**Review of Doris North Water Licence Application (NWB File # 2AM-DOH)**

Submitted by

Department of Environment
Government of Nunavut

June 7, 2007

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## EXECUTIVE SUMMARY

The Department of Environment (DoE) of the Government of Nunavut has reviewed the Water Licence Application and supporting documents submitted by Miramar Hope Bay Mining Limited in April 2007 for the Doris North Project. The review focused on those aspects of the Application which fall within the DoE's mandate (i.e., *Environmental Protection Act*, *Wildlife Act* and associated regulations) and specifically examined:

- Contaminants
- Waste Management
- Hazardous Materials Management
- Fuel and Waste Oil Management
- Spill Contingency Planning and Reporting
- Abandonment and Restoration

The review has not identified any substantive issues; however, several general and specific issues to be addressed during the review by the Nunavut Water Board have been identified and are summarized below.

The Applicant has developed a draft Environment, Health and Safety Management System (EHSMS) which contains plans and procedures to manage and mitigate potential impacts resulting from the project during the operational phase. MHBL needs to clarify how it intends to manage and mitigate potential impacts during the construction phase of the project. Additionally, the EHSMS contains a number of Environmental Protection Plans covering different aspects of the project (e.g., Spill Contingency Planning and Response, Landfill Management, Landfarm Management, etc). There are some inconsistencies among and within some of these plans which should be addressed. It is also recommended that specific operational procedures (e.g., landfarm operation) be restricted to only one plan (Landfarm Management Plan) rather than being contained in several plans.

Specific comments identified in the Application and supporting documents include:

**Acid Rock Drainage/Metals Leaching:** Additional sampling and analysis of runoff from inactive quarry sites is recommended to be included in the ARD/ML monitoring program.

**Dust Suppression:** Dust suppression products should comply with the Government of Nunavut's Guideline for Dust Suppression.

**Landfarm Management**: MHBL should apply a consistent set of parameters for the analysis of soils and waters during treatment and discharge activities. It is also recommended that MHBL not apply

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contaminated soils treated to the industrial standard to pristine or clean areas, but rather only to areas already impacted by the project.

**Air Quality Management:** MHBL should recognize that the Government of Nunavut has adopted its own standards for TSP and is a signatory to the Canada Wide Standards covering parameters such as dioxins and furans. Monitoring results should be compared to these standards during analysis.

**Non- Hazardous Waste Management:** MHBL needs to clarify how waste will be managed during the construction phase of the project. The location for disposal of non- hazardous waste generated during the closure and reclamation phase should also be confirmed during the licencing process.

**Hazardous Materials Management:** The DoE policy "Management of Fluorescent Lamp Tubes" should be referenced in the Management Plan and followed during project activities. MHBL should also register the site as a hazardous waste generation site.

**Fuel and Waste Oil Management:** Fuel storage facilities and distribution procedures for stationary facilities at the mine site need to be documented. Spill prevention procedures for these facilities should also be included in management plans.

**Spill Contingency Planning and Reporting:** It is recommended that the Emergency Response and Contingency Plan be amended to address responsibility and preparedness for the possibility of the fuel re-supply barge remaining at Roberts Bay for longer than the anticipated two week fuel transfer operation. Additionally, it is recommended that MHBL consider providing more detail in initial spill response information and the commit to treat contaminated containment and clean-up materials as hazardous materials.

**Closure and Reclamation**: The Closure and Reclamation Plan presented in the Application is conceptual and does not contain detailed designs. This is typical practice for projects with a lengthy operational phase; however, it may not be appropriate for a project with only a two year operational phase. The level of detail required at the licence approval stage should be discussed during the Technical Conference. Consistent with other comments about the application of treated contaminated soils, the DoE recommends that MHBL demonstrate a stronger commitment to revegetation of disturbed areas during closure. Additionally, discharge of water used to clean fuel storage tanks during closure should be subject to discharge criteria as is the case for similar operations elsewhere in Nunavut.

