Environment Canada **Environnement Canada**

ENVIRONMENTAL PROTECTION OPERATIONS
Prairie and Northern Region
Twin Atria #2, Room 200
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Edmonton, Alberta T6B 2X3

January 23, 2006

Our file: 4703 003 013
Your file: NIRB 05MN047

Mr. Albert Ehaloak
Acting Chairperson
Nunavut Impact Review Board
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Via Email and Facsimile
Original to follow by regular post

Dear Mr. Ehaloak:

Please find attached Environment Canada's written submission to the Nunavut Impact Review Board in respect to the scheduled Public Hearings concerning Miramar Hope Bay Ltd.'s revised proposal to construct, operate and decommission the Doris North gold mine in Nunavut.

Colette Spagnuolo, Environmental Assessment/Contaminated Sites Specialist, will be in attendance at the public hearing to make a formal presentation of this intervention, and will be available to respond to any questions which the Nunavut Impact Review Board members, the proponent, or the public may have concerning the issues raised by Environment Canada in this submission.

If you wish clarification on any aspect of this submission prior to the public hearing, please contact Colette Spagnuolo, Qimugjuk Building 969, P.O. Box 1870 Iqaluit, NU X0A 0H0; Tel: (867) 975-4639; Fax: (867) 975-4645.

Yours sincerely,

Original signed by

Peter Blackall, P. Eng.
Regional Director

cc: (Chuck Brumwell, Manager, Northern Division, Environment Canada, Yellowknife)
(Stephen Harbicht, Head, Assessment and Monitoring Section, Environment Canada, Yellowknife)
(Colette Spagnuolo Environmental Assessment / Contaminated Sites Specialist, Environment Canada, Iqaluit)

ENVIRONMENT CANADA'S

SUBMISSION TO THE

NUNAVUT IMPACT REVIEW BOARD

FOR THE FINAL PUBLIC HEARINGS ON THE

DORIS NORTH GOLD MINE PROJECT

REVISED FINAL ENVIROMENTAL IMPACT STATEMENT
SUBMITTED BY MIRAMAR HOPE BAY LIMITED
OCTOBER 2005

January 2006

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NON-TECHNICAL EXECUTIVE SUMMARY

Contributing to the realization of sustainable development in Canada's North is a priority for Environment Canada (EC). The Department focuses on providing scientific expertise for incorporation into decisions on developments, such that all parties working together can ensure that there is minimal impact on the natural environment, and that ecosystem integrity is maintained and preserved. Toward these goals, the Department has reviewed the revised Miramar Hope Bay Ltd. (MHBL) Final Environmental Impact Statement (FEIS) for the proposed Doris North Project (October 2005) and the supplementary information that has been provided to the Nunavut Impact Review Board (NIRB).

Environment Canada's submission focuses on issues related to the environmental effects on or related to migratory birds, species at risk, aquatic quality and water management, emergency response planning, and abandonment and restoration planning. Issues regarding tailings management will be provided to the NIRB at a later date. As directed by the NIRB, this submission focuses on those aspects of the five major areas of deficiency identified by the NIRB in the document "Final Hearing Report for the Doris North Gold Mine Project" (August 2004) that fall within EC's mandated responsibilities.

While the revised FEIS is greatly improved, EC has identified a number of deficiencies and notes that some of these deficiencies remain outstanding from previous versions of the EIS.

Environment Canada and Fisheries and Oceans Canada (DFO) have been engaged in ongoing discussions with MHBL regarding the alternatives assessment for the tailings disposal area. As a result of these discussions, MHBL agreed to revise the tailings alternatives assessment, and submitted the revised document on January 18, 2006. This document is greatly improved over previous versions, and addresses the majority of EC's outstanding environmental assessment concerns regarding tailings disposal.

The proposed mine development plan is a great improvement over previous plans. However, MHBL must make sure that all of the modeling is updated to reflect the new mine development plan. There are differences of opinion regarding the numbers used by MHBL to calculate the amount of water that will seep through the dams. Therefore, MHBL should agree to monitor changes in the permafrost regime throughout the life of the mine so that seepage rate predictions can be confirmed. MHBL should use numbers in their models that reflect how the tailings impoundment area and other water management structures will actually operate so that impact predications can be confirmed. Concerns have also been identified regarding the levels of contaminants that mine waste rock and other mine components will add to Tail Lake, and EC recommends that the water quality modeling be reviewed prior to the regulatory phase.

Environment Canada is pleased that MHBL has committed to meet Canadian Council of Ministers of the Environment (CCME) criteria downstream of the waterfall in Doris Creek. However, there are still concerns about the water quality in the receiving environment. MHBL is reminded that the Metal Mining Effluent Regulation (MMER)

criteria are only minimal national standards, and that the discharge criteria established during the water licensing process may be lower. In order to help protect the receiving environment, for parameters regulated under the MMER, MHBL should commit that the water being released from Tail Lake will meet the discharge criteria used during the modelling for downstream water quality, which are much lower than MMER criteria. MHBL should review guidelines from other jurisdictions for parameters that do not have CCME guidelines to make sure that levels of these parameters in the downstream environment will also protect aquatic life. Finally, an adaptive management program for ammonia, nitrite and nitrate concentrations should be put in place, including measures to reduce the amount of ammonia that is released into the water, in order to address concerns regarding nutrient concentrations. MHBL should make sure that an aquatic effects monitoring program is put in place, and that it include the parameters discussed in our recommendations.

Environment Canada keeps identifying concerns with the baseline data that MHBL has gathered for migratory birds, and the issues that this poor quality baseline data poses for assessing the predicted impacts of the project on migratory birds. The Hope Bay area is an important area for migratory birds. Not enough baseline data has been collected by MHBL to find out the significance of the impacts from the project on both migratory birds and migratory bird habitat. Further migratory birds (including waterfowl, shorebirds, songbirds, and waterbirds) baseline data should be collected as per the recommendations in this intervention. Due to the lack of baseline data, it is hard to determine if the impact predictions by MHBL are true. However, it is possible that impacts to at least waterfowl are much greater than MHBL has predicted. Due to the lack of adequate baseline data and the likelihood that no further pre-impact data can be collected, MHBL must make sure that the Wildlife Mitigation and Monitoring Plan is thorough and scientifically defensible so that impact predictions made can be confirmed and that any potential impacts can be identified early and mitigated.

Environment Canada notes that the emergency response and contingency plan is currently not complete enough to address all concerns in the areas of prevention, preparedness, response and recovery. Environment Canada has identified issues that must be addressed and may be able to provide MHBL with further advice if it would like it.

Environment Canada would like to thank the NIRB for the opportunity to comment on the Doris North FEIS, and we hope that these technical comments and recommendations are useful to the NIRB in their decision making process. Environment Canada respectfully requests the opportunity to submit additional written comments after the public hearings to address any new information brought forward at the hearings.

SECTION 1.0: INTRODUCTION

Contributing to the realization of sustainable development in Canada's North is a priority for Environment Canada (EC). The Department focuses on the provision of scientific expertise for incorporation into decisions on developments, such that all parties working together can ensure that there is minimal impact on the natural environment, and that ecosystem integrity is maintained and preserved. Toward these goals, the Department has reviewed the revised Miramar Hope Bay Ltd. (MHBL) Final Environmental Impact Statement (FEIS) for the proposed Doris North Project (October 2005) and the supplementary information that has been provided to the Nunavut Impact Review Board (NIRB).

Environment Canada's submission focuses on issues related to the environmental effects on or related to tailings management, migratory birds, species at risk, aquatic quality and water management, emergency response planning, and abandonment and restoration planning. As directed by the NIRB, this submission focuses on those aspects of the five major areas of deficiency identified by the NIRB in the document "Final Hearing Report for the Doris North Gold Mine Project" (August 2004) that fall within EC's mandated responsibilities.

The document is divided into three main sections. Section One provides an overview of EC's mandate and regulatory responsibilities. Section Two provides an overview of the Doris North Gold Project and the environmental assessment process to date. Section Three provides EC's technical comments and recommendations to the proponent in response to the final EIS and supporting documents. Finally, a summary of the recommendations made in the submission is provided in Section Four.

1.1 Mandate of Environment Canada

The general mandate of EC is defined by the *Department of the Environment Act*. This Act provides the Department with a general responsibility for environmental management and protection in terms of the need to foster harmony between society and the environment for the economic, social, and cultural benefit of present and future generations of Canadians. The Department shares this responsibility with the provinces and territories. Environment Canada is also responsible for providing specialist or expert information and knowledge to federal government agencies and for the preservation and enhancement of environmental quality.

1.2 Regulatory Responsibilities

Environment Canada is participating in the review of the proposed Doris North Gold Project in order to provide specialist expertise, information and knowledge to both the NIRB under Article 12 of the Nunavut Land Claims Agreement, and the Responsible Authorities for this project under the *Canadian Environmental Assessment Act*. Environment Canada will not be issuing a permits or authorizations for the proposed Doris North Project. However, if the project receives all the required environmental assessment and regulatory approvals to proceed, EC will work with Fisheries and Oceans

Canada to list the tailings impoundment area (TIA) on Schedule 2 of the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act*.

1.3 Relevant Legislation, Regulations, Policies and Guidelines

The following relevant legislation administered or adhered to by EC influenced the content of this submission: *Department of the Environment Act*, *Canadian Environmental Assessment Act*, *Canadian Environmental Protection Act, 1999*, *Fisheries Act* – Pollution Prevention Provisions, *Migratory Birds Convention Act* and *Migratory Bird Regulations*, and the *Species at Risk Act*. Various regulations, policies and guidelines stem from these legislation. Details regarding the legislation, regulations, policies and guidelines are provided in Appendix A.

SECTION 2.0: BACKGROUND

Miramar Hope Bay Ltd. is proposing to construct, operate, and eventually decommission a gold mine in the Hope Bay Belt located in the West Kitikmeot region of Nunavut, approximately 65 km southeast of Cambridge Bay. The proposed Doris North project will extract 458,157 tonnes of ore, processing it at a rate of 668 tonnes per day to yield 306,830 ounces of gold over a 24-month operating period. Additional exploration in the Hope Bay Belt will be ongoing during the course of the Doris North project, and any new deposits will be permitted under separate application.

This project was previously subject to a Part V review under the Nunavut Land Claims Agreement (NLCA) by the NIRB in August 2004. At that time, the NIRB determined that it had not been presented with the information required to conduct a full review of the matters relevant to its mandate. Specifically, the NIRB determined that additional information was required in five key areas, identified as:

- The wildlife mitigation and monitoring plan, including cumulative effects assessment;
- The Tail Lake water quality and water management strategy;
- The assessment of alternatives to the use of Tail Lake for tailings disposal;
- The design of the jetty and related issues including affects on fish habitat, shoreline erosion and the seabed; and
- The socio-economic impact of the project on affected residents and communities of Nunavut.

As a result of these deficiencies, the NIRB recommended that as per Section 12.2.5 of the NLCA, the project not proceed on the basis of the current application.

The NIRB encouraged MHBL to re-file their application for the Doris North gold mine project once the gaps identified had been addressed. Accordingly, MHBL submitted a revised draft EIS to the NIRB in June 2005.

A technical meeting and a pre-hearing conference were held in August 2005 in Yellowknife, NT in order to help improve the quality of the FEIS. As a result of these

meetings, MHBL committed to a list of 187 items that would be clarified or included in the FEIS. MHBL submitted a FEIS to the NIRB in October 2005, and the NIRB decided that the FEIS generally conformed to the pre-hearing conference decision and Guidelines, but that a few outstanding issues needed to be addressed. A Supplement to the FEIS was submitted by MHBL to address outstanding concerns (November 15, 2005). Information requests were also submitted to the proponent in late November 2005.

This submission takes into consideration all of the documents submitted with the FEIS, as well as the November 15, 2005 FEIS Supplement document, the responses to the information requests dated December 9, 2005, and the revised tailings alternatives assessment submitted January 18, 2006. Should new or additional relevant information be brought forward by the proponent or be identified during the final public hearings, this submission will be re-examined. Within the context of the additional information, any changes in EC's recommendations and position will be brought to the attention of the NIRB and the proponent.

SECTION 3.0: TECHNICAL COMMENTS

Environment Canada would like to commend MHBL and their consultants for the professional manner in which the review of the revised EIS has been undertaken. Most of the information provided in the revised EIS is considerably better than what was previously submitted. Environment Canada appreciates the cooperative approach taken by MHBL in working with the various interveners to address outstanding issues.

While the majority of EC's concerns regarding the project have been addressed during the review of the revised EIS, a number of inadequacies in the information provided still remain. Environment Canada continues to identify areas where comments and recommendations identified during the original review of this project have not been incorporated into the revised FEIS. For instance, while the majority of the technical issues relating to migratory birds have been identified previously, they have not been addressed in the FEIS. As such, these issues remain outstanding.

