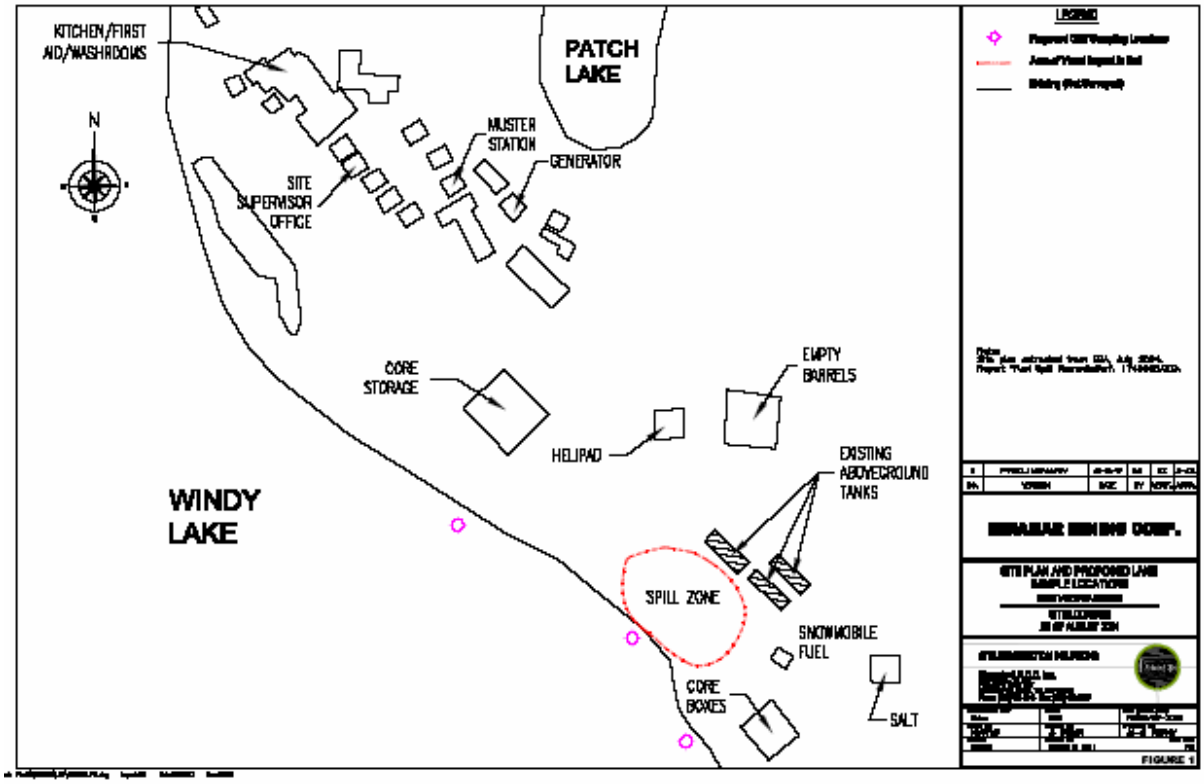
*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.*

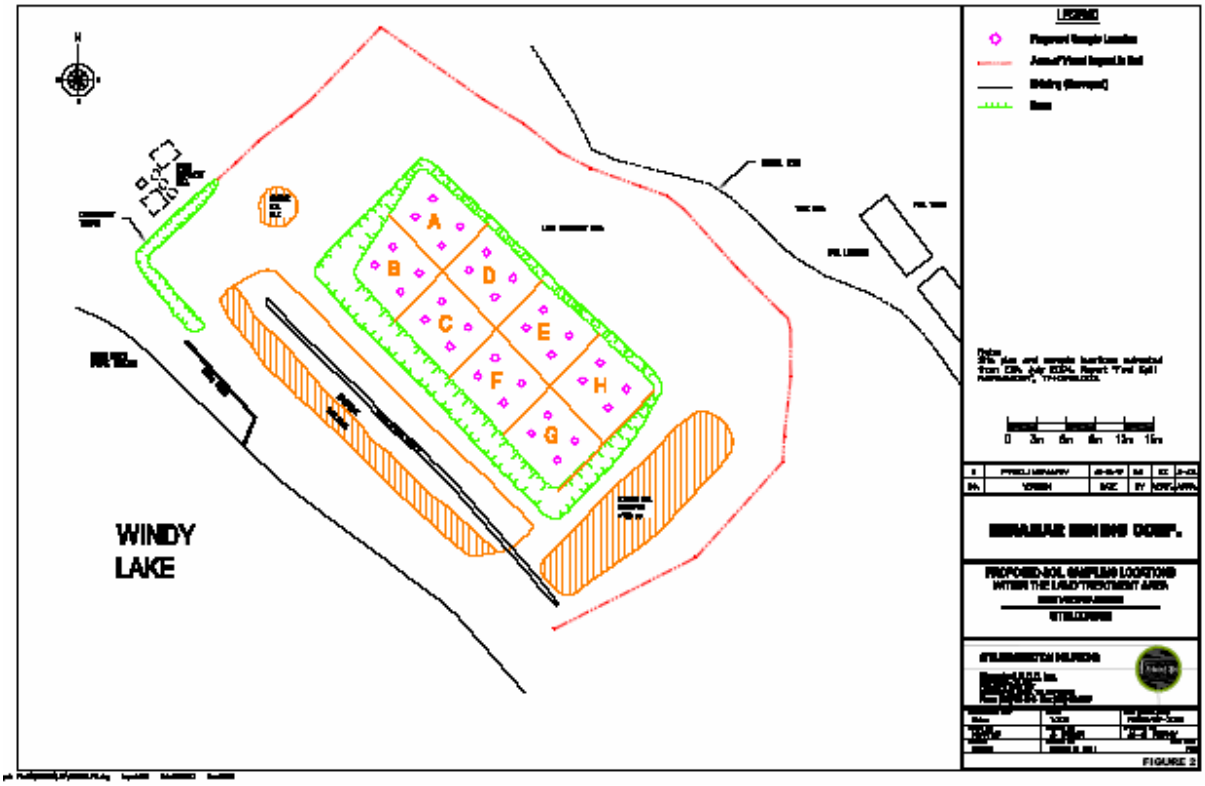
*Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.*