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# 1.0 INTRODUCTION

Miramar Hope Bay Mining Limited ("MHBL" or the "Applicant") proposes to construct, operate, decommission and reclaim the Doris North Project, a 720 tonne per day Gold Mine located approximately 125 km south of Cambridge Bay in the West Kitikmeot Region of Nunavut. The project will include a jetty on Roberts Bay, bulk fuel storage, accommodations, an underground mine, mill, a tailings containment facility, and supporting infrastructure. The mine is expected to operate for a two year period beginning in 2008, followed by closure and reclamation.

The Nunavut Impact Review Board (NIRB) conducted an environmental review of the project proposal between 2002 and 2006, issuing a Project Certificate to MHBL in September 2006. MHBL filed an Application for Water Use and Waste Disposal ("Application") with the Nunavut Water Board (NWB) in April 2007. The Department of Environment (DoE) of the Government of Nunavut was an intervener in the environmental review process and will intervene in the water licencing process.

The following review focuses on those aspects of the Application which fall within the DoE's mandate (i.e., *Environmental Protection Act*, *Wildlife Act* and associated regulations) and provides the NWB with both general observations and specific comments on the Application on behalf of the DoE. In conducting this review, it is acknowledged that the project proposal has been subject to considerable review and analysis, including that by DoE, during the environmental review process. The Project Certificate issued by NIRB has accepted the project proposal advanced by MHBL, subject to specific Terms and Conditions, many of which will be implemented through regulatory instruments such as the Water Licence issued by the NWB. As such this review focuses on the specific actions proposed by the Applicant to meet the requirements of the licencing process and the terms and conditions of the NIRB Project Certificate which are within the jurisdiction of the DoE.

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# 2.0 COMMENTS ON THE APPLICATION

## 2.1 Introduction

The Application submitted by MHBL provides a description of the proposed project components and phases, operational activities, proposed environmental management and mitigation actions, the conceptual closure and reclamation plan and proposed monitoring programs. The Application is supplemented with 20 supporting documents which provide detailed analysis, project designs and environmental management procedures.

Water required for mining, milling and domestic uses will be drawn from Doris Lake. Wastes and emissions generated during the construction, operation and reclamation phases will include:

- Non- hazardous domestic, construction and demolition wastes;
- Hazardous wastes (used oils and fluids, cyanide paste, miscellaneous chemicals, etc);
- Tailings;
- Domestic wastewater, mine water and water from sumps and collection ponds;
- Contaminated soils; and
- Air emissions from mobile and stationary equipment;

Management objectives and procedures for each of the waste streams and hazardous materials to be used are summarized in the Application and described in greater detail in the supporting documents. The Application generally provides satisfactory mitigation and management procedures for all waste streams and hazardous materials; however, the review has identified some issues requiring clarification and/or further attention. The review commences by noting some general observations about the Application, followed by specific concerns.

## 2.2 General Observations

Several observations about the completeness and consistency of the Application are presented below for consideration.

MHBL has stated that it is developing an Environmental Health and Safety Management System (EHSMS) to ensure all of its operational activities meet permit and licence requirements and best management practices. The EHSMS will include an Environmental Protection Plan (EPP), which in

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turn, includes all of the operational management plans included as supporting documents to the Application and the Wildlife Mitigation and Monitoring Program and the Heritage Resource Protection Plan. These plans describe operational and mitigation procedures for various components and activities to be undertaken during the operational phase. The Applicant has made a commitment to update these plans following conclusion of the water licence process and on an annual basis during operation. While this review includes some comments on the content of the plans, the plans generally provide the commitments and procedures to effectively manage environmental issues during operation. There is a need for similar commitments during the construction stage. The "Technical Specifications Tailings Containment Area and Surface Infrastructure Components", presumably the prime contract document directing the construction phase, states that the Construction Contractor is responsible for complying with MHBL's "Environmental Management and Procedures Manual (EMPM)" during construction. This document was not available for review and no further references to it were found during the review of the Application. It is therefore recommended that the Applicant confirm if the EMPM includes the EPP or in fact is a separate document. Environmental protection measures should be in place prior to commencement of construction and responsibility for implementation should be clearly identified.