Issues have been organized according to the five main areas of deficiencies, as directed by the NIRB in their letter dated November 29, 2005. It should be noted that issues relating to the jetty and socio-economic impacts fall outside of EC's mandate and have not been addressed in this submission. Comments relating to issues outside of the five main areas of deficiency are grouped together at the end of the submission. Within each category, comments are organized by specific issue, with reference to the appropriate document title, section, and page number.

3.1 Assessment of Alternatives to the Use of Tail Lake for Tailings Disposal

Environment Canada and Fisheries and Oceans Canada (DFO) have been engaged in ongoing discussions with MHBL regarding the alternatives assessment for the tailings disposal area. As a result of these discussions, MHBL agreed to revise the tailings

alternatives assessment, and submitted a report entitled "Integrated Tailings Disposal Alternatives Assessment" on January 18, 2006. This report is a considerable improvement over the previous alternatives assessment as presented in Chapter 3 of the FIES and Supporting Document A3, and goes a long way toward addressing the majority of EC's outstanding concerns on this issue. As a result of the information presented in the revised document, EC is of the opinion that the tailings disposal alternatives assessment is sufficient for the purposes of the environmental assessment process. However, issues still remain which will require clarification during the regulatory process.

Issue 3.1.1. Criteria included in Multiple Accounts Analysis

Document Name(s): Integrated Tailings Disposal Alternatives Assessment, Doris North Project, Hope Bay; **Document Section(s)**: Tables 2-9

Proponent's Conclusion

Tables 8 and 9 of the Integrated Tailings Disposal Alternatives Assessment detail the environmental, socio-economic, operational and economic criteria that were included in the options analysis that was used to determine the preferred alternative for tailings disposal.

Environment Canada's Conclusion

The criteria included in the option analysis outlined in Tables 8 and 9 do not capture all of the criteria discussed in Tables 2-7 of the report. For instance, Table 5 provides a discussion of potential impacts from each tailings disposal option on the valued ecosystem components (VECs). However, this information does not appear to have been incorporated into the options analysis. Resultantly, it is possible that the options analysis does not consider the potential impacts of those tailings disposal alternatives that were carried forward to final screening on VECs, and as such, may underestimate the environmental impact of these alternatives.

Significance to the Environmental Assessment Process

In order to fully evaluate if the preferred alternative is in fact the best alternative, and if, in the case of the Doris North project, the loss of Tail Lake as a fish-bearing waterbody is acceptable, it is important to have a thorough and robust alternatives assessment. The elimination of fish-bearing waters should be one of last resort and must be fully justified in light of all available disposal alternatives. The assessment must consider the impacts of the project on all potentially impacted VECs. While the revised tailings disposal alternatives assessment provides a good overview of the impacts of the tailings disposal options on water quality, air quality, fish species and vegetation, it does not address potential impacts on terrestrial species, including migratory birds. These considerations should be carried forward to the options analysis and decision matrix.

Environment Canada's Recommendation

Environment Canada is of the opinion that the revised tailings disposal alternatives assessment is sufficient for the purposes of the environmental assessment process. However, EC recommends that MHBL provide clarification regarding why some of the criteria discussed in Tables 2-7 were not included in the options analysis and scoring

matrix. Environment Canada recommends that the Project Certificate include a term and condition requiring this information be provided in advance of the regulatory phase.

3.2 Tail Lake Water Quality and Water Management Strategy

Under a Prime Ministerial Instruction (1978) and a Memorandum of Understanding (1985), EC administers and enforces those aspects of the *Fisheries Act* dealing with the prevention and control of pollutants affecting fish. As such, EC is able to offer expertise to the NIRB regarding the water quality and water management strategy for Tail Lake, especially relating to surface water quality, water management, and groundwater flow and quality.

The *Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the Fisheries Act* states that compliance with the federal *Fisheries Act* is mandatory. Subsection 36(3) of the *Fisheries Act* specifies that unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water. Proponents should note that only a federal regulation under the *Fisheries Act* or another Act of Parliament can authorize a discharge of a deleterious substance; no federal permit, provincial, territorial or municipal regulatory permit or approval allows for exemption from these provisions of the *Fisheries Act*. If approved, the Doris North gold project will be subject to the provisions of the MMERs under the *Fisheries Act*.

Issue 3.2.1: Tail Lake Dam Seepage

Document Name(s): Technical Report; **Document Section(s)**: Section 4.8.6.3; **Page Number(s)**: page 4-113
Document Name(s): Supporting Document A2; **Document Section(s)**: Section 2.4.4; **Page Number(s)**: page 10

Proponent's Conclusion

MHBL indicates seepage from the tailings impoundment can be via three primary routes: North Dam, South Dam and deep recharge through the lake basin. In reality, the North and South Dams will be frozen core dams, which should not have any seepage. In the event that seepage was to occur, MHBL would intercept this seepage and return it to Tail Lake.

However MHBL considered it appropriate to estimate what this seepage may be, such that an evaluation could be made of the potential effect that it may have on the water balance. Since the seepage rates at any of these points cannot be physically measured at this stage, MHBL has made first order seepage calculations using the Darcy equation. MHBL lists the assumed constants for the theoretical seepage calculations and the resultant seepage rates for each potential seep (i.e. North Dam, South Dam). The hydraulic conductivities used for these calculations are an average, maximum or minimum value to provide a range of seepage results. The hydraulic conductivity values are based on typical gold tailings data.

Environment Canada's Conclusion
A hydraulic conductivity based on typical gold tailings data is used in these calculations. However, it is stated in section 2.6 on page 5 of Supporting Document A1 (Preliminary Tailings Dam Design) that "tailings will not be in contact with any of the two dams." Seepage rates through the North and South Dams will, therefore, be controlled solely by the hydraulic conductivity of the dam structures and/or the underlying foundation materials. The hydraulic conductivity of typical gold tailings used in the seepage calculations may not be representative of these materials in their unfrozen state.

An unfrozen zone with a depth of 15 m and a width of 35 m was assumed for computing seepage through the dams. While an unfrozen talik may develop on the upstream sides of the dams, the dams are designed to maintain a frozen core and provided this condition is maintained, seepage rates through the North and South Dams are likely to be considerably less than the estimated values.

Furthermore, since seepage losses from the dams are simply assumed to be pumped back to Tail Lake the calculation of seepage losses does not provide any useful insight into the effects on the water balance of Tail Lake. The assumption that 100% of the seepage will be recovered is probably not reasonable given the adverse hydrologic conditions prevalent in the area.

Significance to the Environmental Assessment Process
It is important that MHBL verify that the predictions made in the FEIS are supported by monitoring completed on site. Given the uncertainty associated with the values used in the seepage calculation, MHBL should commit to monitoring changes in the permafrost regime throughout the life of the mine so that seepage rate predictions can be verified.

Environment Canada's Recommendation
Environment Canada recommends that changes to the permafrost regime in the vicinity of the North and South Dams be monitored as part of a comprehensive long term monitoring program of permafrost conditions at the site. Installed thermisters should be monitored for as long as they are operational, including those thermisters installed between Doris Lake and Tail Lake. MHBL will also need to monitor for seepage conditions during operations to ensure that design criteria are being met.

Issue 3.2.2: Tail Lake Water Balance – Mine Water Component
Document Name(s): Technical Report; **Document Section(s)**: Section 4.8.6.3; **Page Number(s)**: page 4-116
Document Name(s): Supporting Document A2; **Document Section(s)**: Section 2.4.8; **Page Number(s)**: page 12

Proponent's Conclusion
In section 4.8.6.3 on page 4-116 of the Technical Report and in section 2.4.8 on page 12 of Supporting Document A2 (Tail Lake Water Quality Model) MHBL states:

> *Mining at the Doris North Project will exploit the Doris Hinge reserves, which are located north of Doris Lake. There is known permafrost in this region, and*

therefore it would be reasonable to assume that water make-up in the mine would be negligible.

SRK (2003e) documents the results of a scoping level geohydrological model for a mining scenario where the Doris Connector and Doris Central sections are exploited. Under this scenario, mining will move underneath Doris Lake and it is conceivable that there could be an inflow of water into the mine. This inflow has been estimated to average 235 m^3/day.

Although the two-year Doris North project would in all likelihood not experience any mine water inflow (SRK 2005a), a conservative assumption has been made that a mine inflow of 235m^3/day would occur for the life of the project. This water would be captured in the mine and pumped to Tail Lake.

Environment Canada's Conclusion

The revised water management strategy for Tail Lake is a significant improvement over the old strategy. However, the water balance calculations have not been updated for the current mine development plans and, although intended to be conservative, the water balance calculations tend to cloud the advantages and disadvantages of the current management strategy.

The mine water inflow of 235 m^3/day is assumed as a base case condition for computing the water balance in Tail Lake. This mine water discharge is a totally arbitrary number. In the modelling of the potential mine water inflows in Appendix A of Supporting Document B5, the crown pillar is assigned a hydraulic conductivity value one order of magnitude lower than the surrounding bedrock and ore zone. It is not indicated why this was done and, in fact, it is more likely to be one order of magnitude higher than the surrounding bedrock due to stress changes resulting from the mine workings. Furthermore, the assigned hydraulic conductivities are guesstimates and are not based on any field measurements in the talik beneath Doris Lake.

The mine water discharge tends to skew water balance results. A mine water discharge of 235 m^3/day is 85,775 m^3/year. Later, in section 2.5 of Supporting Document A2 (Tail Lake Water Quality Model), the proponent indicates that a decant rate of as little as 100,000 m^3/year from Tail Lake to Doris Creek would add approximately 2 years to the time to reach full supply level in Tail Lake, a 27% increase in time from a zero discharge scenario. This is a similar quantity to the mine water discharge and, therefore, the presence or absence of mine water discharge has a significant effect on the operational parameters for Tail Lake. Convincing arguments are presented for zero mine water discharge with the current mining proposal and, while a mine water discharge of 235 m^3/day might be considered as a specific upset condition, including it in the base case scenario is misleading. In the final analysis, the model will need to rerun with appropriate input conditions if the proponent is to have any hope of demonstrating that actual field observations are corresponding to design criteria.

Significance to the Environmental Assessment Process

The management of the Tail Lake TIA is an important component of the FEIS. The rate at which water will be decanted from the TIA is the main mitigation measure proposed

for ensuring water quality predictions are met downstream of Tail Lake in Doris Creek. As such, it is important that MHBL use appropriate input conditions so that on site conditions can be verified against the model. By using an ultra-conservative base case model, it will be difficult for MHBL to compare actual field results to model results, as the model does not reflect actual operating conditions.

Environment Canada's Recommendation
Environment Canada recommends that the mine water discharge should not be included in the base case computations of the water balance for Tail Lake. These computations should be updated prior to mine startup to provide realistic estimates of operational parameters for the Tail Lake facility that can be compared to field observations to determine whether the facility is operating according to design.

Issue 3.2.3: Tail Lake Water Quality Modeling - Mine Water Component
Document Name(s): Supporting Document A2; **Document Section(s)**: Section 3.1 and 3.2.3; **Page Number(s)**: page 16 and page 27

Proponent's Conclusion
In section 3.1 on page 16 of Supporting Document A2 (Tail Lake Water Quality Model) MHBL states:

> *Losses in saline drilling fluids that will be used during mining will report to the mine water recovered during the dewatering of the underground workings, as will any solute released from the mine wall rocks and waste rock backfilled to the underground workings during operations. The mine water will be pumped directly to Tail Lake. It should be noted that since the mine is not expected to require any dewatering, this is conservative.*

MHBL goes on to state in section 3.2.3 on page 27 of Supporting Document A2 (Tail Lake Water Quality Model):

> *A proportion of the waste rock will be directly backfilled to the underground workings. That rock will be less exposed to flushing, since the mine is expected to be dry. Nonetheless, the calculations for waste rock stored on surface were also applied to the waste rock backfill, with the exception that the blast residues would be released year round to mine water.*

Environment Canada's Conclusion
According to the loading inputs shown in Appendix H of Supporting Document A2, 85,775 m^3 of water from the mine workings with a specified loading of copper resulting in a computed concentration for copper of 3.3 µg/L is input to Tail Lake. The loadings are calculated from an amount of waste rock in the mine workings and the production rate for each solute from humidity cell tests on the waste rock. The quantity of waste rock in the mine workings used to calculate loadings from dewatering of the mine has not been specified.

Copper concentrations in Tail Lake are lower than those in the waste rock runoff and, therefore, the mine water adds some concentration of copper to Tail Lake. Although the inclusion of loadings from the mine water is intended to add some conservatism to the calculations, the loadings from the mine water are small in relation to the loadings from

the mill tailings, the mine is not expected to require any dewatering and, therefore, loadings from the mine water probably could be ignored.

