Environment Canada / Environnement Canada

Environmental Protection Branch
Qimugjuk Building 969 P.O. Box 1870
Iqaluit, NU X0A 0H0
Tel: (867) 975-4639
Fax: (867) 975-4645



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July 15, 2003

Our file: 4703 003-013

Stephanie Briscoe
Executive Director
Nunavut Impact Review Board
P.O. Box 2379
Cambridge Bay, NU X0B 0C0
Tel: (867) 983-2593
Fax: (867) 983-2594

*Via Facsimile*

**RE: Doris North Pre-Hearing Conference Decision**

On June 12, 2003, the Nunavut Impact Review Board (NIRB) released the Pre-hearing Conference (PHC) decision for the Doris North project. This decision provides an overview of the issues presented at the PHC, clarifies the expectations for the timing of submission on the remaining documents, and outlines the requirements for the preparation of the final environmental impact statement (FEIS). Environment Canada (EC) would like to commend the NIRB for the thoroughness of this document. At the same time that the PHC decision was released, the EC review team finished its technical review of the Doris North draft environmental impact statement (DEIS). The technical comments have been attached to this letter in their entirety (Appendix A) so that they can be included in the public record for this project. Environment Canada is pleased to see that the PHC addresses the majority of the concerns that were identified in the review of the Doris North DEIS. However, in order to ensure that EC's mandated responsibilities for the enforcement of the *Canadian Environmental Protection Act*, Section 36(3) of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act* are met, we would like to provide further clarification to the proponent on a few issues.

*Environmental Management and Mitigation Plan*

- The PHC decision outlines the requirements for the Spill Contingency Plan for the site. Environment Canada would also like to see the Spill Contingency Plan address the response plan for potential spills at the supply laydown area, the barge off-loading causeway, and the site infrastructure south of Robert's Bay.

*Cumulative Effects Assessment*

- Environment Canada requests that the proponent address the cumulative impacts of increased marine traffic on the area due to the development of the mineral deposit. Increased marine traffic could result in the release of contaminants during loading/unloading of cargo and marine spills. Please see EC's letter to Mr. Hugh Wilson on December 19, 2003 for further clarification of these impacts.

*Water Quality*

- Environment Canada requests that the FEIS address the effects and fate of the ammonia sources. While the DEIS referenced drainage from blast rock containing nitrate and nitrite, ammonia drainage will be more of an immediate concern. Potential effects and mitigation measures for ammonia should be discussed.



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- The FEIS should discuss the reasons for the selection of a single cell tailings pond for the treatment of wastewater. The FEIS should address the alternatives that were considered in the selection of the chosen waste treatment method, and the rationale behind choosing the preferred treatment method.
- Environment Canada requests that the proponent give further consideration to extending the period of time in which water from Tail Lake will be recycled to the mill. This will result in reduced consumption of fresh makeup water, and less release from Tail Lake. In considering this option, the proponent would have to address the implications this reduction would have on the predicted water quality of Tail Lake.
- Environment Canada would like to see the development of a detailed monitoring plan be included in the FEIS. A first component of the development of this monitoring plan would be improving upon the baseline data available for Little Roberts Lake, as it the first receiving water body that would be inhabited by fish year round. The monitoring plan should include the measurement of Chlorophyll a, as it can provide an early indication of ecosystem changes in lakes following mine discharges. Other considerations should include loadings to the environment for elements such as mercury, and monitoring of biota to assess body burdens of contaminants.

*Hydrological Concerns*

- Environment Canada recognizes that Miramar Ltd. is preparing a response to our March 13, 2003 letter regarding concerns with the water balance calculation for the site. Environment Canada would like to ensure that this issue is resolved prior to the submission of the FEIS and requests that the proponent provide a response to these concerns to EC as soon as it is available. Further clarification as to what is required in the new water balance calculation is provided in Appendix A.

*Air Quality Concerns*

- As stated in the PHC decision, the DEIS did not provide a site-specific air-quality assessment for the Doris North site. Environment Canada requests that the air quality assessment for the Doris North site include an estimate of the total emissions from each of the emission routes listed in the DEIS, as well as other potential areas of air contamination. An appropriate air quality model should be used to predict ambient concentrations and wet and dry deposition rates. Please see the technical comments attached in Appendix A for further clarification.

Once again, EC would like to commend the NIRB for the thoroughness of the PHC decision, and hopes that the direction provided in this letter will help the proponent to further refine the FEIS. Please do not hesitate to contact me with any questions or comments with regards to the foregoing at (867) 975-4639 or by email at colette.meloche@ec.gc.ca.

Yours truly,

Colette Meloche
Environmental Assessment Specialist

cc: (Mike Fournier, Northern Environmental Assessment Coordinator, Environment Canada, Yellowknife)
(Stephen Harbicht, Head, Assessment and Monitoring, Environment Canada, Yellowknife)
(Philippe diPizzo, Executive Director, Nunavut Water Board)
(Hugh Wilson, Miramar Hope Bay Ltd.)