The Application and 20 supporting documents contain an extensive array of information describing how the project will be undertaken and what methods will be implemented to mitigate potential environmental effects resulting from the project. Not surprisingly, there are some inconsistencies between the Application and the supporting documents and within specific supporting documents. Additionally, some operational procedures for the same facility are contained within several of the management plans. For example, some of the management procedures for the landfarm contained in the Landfarm Management Plan differ from commitments made in the Hazardous Materials Management Plan (Section 3.6) and the Application. It is recommended that MHBL review all Management Plans to ensure consistency and, where possible, restrict operational procedures for a facility or process to a single management plan.

## 2.3 Specific Comments

### 2.3.1 Contaminants

This section addresses concerns related to discharges of contaminants to the environment, including operation of the landfarm. Comments and recommendations are not presented in relation to discharges from the Tails Lake Tailings Containment Area (TCA). DoE has commented on this issue during the

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environmental review and recognizes that other interveners have the mandate and resources to address this issue in more detail during the water licencing and other regulatory processes.

#### 2.3.1.1 Acid Rock Drainage/Metal Leaching

**References: Section 2.4.15, page 115, Application Support Document**
**Section 7.1, page 52, S10m, Monitoring and Follow-Up Plan**

The Applicant has assessed the Acid Rock Drainage (ARD) and Metals Leaching (ML) potential of the underground ore and waste rock and the surface quarry material, concluding that only ore from underground has the potential for acid generation. Both the ore and waste rock will be temporarily stored in locations where runoff will be contained, analyzed and either discharged to the environment (if within guidelines) or to the TCA if in excess of guidelines. Waste from the milling process will be sent to the Tailings Containment Area for sub-aqueous disposal. Assessment of surface quarry material indicates that ARD/ML is not a concern. The Applicant commits to a visual assessment of rock during quarrying and further laboratory assessment if rock with unknown ARD/ML potential is encountered. Post-construction monitoring will include sampling and analysis of 100 samples of placed quarry rock and 100 samples of water seeps below placed rock during the first spring after construction. Seep samples will also be collected in subsequent spring periods during the operations phase. Should results indicate acid generation is occurring, remedial action will be undertaken by MHBL.

**Assessment and Recommendation:**

Mitigation and monitoring for placed quarry rock appears sufficient, however it is recommended that sampling of water at seeps from the two quarries not subject to ongoing occupation (Quarry # 1 and Quarry # 3) be conducted in addition to locations of placed quarry rock.

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### 2.3.1.2 Procedure for Dust Control

**References: Sections 2.4.2. 7 and 4.3.2 Application Support Document**
**Appendix A, S10 Environmental Protection Plan**

The Applicant proposes to use water to control dust from surface operational activities during the summer months. Water for drilling and dust suppression underground will be supplied from sumps and re-cycled to them. Due to freezing conditions, a brine solution will be used underground.

**Assessment and Recommendation:**

According to the DoE's Environmental Guideline for Dust Suppression, water and brine solution are not approved dust suppression agents. The Applicant should receive approval from the DoE for this type of dust suppressant.

### 2.3.1.3 Inconsistencies in Performance and Monitoring Sampling in Landfarm

**Reference: Section 4.7, page 15, S10h Landfarm Management Plan**

There are inconsitencies in the parameters the Applicant proposes to monitor in media from the landfarm as exhibited in the following exerpt from the Performance and Environmental Monitoring Program:

"1. Contaminated soil within the landfarm will be sampled at the beginning of each summer treatment season to verify the nature and extent of contamination within the soils to be remediated. The soil samples will be collected by MHBL and tested for Extractable Hydrocarbons F1 and F2, Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB) and total metals using a 36 element ICP-MS scan. MHBL proposes that each separate pile within the landfarm be divided into quadrants, and sampled with a target density of one composite of ten samples per 25 $m^3$ to adequately characterize the soil's hydrocarbon levels. The soil sampling records will be kept by the Environmental Coordinator and reported to the KIA and the NWB as required (at a minimum as part of the annual reporting).