Significance to the Environmental Assessment Process
MHBL has committed to meeting certain water quality parameters for copper in the receiving environment (i.e. downstream of the Doris Creek waterfall). Copper levels have been shown to be one of the limiting factors in determining when water can be decanted from the TIA. As such, it is important that MHBL input appropriate values into their models so that on site conditions can be verified against the model. The water quality management plan relies on the ability of MHBL to be able to accurately predict copper levels. Including copper loadings from mine water, when mine water discharge is not anticipated to be an issue now that there is no mining planned under Doris Lake, may skew the model and prevent the timely correction of true upset conditions.

Environment Canada's Recommendation
Environment Canada recommends that MHBL conduct a complete review of the modeling of water quality in Tail Lake taking into consideration changes in the development plans and provide verification for estimated loading rates from the various mine components including average annual loadings from waste rock in the waste rock pile and in the mine. The modeling should be updated prior to mine startup to provide realistic estimates of operational parameters for the Tail Lake facility that can be compared to field observations to determine whether the facility is operating according to design. Regulatory bodies can review the updated model as part of the water licensing process.

Issue 3.2.4: Effluent Quality – Use of MMER Criteria for End-of-Pipe Targets; and Targets for Parameters for which there are no CCME Criteria.
Document Name(s): SD A2 "Tail Lake Water Quality Model, Doris North Project, Hope Bay, Nunavut, Canada"; **Document Section(s)**:Table 3.8; **Page Number(s)**: page 43 and Table H-3-A-1
Document Name(s): Technical Report Binder; **Document Section(s)**: various

Proponent's Conclusion
The proponent states in several places in the FEIS that the end-of-pipe discharge from the TIA will comply with MMER criteria. Effluent will be discharged into Doris Creek approximately 40 metres upstream of a small waterfall, with the discharge volumes synchronized to the hydrograph and water quality coming from Doris Lake to ensure that Canadian Council of Ministers of the Environment (CCME) guidelines are met in the receiving environment downstream of the waterfall. Water quality modeling was done based on 1,000,000 m^3 of effluent being released each open water season. MHBL provided detailed information on the predicted concentrations of various water quality parameters over time for relevant locations.

Environment Canada's Conclusion
The MMER criteria are a minimum national standard, and do not necessarily take into account regional site sensitivities or resource protection objectives. EC has reviewed the predicted supernatant quality for Tail Lake over the life of the project and believes it is reasonable and practical for the company to manage the discharge such that water quality

below the waterfall is protected. However, the modeling done for downstream concentrations was based on the predicted supernatant quality in Tail Lake, and the parameters regulated under the MMER are predicted to be substantially less than the MMER criteria (SD A2, Table 3.8 and Table H-3-A-1,). It would therefore not be protective to potentially increase discharge concentrations to a higher level than that evaluated. Even if concentrations can be maintained at an acceptable level in the downstream receiving environment (and EC does not necessarily support the use of dilution to achieve this), the increase in loadings would be of concern.

Guidelines for the protection of freshwater and marine aquatic life are available for most, but not all, parameters being reviewed. There is the potential for changes to the aquatic environment associated with increases in parameters which are not included in the CCME guidelines.

Significance to the Environmental Assessment Process
Water quality has been identified by MHBL as a VEC. Therefore, it is important that impacts to water quality be avoided (where possible) or minimized through the implementation of mitigation measures. While MHBL has committed to meeting CCME values downstream of the waterfall in Doris Creek, water quality in the interim area (between the end of pipe discharge and the waterfall) may not be as protected due to regional site sensitivities or resource protection objectives that are not reflected in MMER criteria. If MHBL is not able to meet end of pipe predictions as outlined in the FEIS, and only MMER criteria are achieved, the increase in loading immediately downstream of the point of discharge may be problematic. Further, MHBL is proposing dilution as the primary mitigation measure for avoiding adverse impacts to water quality in the downstream receiving environment. While this may be effective, dilution is not viewed as a best management practice. MHBL should strive to ensure that end of pipe discharge levels are as low as possible prior to discharge.

Environment Canada's Recommendation
Environment Canada acknowledges that effluent discharge criteria will be set in the regulatory process. However, EC recommends that the proposed limits be compatible with those concentrations used to predict downstream receiving environment effects.

Environment Canada recommends that the proponent review guidelines from other jurisdictions for parameters which do not have CCME guidelines (such as chloride, TDS) and/or set management targets which will maintain ambient conditions, to ensure concentrations in the downstream aquatic environment will be protective of aquatic life.

Issue 3.2.5: Nutrient Predictions – Ammonia and Nitrate
Document Name(s): SD A2 "Tail Lake Water Quality Model"; **Document Section(s)**: Section 3.4; **Page Number(s)**: page 45-51

Proponent's Conclusion
Nutrient degradation reactions are discussed in Section 3.4 of Supporting Document A2 titled "Tail Lake Water Quality Model" dated October 2005. Effluent concentrations of total cyanide are predicted to be about 2.5 mg/L following treatment by Caro's acid

process (Table 3.5), with cyanate concentrations of about 400 mg/L and ammonia concentrations of about 20 mg/L. No rate is predicted for degradation of residual cyanide to cyanate, but hydrolysis of cyanate to ammonia was predicted to occur relatively rapidly, based on aging test results. Ammonia degradation or loss is most likely to occur through algal uptake or biological nitrification, which occurs at a very slow rate when temperatures are below 10 degrees C (Section 3.4.2).

Based on the experience at Colomac Mine, natural or enhanced (through phosphorus addition) removal are expected to be viable processes for ammonia-N removal. Rates are estimated by correcting for site differences such as lower amounts of sunshine at the higher latitude.

Various options are available for managing discharge such that parameters meet CCME guidelines in Doris Creek (Section 4, Supporting Document A2).

Environment Canada's Conclusion
Conservative assumptions have generally been used in developing predictions for concentrations of nitrogen compounds in the tailings water, and EC feels these are more realistic than previous predictions. However, the removal rates for ammonia may be optimistic. If the mine life remains at 2 years there may not be large enough source volumes of ammonia for water quality problems to develop, but should the mine life be extended for two further phases of up to an additional 10 years, there is the potential for ammonia in the tailings water to become a concern.

Ammonia degradation at the Doris North site is likely to occur at a lower rate than predicted. Low temperatures will limit bacterial conversion (none of the temperatures reported in Supporting Document C1 for Tail Lake or Doris Lake reached 10°C). Also, there are differences in conditions between the Colomac site and Tail Lake:

- At Colomac, initial degradation of cyanide occurred over a period of years, with concurrent breakdown of cyanate and ammonia (at a very slow rate). At the Doris North site, starting concentrations of CNO^- (and consequently NH_3) are much higher.
- At the Colomac site the tailings are aged and in a relatively stable configuration, while discharge will be ongoing at the Doris North site, and turbidity due to tailings deposition and shoreline erosion will limit algal processes to some extent. Fuscum Lake, which was referenced as providing a baseline natural removal rate at Colomac Mine, never received tailings, and has very different biological characteristics from an active tailings impoundment.
- Other constituents of the Tail Lake tailings water could be expected to inhibit algal and bacterial processes due to chronic toxicity.

Significance to the Environmental Assessment Process
Despite the additional information provided by MHBL in the FEIS in response to issues raised by EC at the technical meetings, EC still has concerns that the ammonia degradation rates in Tail Lake are being overestimated by MHBL. While MHBL has committed to meeting CCME criteria for most parameters in the downstream receiving

environment, this commitment does not include nitrite. If ammonia removal rates are overestimated, there could be environmental effects in the downstream receiving environment, as well as issues with compliance at the final discharge point. Monitoring is the primary mechanism through which proponents can ensure that impact predictions made in an EIS are accurate, and is included in the NIRB's 10 Minimum EIS Requirements. Given that water quality is identified as a VEC, EC feels that it is appropriate for MHBL to implement an adaptive management approach to the water quality management plan that includes ammonia, nitrite and nitrate concentrations.

Environment Canada's Recommendations
EC recommends that ammonia, nitrite, and nitrate concentrations be tracked (from all sources), and water quality predictions revised on an ongoing basis in order to be able to forecast trends which may affect discharge management. Source control of ammonia should be included in management plans.

Issue 3.2.6: Aquatic Effects Monitoring and Adaptive Management
Document Name(s): SD F3 "Final Report on Effluent and Aquatic Monitoring Study Design for Doris North Project, Nunavut, Canada"; **Document Section(s)**: throughout

Proponent's Conclusion
MHBL's proposed monitoring plan is described in the document titled "Final Report on Effluent and Aquatic Monitoring Study Design for Doris North Project, Nunavut, Canada" dated November 2003. The project's aquatic monitoring is expected to comply with the MMERs Environmental Effects Monitoring (EEM) requirements as well as with any requirements of the water licence. Water quality data are proposed to be presented in tabular format and used for comparisons to guidelines.

Environment Canada's Conclusion
It is critical to fully understand the range of natural variability and to be able to discern changes in the receiving environment which are attributable to mine-related effects, and to recognize the need for and implement adaptive management activities.

The proposed study design is set up to meet the MMER requirements, plus provide some further water quality characterization. The monitoring plan which was submitted with the FEIS is somewhat outdated in that it references a two month discharge only (Section 2.3.1) and lower discharge volumes (221,000 m^3/year) so effluent percentages in stream waters need to be re-evaluated (Section 4.4.2) along with timing of sampling. The plan provides the framework for meeting the MMER EEM requirements, but needs to be further developed to ensure environmental effects are detected.

Significance to the Environmental Assessment Process
While the specific details of the aquatic monitoring plan will be developed during the regulatory phase, the environmental assessment must incorporate enough detail so that interveners are able to understand and assess the proposed monitoring. In order to ensure that the Monitoring or Post-Project Analysis component of the NIRB's 10 Minimum EIS Requirements is fulfilled, the Aquatic Effects Monitoring and Adaptive Management Plan should be updated and additional detail provided. The monitoring plan provided in

the environmental assessment phase should also be up to date and based on the preferred water management strategy. Due to the outdated values used in the plan (as referenced above) it is difficult to determine if the proposed monitoring is appropriate.

Environment Canada's Recommendation
EC acknowledges that the monitoring program may be developed in the regulatory stage, but recommends that the commitment to appropriate monitoring be incorporated into the environmental assessment as it will be central to detecting and reacting to aquatic effects before they become unacceptable. Some examples of details which need to be included would be:

- for sediments, ensure consistency of analytical methods with past work, determine the sediment depth that will be analyzed, and think about what statistical tests can be done to detect changes;
- have dissolved as well as total analyses done on water samples;
- the proposed presentation of water quality data will not provide an objective measure of change; statistical tests need to be identified which can provide evaluations of changes in various parameters;
- parameters which do not have guidelines need to be tracked and reported on, e.g. chloride and TDS.
- Some measure of primary productivity will also need to be included, such as chlorophyll *a*, in order to track changes related to nutrient addition.

3.3 Wildlife Mitigation and Monitoring Plan

The Canadian Wildlife Service of Environment Canada (EC-CWS) administers and enforces the *Migratory Birds Convention Act* (MBCA) and Migratory Bird Regulations (MBR). Paragraph 6(a) of the *MBR* states that no one shall destroy or disturb the nests or eggs of migratory birds and Section 35 of the *MBR* states that no person shall deposit or permit to be deposited oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.

EC provides expert advice in environmental assessment review processes focusing primarily on identifying potential adverse effects to migratory bird populations and habitats, and appropriate measures to mitigate those effects. The advice provided in an environmental assessment process does not constitute an authorization for incidental take under the MBR's, nor does it assure that the project will not result in the killing or taking of a migratory bird or its nest. Furthermore, the advice does not absolve project proponents from their obligation to comply with all provisions of the MBCA and MBR.

Environment Canada continues to have significant concerns regarding the migratory bird impact assessment. Environment Canada has repeatedly provided comments to the NIRB and MHBL regarding concerns with the baseline data used for the impact predictions during the course of the review of both the original EIS and the revised EIS. These concerns remain. Further review of the FEIS has also identified a potentially serious underestimation of the impact of the project on waterfowl. If the project is approved, it will be critical for MHBL to revise the Wildlife Mitigation and Monitoring Plan in order

to include a robust and comprehensive monitoring program for migratory birds to allow for early detection of potential impacts and verification of impact predictions.

Issue 3.3.1: Inadequate Baseline Data to Predict Impacts on Migratory Birds (Songbirds and Shorebirds)

Document Name(s): Technical Report; **Document Section(s)**: Chapter 19, Section 19.3.6; **Page Number(s)**: page 19-21
Document Name(s): SD F1 "Final Report: Proposed Wildlife Mitigation and Monitoring Program for the Doris North Gold Mine"; **Document Section(s)**: Section 4.5

Proponent's Conclusion

The proponent concluded that the residual adverse environmental effect of the planned Project on upland breeding birds will be minor (not significant).

