Review of Doris North Water Licence Application

DEPARTMENT OF ENVIRONMENT
GOVERNMEMT OF NUNAVUT

July 2007

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 Limited (MHBL) between April and July 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*, *Nunavut Wildlife Act* and associated regulations). The DoE provided its original comments on the Application to the Nunavut Water Board (NWB) in June 2007 as part of the Technical Meetings and is pleased that MHBL has addressed most of its comments and recommendations. This submission to the Public Hearing to review the Application provides comment and recommendations on outstanding issues of concern in ten (10) of the fifteen (15) topic areas to be reviewed at the Public Hearing. A summary of comment and recommendations are provided below.

Term of License: The DoE supports MHBL's request for an eight year licence term which would allow for construction, operation and reclamation, but also provide an opportunity for a review of performance prior to issuance of a second licence for on-going closure and or post-closure care and maintenance.

Construction: The construction phase of the project provides increased risk of potential environmental effects due to a number of factors. The DoE recommends that the commitments made for a Construction Monitor be formally included in the Construction Specifications and that monitoring results be fully incorporated in the Follow-up and Monitoring Plan.

Water Use: The DoE recommends that potable water be treated to comply with Canadian Drinking Water Quality Guidelines.

Water Quality/Water Management: Effects on water quality can result from a number of project activities including tailings disposal, sewage disposal, discharges from various facilities and acid rock drainage/metals leaching. The DoE recommends that the CCME Canadian Water Quality Guidelines for the protection of Freshwater Aquatic Life be used as the guideline for water quality in Doris Creek downstream of the discharge from Tails Lake, that the quantity and quality of water discharged from the various collection basins be monitored, and that monitoring of discharge from the quarry sites be added to the ARD/ML monitoring program.

Waste Management: The DoE believes that the waste management plans and subsequent amendments prepared by MHBL are generally appropriate and, if followed, will result in effective waste management for the project. However, MHBL now plans to remove sewage sludge prior to discharge of grey water to Tail Lake. Sewage sludge will be incinerated at an on-site incinerator and DoE

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

requires the emissions from this incinerator comply with Canada-Wide standards for Dioxins, Furans and Mercury.

MHBL has requested to dispose of all construction, operational and demolition waste in a single landfill. The DoE believes that consolidation of all non-hazardous waste in one location is desirable and supports this approach. Additionally, DoE also supports MHBL's request to dispose of non- hazardous demolition waste from the Boston and Windy camps in the same single landfill.

Geochemistry: To confirm predictions and provide data for future analysis of closure and reclamation actions, the DoE recommends that MHBL be required to undertake the analysis and monitoring of potential ARD/ML from waste rock, quarry rock and tailings. Freeze- back of waste rock placed underground should also be monitored to confirm the accuracy of predictions.

Tailings Containment Area: The DoE's recommendations for the tailings containment area are addressed in the section on Water Management/Water Quality.

Contingency: The DoE acknowledges improvements made to the Emergency Response and Contingency Plan by MHBL. It is recommended that this plan be updated annually and when significant facility or operational changes occur.

Monitoring: The DoE has reviewed the Applicant's Monitoring and Follow-up Plan and amendments submitted as a result of submissions to the June 2007 Technical Meetings. The DoE has recommended minor changes to ensure its continued consistency with the additional information supplied as a result of the June 2007 Technical meetings and other monitoring recommendations supplied in the intervention.

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, with only a two year operational phase, the DoE recommends that MHBL be directed to submit a detailed Closure and Reclamation Plan prior to the commencement of the operational phase. Additionally, it is recommended that MHBL be directed to commence reclamation revegetation research in advance of submission of the detailed Closure and Reclamation Plan.

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

Table of Contents

Government of Nunavut
Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

1.0 INTRODUCTION

Miramar Hope Bay 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 a closure and reclamation period.

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. The Department of Environment (DoE) of the Government of Nunavut intervened in the environmental review conducted by NIRB. In April 2007 MHBL filed an Application for Water Use and Waste Disposal ("Application") with the Nunavut Water Board (NWB). On June 8, 2007, the Applicant advised the NWB of several modifications to the project as a result of ongoing engineering design studies. The DoE participated with MHBL and other interveners in the Technical Meeting held by the NWB on June 11 and 12, 2007. Direction issued by the NWB on June 21, 2007, confirmed the Public Hearing will focus on the following topics:

1. Nunavut Impact Review Board Schedule 12.4.3 Determination
2. Term of license
3. Type and Amount of Security
4. Compensation Agreements
5. Construction
6. Water Use
7. Water Management/Water Quality
8. Waste Management
9. Geochemistry

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Department of Environment
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FX: (867) 975-7739
PH: (867) 975-7732

10. Tailings Containment Area

11. Contingency Planning

12. Monitoring

13. Closure and Reclamation

14. Recommendations for the Roberts Bay Jetty to Departments or Agencies of the Government of Canada or the Government of Nunavut

15. Other Issues.

The DoE's intervention to the Public Hearing 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 is presented according to the categories requested by the NWB. The DoE's intervention addresses categories 2 and 5-13 only.