2. A similar sampling program will be conducted by MHBL prior to any soil being removed from the landfarm for use in reclamation to demonstrate that the soil has been remediated to the GN remediation standards (Industrial) as set out in Table 2.1. The soil samples will be collected by MHBL and tested for

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Extractable Hydrocarbons F1 and F2, Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), polychlorinated biphenyl (PCB) and total metals using a 36 element ICP-MS scan. MHBL proposes that each pile of remediated soil be divided into quadrants, and sampled with a target density of one composite of ten samples per 25 $m^3$ to adequately characterize the soil's hydrocarbon levels. The soil sampling records will be kept by the Environmental Coordinator and reported to the KIA and the NWB as required (at a minimum as part of the annual reporting). Similarly records will be kept and reported as above as to each location where remediated soil is placed along with an estimate of the volume placed in each location.

3. Samples of the precipitation runoff and snowmelt water collected within the landfarm facility liner will be conducted early each summer following the spring melt to determine water quality prior to the start up of the oil adsorption treatment system. The samples will be analyzed for pH, Total Suspended Solids, Total Oil and Grease, Benzene, Toluene, Ethyl benzene and Total Ammonia.

The discharge from the Oil Adsorption system will be sampled and analyzed on a once per day basis whenever the system is in operation. The sample will be taken from the discharge of the Oil Adsorption System prior to this water being land applied onto the tundra. The samples will be analyzed for: pH, Total Suspended Solids, Total Oil and Grease and Total Ammonia. MHBL recommends that the standard that must be achieved for discharge be set as set out in Table 4.1…"

**Assessment and Recommendation:**

Section 4.4 of the Landfarm Management Plan ("How Will Contaminated Soil be Tested"), which dicusses contaminated soil sampling does not include sampling for "Extractable Hydrocarbons F1 and F2", however, in Section 4.7, these parameters are included in the monitoring program.

In Item 3. above, benzene, toluene and ethylbenzene are included in snow melt/runoff sampling, however, these parameters are not included in the post treatment effluent sampling from the adsorption system. Total petroleum hydrocarbons have not been considered in pre and post treatment water sampling.

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It is recommended that analysis of samples be consistent with regards to which parameters will be analyzed from one event to the next (i.e. the same 'parameters of concern' should be included analyses when collecting samples as part of each monitoring event). This will allow for direct comparison of results from pre-treatment, during treatment and post treatment, providing data that can be used to assess/measure the level and rate of treatment.

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### 2.3.1.4 Analysis of Metals and PCB's in Landfarm Soils

**References: Section 4.7, p 15, S10h, Landfarm Management Plan**

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

**Assessment and Recommendation:**

Metals and PCB concentrations will not be affected by bioremediation activities. Sampling each season for metals and PCBs will not address the remedial objectives.

It is recommended that soil be analyzed for metals and PCBs prior to treatment to determine if these exist at concentrations which could affect suitable soil uses following treatment i.e. if they exceed applicable standards. If exceedances are measured, alternate disposal (e.g., underground) post treatment may be necessary.

### 2.3.1.5 Melted Contaminated Snow Loading on the Landfarm Water Treatment Process

**Reference: Section 4.7, p15 S10h Landfarm Management Plan**

During early summer MHBL will analyze samples of the precipitation runoff and snowmelt water collected within the landfarm facility liner to determine water quality prior to the start up of the oil adsorption treatment system. The samples will be analyzed for pH, Total Suspended Solids, Total Oil and Grease, Benzene, Toluene, Ethyl benzene and Total Ammonia. The discharge from the Oil Adsorption system will be sampled and analyzed on a once per day basis whenever the system is in operation. The sample will be taken from the discharge of the Oil Adsorption System prior to this water being applied onto the tundra. The samples will be analyzed for: pH, Total Suspended Solids, Total Oil and Grease and Total Ammonia. MHBL recommends that the standard that must be achieved for discharge be set as set out in Table 4.1…"

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**Assessment and Recommendation:**

Contaminated snow may contain high concentrations of petroleum hydrocarbons and therefore free phase petroleum hydrocarbons may be observed during melt of the snow. Free phase petroleum product could cause heavy loading in the adsorption treatment system, causing filters and adsorbant materials to become inefficient/uneffective (spent) sooner than expected.