*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.*

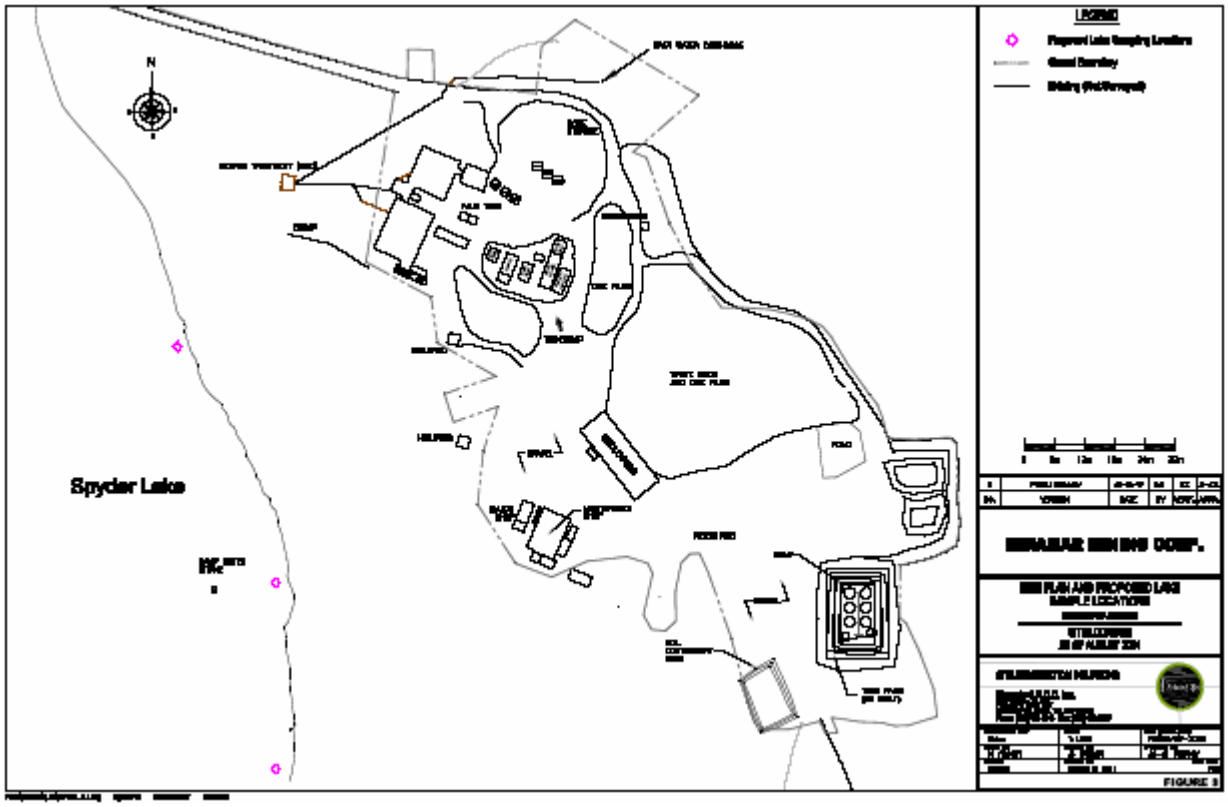
## 9.3 Appendix C - Windy Lake Water Sampling Locations




## 9.4 Appendix D - Windy Lake LTA Soil Sampling Locations



## 9.5 Appendix E - Boston Camp (Spyder Lake) Water Sampling Locations




## 9.6 Appendix F - Boston Camp LTA Soil Sampling Locations