In preparing this intervention, 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 original 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. Further technical review of the Application was conducted by the DoE and other interveners as part of the June 2007 Technical Meetings in Cambridge Bay. The DoE is pleased to see that many of our concerns addressed in our submission for those Technical Meetings have been addressed through the provision of additional information and commitments by MHBL. The following intervention provides comment and recommendations on outstanding issues of concern to the DoE for consideration by the NWB at the Public Hearing.

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P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

2.0 COMMENTS ON THE APPLICATION

2.1 Introduction

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;

The Application, supporting design and management plans and additional information filed by MHBL describe measures to mitigate and manage potential impacts resulting from the project. The Application generally provides satisfactory mitigation and management procedures for all waste streams and hazardous materials; however, the DoE provides the following comments and recommendations for consideration at the Public Hearing.

2.2 Term of License

MHBL has requested an eight (8) year term for the water license for the project. The proposed project schedule outlined in the Application includes the following phases and periods, based on a commencement date of August 2007:

- Construction ..... 14 months
- Operation ..... 24 months
- Closure ..... 24 months intensive, additional 60 months active
- Post closure monitoring ..... Until remedial objectives are confirmed

Under the proposed schedule, construction, operation and closure would occur over slightly more than a ten year period. An eight year license term would cover the construction, operation, intensive closure and approximately three years of the active closure phases. The DoE supports MHBL's request for an eight year licence as this would provide the Applicant with certainty that the project could be constructed, operated and largely closed within a single license period, but also provide stakeholders

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

with an opportunity to review closure and reclamation performance prior to the issuance of a second licence to cover on-going closure and/or post- closure care and maintenance.

2.3 Construction

Construction of the original project and modifications undertaken during operation and reclamation project phases present a risk of impacts to the environment resulting from a number of potential factors, including: contractors potentially unfamiliar with conditions, responsibilities and environmental protection requirements; encountering unanticipated conditions and/or equipment malfunctions during the work; and seasonal and/or performance deadlines.

The DoE is satisfied that MHBL has made a sincere commitment to environmental protection through the establishment of environmental management plans and contractual specifications. The DoE acknowledges the improvements made to the plans as a result of interventions at the June 2007 Technical Meetings and also notes MHBL's commitment to revise and update all environmental management plans on a regular basis as part of its adaptive management and continual improvement approach. The challenge, as always, is to translate intent and commitments on paper into action during construction activity. Recognizing the volume of environmental management plans and regulatory requirements established for the project, the DoE recommends that site orientation for all construction personnel and contractors include orientation on the environmental protection requirements of all project authorizations, procedures in environmental management plans and methods for reporting and communication.

Item 35 "Construction Monitoring" included in the Technical Information Meeting Supplement provided subsequent to the June 2007 Technical Meetings refers to a "Construction Monitor" who will undertake a variety of environmental monitoring activities during construction. For clarity, the DoE recommends that MHBL update the "Engineering Specification ENVIRONMENTAL PROTECTION" to reflect the position of "Construction Monitor" and the proposed monitoring activities referred to above. Additionally, item 3.7, of the "Engineering Specification ENVIRONMENTAL PROTECTION" states that "Oily rags and absorbent pads shall be collected and properly disposed of by burning through the incinerator". This is inconsistent with previous direction and commitments (see item 11 "Use of Oil Absorbents", Technical Information Meeting Supplement) where MHBL commits to treatment of oil absorbents as hazardous waste with offsite disposal and treatment. As such, the DoE recommends the Specification be amended to be consistent with commitments made in the Technical Information Meeting Supplement.

Government of Nunavut
Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

2.4 Water Use

Fresh water for the project during construction and operation will be drawn from Doris Lake. MHBL estimates that approximately 50% of the water required for use in the mill will be recycled from the tailings containment facility. Under this scenario MHBL estimates it will need to withdraw approximately 30,000 m^3 of water from Doris Lake each year.

The DoE reiterates that water used for human consumption meets the Guidelines for Canadian Drinking Water Quality.

2.5 Water Management/ Water Quality

Discharges to the aquatic environment from the project will include:

- Treated effluent from the tailings containment facility
- Treated effluent from the sewage treatment plant
- Discharges from the sedimentation pond, pollution control pond, landfill and land farm sumps

Additionally, storm water will come into contact with disturbed areas on the project site, including the quarries, roadways and other structures. The DoE recognizes that other interveners have the mandate to address water quality in greater detail and, therefore, has conducted only an overview assessment of the issues.