It is recommended that MHBL consider using an oil-water spearator and/or absorbant booms/pads prior to passing heavily contaminated water through their water treatment unit.

### 2.3.1.6 Landfarm Soil Remediation Standards

**References: Section 3.6, page 24, S10e Hazardous Materials Management Plan**

The Applicant proposes that "The landfarm will be operated in accordance with Nunavut government guidelines. The Environmental Protection Service of the Nunavut Department of Environment has published an "Environmental Guideline for Soil Remediation" that provides guidance as to acceptable levels for the remediation of hydrocarbon contaminated soils in Nunavut. These guidelines are derived from the CCME 1991 Interim Criteria and the CCME 1997 Recommended Soil Quality Guidelines. MHBL will use the industrial remediation guideline to determine when soil has been remediated to a level acceptable for removal from the landfarm facility for use in site remediation. Furthermore the MHBL states "Soil that has reached acceptable levels of hydrocarbon degradation will be removed and used as growth media in areas where progressive reclamation is underway…"

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**Assessment and Reccomendation:**

Typically, remediation standards are not considered "contaminate up to" levels; i.e. it is not acceptable to dispose of or use of remediated soil with residual petroleum hydrocarbon concentrations at prisitine or natural areas. Therefore, it is recommended that remedial objectives for soil be tied to end land use objectives. This might limit the application of soil remediated to industrial levels to impacted areas where the soil would not contribute further impacts to clean areas. Soil to be placed in pristine areas should be remediated to a higher standard such as residential/parkland standard.

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### 2.3.1.7 Disposal of Kitchen Waste Incineration Ash in the Landfarm

**Reference: Section 4.1, page 9, S10h, Landfarm Management Plan**
**Section 2.4.11, page 109 Revised Water Licence Application Support Document**

The Applicant proposes that "Organic garbage from the camp kitchen and dormitory areas will be burned in a purpose built incinerator to limit the potential for food wastes to attract wildlife. This ash is typically low in metal contaminants due to its source but high in nutrients that can improve the suitability of soil to sustain vegetation. Consequently MHBL intends to take this ash from the kitchen incinerator, place it into drums and then move it to the landfarm where each summer season it will be mixed using a hand rake and/or roto-tiller to blend this material into the soil undergoing remediation. It is estimated that approximately 5 $m^3$ per year of incinerator ash will be blended with the hydrocarbon contaminated soil undergoing remediation each year."

**Assessment and Recommendation:**

Section 2.4.11 of the Revised Water License Application Support Document indicates that the "The ash will be tested, and if found to be uncontaminated, will be mixed into any soil undergoing remediation within the landfarm." This committment is not contained within the Landarm Management Plan.

It is recommended that MHBL indicate which parameters will be analyzed in ash testing and what standards will be referenced when determining if ash is considered "uncontaminated". Additionally it is recommended the committment made in the Application Support Document is carried through to the Landfarm Management Plan.

### 2.3.1.8 Air Quality Mitigation Plans do not reflect the requirements of the Nunavut Environmental Guideline for Dust Suppression.

**Reference: Section 3.2.1.3, page 8, S10b, Air Quality Management Plan**

The Applicant states 'Since Nunavut does not have ambient air quality criteria, the monitored results will be compared to the NWT standards. The analysis of temporal trends will look for consistent, increasing trends in the measured dust concentrations with consideration to the time of year and meteorological conditions.'