## Appendix A: Technical Comments

***Groundwater Concerns:***

- The proponent proposes to install thermosyphons in the foundation of the tailing containment dam to freeze the ground and prevent seepage under the dam. Environment Canada requests further clarification as how the permafrost core will be maintained post-closure. Will the thermosyphons be left in place and operating indefinitely? If so, what monitoring plans are in place to ensure that they are operating correctly or if they need replacement? Once the dam has been breached to a level that will maintain the indicated 1 metre cover over the tailings, what monitoring plans are in place to ensure the integrity of this remaining structure?
- Miramar Hope Bay Ltd. has indicated that "During the project life, it is planned to add 1.5 km in underground exploration development and a third ventilation raise (this raise will intersect the surface on the west side of Doris Lake) to access the Doris Central mineralized zone. The objective is to facilitate advanced exploration of the Doris Centralized zone and to hopefully move these resources into the category of ore reserves." (pg. A-9, Project Description And Alternatives, Doris North Project, Supporting Document 'A' To The Environmental Impact Statement). Some of this additional exploration may occur below or near a lake. Mining beneath a lake presents a host of new issues that should to be addressed in the final EIS, rather than in an amendment to the water license. The final EIS should address issues such as mine water inflow through any unfrozen talik areas beneath the lake, as well as a discussion of the permafrost conditions in the area of the potential additional exploration.

***Spill Contingency Concerns:***

- The Spill Contingency Plan submitted with the Doris North draft EIS is for the Boston and Windy Lake camps. To ensure proper spill preparedness at the Doris North project site, an appropriate Contingency Plan for the proposed 6 million-litre fuel storage tank farm, supply laydown area, a barge off-loading causeway, and site infrastructure south of Roberts Bay is required for review. The purpose of a contingency plan is to provide a plan of action with procedures appropriate for dealing with possible spill situation for a specific site, and identify key personnel and their responsibilities for responding to spills.

***Hydrological Concerns:***

- In Section 5.3.5.2 of the DEIS, MHBL has indicated that the total disturbed area in the Tail Lake watershed will be 5.2 ha (or 1.2% of the basin). Resultantly, the magnitude of the impact in the local study area was determined to be medium. However, Figure 6, Supporting Document D shows only Tail Lake in the watershed, and that the basin's lake area is 18%. Therefore, at least 18% of the basin will be affected permanently and the impact to the basin is actually high, based on MHBL rating system described in Table 5.1.1 of the draft EIS. However, the impact to entire study area does remain low.
- MHBL determined that the hydrological impact of any releases from Tail Lake on Doris Lake and downstream to be at most moderate for the life of the mine is only 100,000 $m^3$/yr of water were released. However, based on the information provided to MHBL in the March 14, 2003 letter from EC, the impacts of the release may be higher if in order to offset the increased water balance for the site, the proponent decides to decant more water each year. Environment Canada recommends that MHBL reevaluate its water management scheme for Tail Lake and its impacts on Doris Lake and the downstream area if this management option is chosen.
- The water balance for Tail Lake is incorrectly constructed in Figure 5.3.1. Miramar uses:

$$\Delta S = P_n + TS - E - RW - T - O$$

where $\Delta S$ is change in storage, $P_n$ is precipitation, TS is tailings slurry and sewage, E is evaporation, RW is reclaim water, T is loss to tailings solids and O is outflow. $P_n$ is not

defined but seems to be the net input of precipitation minus basin losses to the lake, but its value does not match any of the runoff estimates, or lake or basin areas. Environment Canada is unsure where the 78% runoff coefficient is derived from. The runoff coefficient obvious from Table 19, Supporting Document D is 56%. MHBL calculates $\Delta S$ every year to be 429,447 $m^3$. Miramar should have used the following to better explain the hydrological processes included in the site water balance:

$$\Delta S = P + M + I + TS - E - RW - T - O$$

where P and M are direct rainfall and melt to Tail Lake and I is lateral runoff. Using Miramar's values derived in Supporting Document D, and the equation immediately above, the estimated change in storage every year in the tailings pond should be 542,052 $m^3$. Over the two year life of the mine, the level of Tail Lake should rise from 28.3 m to 29.7 m. In Appendix A Section 2.5.2, the bottom of the emergency spillway is said to be designed at 31.6 m. More freeboard is needed considering that runoff to Tail Lake is possibly 130% of the estimates provided by Miramar (see EC's letter to MHBL dated March 14, 2003).