MHBL proposes that discharge from the Tails Lake Tailings Containment Area will meet MMER discharge criteria and will be mixed with the outflow of Doris Lake to meet CCME Water Quality Guidelines downstream of the waterfall in Doris Creek. Discharge from Tails Lake is expected to commence during the open water period of the first year of the operations phase if water quality in Tails Lake meets MMER discharge criteria. Active discharge would continue during subsequent annual open water periods until water quality in Tails Lake meets CCME Water Quality Guidelines, at which point the lake would return to the natural pre-disturbance un-regulated discharge regime. While some level of uncertainty remains in the water quality resulting in Tails Lake, MHBL has proposed an adaptive discharge management strategy which includes regular sampling and analysis of Tails Lake water quality to determine acceptability for discharge, a variable discharge rate to balance the solute loading of Tails Lake discharge with natural flows in Doris Creek to meet CCME guidelines downstream of the waterfall, and the ability to operate Tails Lake as a zero discharge facility for a minimum of 5 years to allow water quality to improve before discharge. While MHBL anticipates discharges from Tails Lake

will meet MMER discharge criteria and that CCME Guidelines will be met in Doris Creek downstream of the waterfall, it has committed to active water treatment in Tails Lake should it be required to meet these water quality objectives. The DoE recommends that compliance with CCME Water Quality Guidelines for the Protection of Freshwater Aquatic Life at the SNP point downstream of the mixing zone be retained as the objective for discharges from Tails Lake. Furthermore, the DoE recommends that MHBL be required to report annually on the quantity, quality and frequency of discharge from the Tailings Containment Area.

MHBL has substituted a membrane bio reactor sewage plant for the original rotary biological contactor type system originally proposed. The bio reactor system is currently used at several remote mines sites in the Northwest Territories. Treated effluent is proposed to be discharged over the tundra during construction and into the Tailings Containment Area during operation. Overland discharge during construction would be directed away from Doris Lake and flow over the tundra before entering any water body. MHBL state that effluent from the plant will meet discharge criteria consistent with those for other northern mines and exploration projects and have proposed discharge standards. These standards, the discharge away from any waterbodies, the treatment potential of the tundra and the monitoring proposed by MHBL, should ensure protection of the environment from this project component. DOE recommends the proposed discharge standards, with a compliance point at the treatment plant itself form a term of the license.

Runoff from the waste rock storage area will be collected in the pollution control pond, while sumps will be installed in the fuel transfer facility, tank farm, landfarm and landfill to collect runoff in these facilities. Water in each of these containment basins will be sampled and analyzed before discharge. Water from the pollution control pond is proposed to be discharged to the Tailings Containment Area, whereas water from the other facilities would be discharged over the tundra if in compliance with effluent quality criteria. The DoE appreciates MHBL's commitment to include additional parameters of interest for analysis of waters prior to discharge in order to better manage potential environmental effects. The DoE recommends that MHBL be required to report on the quantity, quality and location of these tundra discharges on an annual basis to allow for an evaluation of the potential effects of this practice.

Following initial characterization work, MHBL concludes that quarry rock to be used for construction is non acid-generating. Monitoring of potential acid generation and metals leaching is proposed to be undertaken by collecting samples of quarried rock in place and water samples from seeps down-gradient from the placed quarry rock. Field and laboratory analysis is proposed to identify potential effects. The DoE recommends that the monitoring program also includes the quarry sites, especially if

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

potentially acid generating rock is placed in the quarry for control purposes as proposed under one management option in the Waste Rock Management Plan.

2.6 Waste Management

The DoE has reviewed the Applicant's proposed waste management plans and is generally satisfied that wastes will be managed in an environmentally responsible manner. The DoE appreciates that MHBL has addressed its comments on waste management procedures submitted earlier and committed to undertake annual updates of all its waste management plans. MHBL has also updated its conceptual closure plan to confirm that the operational phase non - hazardous waste landfill will also be used for disposal of non-hazardous demolition wastes during closure. The DoE supports the consolidation of waste in a centralized location rather than the establishment of additional landfills which would require reclamation and monitoring. As such, the DoE recommends, pending landowner acceptance and sufficient capacity, MHBL's request to utilize the Doris North landfill to accept non-hazardous demolition waste from the Boston and Windy Camps be accepted.