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**Assessment and Recommendation:**

The “Environmental Guidelines for Air Quality for Sulphur Dioxide and Suspended Particulate” were issued under Nunavut’s *Environmental Protection Act* in 2002. These Guidelines contain a standard for TSP. Additionally, the Government of Nunavut is a signatory to the CCME Canada Wide Standards for air quality covering particulate matter, ozone, mercury, dioxins and furans. These standards should be referenced in the Air Quality Managerment Plan.

### 2.3.2 Waste Management

#### 2.3.2.1 Disposal of Construction Waste

**References: Section 2.4.11, page 109, Revised Water Licence Application Support Document Section 1.2, page 1, S10g, Landfill Management Plan**

Non - hazardous operational wastes are to be disposed of in the landfill constructed in Quarry #2. Hazardous wastes are to be shipped off site for disposal at an appropriate facility. The Applicant does not state how wastes will be managed during construction.

**Assessment and Recommendation:**

Construction crews are to be accommodated at the Windy Camp until the Accommodation Complex at Doris North is operational; therefore domestic wastes are likely to be disposed of at the existing camp. Construction wastes (hazardous and non- hazardous) will be generated.

The Applicant should clarify how wastes generated during the construction phase will be managed.

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#### 2.3.2.2 Disposal of Demolition Waste

**References: Section 2.4.11, page 109 Revised Water Licence Application Support Document Section 1.2, page 1, S10g, Landfill Management Plan, Section 6.1.1, page 81 S10l Closure and Reclamation Plan**

In the Application, MHBL states that the Landfill to be constructed in Quarry # 2 will have sufficient capacity for demolition wastes generated during closure activities. In the Closure and Reclamation Plan, the Applicant states that prior to closure and reclamation, authorization for a demolition landfill will be sought, anticipating that the landfill in Quarry # 2 will be available for this purpose. The Landfill Management Plan does not comment on demolition waste. The Applicant has not conclusively stated that the landfill in Quarry # 2 will be used for disposal of demolition waste.

**Assessment and Recommendation:**

Given the short period of mine operation it is recommended that the location of the demolition landfill be confirmed during the existing licencing process. Contingent on landowner agreement and sufficient space being available it is recommended that the landfill at Quarry #2 be used for non- hazardous demolition waste disposal rather than creating an additional landfill to be managed and monitored.

### 2.3.3 Hazardous Materials

#### 2.3.3.1 Hazardous Materials Plan – Reference Documents

**References: Section 1.3, page 6 S10e, Hazardous Materials Management Plan**

This section references applicable federal and territorial legislation and guidelines but does not include the DoE policy “Management of Fluorescent Lamp Tubes”.

**Assessment and Recommendation:**

It is recommended that the Applicant become familiar with and include reference to the DoE policy “Management of Fluorescent Lamp Tubes” in the Hazardous Materials Management Plan.

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#### 2.3.3.2 Hazardous Materials Classification

**References: Section 2.2, page 12, S10e, Hazardous Materials Management Plan**

There is no reference in this section regarding registration of this site as a Hazardous Materials Storage Facility or of obtaining a Generator Number for TDG shipping.

**Assessment and Recommendation:**

MHBL should explicitly commit to registration with the DoE for the site as a Hazardous Materials Storage Facility and obtain a Generator Number for identification as the receiver and/or generator of hazardous materials to/from the site.

### 2.3.4 Fuel and Waste Oil Management

#### 2.3.4.1 Fuel Transfer Operations – Mobile and Stationary Equipment

**References: Section 2.4.9, page 106 Revised Application Support Document**
**S2 Design of Surface Infrastructure Components**

Approximately 7.5 million litres of fuel will be offloaded from the barges to truck(s) located in a bermed and lined fuel transfer facility near the Roberts Bay Jetty. The truck(s) will transport the fuel from the transfer facility to the bulk fuel storage facility at the mine site.