Environment Canada's Conclusion

EC-CWS visited the project development area in 2002 and completed ground surveys for shorebirds in the area. Survey results from the five plots that were within 10-15 km of the Doris North and Boston projects produced the following estimates of numbers of breeding pairs/km^2**:**

Savannah sparrow- 16
Common Redpoll- 11
Lapland Longspur- 23
Horned Lark- 11
American Tree Sparrow- 6
Least Sandpiper- 2.5
Semipalmated Sandpiper- 1

Range of plot densities (all birds): 12 – 143 birds/km^2

These figures are considerably higher than those presented by MHBL in the Technical Report (10 – 79 birds/km^2) (Technical Report, Chapter 19, Section 19.3.6, page 19-1) but considerably lower than those reported for 2005 in MHBL's Response to Wildlife Information Requests (102 – 439 birds/km^2). It is impossible to determine which density figures are most representative of the area, or if all are equally representative due to natural fluctuations.

Additionally, the proponent should not continue to lump shorebirds in with upland birds. The vast majority of shorebirds do NOT frequent upland habitats and thus the proponent's assumptions about what constitutes important upland bird habitat are not correct for shorebirds. For example, while wetland habitats are ranked as of 'moderate' importance for upland birds, these habitat types would be of 'high" importance for most shorebird species. The proponent should separate out shorebirds for surveying and habitat identification purposes.

Significance to the Environmental Assessment Process
As noted in EC's intervention on the original EIS and comments provided on the revised draft EIS, it is not possible to evaluate the adequacy of the bird surveys completed to date. The recent reply from MHBL to EC's information request regarding upland bird survey methodology, raw data, and 2005 results contained some summarized data for 2005 but nothing else. Environment Canada repeats its previous comments that the proponent has not supplied the NIRB with enough information from which to make a decision regarding the impact of the project on songbirds and shorebirds. The baseline data collected by MHBL for these birds are inadequate and are unsuitable for predicting or assessing impacts.

If the project is approved, it is unlikely that MHBL will have time to be able to collect any true pre-impact baseline data from the project area given the construction schedule outlined in the FEIS. Given EC is unable to assess the validity of the impact predictions made in the FEIS, it is essential that the Wildlife Mitigation and Monitoring Plan be robust, thorough, and incorporate scientifically-defensive techniques so that any potential impacts to migratory birds can be documented and mitigated through adaptive management techniques.

Environment Canada's Recommendations
EC-CWS has identified a number of ways in which the methodology of the data collection for migratory birds and their habitat could be improved in the Wildlife Mitigation and Monitoring Plan so that the impacts of the proposed project on migratory birds can be better assessed.

The goals and objectives of monitoring should be related to providing appropriate baseline information, evaluating specific effects of the project, and providing information for the cumulative effects monitoring program for the region. Particularly if this is just the beginning of development in the Hope Bay region, it is vital that a good monitoring program is designed and implemented so that cumulative effects can be properly monitored and assessed from the beginning of development in the area.

The effectiveness of mitigation measures, and results of any monitoring activities undertaken by the proponent, should be reported to the appropriate agencies via annual wildlife reports. Copies of these reports should be provided to EC personnel as they become available.

Specific recommendations / comments on the Mitigation and Monitoring Plan include:

- The point count survey method suggested by MHBL in the WMMP is mostly suitable for a small number of passerine species, but is not suitable for shorebirds. Environment Canada recommends that surveyors use a plot-based, 'area search' protocol that will effectively survey songbirds, shorebirds, and some of the larger nesting species (e.g. cranes and jaegers). EC-CWS has used this type of program to survey arctic shorebird and passerines for several years now, and can provide the proponent with details of the monitoring protocol.

- The proponent should separate its habitat modeling for shorebirds and true upland birds. Currently the proponent appears to have two habitat models in use: one which considers most wet habitats to be of medium quality (clearly wrong for shorebirds), and one which considers virtually all vegetated habitat and shoreline to be of high quality for all upland birds (also clearly wrong). In order to get future estimates of amounts of high quality habitat impacted by development, the proponent must do a separate habitat modeling for upland birds and shorebirds. EC-CWS has expertise in this area and could provide direction.
- Reporting, archiving, and making data available for other users is essential.

Issue 3.3.2: Lack of Baseline Data on Migratory Birds in the Marine Environment

Document Name(s): Technical Report; **Document Section(s)**: Chapter 20; **Page Number(s)**: pages 20-1 to 20-21
Document Name(s): Technical Report; **Document Section(s)**: Chapter 22; **Page Number(s)**: pages 22-1 to 22-18
Document Name(s): SD F1 "Final Report: Proposed Wildlife Mitigation and Monitoring Program for the Doris North Gold Mine"; **Document Section(s)**: Section 4.5

Proponent's Conclusion

The proponent concludes that the effect of the planned project on waterfowl (including sea ducks) will be minor (i.e. not significant) (Section 20.3.5). However, Chapter 20 of the Technical Report states in general terms that sea ducks could be affected by the project. Further, the Mitigation and Monitoring Program implies that MHBL will monitor the impact of the project on sea ducks. However, MHBL does not mention birds when discussing the impact of the project on marine processes, including impacts from potential fuel spills. MHBL has also not attempted to collect any baseline data on birds that occur in Roberts Bay and Hope Bay.

Environment Canada's Conclusion

Despite the recommendation in EC's submission of June 2004 (see Issue 2.1(j): Migratory Birds in the Marine Environment), MHBL has not collected any baseline data on the birds that use Roberts Bay and Hope Bay. The proponent acknowledges that sea ducks could be affected by certain aspects of the development including ship traffic and the shoreline staging area (page 20-11 of chapter 20 on Waterfowl). MHBL also acknowledges that the impact of the project on sea ducks should be monitored (page 13 of chapter on Mitigation and Monitoring under Disturbance to Wildlife). Further, MHBL also acknowledges that the two eider species that occur in the area are classified as "Sensitive" by the Government of Nunavut (see page 20-1 Existing Conditions chapter 20 Waterfowl; also page 20-8). Despite all this, the proponent has not gathered any baseline data on sea ducks. Environment Canada is unclear how MHBL can evaluate potential impacts of the project on sea ducks without the baseline data. Likewise, is it unclear how MHBL can consider mitigation measures, or monitor the effect of the development on sea ducks without first knowing where and when the sea ducks occur in the area.

The proponent states "information on the current distribution and population status of sea ducks in the Hope Bay region was obtained from EC-CWS (courtesy of Lynne Dickson)"

(Chapter 20 "Waterfowl", page 20-4). The information that EC-CWS provided was of a regional nature (i.e. provided information on distribution and population status within the Kitikmeot Region not within Roberts Bay/Hope Bay) and, hence, it should not be construed as the site specific data needed for environmental assessment purposes. All that can be concluded from the EC-CWS data is that a substantial number of Common Eiders potentially occur in or near Roberts Bay/Hope Bay from late June through to the end of October. Consequently, MHBL should gather baseline data to evaluate what impact the project might have on eiders (see Appendix 2 for correspondence from Dickson to Golder Associates dated October 29, 2004 for the EC-CWS information provided by Dickson).

In their description of existing conditions on page 20-7 of the Technical Report (Chapter 20), the proponent notes that the only eider colony in the area is an island with 50 – 100 nests in Hope Bay. What they fail to mention is that no one has ever actually done a survey to locate all the nesting colonies in the vicinity of Roberts Bay/Hope Bay.

In the Technical Report, Chapter 22 "Nearshore Marine Processes", page 22-11, the proponent identifies several ways that the project will affect Roberts Bay, including direct disturbance, increased water turbidity and the potential for accidental fuel spills. However, there is no background information on the birds that use Roberts Bay and no discussion of how birds might be affected. Birds are not even discussed in the context of a fuel spill into the marine environment, despite how vulnerable birds are to oil spills.

Significance to the Environmental Assessment Process
The proponent has failed to provide the baseline data needed to assess the effect of the development on sea ducks. Adequate information necessary to develop mitigation measures or a monitoring program is not provided.

Environment Canada's Recommendations
The proponent should collect at least 1 year of baseline data on sea ducks and other birds that occur in Roberts Bay and Hope Bay area. The data set should include:

- location of spring staging birds (survey in last week of June)
- location and size of Common Eider breeding colonies in Roberts Bay and Hope Bay (survey on foot all islands <20 ha in size in Hope Bay and Roberts Bay, including islands off the point between the 2 bays around July 7 - 10)
- surveys of both Roberts Bay and Hope Bay around August 10 and 30 to determine distribution and abundance of moulting and brood-rearing and fall staging Common Eiders, King Eiders and Long-tailed Ducks.

The proponent should then use this baseline data to evaluate the effect of the project on sea ducks, consider mitigation measures for sea ducks and develop a plan for follow-up monitoring. This information should be provided to the NIRB via annual wildlife reports. Copies of these reports should be provided to EC personnel as they become available.

Issue 3.3.3: Inadequate Baseline Data on Waterfowl

Document Name(s): Technical Report; **Document Section(s)**: Chapter 20, Section 20.1.3 and 20.3.5; **Page Number(s)**: pages 20-7 and 20-18

Proponent's Conclusion

Estimated waterfowl densities in the FEIS environmental assessment area range from 2.5 to 10.2 birds/ha (Section 20.1.3). The proponent concluded that the effect of the planned Project on waterfowl will be minor (i.e. not significant) (Section 20.3.5).

Environment Canada's Conclusion

If correct, the waterfowl densities reported by MHBL are exceedingly high (in the order of 250 to 1000 bird/km^2). Perhaps the authors intended the units to be birds/km^2 and not birds/ha? However, even if the densities are in the range of 2.5 to 10.2 birds/km^2 that would make the densities of waterfowl as high as those observed in some "key habitat sites" elsewhere in the Canadian Arctic. Key habitat sites are those sites believed to support at least 1% of a national population.

Furthermore, the NIRB's Pre-hearing Conference decision directed the proponent to continue to collect baseline data in 2005 and 2006 for all breeding birds. In comments made on the revised draft EIS, EC also recommended that the proponent design and carry out effective surveys to determine both the importance of the area, as well as the different types of habitat within the area, for migratory birds, including waterfowl. In response to an information request from EC about migratory bird baseline data collected in 2005, the proponent did indicate that some waterfowl were sighted in 2005, but no new information on waterfowl densities was provided.

Significance to the Environmental Assessment Process

Based on the inadequate and possibility inaccurate information presented, it is impossible to come to any real conclusions about the effects (cumulative or otherwise) of the project on waterfowl. The potential importance of the area underscores the need for complete, careful, and well thought out monitoring and mitigation plans for waterfowl and other birds.

If the project is approved, it is unlikely that MHBL will be able to collect any true pre-impact baseline data from the project area given the construction schedule outlined in the FEIS. Given that EC is unable to assess the validity of the impact predictions made in the FEIS, it is essential that the Wildlife Mitigation and Monitoring Plan be robust, thorough, and incorporate scientifically-defensible techniques so that any potential impacts to migratory birds can be documented and mitigated through adaptive management techniques.

Environment Canada's Recommendations

Environment Canada has identified a number of ways in which the methodology of the data collection for migratory birds and their habitat could be improved in the Wildlife Mitigation and Monitoring Plan so that the impacts of the proposed project on migratory birds can be better assessed.

The goals and objectives of monitoring should be related to providing appropriate baseline information, evaluating specific effects of the project, and providing information for the cumulative effects monitoring program for the region. If the Doris North Project is just the beginning of development in the Hope Bay region, it is particularly vital that a good monitoring program is designed and implemented by MHBL so that cumulative effects can be properly monitored and assessed from the beginning of development in the area.

The effectiveness of mitigation measures, and results of any monitoring activities undertaken by the proponent, should be reported to the appropriate agencies via annual wildlife reports. Copies of these reports should be provided to EC personnel as they become available.