- Environment Canada requests that the FEIS provide clarification on the following issues:
  - How did MHBL derive the design storm of 1:500 year rainfall event? This information is not in any of the supporting documents.
  - What is the argument for assuming minimal groundwater seepage into the mine?
  - How was the Doris Lake climate data collected?
  - What were the comparison periods between the Meteorological Service of Canada regional stations at Doris Lake, Kugluktuk, Cambridge Bay and Lupin Mine? What were the conditions then, relative to normals?
  - Why is the mean annual hydrograph different at Doris than at Tail Lake if the Ellice River was the only station used for extrapolating the site streamflow record?
  - Once the rainfall record at the Doris North site is reconstructed with regional data, why not apply a frequency analysis through that record rather than apply the same correlation equations that compare weekly rainfall?
  - If after operations begin, the elevation of Tail Lake approaches the spillway elevation of 31.6 m, what will be the response in the tailings pond to the design storm?
  - Why use a 1:500 year rainfall event as the design storm for Tail Lake when the largest runoff event will likely be a snowmelt event?
  - Why is Doris Lake used for dilution of Tail Lake decant when the former is the potable water supply?
- In Figure 3.1.5, Figure 3.1.6 and pages C-22 through C-29 (and the tables therein) of the DEIS, no information is presented regarding the number of stream water quality samples collected at each site at various times in the water year, and no mention of quality assurance programs and quality control samples. There is little information on seasonal variability in water quality values. The length of record for each stream water quality site is discernable with some difficulty from the maps provided. It is difficult for the reviewer to conclude that median and range values are truly representative without available descriptive statistics concerning numbers of water quality samples collected at various sites and at different times of the water year. Water quality samples should be collected in statistically large numbers at all times during the water year, such has the spring freshet, summer/fall recession, winter low flow, late winter base flow. The reviewer wonders if the water quality results are accurate and/or precise when there is no mention of a quality assurance/quality control (QA/QC) water quality program involving 10% to 30% quality control samples. The reviewer notes that water quality samples were collected over a period of nearly 10 years at some sites, and this may give yield very good baseline information about water quality in both high and low water years if the

above-mentioned concerns have been properly dealt with. Environment Canada recommends that the number of water quality samples collected should be shown in brackets alongside median, minimum and maximum values. A paragraph and/or table should be inserted to describe the field QA/QC program and the findings of that program. This is necessary as it is important to know whether the median, minimum and maximum water quality values described and compared to CCME Canadian Water Quality Guidelines are representative, and derived from statistically large (i.e. usually more than 30) numbers of water quality samples. It is equally important to have some measure of the accuracy (i.e. close to the actual value) and precision (i.e. repeatable and clustered) of the water quality values.

- In pages C-12 through C-18 of the DEIS, there is insufficient information concerning kinetic geochemistry testing for acid rock drainage (ARD) in rocks of high acid-generating potential. Such rocks include: Lakeshore Vein Quartz Veins Q1 and Q2, Central Vein Quartz Veins Q4, mineralized material, underground quartz, altered (i.e. dolomitized, sericitized) mafic volcanics D2 and underground mafic volcanics with more than 1% (by weight) total sulphur concentrations. There are only four kinetic tests carried out so far; this is an insufficient number of tests, given that there are at least eight rock types (listed above) capable of having high acid-generating potential. It would be desirable to have two or three kinetic geo-chemical tests carried out for each of the eight rock types capable of high acid-generating potential (i.e. 16 to 24 tests). A more common practice in kinetic geo-chemical testing at the Ekati, Diavik and Snap Lake Diamond Projects in largely granitic and kimberlitic rocks with less ARD-generating potential involves column leach testing. The test period is typically 80+ weeks. The 80+ week test period allows for the slow reaction time of some geo-chemical reactions. As there are a large number (i.e. at least eight) of rock types capable of generating ARD, four tests are an insufficient number of tests.

***Air Quality Concerns***

- The proponent has not provided any quantified emission estimates of criteria contaminants or toxic pollutants nor has the proponent provided any predictions on resulting ambient air concentration or deposition of the pollutants the mine will be emitting to the atmosphere. The comparisons currently proposed in the DEIS are between emissions from Ekati Diamond Mine and the Doris North site. However, emissions from a gold mine can be quite different from those from a diamond mine. For example, the extraction process for diamonds is completely different from the process to extract gold from the ore. Furthermore, an air quality assessment from one site cannot be superimposed on a different site hundreds of kilometers away. The two mine developments have different emission sources and configurations. Even if the emissions sources were identical, the impacts could be vastly different because of geographical and meteorological differences. Therefore, EC requests that a separate air quality assessment specific to Doris North project be conducted. The atmosphere can be an important pathway for contaminants to environment affecting water quality, soils, vegetation and wildlife. Until an air quality assessment is completed, the environmental impact of the Doris North Project is unknown.
    - To conduct an air quality assessment, MHBL must estimate the total emissions from each of the emission sources listed in Table 5.3.2 plus any other sources such as crushing and processing of the ore and gold extraction and smelter and fugitive emissions from roads and waste rock stock piles. The pollutants that should be reported are the criteria air contaminants (sulphur dioxide ($SO_2$), nitrogen oxides ($NO_x$), carbon monoxide (CO), volatile organic compounds (VOCs), ammonia ($NH_3$), total suspended particulate (TSP) and particulate mass size fractions less than 10 microns ($PM_{10}$) and less than 2.5 microns ($PM_{2.5}$)), and any toxics and metals released to the atmosphere through the ore processing and gold extraction processes.
    - The estimated emissions must be used in an appropriate air quality model to predict ambient concentrations and wet and dry deposition rates. The modeling

domain must be large enough to include all regional emission sources and predicted impact areas. Environment Canada is willing to assist the proponent in guiding the modeling effort. Environment Canada requests that MHBL provide all input and output data from the modeling work.