The Application does not include any information on fuel storage and distribution to the facilities at the mine site. It is expected that individual buildings will have dedicated on-site fuel storage; however MHBL has indicated that facility designs are not currently available. There is no evidence in the Application as to how these remote fuel tanks will be filled, other than a reference in the Closure and Reclamation Plan about the flushing of underground fuel lines.

**Assessment and Recommendation:**

Fuel storage and transfer present a risk to the environment as a result of equipment or operator failure. The Applicant has included the MHBL "Standard Operating Procedure – Hydrocarbon Fuel and Gas Dispensing Procedure" as Appendix F of the Hazardous Materials Plan; however the systems to be utilized at the mine site facilities have not been identified. Section 4.12 of the Emergency Response

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and Contingency Plan states that mobile equipment will be refueled either at pump stations, from “Tidy Tanks” in other vehicles or from fuel service vehicles. There is no information about fuel storage systems at stationary facilities or methods for fueling such systems in the Application. Therefore, it is recommended that the Applicant confirm the fuel storage systems and transfer methods to be used at all site facilities. Furthermore, MHBL should update the above noted Standard Operating Procedure to include refueling methods to be used at the project.

### 2.3.5 Spill Contingency Planning and Reporting

#### 2.3.5.1 Responsibility for Spill Response at Roberts Bay

**References: Section 6**, **page 41**, **S10a, Emergency Response and Contingency Plan**

Section 6 of the Emergency Response and Contingency Plan states “MHBL will rely upon NTCL for spill response while bulk fuel and containerized shipments of hydrocarbon based products are in transit from Hay River to the Doris North site. … MHBL will maintain marine spill response equipment at the Roberts Bay jetty site stored within a sea-can container for use while barges are being off loaded”.

Fuel will be offloaded from the barge to truck(s) at the transfer station for delivery to the bulk fuel storage facility at the mine site. The Applicant estimates it will take approximately 2 weeks of 24 hour a day trucking to transfer the fuel between the barge and the main fuel storage facility at the mine site.

**Assessment and Recommendation:**

Based upon the above statements it appears that NTCL and any future barge operators will be responsible to lead the spill response effort during offloading of the fuel from the barge; however, the lead party should be clarified. MHBL predicts that offloading and transfer of fuel to the bulk fuel storage facility will be accomplished in a 2 week period annually. The Application states that the largest fuel truck available for the transfer process will contain 40,000 litres. It is not clear if there will be one or more trucks available for the transfer process. Should delays occurr during the transfer effort, the fuel barge may be required to stay at Roberts Bay without NTCL spill responders on site. This could be for several weeks or an entire year in a worst case scenario. It is therefore recommended that MHBL’s Emergency Response and Contingency Plan address this possibility by including provision for regular monitoring of the integrity of the barge and spill response when NTCL is not available.

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### 2.3.5.2 Spill Response

**References: Section 4.7.1, page 18 S10a, Emergency Response and Contingency Plan**

As part of the initial assessment of the spill the Mine General Manager is required to, among other things, make an assessment of the estimated quantity of material spilled.

**Assessment and Recommendation:**

In addition to estimating the quantity spilled, the Manager should also document how the estimate was made and the level of certainty of the estimate. Inaccurate estimates of spill volumes can result in under/over estimating the level of effort that will be required for recovery and clean-up.

It is recommended that it be a requirement of the initial spill response to estimate the volume of the spill, qualify how this estimate was made, and indicate the confidence of the accuracy of the estimate. The ability to make accurate estimates is best achieved by maintaining accurate and up to date records of the fuel or material stored within the storage tank or location. An estimate of the volume spilled can then be made by comparing the amount of material remaining in the original tank or location with the amount contained in the tank or facility record. Any uncertainties in the volume, location and type(s) of materials spilled should be documented in detail.

**Comment [hd1]:** During the teleconference, I believe Mike requests that you give examples on how to qualify. Can you elaborate on this?