Specific recommendations / comments on the Mitigation and Monitoring Plan include:

- It is unclear exactly how the proponent selected the size and shape of the Local Study Area for habitat related and local impact studies. Also, the marine component is completely ignored and the freshwater component is downplayed. The proponent may need to reassess the size and shape of the Local Study Area to ensure that this area does address all areas needed.
- Waterfowl monitoring should continue to occur over in the Local Study Area.
- The waterfowl surveys should closely follow the standardized approach used elsewhere in North America for breeding waterfowl (as adapted for northern Canada by EC-CWS). Published scientific literature describing these methods include:
    - U.S. Department of the Interior; Environment Canada. 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America. U.S. Fish and Wildlife Service, Patuxent, Maryland; and Canadian Wildlife Service, Ottawa, Ontario.
    - Hines, J.E., and M.O. Wiebe. 2005 (editors). Surveys of geese and swans in the Inuvialuit Settlement Region, Western Canadian Arctic, 1989–2001. Occasional Paper, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.
    - Hines, J.E.; Dickson, D.L.; Turner, B.C.; Wiebe, M.O.; Barry, S.J.; Barry, T.W.; Kerbes, R.H.; Nieman, D.J.; Kay, M.F.; Fournier, M.A.; Cotter, R.C. 2000. Population status, distribution, and survival of Shortgrass Prairie Canada Geese from the Inuvialuit Settlement Region, Western Canadian Arctic. Pages 27–58 in K.M. Dickson (ed.), Towards conservation of the diversity of Canada Geese (*Branta canadensis*). Occasional Paper No. 103, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.
    - Hines, J.E., M.F. Kay, and M.O. Wiebe. 2003. Aerial surveys of Greater White-fronted Geese and other waterfowl in the Rasmussen Lowlands of the Central Canadian Arctic. Wildfowl 54:183-199.

  The use of this approach would ensure that results are gathered in a standardized and consistent way that makes the results comparable to those reported for other areas.

EC-CWS can provide the proponent with more details on the survey procedures, but the key points for standardizing the surveys are listed below.

  - Basic survey methods would involve flying a Bell 206 helicopter at survey height of 45 m. All waterfowl and other visible birds occurring within 200 m of the aircraft should be counted. Airspeed should be 80 km/hour.
  - Spacing of transects at 2-km intervals seems appropriate for Local Study Area or other areas of higher expected waterbird densities. Spacing of transects at 5-km intervals might be appropriate for rest of Regional Study Area.
  - Transects should stretch the width of the study area and data should be geographically coded so that spatial distribution of different species can be documented and analyzed.
  - Surveys in June would document breeding numbers and distribution and some or all of the transects could be repeated in July to document reproductive success. This is typically done by 2-km segment.

- Reporting, archiving, and making data available for other users is essential.

Issue 3.3.4: Incorrect Calculation of Number of Waterfowl Impacted by Project
Document Name(s): Technical Report; **Document Section(s)**: Chapter 20, Section 20.3, Section 20.3.1, Section 20.3.7.4; **Page Number(s)**: pages 2015-20-16 and page 20-21

Proponent's Conclusion
MHBL concludes that the number of waterfowl home ranges lost compared to the total number possible in the environmental assessment area is 1.9%. MHBL also concludes that the Project will result in a loss of 112 ha of moderate and high suitability habitat for waterfowl. The determination of significance for waterfowl is based on a residual environmental effect that affects greater than 5% of the potential number of home ranges in the environmental assessment area.

Environment Canada's Conclusion
Environment Canada questions the appropriateness of the methodology used to estimate the number of waterfowl present in the environmental assessment area (i.e. dividing the expected size of a home range into an estimate of the total amount of suitable habitat available). Waterfowl home ranges overlap greatly, but the degree of overlap is not known for the area. Further, accurate estimates of home range sizes are also unknown.

A better estimate of waterfowl numbers would be population density (2.5 to 10 birds per ha according to proponent's data in Section 20.1.3) multiplied by the amount of available habitat (3,285 ha) (Section 20.1.1.2). Thus, the number of waterfowl present would be 8,213 to 32,850 birds -- compared to an estimate of a few hundred birds at most following the proponent's chosen method. Furthermore, the project is expected to result in a loss of 112 ha of moderate and high suitability waterfowl habitat, which would result in a direct impact for 280 – 1120 waterfowl (using proponent's estimate of 2.5 to 10 birds per ha). This estimate only includes waterfowl affected by habitat loss, not waterfowl affected by other impacts from the Project.

MHBL has also used waterfowl home ranges in their determination of significance of impact. However, as stated above, due to the uncertainties surrounding the use of home ranges to estimate the number of waterfowl present in the area, it is difficult to determine if the methodology suggested by EC would result in a change in the significance determination.

Significance to the Environmental Assessment Process
As indicated above, as the methodology used to calculate the potential impact on waterfowl is questionable, it is difficult to assess the validity of the impact predictions.

Environment Canada's Recommendations
The proponent should provide a revised estimate of the number of waterfowl impacted by the project using population densities and available habitat. Accurate waterfowl baseline data will be needed for this estimate.

Issue 3.3.5: Incorrect Conclusions Regarding Impact of Project to Waterfowl Habitat and Populations
Document Name(s): Technical Report; **Document Section(s)**: Chapter 20, Section 20.3.7.4; **Page Number(s)**: page 20-21

Proponent's Conclusion
The direct and indirect effects of the Project will result in a loss of 112 ha of moderate and high suitability habitat (-0.03%) for waterfowl. The proponent suggests that a decrease in species abundance and diversity may be observed when the amount of suitable habitat lost exceeds a threshold value of 40 to 90%.

Environment Canada's Conclusion
The proponent's habitat modeling for waterfowl is based on questionable assumptions and will greatly underestimate habitat availability. For instance, some waterfowl (such as geese) are highly terrestrial and will feed in areas some distance from water. Other species (such as ducks), though aquatic feeders, sometimes nest hundreds of meters away from water bodies as well. All grass and sedge dominated lowland areas (including cotton grass tussock tundra) should be considered as important habitats for waterfowl (regardless of distance from water).

Environment Canada questions the proponent's conclusions that a decrease in species abundance and diversity may be observed when the amount of suitable habitat lost exceeds a threshold value of 40 to 90%. Results from the studies referenced by MHBL in Chapter 20, Section 20.3.7.4 of the Technical Report may not be applicable in this particular situation due to regional differences and species specific conditions.

Significance to the Environmental Assessment Process
As stated above, it is possible the MHBL has significantly underestimated the impact of the project on waterfowl.

Environment Canada's Recommendations
Accurate waterfowl baseline data and ongoing monitoring will be needed for properly assess the full impact of this project on waterfowl.

Issue 3.3.6: Biodiversity
Document Name(s): Not addressed

Proponent's Conclusion
The proponent does not specifically address the issue of biodiversity.

Environment Canada's Conclusion
Despite the lack of adequate information on the use of the area by waterfowl and other migratory birds, the available information describing the project area provides the impression that this is an area of relatively high biological productivity. The relatively high densities of raptors alone suggest this is an area of some significance, and this is confirmed by the inclusion of the area in the report "Wildlife Areas of Special Interest to the Department of Renewable Resources" (R.S. Ferguson, 1987). The region obviously provides prime nesting habitat for this group of species. However, the availability of nesting habitat alone does not necessarily produce such high densities of breeding raptors. An adequate food supply is also necessary to support these breeding populations. The numbers and diversity of raptors present in the area suggest the availability of an abundant food supply, including migratory birds and small mammals indicating a region of high biological productivity.

At a minimum, portions of this area may warrant consideration for special conservation status.

Significance to the Environmental Assessment process
In 1996, all provinces and territories and the federal government signed a National Statement of Commitment to conserve biodiversity and use biological resources in a sustainable manner. Governments also committed to using the Canadian Biodiversity Strategy as a guide for their actions. The Strategy is a key building block in Canada's efforts to achieve sustainable development. The goals of the Strategy are to:

- Conserve biological diversity.
- Promote sustainable use of biological resources.
- Improve our understanding of ecosystems.
- Increase our resource management capacity.
- Maintain or develop incentives and legislation that support biodiversity conservation and sustainable use.

Applicable policies and guidelines must be considered by decision makers when assessing potential developments. The conservation of biodiversity for future generations is an important component of sustainable development.

Environment Canada's Recommendations
Further and more reliable information on the importance of the area to migratory birds and perhaps other wildlife would be helpful for governments to make informed decisions

regarding the importance of the area for conservation of biodiversity. The wildlife mitigation and monitoring plan should incorporate provisions to examine the regional importance of the Hope Bay belt for biological conservation.

Issue 3.3.7: Potential Increase in Predation on Migratory Birds due to Project Development

Document Name(s): Technical Report; **Document Section(s)**: Chapter 19, Section 19.2.4; **Page Number(s)**: page 19-15
Document Name(s): SD F1 "Proposed Wildlife Mitigation and Monitoring Program"

Proponent's Conclusion
In Chapter 19 of the Technical Report (Upland Breeding Birds), MHBL addresses the issue of garbage containment and disposal in relation to preventing wildlife-human interaction. It recognizes the potential for garbage and other attractants to provide a food source for predators of birds, thereby increasing predator populations in the development area and negatively impacting local bird populations. However, it does not recognize the potential for the development to provide additional nesting, roosting, or denning sites for predators, thus increasing their local populations and putting pressure on local bird populations.

Environment Canada's Conclusion
The Project may increase potential predators on migratory birds by also providing additional nesting, roosting, and denning sites.

Significance to the Environmental Assessment Process
An environmental assessment is designed to identify, mitigate and monitor potential impacts on VECs by a project. Therefore, the identification of all likely impacts is critical to an effective EIS, so that impacts can be avoided or mitigated to prevent significant adverse environmental impacts from occurring.

Environment Canada's Recommendations
In the Wildlife Mitigation and Monitoring Plan, the potential for increased numbers of predators because of both an increase in potential attractants and an increase in nesting, roosting, and denning sites should be addressed by:

- acknowledging these potentials;
- expanding the statements regarding proper containment and disposal of food to include other edible attractants (e.g. plastics, motor oil, etc); and
- including a commitment to design structures in such a way as to eliminate denning, roosting, and nesting sites for avian predators and arctic foxes. The proponent may consult with EC-CWS staff regarding design measures that could be taken.

Issue 3.3.8: Aircraft Disturbance of Migratory Birds

Document Name(s): Technical Report; **Document Section(s)**: Chapter 19 and Chapter 20, Appendix 19.A and Appendix 20.A
Document Name(s): SD F1 "Proposed Wildlife Mitigation and Monitoring Program"; **Document Section(s)**:Section 3.3; **Page Number(s)**: page 48

Proponent's Conclusion
Mitigation measures for aircraft disturbance are not directly addressed, although the proponent does suggest in the Environmental Effects Analysis Matrices that air traffic noise may have an effect on birds (Section 19. A-1 and Section 20. A-1). The proponent discusses indirect effects of the Project in Section 3.3 (Proposed Wildlife Mitigation and Monitoring Program) on caribou and grizzly bears, but does not address these issues related to migratory birds.

Environment Canada's Conclusion
Disturbance of birds by aircraft, which includes a noise as well as a visual component, has been widely observed.

Significance to the Environmental Assessment Process
It is important that all potential impacts from the project are mitigated in order to minimize adverse effects.

Environment Canada's Recommendations
Environment Canada recommends that aircraft maintain higher cruising altitudes of 610 m above ground level during point to point travel whenever possible when in areas likely to have migratory birds or species at risk, and 1000 m vertical and 1.5 km horizontal distance from any observed concentrations of migratory birds or species at risk. The proponent should also consider the use of flight corridors to avoid areas of significant wildlife importance.

Issue 3.3.9: Need for Wildlife Protection Plan as part of the Spill Contingency Plan

Document Name(s): Not mentioned in document

Proponent's Conclusion
Not provided.

Environment Canada's Conclusion
There is no mention of a wildlife protection plan as part of the oil spill contingency plan. The proponent will be shipping, transferring and storing hazardous materials, including cyanide and approximately 8 million litres of diesel fuel, so there is potential for a substantial oil spill or other toxic spill.

Significance to the Environmental Assessment Process
An environmental assessment is designed to identify, mitigate and monitor potential impacts on VECs by a project. Therefore, the identification of all likely impacts and related mitigation measures is critical to an effective EIS, so that impacts can be avoided or mitigated to prevent significant adverse environmental impacts from occurring. Given

the history of oil spills at other Miramar exploration camps in the area, it would be good to see wildlife protection considered in the Doris North Site Spill Contingency Plan.

Environment Canada's Recommendation
Environment Canada recommends that the proponent's Spill Contingency Plan include a section that outlines how they would protect wildlife in the event of a spill. The plan should include, but not be limited to the following:

A) A description with maps of the migratory bird resources at risk (including birds using Roberts Bay/Hope Bay area)
B) Agencies and people (name location, phone number) to contact for
    - expertise in bird hazing and bird exclusion
    - expertise in oiled bird rehabilitation
    - permits needed to haze, salvage, hold and clean, or euthanize birds
C) Procedures for deployment of bird hazing and bird exclusion techniques
    - equipment and trained manpower requirements and availability
    - rapid transport of equipment and trained manpower to site
D) Procedures for rehabilitating oiled birds
    - equipment and trained manpower requirements and availability
    - guidelines for situations when birds would be captured and rehabilitated
    - guidelines for handling, care and transportation of oiled birds
E) Procedures for destroying oiled/contaminated oiled birds
    - guidelines for situations when birds should be euthanized
    - methods for euthanization
    - disposal of euthanized birds.