MHBL plans to remove sewage sludge from its effluent prior to discharge. The sludge will be bagged and incinerated. The DoE recommends that the incinerator used to incinerate sewage sludge be suitable for such purpose. The Government of the Nunavut is a signatory to the Canada-wide Standards for dioxins and furans and the Canada-wide Standard for mercury, and is required to implement them according to jurisdictional responsibility. Installation of an incineration device capable of meeting the emission limits established under these standards is required. Compliance with the Standards must be demonstrated with an initial stack test upon commission of the incinerator at site. During the course of operations, the proponent shall make determined efforts to achieve compliance with the Canada-wide Standards for dioxins and furans and the Canada-wide Standard for mercury. Determined efforts shall include but not be limited to appropriate record management, including maintenance reports, operator training logs, and the submission of an annual report that outlines the efforts made to achieve compliance with the Standards.

2.7 Geochemistry

Through previous testing and analysis the Applicant has concluded that waste rock and quarry rock is not acid generating or subject to metals leaching. Visual monitoring of quarry rock, supplemented by analysis of samples of placed quarry rock for acid generation and metal leaching potential is proposed. Quarry rock which is confirmed to be a source of acid rock drainage and metals leaching (ARD/ML) will be removed and either placed underground or contained in the quarry. Waste rock from underground is proposed to be returned underground for permanent disposal where it will be isolated from conditions conducive to ARD/ML. Tailings from the mill are to be deposited under permanent water cover in the tailings containment area. All of these actions are intended to mitigate potential ARD/ML from the project. While the applicant is confident that risks of ARD/ML are limited, the DoE recommends that the Applicant be required to undertake on-going monitoring and analysis of potential for ARD/ML of tailings discharged from the mill, waste rock and quarry rock to confirm predictions. Additionally, monitoring of waste rock placed underground should be undertaken to confirm freezing is occurring as predicted. Information from this monitoring will assist with verifying predictions, and confirming reclamation and post closure monitoring actions. This information will also provide data for the assessment of reclamation and post closure monitoring actions.

2.8 Tailings Containment Area

DoE's comments and recommendations for the Tailings Containment Area are included in Section 2.5, Water Management/Water Quality.

2.9 Contingency Planning

The DoE has reviewed the Emergency Response and Contingency Plan and subsequent amendments submitted by MHBL and is satisfied with the Plan. Supplemental information provided by MHBL on June 8, 2007 indicates that total on-site fuel storage will be increased from 7.5 million to 12 million litres to address increased demand from increased electrical generation capacity and to provide a 14 month rather than 12 month supply to accommodate contingencies. While the increased amount of fuel presents the potential for more fuel spills, the DoE believes the addition of a fuel storage tank at the Roberts Bay site is an important preventative measure which will alleviate the pressure and inherent risks associated with the originally proposed short fuel transfer period. The addition of the fuel storage tank at the Roberts Bay facility should also allow barges to be offloaded in a relatively short period, avoiding the possibility of potential over-winter storage of fuel in barges and/or the transfer of fuel from barges to shore without the presence of the lead spill responders from the barge operators being present.

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P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

To ensure the Emergency Response and Contingency Plan is fully functional, the DoE recommends that it be updated on an annual basis and when significant changes in facilities or operations occur. Additionally, all site personnel, including contractors, should receive training on the Plan and spill response.

2.10 Monitoring

The DoE has reviewed the Applicant's Monitoring and Follow-up Plan and amendments submitted as a result of submissions to the June 2007 Technical Meetings. Follow - up monitoring is important to assess compliance with regulatory requirements and assess the accuracy of predictions. The latter is especially important to build the knowledge base for the assessment of future projects.

The DoE recommends that MHBL:

- ensure that the construction monitoring outlined in Section #35 of the Technical Meeting Information Supplement is fully incorporated in the Follow-up and Monitoring Plan;
- report on the quantity, quality and location of all tundra discharges on an annual basis to allow for an evaluation of the potential effects of this practice;
- include the quarry sites in its ARD/ML monitoring program, especially if potentially acid generating rock is placed in the quarry for control purposes as proposed under one management option in the Waste Rock Management Plan.

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732

2.11 Closure and Reclamation

It is common practice that a final Closure and Reclamation Plan is submitted for approval at least 24 months prior to the planned termination of operations. The Mine Closure and Reclamation Plan submitted with the Application is conceptual in nature and lacks the detail required in a final plan. As the Applicant expects only a 14 month construction period followed by a 24 month oprational phase, there is limited time available for the development, review and approval of a detailed Closure and Reclamation Plan before the closure phase begins. It is therefore recommended that MHBL be required to submit a detailed Closure and Reclamation Plan for review prior to the commencement of the project operations phase. Acknowledging that MHBL has identified that the site will be reclaimed to provide wildlife habitat after closure, the DoE also recommends that MHBL be directed to pursue reclamation revegetation research in advance of submission of the detailed Closure and Reclamation Plan. Under separate cover the DoE will provide information on a source for potential vegetation species that could be used for revegation trials at the site.

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Department of Environment
P. O. Box 1000, Stn. 1360
FX: (867) 975-7739
PH: (867) 975-7732