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### 2.3.5.3 Spill Response Action Plans – Spent Sorbant Material

**References: Section 4.11.3, page 26, S10a, Emergency Response and Contingency Plan**

The Action Plan for responding to spills on land states that granular absorbent materials or absorbent sheeting can be used for soaking up stained rock. Further the procedure states “Depending upon the volumes generated, the spent absorbent should be placed in drums for later disposal in dumpsters.”

**Assessment and Recommendation:**

The proposed disposal into “dumpsters” is unclear here (there is no reference elsewhere to having dumpsters onsite for waste disposal). It is recommended that spent absorbent materials be disposed of as hazardous waste, under the Transportation of Dangerous Goods Regulations; they are identified as Class 3 substances.

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**References: Section 8, page 234, Application Support Document**
**S10I, Mine Closure and Reclamation Plan**

Section 4 of the NWB Guidelines for the project state that the Board will not engage in an exhaustive process of conditionally approving technical reports through conditions set in the water licence. The NWB Guidelines state that "MHBL is encouraged to develop design and water management beyond the conceptual and intermediate phases before the submittal of a water licence application" (p5); however when a final design can not be presented " a clear defined criteria for which final design decisions will be made must be submitted" (p6).

The Closure and Reclamation Plan included in the Application remains conceptual and does not include final designs. This approach is common during the planning and permitting stage of many mining projects as operational developments and resulting reclamation requirements can not always be fully anticipated, especially for sites operating for decades. Closure and Reclamation Plans are living documents which become increasingly defined as the project nears completion, with a final design approved before actual closure.

**Assessment and Recommendation:**

With an operational life of only 2 years, the Doris North Project is different than many project scenarios: the mine plan is essentially established; and the short operational period presents a small window for development, review and approval of a closure and reclamation plan before actual project closure. It is recommended that the level of detail required in the Closure and Reclamation Plan for licence review be resolved at the Technical Conference.

### 2.3.6.1 Enhancing Wildlife Habitat

**Reference: Section 1.2, page 6, S10I, Mine Closure and Reclamation Plan**

While the Applicant concedes that site specific reclamation criteria need to be developed, they have identified that the targeted post- closure land use objective for the mine site is wildlife habitat. All underground openings will be sealed, buildings removed and landfilled and surface disturbances contoured to match surrounding grade and promote positive drainage. Roads, airstrips and other

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surface disturbances will be scarified to promote natural revegetation. The Applicant will consider the practicality of seeding scarified areas to enhance revegetation.

**Assessment and Recommendation:**

As the post- closure land use objective for the mine site is proposed to be wildlife habitat, it is recommended that the Applicant take action beginning in the construction phase to prepare for meeting this objective. This would include stockpiling any potential soils that would enhance revegetation of disturbed areas, conducting revegetation trials and seeding areas during reclamation.

#### 2.3.6.2 Disposal of Fuel Storage Tank Wash Water

**Reference*:* Section 6.1.5.7, page 94, S10l, Mine Closure and Reclamation Plan**

Prior to destruction the fuel storage tanks will be steam cleaned and the residual oil recovered through an oil water seperator unit. Wash water will be recycled until all the tanks are cleaned.

**Assessment and Recommendations:**

Upon completion of the tank cleaning the water effluent should be analyzed for petroleum hydrocarbon constituents prior to discharge. Provision for treatment of wash water using oil/water separator, carbon filters or other methods should be included in reclamation plan.

### 2.3.7 Other

**Reference*:* Section 10.3, page 62, S10m, Monitoring and Follow-up Plan**

MHBL has embraced the concept of adaptive management within its EHSMS, stating “In general, adaptive management is triggered when effects to the receptor exceed predictions determined in the Environmental Impact Statement (EIS)”. With respect to monitoring vegetation quality, MHBL states “Triggers for adaptive management are as yet undetermined, however, MHBL will initiate discussions with the GN DoE and Environment Canada to determine appropriate trigger thresholds for adaptive management.

**Assessment and Recommendations:**

It is recommended that the triggers be confirmed prior to the start of construction.

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