Issue 3.3.10: Different Habitat Classifications for Local and Regional Study Areas
Document Name(s): SD F1 "Proposed Wildlife Mitigation and Monitoring Program"; **Document Section(s)**: Figures 3.2.1 and 3.3.1

Proponent's Conclusion
The proponent has provided land cover classification maps showing the different habitat types for both the Local Study Area (Figure 3.2-1) and the Regional Study Area (Figure 3.3-1).

Environment Canada's Conclusion
Taken individually, the land cover classification maps are a good representation of the diversity of habitats found within the LSA and RSA. However, the proponent uses different land cover classification schemes for the LSA (Fig. 3.2.-1) and RSA (Fig. 3.3-1), which makes it difficult or impossible to compare land covers between the LSA and RSA. No figures comparing the relative importance of various habitats in the LSA within the regional landscape are presented.

Additionally, bird surveys do not appear to be stratified by the habitat types identified in the LSA.

Significance to the Environmental Assessment Process
Even though the land cover classification between the LSA and RSA maps are different, it is obvious that a large proportion of high quality habitat for migratory birds within the regional landscape is found within the current LSA (and what may become the future LSA with the potential development of the Hope Bay belt). By not presenting habitat comparisons of the two study areas, the proponent underestimates the potential cumulative impacts on high quality habitats in the context of the regional landscape as a result of ongoing exploration

Environment Canada's Recommendations
A rationale should be given for the use of two different land cover classification schemes and a tool/table provided to help readers identify classes which are the same and/or should be lumped between schemes. Preferably, EC recommends that MHBL use one or the other classification scheme for both the LSA and RSA. Using the same scheme, the amount of each habitat class within the LSA and RSA and their relative importance should be compared. Environment Canada believes this would give a more appropriate picture of the importance and quality of habitats found within the LSA when compared to the surrounding region. This revised information should be included in the cumulative effects assessment.

Bird surveys should then be stratified by the habitat types identified in the LSA.

Issue 3.3.11: Identification of Adverse Effects, Mitigation, and Monitoring for Species at Risk
Document Name(s): Technical Report; **Document Section(s)**: Chapters 16-18, Chapter 21
Document Name(s): SD F1 "Proposed Wildlife Mitigation and Monitoring Program"

Proponent's Conclusion
The proponent noted that the following Species at Risk could occur within the Project area: Dolphin and Union population of Barren-ground Caribou, Wolverine, Grizzly Bear, Peregrine Falcon, and Short-eared Owl (Sections 16.1, 17.1, 18.1, 21.1). The proponent has identified effects, mitigation measures and monitoring for the Dolphin and Union population of Barren-ground Caribou, Wolverine, Grizzly Bear and Peregrine Falcon. The proponent states that Short-eared Owls have been found in the Hope Bay Belt, however, there have been no specific surveys for owls within the immediate Project area (Section 21.1).

The proponent states that the effects on the project will be minor (not significant) for Caribou, Wolverines, Grizzly Bears, and Raptors (e.g., falcons and owls) (Sections 16.3.6, 17.3.6, 18.3.6, 21.3.6).

Environment Canada's Conclusion
The species listed in Table 1 below are those that have been designated at risk by COSEWIC and are either on a Schedule of SARA or are being considered for addition to Schedule 1 of SARA.

Table 1. Species at risk that could be impacted by the Doris North project.

Species at Risk	COSEWIC Designation	Schedule of SARA
Barren-ground Caribou (Dolphin and Union Population)	Special Concern	Pending
Grizzly Bear	Special Concern	Pending
Wolverine (Western Population)	Special Concern	Pending
Peregrine Falcon (subspecies tundris)	Special Concern	Schedule 3
Short-eared Owl	Special Concern	Schedule 3

The proponent has identified effects, mitigation measures and monitoring for the Dolphin and Union population of Barren-ground Caribou, Grizzly Bear, Wolverine and Peregrine Falcon. Environment Canada anticipates the Government of Nunavut – Department of the Environment will provide expertise as to the adequacy of the information provided on these species. The proponent has not identified effects, mitigation measures and monitoring for the Short-eared Owl.

Significance to the Environmental Assessment Process

Section 79 (2) of the *Species at Risk Act* (SARA), states that during an assessment of environmental effects of a project, the adverse effects of the project on listed wildlife species and its critical habitat must be identified, that measures are taken to avoid or lessen those effects, and that the effects need to be monitored. This section applies to all species listed on Schedule 1 of SARA. Environment Canada realizes that none of the species affected by this project are on Schedule 1 of SARA. However, as a matter of best practice, EC asks that species listed on other Schedules of SARA and under consideration for listing also be given this type of assessment.

Environment Canada's Recommendations

Environment Canada recommends the proponent identify effects, mitigation measures and monitoring for the Short-eared Owl as it has for other species at risk on Table 1.

Other recommendations for Species at Risk:

- The primary mitigation measure for each species should be avoidance. The proponent should avoid contact with or disturbance to each species.
- The proponent should consult with the Government of Nunavut and appropriate status reports, recovery strategies, action plans, and management plans to identify other appropriate mitigation measures to minimize effects to these species from the project.
- The proponents should develop monitoring plans for each species in accordance with any applicable status reports, recovery strategies, action plans, and management plans and in consultation with Government of Nunavut and EC.

3.4 Other Issues

3.4(a) Emergency Response and Contingency Planning

Issue 3.4.1: Lack of Detail in Emergency Response and Contingency Plan
Document Name(s): SD F6 "Miramar Hope Bay Ltd. Emergency Response and Contingency Plan",;
Document Section(s): Section 6.0; **Page Number(s)**: page 14
Document Name(s): Supplement to Final Environmental Impact Statement – F6

Proponent's Conclusion
The proponent has indicated "Separate detailed site specific Spill Response Plans for facility construction and operations will be drafted as the project moves forward in the approval process."

Environment Canada's Conclusion
The Emergency Response and Contingency Plan does not contain sufficient detail to understand and assess emergency preparedness and response capacity. The documentation provided by MHBL in support of their Emergency Response and Contingency Plan fails to adequately demonstrate, to EC's expectations, the key elements of prevention, preparedness, response and recovery.

Significance to the Environmental Assessment Process
The responsibility for preparing a Spill Contingency and Response Plan clearly lies with the Company, but agencies and co-management boards also have a major role in assessing whether the impacts of the development on the environment and human health are within acceptable limits of risk. Therefore, spill and response plans should incorporate sufficient detail to understand and assess emergency preparedness and response capacity.

Environment Canada's Recommendations
MHBL should describe the **emergency response plans and procedures** for the accidents, malfunctions, and scenarios, which include site-specific information and encompass the transportation, transferal, storage, use and disposal of fuels and other hazardous substances. The overall plan should cover the construction, operation and abandonment of the project and all related facilities used by the Proponents. MHBL should also define the Standards for Clean-up and area of impact.

In order to assess the risk of operational spills during marine terminal operations (oil or chemical transfers), the proponent is requested to provide a copy of the contractor's fuel handling and spill clean-up procedures, and an explanation of how MHBL has ensured that the contractor is cognizant of and in adherence with permit conditions.

The following suggestions should be among those incorporated into work procedures to reduce the possibility of spillage and mitigate the effects of any spills that may occur in the marine environment:

- At all times during loading or discharge of liquid products, suitably trained and qualified personnel should standby at both the receiving and discharge points. A

supervisor employed by MHBL should be present and responsible for overseeing the entire operation.

- Berth operators and crew at the marine facilities should be trained and competent in all vessel, and transfer operations and emergency procedures.
- Fire extinguishers should be available near transfer locations and personnel should be trained in the techniques of fighting petrochemical or hazardous substance fires.
- Liquid products should not be transferred to or from waterborne transport when visibility is reduced.
- In tidal waters, all fuel transportation equipment should be surrounded by a floating containment boom during the transfer of a liquid product.
- Transfer systems should be kept in good order along with a detailed preventive maintenance schedule.
- Meeting the requirements of the federal *Fisheries Act* is mandatory, irrespective of any other regulatory or permitting system. Section 36(3) of the *Fisheries Act* specifies that unless authorized by federal regulation, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water.

3.4(b) Mine Closure and Reclamation Plan

Issue 3.4.2: Reclamation of the South Dam in the Tail Lake Tailings Impoundment Area

Document Name(s): SD G1 "Preliminary Mine Closure and Reclamation Plan"; **Document Section(s)**: Sections 5.0 – 6.1.9; **Page Number(s)**: pages 73 - 92
Document Name(s): Final Environmental Impact Statement; **Document Section(s)**: Section 9.10; **Page Number(s)**: page 9-3

Proponent's Conclusion

MHBL has provided an overview of the proposed preliminary mine closure and reclamation plan. This plan outlines both interim reclamation measures (Section.5.0), as well as final reclamation measures (Section 6.0). MHBL states that the plan is a living document that will undergo further revision in the future. No information is presented in SD G1 regarding reclamation plans for the South dam of the proposed TIA.

Environment Canada's Conclusion

As currently presented, the preliminary mine closure and reclamation plan provides insufficient detail to assess the proposed plan. The information provided is vague and relies heavily on details being provided during the regulatory stage. Proposed closure options have not been evaluated based on the environmental assessment methodology used throughout the rest of the FEIS. The plan does not relate the stages of reclamation outlined on page 16 with the proposed site specific reclamation criteria outlined in Table 1.1 on page 19. Further, some of the information provided in the proposed site specific reclamation criteria differs from what is presented in the discussion of final reclamation measures (Section 6.0).

The reclamation objectives discussed in Section 1.2 do not appear to have been consistently applied to the closure plans. The main objectives outlined in this section include:

- Establishment of Stable landforms
- Protection of water resources
- Facilitation of natural recovery of areas affected by mining and mining related activities
- Re-establishment of productive uses of the land and water for future generations in a manner that is consistent with the pre-development use of the land and water

While these objectives are outlined as the main landscape reclamation goals, other issues are also identified:

- Aesthetics considerations
- Leaving a clean site, including the removal of all hazardous and non-hazardous materials from the site.

In SD G1, the site specific reclamation measures for the Tail Lake tailings containment area indicate that "dams in the water management pond [i.e. the tailings impoundment area] will be breached to re-establish hydrologic flow" (Table 1.1, page 19). However, Section 6.1.7 does not indicate that the South dam will be breached. In fact, page 4-102 of the Technical Reports of the FEIS states "The South dam will not be breached, since it is located at the cachment divide between Tail and Ogama Lakes, and will not affect the regional hydrology in any way. No other reclamation will be carried out on this structure." However, the reclamation and closure plan outlined in SD G1 does not address specific closure plans for the South dam. The lack of discussion regarding closure options for the South dam seems to be in contradiction with the reclamation objectives identified above, including aesthetic concerns.

Significance to the Environmental Assessment Process

While it is recognized that the details relating to closure and reclamation will be finalized during the regulatory process, the closure and reclamation plan presented during the environmental assessment phase should contain sufficient detail so that the potential environmental impacts of the proposed reclamation measures can be assessed. The plan presented should provide matrices that indicate the potential environmental impact of proposed reclamation options on VECs, based on the environmental assessment methodology outlined in Section 9.8 of the Technical Report to the FEIS. The Closure and Reclamation Plan should be a stand-alone document and not rely on details in other reports for completeness.

Environment Canada's Recommendation

Due to the lack of information regarding the potential environmental impact of leaving the South dam in place, EC recommends that no decision be made regarding this component of the closure and reclamation plan until the potential impacts on each VEC are examined. The impact analysis should follow the environmental assessment methodology outlined in the FEIS (i.e. conducting an environmental effects analysis, describing potential environmental effects on each VEC based on the factors of

magnitude, geographic extent, duration/frequency, reversibility, and ecological and socio/cultural context).

Issue 3.4.3: Depth of Final Water Cover in Tail Lake Tailings Impoundment Area
Document Name(s): SD G1 "Preliminary Mine Closure and Reclamation Plan"; **Document Section(s)**: Sections 5.0 – 6.1.9; **Page Number(s)**: pages 73 - 92
Document Name(s): SD A1 "Preliminary Tailings Dam Design"; **Document Section(s)**: Section 2.9; **Page Number(s)**: pages 6-7, and Appendix B
Document Name(s): Final Environmental Impact Statement;**Document Section(s)**:Section 9.10; **Page Number(s)**:page 9-3

Proponent's Conclusion
SD G1 states that the final closure for the Tail Lake TIA is a permanent water cover of 4.0 m above the highest tailings elevation in the impoundment. The SRK Technical Memorandum "Water Cover Design for Tail Lake" included as Appendix B of SD A1 also indicates that using conservative calculations and worst case input variables, the final water cover in the Tail Lake TIA would have to be 3.6 m to prevent tailings resuspension.

Environment Canada's Conclusion
It is important that the tailings in the Tail Lake TIA are not resuspended due to wave action, especially given the relatively shallow depth of Tail Lake. Section 3.1.10 of SD G1 states that background data has indicated that in the summer months, lakes in the Doris North area were generally well mixed, and that shallow lakes appeared to have complete turnover due to wind action. MHBL is relying on the permanent sub-aqueous storage of tailings as a mitigation measure to prevent significant adverse impacts to water quality and as justification for not requiring any long-term water treatment requirements.

When examined as a whole, the FEIS and supporting documents do not present a consistent design to the final water cover for the Tail Lake TIA. Section 9.10 of the FEIS indicates that "the final closure for the Tail Lake tailings impoundment is a permanent water cover of at least 3.0 m above the highest tailings elevation…which implies that the minimum final water elevation in Tail Lake is 27.3 m" (page 9-3). This is in contradiction to the statements made in Section 6.1.7 of SD G1, which clearly state that the final closure of the TIA will be a water cover of 4.0 m.

Significance to the Environmental Assessment Process
The depth of the final water cover on the Tail Lake TIA is an important mitigation measure proposed by MHBL for the water quality VEC. Discrepancies in the depth of the cover could result in adverse post-closure impacts to water quality that have not been predicted in the EIS or mitigated for in the project design.

Environment Canada's Recommendation
Environment Canada recommends that the final water cover in the Tail Lake TIA be 4.0 m as presented in SD G1. Based on the information provided by SRK in Appendix B to SD A1 "Preliminary Tailings Dam Design", the worst case scenario indicates that maximum water cover would have to be 3.6 m, so designing the final water cover to 4.0

m would allow for a factor of safety over the worst case scenario. MHBL should ensure that all appropriate design and operation documents clearly indicate the need for a 4.0 m cover.

SECTION 4.0: SUMMARY OF RECOMMENDATIONS

While the revised FEIS is greatly improved, EC has identified a number of deficiencies and notes that some of these remain outstanding from previous versions of the EIS. The following summary of recommendations is provided as per the NIRB's direction regarding the format for final hearing submissions. The text below is merely an overview of the recommendations for each of the issues identified in Section 3.0, and the NIRB is, therefore, requested to refer the original recommendation for complete details.

Section 3.1: Assessment of Alternatives to the Use of Tail Lake for Tailings Disposal

1. Environment Canada recommends that MHBL provide clarification regarding why some of the criteria discussed in Tables 2-7 were not included in the options analysis and scoring matrix of the revised tailings disposal alternatives assessment. The Project Certificate should include a term and condition requiring this information be provided in advance of the regulatory phase.

Section 3.2: Tail Lake Water Quality and Water Management Strategy

1. Environment Canada recommends that changes to the permafrost regime in the vicinity of the North and South Dams be monitored as part of a comprehensive long term monitoring program of permafrost conditions at the site. MHBL will also need to monitor for seepage conditions during operations to ensure that design criteria are being met.

2. Environment Canada recommends that mine water discharge should not be included in the base case computations of the water balance for Tail Lake. The water balance should be updated prior to mine startup to provide realistic estimates of operational parameters for the Tail Lake facility.

3. Environment Canada recommends that MHBL conduct a complete review of the modeling of water quality in Tail Lake prior to mine start-up, taking into consideration changes in the development plans and provide verification of estimated loading rates from the various mine components including average annual loadings from waste rock in the waste rock pile and in the mine.

4. Environment Canada recommends that the proposed discharge criteria limits from the TIA be compatible with those concentrations used in the modeling to predict downstream receiving environment effects.

5. Environment Canada recommends that the proponent review guidelines from other jurisdictions for parameters which do not have CCME guidelines (such as chloride, TDS) and/or set management targets which will maintain ambient conditions, to

ensure concentrations in the downstream aquatic environment will be protective of aquatic life.

6. Environment Canada recommends that ammonia, nitrite, and nitrate concentrations be tracked (from all sources), and water quality predictions revised on an ongoing basis in order to forecast trends which may affect discharge management. Source control of ammonia should be included in the management plans.

7. Environment Canada recommends that the water quality monitoring program include a commitment that appropriate monitoring be incorporated into the environmental assessment as it will be central to detecting and reacting to aquatic effects before they become unacceptable. Examples of details which need to be included are provided in the main text of this submission.

Section 3.3: Wildlife Mitigation and Monitoring Plan

1. Environment Canada has identified a number of ways in which the methodology of the data collection for migratory birds and their habitat could be improved in the Wildlife Mitigation and Monitoring Plan so that the impacts of the proposed project on migratory birds can be better assessed. While the details can be found in the main text of the submission, the goals and objectives of monitoring should be related to providing appropriate baseline information, evaluating specific effects of the project, and providing information on the cumulative effects monitoring program for the region. Additionally, the effectiveness of mitigation measures, and results of any monitoring activities undertaken by the proponent, should be reported to the appropriate agencies via annual wildlife reports. Copies of these reports should be provided to EC personnel as they become available.

   Specific recommendations / comments on the Mitigation and Monitoring Plan include:

   - The point count survey method suggested by MHBL in the WMMP is mostly suitable for a small number of passerine species, but is not suitable for shorebirds. Environment Canada recommends that surveyors use a plot-based, 'area search' protocol that will effectively survey songbirds, shorebirds, and some of the larger nesting species (e.g. cranes and jaegers). EC-CWS has used this type of program to survey arctic shorebird and passerines for several years now, and can provide the proponent with details of the monitoring protocol.
   - The proponent should separate its habitat modeling for shorebirds and true upland birds. Currently the proponent appears to have two habitat models in use: one which considers most wet habitats to be of medium quality (clearly wrong for shorebirds), and one which considers virtually all vegetated habitat and shoreline to be of high quality for all upland birds (also clearly wrong). In order to get future estimates of amounts of high quality habitat impacted by development, the proponent must do a separate habitat modeling for upland birds and shorebirds. EC-CWS has expertise in this area and could provide direction.
   - Waterfowl monitoring should occur over the entire Regional Study Area as well as the Local Study Area. The waterfowl surveys should closely follow the

standardized approach used elsewhere in North America for breeding waterfowl (as adapted for northern Canada by EC-CWS). The use of this approach would guarantee that results are gathered in a standardized and consistent way that makes the results comparable to those reported for other areas. Published scientific literature describing these methods include:

- U.S. Department of the Interior; Environment Canada. 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America. U.S. Fish and Wildlife Service, Patuxent, Maryland; and Canadian Wildlife Service, Ottawa, Ontario.
- Hines, J.E., and M.O. Wiebe. 2005 (editors). Surveys of geese and swans in the Inuvialuit Settlement Region, Western Canadian Arctic, 1989–2001. Occasional Paper, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.
- Hines, J.E.; Dickson, D.L.; Turner, B.C.; Wiebe, M.O.; Barry, S.J.; Barry, T.W.; Kerbes, R.H.; Nieman, D.J.; Kay, M.F.; Fournier, M.A.; Cotter, R.C. 2000. Population status, distribution, and survival of Shortgrass Prairie Canada Geese from the Inuvialuit Settlement Region, Western Canadian Arctic. Pages 27–58 in K.M. Dickson (ed.), Towards conservation of the diversity of Canada Geese (*Branta canadensis*). Occasional Paper No. 103, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.
- Hines, J.E., M.F. Kay, and M.O. Wiebe. 2003. Aerial surveys of Greater White-fronted Geese and other waterfowl in the Rasmussen Lowlands of the Central Canadian Arctic. Wildfowl 54:183-199.

EC-CWS can provide the proponent with more details on the survey procedures, but the key points for standardizing the surveys are listed below.

- Basic survey methods would involve flying a Bell 206 helicopter at survey height of 45 m. All waterfowl and other visible birds occurring within 200 m of the aircraft should be counted. Airspeed should be 80 km/hour.
- Spacing of transects at 2-km intervals seems appropriate for Local Study Area or other areas of higher expected waterbird densities. Spacing of transects at 5-km intervals might be appropriate for rest of Regional Study Area.
- Transects should stretch the width of the study area and data should be geographically coded so that spatial distribution of different species can be documented and analyzed.
- Surveys in June would document breeding numbers and distribution and some or all of the transects could be repeated in July to document reproductive success. This is typically done by 2-km segment.

- Reporting, archiving, and making data available for other users is essential.

2. Environment Canada recommends that the proponent collect at least 1 year of baseline data on sea ducks and other birds that occur in Roberts Bay and Hope Bay area. The proponent should then use this baseline data to evaluate the effect of the

project on sea ducks, consider mitigation measures for sea ducks and develop a plan for follow-up monitoring. The data set should include:

- location of spring staging birds (survey in last week of June)
- location and size of Common Eider breeding colonies in Roberts Bay and Hope Bay (survey on foot all islands <20 ha in size in Hope Bay and Roberts Bay, including islands off the point between the 2 bays around July 7 - 10)
- surveys of both Roberts Bay and Hope Bay around August 10 and 30 to determine distribution and abundance of moulting and brood-rearing and fall staging Common Eiders, King Eiders and Long-tailed Ducks.

3. Environment Canada recommends that the proponent provide a revised estimate of the number of waterfowl impacted by the project using population densities and available habitat. Accurate waterfowl baseline data will be needed for this estimate.

4. Environment Canada recommends that the Wildlife Mitigation and Monitoring Plan incorporate provisions to examine the regional importance of the Hope Bay belt for biological conservation. Further and more reliable information on the importance of the area to migratory birds and perhaps other wildlife may be necessary in order to make informed decisions regarding the importance of the area for conservation of biodiversity.

5. Environment Canada recommends that the Wildlife Mitigation and Monitoring Plan address the potential for an increase in the number of predators because of both an increase in potential attractants and an increase in nesting, roosting, and denning sites by:
   - acknowledging these potentials;
   - expanding the statements regarding proper containment and disposal of food to include other edible attractants (e.g. plastics, motor oil, etc); and
   - including a commitment to design structures in such a way as to eliminate denning, roosting, and nesting sites for avian predators and arctic foxes. The proponent may consult with EC-CWS staff regarding design measures that could be taken.

6. Environment Canada recommends that aircraft maintain higher cruising altitudes of 610 m above ground level during point to point travel whenever possible when in areas likely to have migratory birds or species at risk, and 1000 m vertical and 1.5 km horizontal distance from any observed concentrations of migratory birds or species at risk. The proponent should also consider the use of flight corridors to avoid areas of significant wildlife importance.

7. Environment Canada recommends that a rationale be given for the use of two different land cover classification schemes, and that a tool/table be provided to help readers identify classes which are the same and/or should be lumped between schemes. Preferably, EC recommends that MHBL use one or the other classification scheme for both the LSA and RSA. Using the same scheme, the amount of each habitat class within the LSA and RSA and their relative importance should be

compared. This revised information should be included in the cumulative effects assessment. Bird surveys should then be stratified by the habitat types identified in the LSA.

8. Environment Canada recommends the proponent identify effects, mitigation measures and monitoring for the Short-eared Owl as it has for other species at risk on Table 1.

9. Environment Canada recommends that for species at risk other than Short-eared owls:
   - The primary mitigation measure for each species should be avoidance. The proponent should avoid contact with or disturbance to each species.
   - The proponent should consult with the Government of Nunavut and appropriate status reports, recovery strategies, action plans, and management plans to identify other appropriate mitigation measures to minimize effects to these species from the project.
   - The proponents should develop monitoring plans for each species in accordance with any applicable status reports, recovery strategies, action plans, and management plans and in consultation with Government of Nunavut and EC.

Section 3.4: Other Issues

1. Environment Canada recommends that MHBL describe the emergency response plans and procedures for the accidents, malfunctions, and scenarios, which include site-specific information and encompass the transportation, transferal, storage, use and disposal of fuels and other hazardous substances. The overall plan should cover the construction, operation and abandonment of the project and all related facilities used by the Proponents. MHBL should also define the Standards for Clean-up and area of impact.

2. Environment Canada recommends that in order to assess the risk of operational spills during marine terminal operations (oil or chemical transfers), MHBL should provide a copy of the contractor's fuel handling and spill clean-up procedures, and an explanation of how MHBL has ensured that the contractor is cognizant of and in adherence with permit conditions. Specific recommendations regarding the content of the plan are provided in the main text of the submission.

3. Environment Canada recommends that no decision be made regarding the South dam component of the closure and reclamation plan until the potential impacts on each VEC are examined due to the lack of information regarding the potential environmental impact of leaving the dam in place. The impact analysis should follow the environmental assessment methodology outlined in the FEIS (i.e. conducting an environmental effects analysis, describing potential environmental effects on each VEC based on the factors of magnitude, geographic extent, duration/frequency, reversibility, and ecological and socio/cultural context).

4. Environment Canada recommends that the final water cover in the Tail Lake TIA be 4.0 m as presented in SD G1. MHBL should ensure that all appropriate design and operation documents clearly indicate the need for a 4.0 m cover.

Environment Canada would like to thank the NIRB for the opportunity to comment on the Doris North FEIS, and we hope that these technical comments and recommendations are useful to the NIRB in their decision making process. Environment Canada respectfully requests the opportunity to submit additional written comments after the public hearings to address any new information brought forward at the hearings.

APPENDIX 1: RELEVENT LEGISLATION, POLICIES AND GUIDELINES

Department of the Environment Act

The *Department of the Environment Act* (*DOE Act*) provides EC with general responsibility for environmental management and protection. Its obligations extend to and include all matters over which Parliament has jurisdiction, and have not by law been assigned to any other department, board, or agency of the Government of Canada as related to:

- Preservation and enhancement of the quality of the natural environment (e.g. water, air, soil)
- Renewable resources including migratory birds and other non-domestic flora and fauna
- Water
- Meteorology
- Coordination of policies and programs respecting preservation and enhancement of the quality of the natural environment.

The *DOE Act* states that EC has a mandated responsibility to advise heads of federal departments, boards and agencies on matters pertaining to the preservation and enhancement of the quality of the natural environment. As such, this mandate is extremely broad.

Canadian Environmental Assessment Act

The *Canadian Environmental Assessment Act* (*CEAA*) came into force in January 1995. *CEAA*'s primary purpose is to ensure that the environmental effects of projects are considered as early as possible in a project's planning stages. Section 16 of *CEAA* describes the factors which must be considered in order to assess the environmental effects. Environment Canada attempts to incorporate these factors (e.g. consideration of cumulative effects) into all expert advice and information it provides to environmental assessments.

Canadian Environmental Protection Act, 1999

Proclaimed on March 31, 2000, the new *Canadian Environmental Protection Act, 1999* (CEPA 1999, referred to hereinafter as *CEPA*) is an Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. *CEPA* shifts the focus away from managing pollution after it has been created to preventing pollution. The Act provides the federal government with new tools to protect the environment and human health, establishes strict deadlines for controlling certain toxic substances, and requires the virtual elimination of toxic substances which are bioaccumulative, persistent and result primarily from human activity.

For substances that are declared "toxic" under *CEPA* and are added to the List of Toxic Substances in Schedule 1 of the Act, instruments will be proposed to establish preventive or control actions for managing the substance and thereby reduce or eliminate its release into the environment. These tools may be used to control any aspect of the substance's life cycle, from the design and development stage to its manufacture, use, storage, transport and ultimate disposal.

Examples of preventive and control instruments include:

- regulations;
- pollution prevention plans;
- environmental emergency plans;
- environmental codes of practice;
- environmental release guidelines; and
- pre-notification and assessment of new substances (chemicals, biochemicals, polymers, biopolymers, and animate products of biotechnology).

Authority to require emergency plans for toxic or other hazardous substances is provided in Part 8 of *CEPA*. Environmental emergency plans for such a substance(s) must cover prevention, preparedness, response and recovery.

Fisheries Act - Pollution Prevention Provisions

The Minister of Fisheries and Oceans is legally responsible to Parliament for administration and enforcement of all sections of the *Fisheries Act*. However, under a Prime Ministerial Instruction (1978) and a Memorandum of Understanding (1985), EC administers and enforces those aspects of the Act dealing with the prevention and control of pollutants affecting fish. In this context, EC works to:

- advance pollution prevention technologies;
- promote the development of preventative solutions; and
- work with the provinces, territories, industry, other government departments and the public on issues relating to the pollution provisions of the *Fisheries Act*.

The main pollution prevention provision is found in subsection 36(3) of the Act, and is commonly referred to as the "general prohibition". This subsection prohibits the deposit, into fish-bearing waters, of substances that are deleterious to fish. The legal definition of "deleterious substance" provided in subsection 34(1) of the Act, in conjunction with court rulings, provides a very broad interpretation of deleterious and includes any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat. One measure of a deleterious substance (such as a liquid discharge) is acute lethality as measured by the standard 96 hour fish bioassay test.

Pertinent regulations under the *Fisheries Act* include the Metal Mining Effluent Regulations (MMER's). The MMER's were registered and become national law on June

6, 2002. The regulations apply to all metal mines in Canada, including gold mines. The MMER's take a three tiered approach to monitoring, including end of pipe physical/chemical quality, end of pipe biological quality (through biological testing of lethality), and downstream environmental effect monitoring. The MMER's also have a requirement for comprehensive Environmental Effects Monitoring (EEM). An EEM program is a scientific assessment to evaluate the effects of mine effluent on the aquatic environment, specifically fish, fish habitat and the use of fisheries resources as defined in the *Fisheries Act*. An "effect" is defined in the MMER's as a statistically significant difference between fish or benthic invertebrate community measurements taken from exposure and reference areas (or along a gradient of effluent exposure). Environment Canada staff are available to assist in the development of EEM programs and to answer questions relating to the MMER's.

Migratory Birds Convention Act

The purpose of the *Migratory Birds Convention* (1916, amended by Protocol in 1999) is to ensure the conservation of migratory birds, as defined in the *Act*, and prohibit the take of migratory birds except for scientific, educational, avicultural, or other specific purposes consistent with the principles of the Convention. The *Migratory Birds Convention Act* (*MBCA*), based upon the Convention, provides the authority for the *Migratory Bird Regulations* (*MBR*), which establishes specific prohibitions and defines activities which may be permitted, and the circumstances under which such permitted activities may take place.

The Canadian Wildlife Service (CWS) of Environment Canada administers and enforces the *MBCA* and *MBR*. CWS provides expert advice in environmental assessment review processes. CWS focuses primarily on identifying potential adverse effects to migratory bird populations and habitats, and appropriate measures to mitigate those effects. The advice provided in an environmental assessment process does not constitute an authorization for incidental take under the MBR's, nor does it assure that the project will not result in the killing or taking of a migratory bird or its nest. Furthermore, the advice does not absolve project proponents from their obligation to comply with all provisions of the MBCA and MBR.

Species at Risk Act

The *Species at Risk Act* (*SARA*) provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. Three federal Ministers have responsibilities under *SARA*; the Minister of Fisheries and Oceans is responsible for aquatic species at risk, the Minister of Heritage (through Parks Canada Agency) is responsible for species at risk found in national parks, national historic sites or other protected heritage areas, and the Minister of the Environment is responsible for all other species at risk, and is also responsible for the administration of the *Act.*

The *Species at Risk Act* is being brought into force through a phased approach. Phase 1

came into force March 24, 2003 and set out amendments to other related federal laws including the *Canada Wildlife Act*, *Migratory Birds Convention Act* (1994), and the *Wild Animal and Plant Regulation of International and Inter-provincial Trade Act*. As of June 5, 2003, Phase 2 of the Act emphasizing consultation, stewardship, cooperation and information about the law came into effect. The remaining sections of SARA (Phase 3), the SARA prohibitions, critical habitat protection, and enforcement of the law, came into effect on June 1, 2004.

SARA applies on all federal lands, and on those territorial lands where the territorial government does not have its own specific legislation to protect species at risk (the "safety net" clause). All species included on the List of Wildlife Species at Risk (i.e. endangered, threatened, extirpated and special concern) will require the development of either recovery strategies or management plans. Further, projects that require an environmental assessment under an Act of Parliament will have to take into account the project's effects on listed wildlife species and their critical habitat. The assessment must include recommendations for measures to avoid or reduce adverse effects and plans to monitor the impact of the project, if it goes ahead. The project plan must respect recovery strategies and action plans. All other SARA prohibitions will still apply.

The Canadian Biodiversity Strategy

In 1992, more than 160 countries, including Canada, signed the United Nations Convention on Biological Diversity (the Convention) at the United Nations Conference on Environment and Development (the Earth Summit), held in Rio de Janeiro. The goals of the Convention are to conserve the ecosystem, species and genetic diversity, to ensure that the Earth's biological resources are used wisely and to ensure that the economic benefits from using these resources are shared fairly and equitably. Conservation of biodiversity and sustainable use of biological resources are necessary to ensure that the economic, societal and environmental benefits can be available to current and future generations.

One of the key obligations for parties that ratified the Convention was to prepare a national biodiversity strategy. The Canadian Biodiversity Strategy (the Strategy) was prepared as a response to this obligation and has been developed as a guide to the implementation of the Biodiversity Convention in Canada. According to the Strategy, federal, provincial and territorial governments, in cooperation with stakeholders and members of the public, will pursue implementation of the directions contained in the Strategy according to their policies, priorities and fiscal capabilities.

Environment Canada in collaboration with other federal agencies, provincial and territorial environmental and resource management agencies, industry and a range of non-governmental organizations completed the Strategy in 1995, based in part on the principles of the *Canada Wildlife Act* and "A Wildlife Policy for Canada". The Strategy supports wildlife biodiversity and conservation and increases the focus on integrated and ecosystem-based approaches to conservation based on Canada's existing legislation.

While the Strategy does not deal with the mining sector specifically, it does provide a framework for jurisdictions to consider biodiversity when addressing environmental issues. The goals of the Strategy are to:

- Conserve biological biodiversity and sustainable use of biological resources.
- Improve our understanding of ecosystems and increase our resource management capacity.
- Promote an understanding of the need to conserve biodiversity and sustainably use biological resources.
- Maintain or develop incentives and legislation that support biodiversity conservation and sustainable use.
- Work with other countries to meet the objectives of the Convention.

The Federal Policy on Wetland Conservation

In 1991, The Federal Policy on Wetland Conservation was adopted by the Government of Canada. This policy promotes the wise use of wetlands and elevates concerns for wetland conservation to a national level. The policy promotes the concepts of cooperative approaches to wetland conservation, the need for linkages between wetlands conservation and other related initiatives (e.g. water policy, wildlife conservation, etc.), promotion of the concept of no net loss of wetland functions for federal lands and the promotion of wetland protection through adequate consideration of wetland concerns in environmental assessments of new development projects.
The federal policy holds No Net Loss of wetland functions as its target for conservation of wetlands. Similarly, this guideline emphasizes the need for environmental assessment to ensure every effort has been made on the part of the proponent to prevent loss of wetland functions.

APPENDIX 2: CORRESPONDENCE FROM DICKSON TO GOLDER ASSOCIATES RE: SEA DUCK SURVEYS

Canadian Wildlife Service
Room 200, 4999-98 Ave,
Edmonton, Alberta
T6B 2X3

October 29, 2004

Corey De La Mare
Golder Associates
#300, 10525 – 170 St
Edmonton, Alberta
T5P 4W2

Dear Corey,

Enclosed are two unpublished reports on the results of satellite tracking of common eiders that nest at a colony north of Parry Bay. Although the common eiders we tagged were a bit east of the area in question, these data should give you some insight into use of the Doris North development area by common eiders (e.g. fact that females moult and rear young within about 40 km of where they nest and remain in the area until mid to late October). I've also included a CWS Occasional Paper that provides more of a regional perspective on the eiders.

Since the results of the common eider breeding population surveys I did in 1995 and 1996 are not available in report form, I'll give you a brief summary of relevant results here. The study area stretched from southeastern Dolphin and Union Strait to the east side of Queen Maud Gulf and included Melville Sound. In 1995, we surveyed by helicopter all areas of open water between 20 June and 3 July, and did a complete count of all common eiders. In 1996, we randomly sampled small islands in the marine area, searched each on foot for common eider nests, and estimated total number of common eider nests by region.

We counted a total of 34,000 common eiders in the entire study area in 1995 and in 1996 we estimated a total of about 18,300 breeding pairs. I looked specifically at the results from the area that falls within the general coordinates you sent me (from 7540000 N and 445000 E to 7570000 N and 420000 E). My Area # 96 falls entirely within those coordinates and my Area #97 falls partially within the coordinates, but is mostly to the west. In 1995 we saw 196 common eiders in Area 96 which represented 0.6% of the central arctic common eider population. In Area 97, we saw 469 common eiders which was 1.4% of all central arctic eiders. In 1996 we sampled 14 small offshore islands in Area 96 and found 5 with common eider nests (1 to 3 nests on each). In the same year, we surveyed 16 islands in Area 97 and found 3 common eider nesting colonies of 8 to 352 nests.

Our study results indicate that the outer Bathurst Inlet / Melville Sound / Elu Inlet region is critically important to the common eider, as that area supports an estimated 25% of Canada's breeding population of Pacific common eiders.

Give me a call if you have any questions about any of these studies.

Sincerely,

Original signed by

Lynne Dickson
Biologist
Canadian Wildlife Service